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The M. A. C. Bulletin

Amherst, Mass.

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1920

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- Contents -

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1. Fifty-seventh annual report of the
Massachusetts Agricultural College.
Part II.- Catalog of the college for
1919-1920.
2. Concerning the Massachusetts Agricultural
College.
3. Fifty-seventh annual report of the
Massachusetts Agricultural College.
Part I.- The report of the President
and other officers of administration.
4. Opportunities for women in agriculture
and country life.
5. Announcement of the Summer Schools and
Courses, 1920.
6. Announcement of the Two-Year Course in
Practical Agriculture, 1920-21.
7. The Ten Weeks' Winter School, 1921.
8. Not published.

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MASSACHUSETTS
AGRICULTURAL COLLEGE

CATALOGUE, 1919-1920



THE M. A. C. BULLETIN
AMHERST, MASSACHUSETTS

VOLUME XII JANUARY, 1920 NUMBER 1

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THE FIFTY-SEVENTH ANNUAL REPORT OF THE
MASSACHUSETTS AGRICULTURAL COLLEGE

PART II.—CATALOGUE OF THE COLLEGE FOR
1919-1920



PUBLICATION OF THIS DOCUMENT
APPROVED BY THE
SUPERVISOR OF ADMINISTRATION.

The Commonwealth of Massachusetts.

MASSACHUSETTS AGRICULTURAL COLLEGE,
AMHERST, Nov. 29, 1919.

To His Excellency CALVIN COOLIDGE.

SIR: — On behalf of the trustees of the Massachusetts Agricultural College I have the honor to transmit herewith, to Your Excellency and the Honorable Council, Part II of the fifty-seventh annual report of the trustees, this being the catalogue of the college.

I am, very respectfully, your obedient servant,

KENYON L. BUTTERFIELD,
President.

CONTENTS.

	PAGE
Calendar, 1919-1921,	9
Historical Statement,	11
Members of the Corporation,	14
Officers of the Institution,	16
Standing Committees of the Faculty,	26
Admission,	29
Courses of Instruction,	40
Description of Courses,	65
Graduate School,	143
Short Courses,	163
Extension Service,	171
General Information,	181
Degrees Conferred,	195
Roll of Students,	197
Index,	219

THE MASSACHUSETTS
AGRICULTURAL COLLEGE

Without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and mechanic arts in such manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life. — *Act of Congress, July 2, 1862.*

This issue of the catalogue represents the status of the college for the current college year, with provisional announcement of courses of study and other matters for the year to follow. When deemed necessary, additional announcements are made in a supplementary bulletin, published in the spring.

The college reserves, for itself and its departments, the right to withdraw or change the announcements made in its catalogue. Special publication will be made should it become necessary on account of important changes.

CALENDAR.

1919-20-21.

REGULAR AND TWO-YEARS' COURSES.

1919.

September 24, Wednesday, 1.30 P.M.,	Fall term begins; assembly.
October 13, Monday,	Holiday — Columbus Day.
November 11, Tuesday,	Holiday — Armistice Day.
November 26-28, Wednesday, 12 M.—Friday, 1 P.M.,	Thanksgiving recess.
December 19, Friday, 5 P.M.,	Fall term closes.
December 30, Tuesday, 7.30 A.M.,	Winter term begins.

1920.

February 23, Monday,	Holiday — Washington's Birthday.
March 19, Friday, 5 P.M.,	Winter term closes.
March 29, Monday, 1 P.M.,	Spring term begins.
April 19, Monday,	Holiday — Patriots' Day.
May 31, Monday,	Holiday — Memorial Day.
June 19-22, Saturday-Tuesday,	Commencement.
June 24-26, Wednesday-Saturday,	Entrance examinations.
September 22-25, Wednesday-Saturday,	Entrance examinations.
September 29, Wednesday, 1.30 P.M.,	Fall term begins; assembly.
October 12, Tuesday,	Holiday — Columbus Day.
November 24-26, Wednesday, 12 M.—Friday, 1 P.M.,	Thanksgiving recess.
December 23, Thursday, 5 P.M.,	Fall term ends.

1921.

January 3, Monday, 1 P.M.,	Winter term begins.
February 22, Tuesday,	Holiday — Washington's Birthday.
March 25, Friday, 5 P.M.,	Winter term ends.
April 4, Monday, 1 P.M.,	Spring term begins.
April 19, Tuesday,	Holiday — Patriots' Day.
May 30, Monday,	Holiday — Memorial Day.
June 25-28, Saturday-Tuesday,	Commencement.
June 30-July 2, Thursday-Saturday,	Entrance examinations.
September 21-24, Wednesday-Saturday,	Entrance examinations.
September 28, Wednesday, 1.30 P.M.,	Fall term begins; assembly.

MASSACHUSETTS AGRICULTURAL COLLEGE.

HISTORY. — The Massachusetts Agricultural College was organized under the national land grant act of 1862. This legislation is also known as the Morrill act, the original bill having been framed by Justin Smith Morrill, Senator from Vermont, and its final enactment secured under his leadership. It provided that public lands be assigned to the several States and territories, the funds from the sale of which were to be used to establish and maintain colleges of agriculture and mechanic arts. The Massachusetts Agricultural College is among the first of these institutions established. When this act was passed the Massachusetts Institute of Technology was already organized, and the State of Massachusetts definitely decided that the instruction in the mechanic arts should be at the institute, and that the new institution should confine its work to agriculture. On this account the Massachusetts Agricultural College has the unique distinction of being the only separate agricultural college in the country.

In 1863 the State of Massachusetts accepted the provisions of the Morrill act and incorporated the Agricultural College. The location at Amherst was decided only after long and careful study by the original Board of Trustees. The college was formally opened to students on the 2d of October, 1867, with a faculty of four teachers and with four wooden buildings.

The Massachusetts Legislature has granted money for the erection of practically all of the buildings now on the grounds. In view of the fact that the annual income from the original endowment has been only a few thousand dollars, it has been necessary for the State to assume responsibility for the current expenses of the institution.

ORGANIZATION. — The college is a State institution, and as such is subject to the laws governing and the rules applying to all State departments and institutions. The work of the college is directed by a board of eighteen trustees. Four of these are ex-officio members, — the Governor of the State, the Commissioner of Education, the Commissioner of Agriculture and the president of the college. The other fourteen members are appointed by the Governor for terms of seven years each, or two each year. The immediate control of the institution is vested in the president of the college. The various administrative officers, having supervision of the various departments of activity, are directly responsible to the president.

In carrying out its purpose the college has organized three distinct yet correlated types of work, — namely, research, resident instruction and extension service.

RESEARCH. — Massachusetts provided for the establishment of an agricultural experiment station in 1882. This station, though on the college grounds and supported by the State, was without organic connection with the college. Under an act of Congress, passed in 1887, an agricultural experiment station was established and supported as a department of the college.

For a time, therefore, Massachusetts had two experiment stations at the college. In 1894 these were combined, and the station reorganized as a department of the college. It is now supported by funds from both the State and the Federal government. In 1906 the Federal government largely increased its support on condition that the money thus provided should be used only for research. The station now receives about two-thirds of its support from the State.

The station is under the direct supervision of the Board of Trustees; the chief officer is the director, who is responsible to the president. It is organized into a number of departments, all co-operating toward the betterment of agriculture. In most cases the heads of these departments are heads of corresponding departments in the college. The station publishes numerous bulletins and two annual reports, one scientific, the other popular. These publications are free and circulate extensively, the mailing list containing approximately 20,000 addresses.

RESIDENT INSTRUCTION. — The college offers an education without tuition fee to any student who is a resident of Massachusetts and who meets the requirements for admission. Women are admitted on the same basis as are men. Students who are not residents of Massachusetts are required to pay a nominal tuition fee. The chief aim of the institution, through its resident instruction, is to prepare men and women for the agricultural vocations. The term "agricultural vocations" is here used in its broadest sense. Courses are offered which give efficient training in various agricultural pursuits, such as general farming, dairying, management of estates, poultry husbandry, fruit growing, market gardening, floriculture, landscape gardening and forestry. Students are also trained for investigation in many sciences underlying the great agricultural industry, for teaching in agricultural colleges and high schools, and for scientific work in chemistry, entomology, botany and microbiology.

Though training for the agricultural vocations is thus the chief concern of the college, students should find the course one that trains them admirably for pursuits in which the sciences are an essential preparation. The course of study aims also to combine an adequate general education with specialized technical and practical training.

FOUR-YEAR COURSES. — Twenty-nine teaching departments offer instruction in agriculture, horticulture, sciences, the humanities, rural social science and rural home making. A system of major courses permits the student to elect major work in one of eighteen departments, and to specialize in it and allied subjects for a period of two years. The degree of bachelor of science is granted on the satisfactory completion of the four years' work of collegiate grade.

SHORT COURSES. — In order to extend the advantages of the institution to those men and women who cannot or do not care to take advantage of the four-year course, various short courses are offered. Chief among these are a two-year course in practical agriculture, a summer school of agriculture and country life, and a winter school of agriculture.

GRADUATE SCHOOL. — The graduate school is organized to provide the necessary training for scientific leadership in agriculture and allied sciences. The degrees of master of agriculture, master of landscape architecture, master of science, doctor of agriculture and doctor of philosophy may be earned upon the completion of satisfactory study, research and thesis.

THE EXTENSION SERVICE. — The extension service is an organized effort to carry systematic and dignified instruction to the thousands of people throughout the State who are unable, for various reasons, to take advantage of the regular courses offered at the college. It is in reality the "carrying of the college to the people of the State." Every department of the institution, insofar as the regular teaching and research work will permit, contributes what it can to this work. There is also a regular staff of extension workers whose sole business it is to present the instruction of the college to individuals and various organizations throughout the State, such as extension schools, granges and boards of trade.

LOCATION AND EQUIPMENT. — The Agricultural College is located in the town of Amherst. The grounds comprise more than 600 acres, lying about a mile north of the village center. The college has also a demonstration forest of 755 acres, located 6 miles north of the campus. The equipment of the college, both in buildings and facilities for instruction, is excellent. Amherst is 97 miles from Boston, and may be reached by the Central Massachusetts division of the Boston & Maine Railroad, or by the Central Vermont Railroad. Electric car lines connect Amherst with Northampton, Holyoke and Springfield.

MILITARY DRILL. — By Federal law military drill is required of all regular students attending the Massachusetts Agricultural College.

THE CORPORATION.

ORGANIZATION OF 1920.

MEMBERS OF THE CORPORATION.

	TERM EXPIRES
ELMER D. HOWE of Marlborough,	1921
EDMUND MORTIMER of Grafton,	1921
NATHANIEL I. BOWDITCH of Framingham,	1922
WILLIAM WHEELER of Concord,	1922
CHARLES A. GLEASON of New Braintree,	1923
JAMES F. BACON of Boston,	1923
FRANK GERRETT of Greenfield,	1924
HAROLD L. FROST of Arlington,	1924
CHARLES H. PRESTON of Danvers,	1925
CARLTON D. RICHARDSON of West Brookfield,	1925
DAVIS R. DEWEY of Cambridge,	1926
JOHN F. GANNON of Pittsfield,	1926
ARTHUR G. POLLARD of Lowell,	1927
GEORGE H. ELLIS of West Newton,	1927

MEMBERS EX OFFICIO.

His Excellency Governor CALVIN COOLIDGE, *President of the Corporation.*
 KENYON L. BUTTERFIELD, *President of the College.*
 PAYSON SMITH, *State Commissioner of Education.*
 ARTHUR W. GILBERT, *State Commissioner of Agriculture.*

OFFICERS OF THE CORPORATION.

His Excellency Governor CALVIN COOLIDGE of Northampton, *President.*
 CHARLES A. GLEASON of New Braintree, *Vice-President.*
 RALPH J. WATTS of Amherst, *Secretary.*
 FRED C. KENNEY of Amherst, *Treasurer.*
 CHARLES A. GLEASON of New Braintree, *Auditor.*

STANDING COMMITTEES OF THE CORPORATION.¹

Committee on Finance.

CHARLES A. GLEASON, <i>Chairman.</i>	ARTHUR G. POLLARD.
GEORGE H. ELLIS.	CARLTON D. RICHARDSON.
NATHANIEL I. BOWDITCH.	EDMUND MORTIMER.

Committee on Course of Study and Faculty.

WILLIAM WHEELER, <i>Chairman.</i>	DAVIS R. DEWEY.
ELMER D. HOWE.	JOHN F. GANNON.
PAYSON SMITH.	JAMES F. BACON.

Committee on Farm.

NATHANIEL I. BOWDITCH, <i>Chairman.</i>	GEORGE H. ELLIS.
FRANK GERRETT.	EDMUND MORTIMER.
CARLTON D. RICHARDSON.	ARTHUR W. GILBERT.

¹ The president of the college is ex-officio member of each committee.

Committee on Horticulture.

HAROLD L. FROST, *Chairman.*
 CHARLES A. GLEASON.
 EDMUND MORTIMER.

ELMER D. HOWE.
 ARTHUR W. GILBERT.
 CHARLES H. PRESTON.

Committee on Experiment Department.

CHARLES H. PRESTON, *Chairman.*
 ARTHUR W. GILBERT.

ARTHUR G. POLLARD.
 HAROLD L. FROST.

EDMUND MORTIMER.

Committee on Buildings and Arrangement of Grounds.

FRANK GERRETT, *Chairman.*
 WILLIAM WHEELER.

CHARLES H. PRESTON.
 GEORGE H. ELLIS.

JAMES F. BACON.

Committee on Extension Service.

ELMER D. HOWE, *Chairman.*
 GEORGE H. ELLIS.
 HAROLD L. FROST.

DAVIS R. DEWEY.
 NATHANIEL I. BOWDITCH.
 JOHN F. GANNON.

ARTHUR W. GILBERT.

OFFICERS OF THE INSTITUTION.

AS OF DEC. 1, 1919.

OFFICERS OF GENERAL ADMINISTRATION.

KENYON L. BUTTERFIELD, A.M., LL.D.,	President's House. President of the College.
CHARLES H. FERNALD, Ph.D.,	3 Hallock Street. Honorary Director of the Graduate School.
CHARLES R. GREEN, B.Agr.,	Mount Pleasant. Librarian.
PHILIP B. HASBROUCK, B.Sc.,	31 Fearing Street. Registrar.
FRED C. KENNEY,	Mount Pleasant. Treasurer of the College.
EDWARD M. LEWIS, A.M.,	19 Lincoln Avenue. Dean of the College.
CHARLES E. MARSHALL, Ph.D.,	44 Sunset Avenue. Director of the Graduate School.
FRED W. MORSE, M.Sc.,	40 Pleasant Street. Acting Director of the Experiment Station.
JOHN PHELAN, A.M.,	5 Mount Pleasant. Director of Short Courses.
RALPH W. REDMAN, B.Sc.,	1 Mount Pleasant Avenue. Acting Director of the Extension Service.
RALPH J. WATTS, B.Sc.,	101 Butterfield Terrace. Secretary of the College.
JOHN D. WILLARD, B.A., ¹	East Pleasant Street. Director of the Extension Service.

THE FACULTY OF INSTRUCTION.

KENYON L. BUTTERFIELD, A.M., LL.D.,	President's House. President of the College and Head of Division of Rural Social Science.
CHARLES H. ABBOTT, Ph.D.,	3 Dana Street. Instructor in Zoölogy.
MAX F. ABELL, B.Sc., ¹	103 Butterfield Terrace. Assistant Professor of Farm Management.
PAUL J. ANDERSON, Ph.D.,	McClure Street. Associate Professor of Botany.
EDGAR L. ASHLEY, A.M.,	24 Pleasant Street. Associate Professor of German.
LUTHER BANTA, B.Sc.,	Lincoln Avenue. Instructor in Poultry Husbandry.
ARTHUR B. BEAUMONT, Ph.D.,	5 Farview Way. Professor of Agronomy and Head of Department.
HENRY J. BURT, B.Sc.,	Physics Building. Assistant in Physics.
ALEXANDER E. CANCE, Ph.D.,	9 Fearing Street. Professor of Agricultural Economics and Head of Department.

¹ Appointment to take effect Jan. 1, 1920.

JOSEPH S. CHAMBERLAIN, Ph.D., Professor of Organic and Agricultural Chemistry.	Mount Pleasant.
WALTER W. CHENOWETH, M.Sc., Professor of Horticultural Manufactures and Head of Department.	North Amherst.
ORTON L. CLARK, B.Sc., Assistant Professor of Botany.	16 College Street.
WILLIAM D. CLARK, A.B., M.F., Professor of Forestry and Head of Department.	45 Amity Street.
HERBERT P. COOPER, M.Sc., Assistant Professor of Agronomy.	24 Pleasant Street.
GUY C. CRAMPTON, Ph.D., Professor of Insect Morphology.	116 Pleasant Street.
ARTHUR L. DACY, B.Sc., Associate Professor of Vegetable Gardening.	2 Allen Street.
A. LAWRENCE DEAN, Instructor in Poultry Husbandry.	24 Pleasant Street.
BROOKS D. DRAIN, B.Sc., Assistant Professor of Pomology.	24 Pleasant Street.
HENRY T. FERNALD, Ph.D., Professor of Entomology, Head of Department, Chairman of Division of Science.	44 Amity Street.
JAMES A. FOORD, M.S.A., Professor of Farm Management, Head of Department, Head of Division of Agriculture.	54 Lincoln Avenue.
GEORGE E. GAGE, A.B., M.A., Ph.D., Associate Professor of Animal Pathology.	2 Farview Way.
HELENA T. GOESSMANN, M.Ph., Instructor in English.	21 Pleasant Street.
CLARENCE E. GORDON, Ph.D., Professor of Zoölogy and Géology and Head of Department.	38 Lincoln Avenue.
HAROLD M. GORE, B.Sc., Assistant Professor of Physical Education.	The Davenport.
CHARLES H. GOULD, B.Sc., Instructor in Pomology.	12 Chestnut Street.
JOHN C. GRAHAM, B.Sc., ¹ Professor of Poultry Husbandry and Head of Department.	Lincoln Avenue.
EMORY E. GRAYSON, B.Sc., Instructor in Physical Education.	120 Pleasant Street.
CHRISTIAN I. GUNNESS, B.Sc., Professor of Rural Engineering and Head of Department.	105 Butterfield Terrace.
MARGARET HAMLIN, B.A., Supervisor of Agricultural Courses for Women.	12 North East Street.
ARTHUR K. HARRISON, Assistant Professor of Landscape Gardening.	6 Allen Street.
WILLIAM R. HART, LL.B., M.A., Professor of Agricultural Education and Head of Department.	97 Pleasant Street.
PHILIP B. HASBROUCK, B.Sc., Professor of Physics and Head of Department.	31 Fearing Street.
CURRY S. HICKS, B.Pd., Professor of Physical Education and Hygiene and Head of Department.	The Davenport.
Mrs. CURRY S. HICKS, ² Assistant in Department of Physical Education.	The Davenport.
RICHARD L. HOLDEN, B.Sc., Instructor in Animal Husbandry.	14 Nutting Avenue.
ECERTON G. HOOD, B.Sc.Agr., Instructor in Microbiology.	15 Spring Street.
ARAO ITANO, Ph.D., Associate Professor of Microbiology.	3 Fearing Street.
LORIAN P. JEFFERSON, M.A., Assistant Professor in the Division of Rural Social Science.	84 Pleasant Street.
HENRY F. JUDKINS, B.Sc., Associate Professor of Dairying.	103 Butterfield Terrace.
ARTHUR N. JULIAN, A.B., Assistant Professor of German.	4 Farview Way.

¹ On leave of absence.² Temporary position.

EDWARD M. LEWIS, A.M.,	19 Lincoln Avenue.
Professor of Language and Literature and Head of Department.	
JOSEPH B. LINDSEY, Ph.D.,	47 Lincoln Avenue.
Goessmann Professor of Agricultural Chemistry and Head of Department.	
WILLIAM P. B. LOCKWOOD, M.Sc.,	34 North Prospect Street.
Professor of Dairying and Head of Department.	
WILLIAM L. MACHMER, A.M.,	3 Kendrick Place.
Associate Professor of Mathematics.	
ALEXANDER A. MACKIMMIE, A.M.,	Pine Street, North Amherst.
Professor of French.	
CHARLES E. MARSHALL, Ph.D.,	44 Sunset Avenue.
Professor of Microbiology and Head of Department.	
FREDERICK A. McLAUGHLIN, B.Sc.,	15 Fearing Street.
Assistant Professor of Botany.	
ARTHUR M. MCCARTHY, B.Sc.,	120 Pleasant Street.
Assistant in Physical Education.	
JOHN C. McNUTT, B.Sc.Agr.,	7 East Pleasant Street.
Professor of Animal Husbandry and Head of Department.	
FREDERICK G. MERKLE, M.Sc.,	North East Street.
Instructor in Agronomy.	
FRANK C. MOORE, A.B.,	10 Allen Street.
Assistant Professor of Mathematics.	
ROBERT W. NEAL, A.M.,	8 Woodside Avenue.
Associate Professor of English.	
JOHN B. NEWLON,	94 Pleasant Street.
Instructor in Rural Engineering.	
JOSEPH F. NOVITSKI, ¹	6 Phillips Street.
Assistant in Rural Sociology.	
A. VINCENT OSMUN, M.Sc.,	16 Northampton Road.
Professor of Botany and Head of Department.	
JOHN E. OSTRANDER, A.M., C.E.,	33 North Prospect Street.
Professor of Mathematics and Civil Engineering and Head of Department.	
JAMES B. PAIGE, B.Sc., D.V.S.,	42 Lincoln Avenue.
Professor of Veterinary Science and Head of Department.	
LAURENCE H. PARKER, A.B.,	The Davenport.
Instructor in Mathematics.	
CHARLES H. PATTERSON, A.M.,	26 Lincoln Avenue.
Professor of English.	
LOYAL F. PAYNE, B.Sc.,	33 East Pleasant Street.
Associate Professor of Poultry Husbandry, Acting Head of Department.	
CHARLES A. PETERS, Ph.D.,	Sunset Place.
Professor of Inorganic and Soil Chemistry.	
JOHN PHELAN, A.M.,	5 Mount Pleasant.
Professor of Rural Sociology and Head of Department.	
WALTER E. PRINCE, A.M.,	25 Amity Street.
Assistant Professor of English.	
GEORGE F. PUSHEE,	North Amherst.
Shop Assistant in Rural Engineering.	
FRANK P. RAND, M.A.,	North Amherst.
Instructor in English.	
WILLIAM S. REGAN, Ph.D.,	84 Pleasant Street.
Associate Professor of Entomology.	
VICTOR A. RICE, B.S.Agr.,	Mount Pleasant.
Assistant Professor of Animal Husbandry.	
HAROLD E. ROBBINS, A.M.,	4 Nutting Avenue.
Associate Professor of Physics.	
DONALD W. SAWTELLE, M.Sc.,	13 Fearing Street.
Instructor in Agricultural Economics.	
FRED C. SEARS, M.Sc.,	Mount Pleasant.
Professor of Pomology and Head of Department.	
PAUL SEREX, Jr., M.Sc.,	5 East Pleasant Street.
Instructor in Chemistry.	

¹ On leave of absence.

EDNA L. SKINNER, B.Sc.,	50 Lincoln Avenue.
Professor of Home Economics and Head of Department.	
LELAND SPENCER, B.Sc., ¹	24 Pleasant Street.
Instructor in Farm Management.	
ROBERT J. SPRAGUE, Ph.D.,	Mount Pleasant.
Professor of Economics and Sociology, Head of Department, Head of Division of the Humanities.	
JAMES L. STRAHAN, M.Sc.,	24 Pleasant Street.
Assistant Professor of Rural Engineering.	
CHARLES H. THAYER,	Hickory Farm, Amherst.
Instructor in Agronomy.	
CLARK L. THAYER, B.Sc.,	The Davenport.
Associate Professor of Floriculture and Head of Department.	
CHARLES H. THOMPSON, M.Sc.,	Mount Pleasant.
Assistant Professor of Horticulture.	
HAROLD F. TOMPSON, B.Sc.,	10 Temple Street, Arlington.
Professor of Vegetable Gardening and Head of Department.	
RAY E. TORREY, Ph.D.,	24 Pleasant Street.
Instructor in Botany.	
STANLEY E. VANHORN,	North Amherst.
Instructor in Dairying.	
RICHARD W. WALKER, Lieut. Col., U. S. A.,	21 Northampton Road.
Professor of Military Science and Tactics.	
GILBERT S. WATTS, B.Sc.,	12 Nutting Avenue.
Instructor and Foreman, Vegetable Gardening.	
FRANK A. WAUGH, M.Sc.,	Campus.
Professor of Landscape Gardening, Head of Department, Head of Division of Horticulture.	
WINTHROP S. WELLES, B.Sc.,	21 Lincoln Avenue.
Professor of Agricultural Education.	
CHARLES WELLINGTON, Ph.D.,	34 Amity Street.
Professor of Chemistry.	
FRED E. WHEELER, B.Sc.,	24 Pleasant Street.
Instructor in Dairying.	
T. G. YAXIS, M.Sc., ²	Tillson Court.
Assistant Professor of Dairying.	

Professor of Chemistry.	

Associate Professor of Beekeeping.	

Instructor in French.	

Associate Professor of Rural Sociology.	

THE EXPERIMENT STATION STAFF.

KENYON L. BUTTERFIELD, A.M., LL.D.,	President's House.
President of the College.	
FRED W. MORSE, M.Sc.,	40 Pleasant Street.
Acting Director and Research Chemist.	
JAMES R. ALCOCK,	North Amherst.
Assistant in Animal Nutrition.	
HARRY L. ALLEN,	89 Main Street.
Laboratory Assistant.	
PAUL J. ANDERSON, Ph.D.,	McClure Street.
Associate Plant Pathologist.	
ALYN S. BALL,	11 Whitney Street.
Laboratory Assistant.	
CARLOS L. BEALS, M.Sc.,	10 Nutting Avenue.
Assistant Chemist.	

¹ Temporary appointment.² Appointment to take effect Jan. 1, 1920.

ARTHUR I. BOURNE, B.A., Assistant Entomologist.	12 East Pleasant Street.
ETHEL BRADLEY, B.Sc., Assistant Chemist.	79 Pleasant Street.
WILLIAM P. BROOKS, Ph.D., Consulting Agriculturist.	6 Farview Way.
ALEXANDER E. CANCE, Ph.D., Professor of Agricultural Economics.	9 Fearing Street.
GEORGE H. CHAPMAN, Ph.D., Research Physiologist.	31 Lincoln Avenue.
WALTER W. CHENOWETH, M.Sc., Professor of Horticultural Manufactures.	North Amherst.
ARTHUR M. CLARKE, B.A., Assistant Chemist.	123 South Pleasant Street.
ORTON L. CLARK, B.Sc., Assistant Plant Physiologist.	16 College Street.
ROBERT L. COFFIN, Assistant in Agriculture.	19 Phillips Street.
HENRY T. FERNALD, Ph.D., Entomologist.	44 Amity Street.
HENRY J. FRANKLIN, Ph.D., In charge of Cranberry Investigations.	East Wareham.
GEORGE E. GAGE, A.B., M.A., Ph.D., Associate Professor of Animal Pathology.	2 Farview Way.
EDWIN F. GASKILL, B.Sc., Assistant Agriculturist.	North Pleasant Street.
HUBERT D. GOODALE, Ph.D., Research Biologist in Poultry Husbandry.	North Amherst.
JOHN C. GRAHAM, B.Sc., ¹ Professor of Poultry Husbandry.	Lincoln Avenue.
HENRI D. HASKINS, B.Sc., Chemist in charge of Fertilizer Section.	14 Amity Street.
EDWARD B. HOLLAND, Ph.D., Associate Chemist in charge of Research Section.	28 North Prospect Street.
JAMES T. HOWARD, Inspector.	46 Pleasant Street.
THOMAS G. HULL, Ph.D., ² Assistant in Veterinary Science.	103 Butterfield Terrace.
MARGUERITE G. ICKIS, M.A., Curator, Department of Botany.	The Davenport.
ARAO ITANO, Ph.D., Associate Professor of Microbiology.	3 Fearing Street.
CARLETON P. JONES, M.Sc., Assistant Chemist.	8 Nutting Avenue.
WEBSTER S. KROUT, B.Sc., M.A., Field Plant Pathologist.	46 Pleasant Street.
JOSEPH B. LINDSEY, Ph.D., Vice-Director and Chemist.	47 Lincoln Avenue.
CHARLES E. MARSHALL, Ph.D., Professor of Microbiology.	44 Sunset Avenue.
ANNE C. MESSER, A.B., Assistant Chemist.	8 Allen Street.
A. VINCENT OSMUN, M.Sc., Botanist.	16 Northampton Road.
JOHN E. OSTRANDER, A.M., C.E., Meteorologist.	33 North Prospect Street.
JAMES B. PAIGE, B.Sc., D.V.S., Veterinarian.	42 Lincoln Avenue.
FRED C. SEARS, M.Sc., Professor of Pomology.	Mount Pleasant.
PHILIP H. SMITH, M.Sc., Chemist in charge of Feed and Dairy Section.	102 Main Street.

¹ On leave of absence.² Temporary appointment.

HAROLD F. TOMPSON, B.Sc.,	10 Temple Street, Arlington.
In charge of Market Garden Field Station.	
LEWELL S. WALKER, B.Sc.,	19 Phillips Street.
Assistant Chemist.	
FRANK A. WAUGH, M.Sc.,	Campus.
Head of Division of Horticulture.	
— — — — —	— — — — —
Assistant Professor of Agricultural Economics.	
— — — — —	— — — — —
Assistant Chemist.	
— — — — —	— — — — —
Investigator, Entomology.	
— — — — —	— — — — —
Research Pomologist.	

THE EXTENSION SERVICE STAFF.

KENYON L. BUTTERFIELD, A.M., LL.D.,	President's House.
President of the College.	
JOHN D. WILLARD, B.A., ¹	East Pleasant Street.
Director.	
L. WAYNE ARNY, B.Sc.,	7 Allen Street.
Supervisor of Correspondence Courses and Editor of Extension Service Publications.	
LINCOLN W. BARNES, B.Sc., ²	50 Amity Street.
Extension Assistant Professor of Agricultural Education.	
WILLIAM R. COLE,	5 East Pleasant Street.
Extension Specialist in Food Preservation.	
LAURA COMSTOCK,	84 Pleasant Street.
Extension Professor of Home Economics.	
ROY B. COOLEY, B.S.A.,	54 Pleasant Street.
Extension Assistant Professor of Animal Husbandry.	
GEORGE L. FARLEY, M.Sc.,	22 Dana Street.
Supervisor of Junior Extension Work.	
LAURA R. GIFFORD,	5 School Street.
Assistant Leader of Rural Home Economics Projects.	
HENRY E. HASLETT, B.Sc.,	Lincoln Avenue.
Extension Specialist in Sheep Husbandry.	
WILLIAM F. HOWE,	8 North Prospect Street.
Assistant Supervisor of Junior Extension Work.	
DELOS L. JAMES, B.Sc.,	6 Kellogg Avenue.
Extension Specialist in Dairying.	
EARL JONES, M.Sc.,	8 Allen Street.
Extension Associate Professor of Agronomy.	
WILLIAM C. MONAHAN, B.Sc.,	34 Pleasant Street.
Extension Assistant Professor of Poultry Husbandry.	
EZRA L. MORGAN, A.M., ³	— — — — —
Extension Professor of Community Planning.	
EARLE H. NODINE, ²	24 Pleasant Street.
Extension Instructor in charge of Poultry Club Work.	
HELEN M. NORRIS,	87 Pleasant Street.
Extension Instructor in Agricultural Education.	
SUMNER R. PARKER, B.Sc.,	51 Amity Street.
Extension Professor of Rural Organization and County Agent Leader.	
RALPH W. REDMAN, B.Sc.,	1 Mount Pleasant.
Assistant Director, Acting Director, 1919.	
MRS. RUTH S. REED, ²	— — — — —
Extension Assistant Professor of Home Economics.	
RALPH A. VAN METER, B.Sc.,	1 Bank Block.
Extension Instructor in Pomology.	

¹ Appointment to take effect Jan. 1, 1920.² Temporary position.³ On leave of absence.

JOHN D. WILLARD, B.A.,	East Pleasant Street.
Extension Professor of Agricultural Economics.	
JOHN D. ZINK, B.Sc.,	College Avenue.
Assistant to the Director.	
Assistant Professor of Farm Management.	- -
Assistant Professor of Landscape Gardening.	- -
Assistant Professor of Agricultural Economics.	- -
Assistant Professor of Vegetable Gardening.	- -

THE CLERICAL STAFF.

NELLIE V. BARKHOUSE,	Lincoln Avenue.
Clerk, Department of Rural Home Life.	
ELEANOR F. BISHOP,	3 Spaulding Street.
Bookkeeper, Treasurer's Office.	
EVELYN BREWSTER, B.Sc.,	79 Pleasant Street.
Private Secretary, President's Office.	
JOHN K. BROADFOOT,	130 Pleasant Street.
Cashier, Treasurer's Office.	
MARY L. BROADFOOT,	130 Pleasant Street.
Clerk, Treasurer's Office.	
RUTH BROOKS,	9 Phillips Street.
Clerk, Treasurer's Office.	
LUCIA G. CHURCH,	North Amherst.
First Clerk, Experiment Station.	
SUSAN L. CLARK, ¹	Northampton.
Stenographer, Extension Service.	
GRACE COLBURN,	Care of Mrs. H. D. Fearing.
Clerk, Treasurer's Office.	
IRENE CRUTCH,	South Amherst.
Clerk, Division of Agriculture.	
VIOLA E. DAMON,	Bank Block.
Clerk, Department of Floriculture.	
EMILY G. DAVIDSON,	10 Maple Avenue.
Telephone Operator.	
MARGARET G. DAVIDSON,	10 Maple Avenue.
Clerk, Extension Service.	
LLEWELYN L. DERBY,	81 Pleasant Street.
Assistant, Department of Physical Education.	
MARION F. DONDALE, A.B.,	15 Spring Street.
Clerk, Graduate School and Department of Microbiology.	
NOELLIA C. DUVAL,	34 McClellan Street.
Clerk, Power Plant.	
CHARLOTTE E. ERICKSON,	Florence.
Clerk, Treasurer's Office.	
F. ETHEL FELTON, A.B.,	8 Allen Street.
Clerk and Editorial Assistant, Experiment Station.	
MELINA M. FISHER,	28 Pleasant Street.
Clerk, Department of Chemistry.	
GRACE E. GALLOND,	28 Pleasant Street.
Clerk, Department of Dairying.	
KATHERINE GARDNER, A.B.,	87 Pleasant Street.
Clerk, Division of Agriculture.	
MARGARET T. GASKELL,	105 Main Street.
Clerk, Registrar's Office.	
CORA B. GROVER,	North Amherst.
Clerk, Experiment Station.	

¹ Appointment to take effect Dec. 4, 1919.

LILLIAN S. HADFIELD,	16 Nutting Avenue.
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AMY H. HAMILTON,	Savings Bank Block.
Stenographer, Division of Rural Social Science.	
CATHERINE A. HARRINGTON,	62 Main Street.
Stenographer, Department of Agricultural Economics.	
MARION E. HAWTHORNE,	South Amherst.
Stenographer, Extension Service.	
MARY E. HORTON,	79 Pleasant Street.
Clerk, Department of Rural Sociology.	
ELIZABETH M. KILEY,	Northampton.
Clerk, Department of Entomology.	
MARGUERITE C. LEDUC,	Northampton.
Clerk, Extension Service.	
HONORIA A. LEE,	38 Cottage Street.
Clerk, Division of Horticulture.	
HELEN A. MARTIN,	5 Phillips Street.
Clerk, Treasurer's Office.	
REBECCA L. MELLOR,	10 Kellogg Avenue.
First Clerk, Experiment Station.	
MARIE MERCIER,	Northampton.
Stenographer, Short Courses.	
GLADYS I. MINER,	73 Pleasant Street.
Clerk, Extension Service.	
BRIDIE E. O'DONNELL,	Hadley.
Clerk, Department of Entomology.	
RACHEL C. PACKARD,	22 North Prospect Street.
Clerk, President's Office.	
HELEN L. PHILLIPS,	13 Amity Street.
Clerk, Extension Service.	
MILDRED PIERPONT, A.B.,	12 East Pleasant Street.
Clerk, Short Courses.	
FRANCES E. POWERS,	44 Lincoln Avenue.
Stenographer, Department of Dairying.	
JESSIE M. PRINCE, B.A.,	Care of Mrs. H. D. Fearing.
First Clerk, Extension Service.	
EDITH ROBINSON,	73 Pleasant Street.
Clerk, President's Office.	
LAURA H. SABIN,	15 Phillips Street.
Stenographer, Department of Poultry Husbandry.	
RUBY SANBORN, A.B.,	45 Pleasant Street.
Clerk, Department of Poultry Husbandry.	
MARY I. SHORES,	35 South Pleasant Street.
Clerk, Dean's Office.	
MARJORIE T. SILCOX,	73 Pleasant Street.
Clerk, President's Office.	
ELIZABETH STRACHAN,	17 High Street.
Clerk, Treasurer's Office.	
ETHELYN STREETER,	2 Tyler Place.
Clerk, Division of Horticulture.	
MARJORIE E. SULLIVAN,	55 Amity Street.
Clerk, Division of Agriculture.	
ALINE B. SURPRENANT,	44 Triangle Street.
Clerk, Extension Service.	
CLARA A. SWIFT,	North Amherst.
Clerk, Extension Service.	
DORIS C. TOWER,	55 Amity Street.
Clerk, Department of Poultry Husbandry.	
OLIVE M. TURNER, B.Sc.,	22 Spaulding Street.
Clerk, Registrar's Office.	

MARION D. WARNER,	12 East Pleasant Street.
First Clerk, Division of Agriculture.	
ELLEN L. WELCH, B.A.,	East Hadley.
Clerk, Department of Botany.	
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Clerk, Dean's Office.	
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Clerk, Department of Dairying.	

THE LIBRARY STAFF.

CHARLES R. GREEN, B.Agr.,	Mount Pleasant.
Librarian.	
LENA V. CHAPMAN,	77 South Pleasant Street.
Assistant in charge of Circulation.	
LALIA M. DAMON,	2 McClellan Street.
Cataloguer.	
LOUISE J. DELANO, B.Sc.,	87 Pleasant Street.
Department Librarian.	
LOTTIE M. FOSDICK, B.A.,	87 Pleasant Street.
Assistant.	

OTHER OFFICERS.

Mrs. JESSIE BACHARACH, ¹	Draper Hall.
Matron.	
THOMAS F. BUTTERWORTH,	3 Phillips Street.
Engineer.	
LAWRENCE S. DICKINSON, B.Sc., ²	2 Farview Way.
Superintendent of Grounds.	
LULU DIETHER,	Draper Hall.
Manager of the Dining Hall.	
CLARENCE A. JEWETT,	112 Pleasant Street.
Superintendent of Buildings.	
JOHN J. LEE,	38 Cottage Street.
Assistant to Military Detail.	
WILLIAM MARTIN,	5 Phillips Street.
Laboratory Assistant, Department of Horticultural Manufactures.	
ENOS J. MONTAGUE, B.Sc.,	Campus.
Farm Superintendent.	
ELIZABETH OLMSTEAD,	Infirmary.
Resident Nurse.	
ALMON W. SPAULDING, B.Sc.,	The Davenport.
Field Agent.	
JAMES WHITING,	16 Hallock Street.
Foreman, Department of Floriculture.	

GRADUATE ASSISTANTS.

DANIEL A. ALBRECHT, B.A., B.Sc.,	Clark Hall.
Department of Botany.	
ROY C. AVERY, B.Sc.,	15 Spring Street.
Department of Microbiology.	
AMBROSE C. FANEUF, B.Sc.,	Chemistry Laboratory.
Department of Chemistry.	
MARY E. GARVEY, B.Sc.,	27 South Prospect Street.
Department of Microbiology.	
ARTHUR H. HELDER, M.Sc.,	24 Pleasant Street.
Department of Landscape Gardening.	
CHARLES H. JEWELL, B.Sc.,	Chemistry Laboratory.
Department of Chemistry.	

¹ Temporary position.² On leave of absence.

CONRAD H. LIEBER, B.Sc.,	3 Nutting Avenue.
Department of Microbiology.	
ALFRED S. MALLOREY, B.Sc.,	15 Hallock Street.
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JOSEPH A. MIDDLETON, B.Sc.,	24 Pleasant Street.
Department of Pomology.	
JAMES NEILL, B.Sc.,	5 McClellan Street.
Department of Microbiology.	
JAMES A. PURINGTON, B.Sc.,	5 East Pleasant Street.
Department of Agronomy.	
RUSSELL D. STURGIS, B.Sc.,	5 Nutting Avenue.
Department of Chemistry.	
LESLIE C. WHITAKER, B.Sc.,	30 North Prospect Street.
Department of Microbiology.	
OLIVER W. WOOD, B.Sc.,	North College.
Department of Poultry Husbandry.	

STANDING COMMITTEES OF THE FACULTY.

1919-20.

CATALOGUE AND OTHER PUBLICATIONS.

Associate Professor NEAL.
Secretary WATTS.

COMMENCEMENT.

Dean LEWIS.
Treasurer KENNEY.
Colonel WALKER.
Professor PATTERSON.
Secretary WATTS.
Professor PETERS.
Associate Professor C. L. THAYER.

COURSE OF STUDY.

President BUTTERFIELD.
Dean LEWIS.
Professor HART.
Professor WAUGH.
Professor SPRAGUE.
Professor FERNALD.
Professor OSTRANDER.
Professor MARSHALL.
Professor CHAMBERLAIN.
Professor PHELAN.
Professor FOORD.

DISCIPLINE.

Dean LEWIS.
Professor PATTERSON.
Professor McNUTT.
Professor PHELAN.
Professor LOCKWOOD.
Professor HICKS.

EMPLOYMENT.

Professor SEARS.
Treasurer KENNEY.
Secretary WATTS.
Associate Professor PAYNE.

ENTRANCE EXAMINATIONS AND ADMISSION.

Professor HASBROUCK.
Professor PATTERSON.
Professor OSMUN.
Associate Professor ASHLEY.

HEALTH AND SANITATION.

Professor MARSHALL.
Treasurer KENNEY.
Professor PATTERSON.
Professor HICKS.
Miss SKINNER.

LIBRARY.

Professor MARSHALL.
Professor SPRAGUE.
Professor CANCE.
Mr. GREEN.

SCHEDULE.

Professor PETERS.
Assistant Professor JULIAN.
Mr. L. H. PARKER.

SCHOLARSHIP.

Professor PATTERSON.
Professor HASBROUCK.
Professor CHAMBERLAIN.
Mr. RAND.
Professor MACKIMMIE.
Associate Professor MACHMER.
Mr. L. H. PARKER.
Professor HICKS.

STUDENT LIFE.

Professor PATTERSON.
Mr. RAND.
Secretary WATTS.
Professor PHELAN.

ATHLETIC BOARD.

Dean LEWIS.
Professor HASBROUCK.
Professor OSMUN.

NON-ATHLETIC BOARD.

Professor LOCKWOOD.
Professor PATTERSON.

THE COLLEGE

ADMISSION.

A. APPLICATION FOR ADMISSION.

All correspondence concerning admission should be addressed to the registrar.

Every applicant for admission to the college must be at least sixteen years old, and must present to the registrar proper testimonials of good character. Such testimonials, whenever possible, should come from the principal of the school at which the applicant has prepared for college. Candidates who desire to present themselves for examination in any subjects must make application to the college for such privilege at least one month before examination is desired. Blanks for such application may be obtained by addressing the registrar of the college. All entrance credentials must be in the hands of the registrar before the applicant can matriculate.

B. MODES OF ADMISSION.

Students are admitted to the freshman class either upon certificate or upon examination. No *diploma* from a secondary school will be accepted.

CERTIFICATES. — Certificates will be received from those schools in New England which have been approved by the New England College Entrance Certificate Board. Principals of schools in New England who desire the certificate privilege should address the secretary of the Board, Professor Frank W. Nicolson, Wesleyan University, Middletown, Conn. Certificates from schools outside of New England may be received if those schools are on the approved list of the leading colleges of the section in which the school in question is located.

The credentials of the Board of Regents of the State of New York are accepted as satisfying the entrance requirements of this college when offered subject for subject.

Certificates in order to be accepted must present at least three of the necessary fourteen credits. It is to be understood, however, that responsibility for certification in either elementary French, elementary German, English 1 or English 2, Latin A, Greek A or algebra must be assumed by one school, if the candidate has received his preparation in any one subject named above in more than one school. Subjects lacking on certificate (except for the permitted number of conditions) must be made up at the time of the examinations for admission.

Blank forms for certification — sent to principals or school superintendents only — may be obtained on application to the registrar of the college.

EXAMINATIONS. — The examination in each subject may be oral or written, or both. The standard required for passing an examination for admission is 65 per cent. Conditions to the amount of two units will be allowed.

Entrance examination for admission to the Massachusetts Agricultural College will be held at the following centers:—

- In June,** Amherst, Department of Physics building.
 Massachusetts Institute of Technology,
 Cambridge, Mass.
 Worcester, Horticultural Hall.
- In September,** Amherst, Department of Physics building.

Please note that September examinations are held in Amherst only.

Schedule for Entrance Examinations, June 24-26, inclusive, 1920.— The examinations in June will follow this schedule:—

First Day.

- 7.45 A.M. Registration.
 8.00 A.M. Plane geometry.
 10.00 A.M. Chemistry.
 11.30 A.M. Botany.
 2.00 P.M. Solid geometry.
 4.00 P.M. Physics.

Second Day.

- 8.00 A.M. Required English.
 11.00 A.M. Algebra.
 2.00 P.M. History, required and elective.

Third Day.

- 8.00 A.M. French, German, required and elective.
 1.00 P.M. Latin A and B and all one-half credit electives, except those already noted.

Schedule for Entrance Examinations in September.— In September, 1920, the examinations will be given September 22-25, inclusive, and will follow the order indicated below:—

First Day.

- 1.00 P.M. Registration.
 1.15-5.00 P.M. Greek A and B.

Second Day.

- 8.00 A.M. Plane geometry.
 10.00 A.M. Chemistry.
 11.30 A.M. Botany.
 2.00 P.M. Solid geometry.
 4.00 P.M. Physics.

Third Day.

- 8.00 A.M. Required English.
 11.00 A.M. Algebra, agriculture.
 2.00 P.M. History, required and elective.

Fourth Day.

- 8.00 A.M. French, German, required and elective.
 1.00 P.M. Latin A and B and all one-half credit electives, except those already noted.

C. REQUIREMENTS FOR ADMISSION.

The requirements for admission are based on the completion of a four-year high school course, or its equivalent, and are stated in terms of units. The term unit means the equivalent of at least four recitations a week for a school year. **Neither more nor less credit will be given in any subject than is indicated in the table below.** Fourteen units must be offered for admission. In the list given below, *every subject in black-faced type is prescribed and no substitution is allowed.* The subjects so typed total eight and one-half units. In addition to these points five and one-half more units must be chosen from the subjects printed in light-faced type. Not more than four half-credit units may be offered. No applicant deficient in both algebra and plane geometry will be admitted. Entrance credits gained either by certificate or by examination will hold good for one year.

Agriculture, ¹	1 to 4*
Botany, ²	½ or 1
Chemistry, ²	1
Algebra,	1½
Plane geometry,	1
Solid geometry,	½
Trigonometry,	½
Physics, ²	1
Geology,	½
Physical geography,	½
Physiology,	½
Zoology, ²	½
History³ (Ancient; Medieval and Modern; English; General; United States and Civics), any one,	1 ⁴
English 1,	1½
English 2,	1½
Modern Language (elementary French or elementary German),	2
Elementary French, ⁵	2
Elementary German, ⁵	2
Intermediate French,	1
Advanced French,	1
Intermediate German,	1
Advanced German,	1
Greek A, ¹	2
Greek B, ¹	1
Latin A,	2
Latin B,	1
Commercial geography, ⁶	½
Drawing, ⁶	½
Manual training, ⁶	½ or 1

PRESENTATION OF NOTE-BOOKS. — The keeping of a note-book is required as part of the preparation in those subjects indicated (see note 2, below).

Candidates presenting themselves for examination in such subjects must present at the same time the required note-book, properly certified by the principal. Candidates presenting such subjects on certificates should not present note-books, but their certificates must state that note-books have been satisfactorily completed.

* See page 32 for details.

¹ Examination in September only.

² Note-book required as part of preparation will be credited as part of the examination.

³ One must be offered for the required point; one, two or three others may be offered for elective points.

⁴ For each offered.

⁵ May be offered as elective if not offered to satisfy *prescribed* points.

⁶ On certificate only, no examination given.

D. STATEMENT OF PREPARATION REQUIRED FOR ADMISSION.

AGRICULTURE. — Entrance credit in agriculture is granted on the following basis: —

I. The Massachusetts Agricultural College accepts a maximum of four credits in agriculture from any secondary and county agricultural high school in Massachusetts offering work in that subject, provided: —

1. That a maximum credit of one unit be accepted on certificate from schools approved by the New England College Entrance Certificate Board.

2. That, if further credit be desired from such schools, it may be obtained up to a total of four (including the one credit presented by certificate) for four full calendar years of work, credits in addition to the one credit by certificate to be measured after and determined by examination given by the head of the Division of Agriculture of the Massachusetts Agricultural College.

3. That from all other secondary schools and county agricultural high schools a maximum of four credits in agriculture be accepted for four full calendar years of work, the number of units to be measured after and determined by examinations given by the head of the Division of Agriculture of the Massachusetts Agricultural College.

II. In high schools organizing agricultural club work under the supervision and rules of the junior extension service of the college, 1 credit is granted for each full year of work performed under the following plan: —

Work of the Winter Term. — (a) The study of text-books such as are suitable for secondary school instruction in agriculture.

(b) Course of Study: A general outline of suggested topics for study.

(c) Visits by a representative of the Massachusetts Agricultural College for observation, counsel and advice in regard to kind and amount of work being done in agriculture.

(d) Formation of an agricultural club with officers from among its own members, meeting once a month under local supervision of some one authorized to act for the school authorities.

Work of the Spring Term. — Same in general form as winter term.

Work of the Summer Term. — An approved project conforming to the rules of some one or more of the agricultural clubs of the junior extension service of the Massachusetts Agricultural College.

Work of the Fall Term. — (a) An exhibit of work.

(b) Reports and story of achievement submitted to the junior extension service of the college.

The maximum number of credits in agriculture is 4. The examinations in agriculture are given in September only.

BOTANY. — For one unit of credit in botany, the work outlined in the statement of requirements issued by the College Entrance Examination Board, or its equivalent, will be accepted. This work should occupy one school year and include laboratory and supplementary text-book study. For one-half unit of credit, work that covers the same ground but occupies half the time required for a full unit of credit will be accepted. These requirements are met by such texts as Steven's "Introduction to Botany" and Bergen & Davis's "Principles of Botany." A note-book containing neat, accurate drawings and descriptive records forms part of the requirement for either the half-unit or the one-unit credit, and this note-book must be pre-

sented by all applicants for admission upon examination in this subject. The careful preparation of an herbarium is recommended to all prospective students of this college, although the herbarium is not required.

CHEMISTRY. — The entrance examination in chemistry will cover the work outlined by the College Entrance Examination Board as preparatory for college entrance. In general, this consists of a year of high school chemistry from any standard text-book, with laboratory work on the properties of the common elements and their simpler compounds. No particular work is prescribed. The keeping of a note-book is required.

MATHEMATICS. — (*a*) *Required.* — Algebra: The four fundamental operations for rational algebraic expressions; factoring, determination of highest common factor and lowest common multiple by factoring; fractions, including complex fractions; ratio and proportion; linear equations, both numerical and literal, containing one or more unknown quantities; problems depending on linear equations; radicals, including the extraction of the square root of polynomials and numbers; exponents, including the fractional and negative; quadratic equations, both numerical and literal; simple cases of equations with one or more unknown quantities that can be solved by the methods of linear or quadratic equations; problems depending upon quadratic equations; the binomial theorem for positive integral exponents, the formulas for the n th term and the sum of the terms of arithmetic and geometric progressions, with applications.

Plane Geometry: The usual theorems and constructions of good text-books, including the general properties of plane rectilinear figures; the circle and the measurement of angles; similar polygons; areas; regular polygons and the measurement of the circle; the solution of numerous original exercises, including loci problems; applications to the mensuration of lines and plane surfaces.

(*b*) *Elective.* — Solid Geometry: The usual theorems and constructions of good text-books, including the relations of planes and lines in space; the properties and measurement of prisms, pyramids, cylinders and cones; the sphere and spherical triangle; the solution of numerous original exercises, including loci problems; applications to the mensuration of surfaces and solids.

Plane Trigonometry: A knowledge of the definitions and relations of trigonometric functions and of circular measurements and angles; proofs of the principal formulas and the application of these formulas to the transformation of the trigonometric functions; solution of trigonometric equations, the theory and use of logarithms, and the solution of right and oblique triangles.

PHYSICS. — To satisfy the entrance requirement in physics, the equivalent of at least one unit of work is required. This work must consist of both class-room work and laboratory practice. The work covered in the class-room should be equal to that outlined in Hall & Bergen's "Text-book of Physics" or Millikan & Gale; the laboratory work should represent at least thirty-five experiments involving careful measurements, with accurate recording of each in laboratory note-book. This note-book, certified by the instructor in the subject, must be submitted by each candidate presenting himself for examination in physics; credit for passing the subject will be given on laboratory notes and on the examination paper submitted. Candidates entering on certificate will not be required to present note-books, but the principal's certification must cover laboratory as well as class-room work.

PHYSIOLOGY. — Hough & Sedgwick's "The Human Mechanism;" Martin's "The Human Body; Briefer Course."

ZOOLOGY, PHYSICAL GEOGRAPHY, GEOLOGY. — The following suggestions are made concerning preparation for admission in the subjects named above: —

For physiography, Davis' "Elementary Physical Geography;" Gilbert & Brigham's "Introduction to Physical Geography." For zoölogy, text-books entitled "Animals" or "Animal Studies," by Jordan, Kellogg and Heath; Linville & Kelley's "A Text-book in General Zoölogy." For geology, A. P. Brigham's "A Text-book of Geology" or Tarr's "Elementary Geology."

Applicants for examination in zoölogy are *required* to present certified laboratory note-books; applicants for examination in the other subjects are *advised* to present note-books, if laboratory work has been done. Good note-books may be given credit for entrance. Examination in these subjects will be general, in recognition of the different methods of conducting courses; but students will be examined on the basis of the most thorough secondary school courses.

HISTORY. — The required unit must be offered in either ancient history, medieval and modern history, English history, general history, or United States history and civics. Either one, two or three elective units in any of the historical subjects here named may be offered, provided that no unit be offered in the same subject in which the required unit has been offered.

Preparation in history will be satisfactory if made in accordance with the recommendations of the committee of seven of the American Historical Association, as outlined by the College Entrance Examination Board. The examination will require comparisons and the use of judgment by the candidate rather than the mere use of memory, and it will presuppose the use of good text-books, collateral reading and practice in written work. Geographical knowledge may be tested by requiring the location of places and movements on outline maps.

To indicate in a general way the character of the text-book work expected, the texts of the following authors are suggested: Botsford, Morey or Myers, in ancient history (to 814 A.D.); Adams, West or Myers, in medieval history; Montgomery, Larned or Cheyney, in English history; Myers or Fisher, in general history; Fiske, together with MacLaughlin or Montgomery, in United States history and civics.

ENGLISH. — The study of English in school has two main objects, which should be considered of equal importance: (1) command of correct and clear English, spoken and written; (2) ability to read with accuracy, intelligence and appreciation, and the development of the habit of reading good literature with enjoyment.

(1) *Grammar and Composition* (One and One-half Units). — The first object requires instruction in grammar and composition. English grammar should ordinarily be reviewed in the secondary school; and correct spelling and grammatical accuracy should be rigorously exacted in connection with all written work during the four years. The principles of English composition governing punctuation, the use of words, sentences and paragraphs should be thoroughly mastered; and practice in composition, oral as well as written, should extend throughout the secondary school period. Written exercises may well comprise letter-writing, narration, description and easy exposition and argument. It is advisable that subjects for this work be taken from the student's personal experience, general knowledge and studies other than English, as well as

from his reading in literature. Finally, special instruction in language and composition should be accompanied by concerted effort of teachers in all branches to cultivate in the student the habit of using good English in his recitations and various exercises, whether oral or written.

(2) *Literature* (One and One-half Units). — The second object is sought by means of two lists of books, headed, respectively, "Reading" and "Study," from which may be framed a progressive course in literature covering four years. In connection with both lists the student should be trained in reading aloud and encouraged to commit to memory some of the more notable passages both in verse and in prose. As an aid to literary appreciation, he is further advised to acquaint himself with the most important facts in the lives of the authors whose works he reads and with their place in literary history.

A. *Books for Reading*. — The aim of this course is to foster in the student the habit of intelligent reading and to develop a taste for good literature by giving him a first-hand knowledge of some of its best specimens. He should read the books carefully, but his attention should not be so fixed upon details that he fails to appreciate the main purpose and charm of what he reads.

The books provided for reading are arranged in the following groups, from each of which at least two selections are to be made, except that for any book in Group I. a book from any other may be substituted.

GROUP I. CLASSICS IN TRANSLATION.

The "Old Testament," at least the chief narrative episodes in Genesis, Exodus, Joshua, Judges, Samuel, Kings and Daniel, together with the books of Ruth and Esther.
The "Odyssey," with the omission, if desired, of Books I-V, XV and XVI.
The "Æneid."
The "Odyssey" and the "Æneid" should be read in English translations of recognized literary excellence.

GROUP II. DRAMA.

Shakespeare: "Merchant of Venice," "As You Like It," "Julius Cæsar."

GROUP III. PROSE FICTION.

Dickens: "A Tale of Two Cities."
George Eliot: "Silas Marner."
Scott: "Quentin Durward."
Hawthorne: "The House of the Seven Gables."

GROUP IV. ESSAYS, BIOGRAPHY, ETC.

Addison and Steele: "The Sir Roger de Coverly Papers."
Irving: "The Sketch Book," selections covering about 175 pages.
Macaulay: "Lord Clive."
Parkman: "The Oregon Trail."

GROUP V. POETRY.

Tennyson: "The Coming of Arthur," "Gareth and Lynette," "Lancelot and Elaine," "The Passing of Arthur."
Browning: "Cavalier Tunes," "The Lost Leader," "How They Brought the Good News from Ghent to Aix," "Home Thoughts from Abroad," "Home Thoughts from the Sea," "Incident of the French Camp," "Herve Riel," "Pheidippides," "My Lost Duchess," "Up at a Villa—Down in the City," "The Italian in England," "The Patriot," "The Pied Piper," "De Gustibus," "Instans Tyrannus."
Scott: "The Lady of the Lake."
Coleridge: "The Ancient Mariner."
Arnold: "Sohrab and Rustum."

B. Books for Study. — This part of the requirement is intended as a natural and logical continuation of the student's earlier reading, with greater stress laid upon form and style, the exact meaning of words and phrases, and the understanding of allusions. The books provided for study are arranged in four groups, from each of which one selection is to be made.

The books provided for study are arranged in four groups, from each of which one selection is to be made.

GROUP I. DRAMA.

Shakespeare: "Macbeth," "Hamlet."

GROUP II. POETRY.

Milton: "L'Allegro," "Il Penseroso," "Comus."

Book IV of Palgrave's "Golden Treasury" (first series), with special attention to Wordsworth, Keats and Shelley.

GROUP III. ORATORY.

Burke: "Speech on Conciliation with America."

Washington's "Farewell Address," Webster's "First Bunker Hill Oration," and Lincoln's "Gettysburg Address."

GROUP IV. ESSAYS.

Macaulay: "Life of Johnson."

Carlyle: "Essay on Burns," with a brief selection from Burns's poems.

Examination. — However accurate in subject-matter, no paper will be considered satisfactory if seriously defective in punctuation, spelling or other essentials of good usage.

The examination will be divided into two parts, one of which will be on grammar and composition, and the other on literature.

In grammar and composition, the candidate may be asked specific questions upon the practical essentials of these studies, such as the relation of the various parts of a sentence to one another, the construction of individual words in a sentence of reasonable difficulty, and those good usages of modern English which one should know in distinction from current errors. The main test in composition will consist of one or more essays, developing a theme through several paragraphs; the subjects will be drawn from the books read, from the candidate's other studies and from his personal knowledge and experience quite apart from reading.

The examination in literature will include: —

(a) General questions designed to test such a knowledge and appreciation of literature as may be gained by fulfilling the requirements defined under "A, Reading," above.

(b) A test on the books prescribed for study, which will consist of questions upon their content and structure, and upon the meaning of such words, phrases and allusions as may be necessary to an understanding of the works and an appreciation of their salient qualities of style. General questions may also be asked concerning the lives of the authors, their works and the periods of literary history to which they belong.

FRENCH. — Elementary: The necessary preparation for this examination is stated in the description of the two-year course in elementary French recommended by the Modern Language Association, contained in the definition of requirements of the College Entrance Examination Board.

Third and fourth year French (elective subjects for admission). — For a third credit unit in French as an elective subject for entrance, the work heretofore described by the College Entrance Examination Board as “intermediate” is expected. For a fourth credit unit, the work described as “advanced” is expected.

No examination for a third unit in French will be given unless the candidate has presented elementary French on certificate, or has written the examination in elementary French.

No examination for a fourth credit in French will be given unless the candidate has presented both elementary and intermediate French upon certificate, or has written the examination in both elementary and intermediate French.

GERMAN. — Elementary: The entrance requirements in German conform to those of the College Entrance Examination Board for elementary German (the standard two-year requirements).

Third and fourth year German (elective subjects for admission). — For a third credit unit in German as an elective subject for entrance, when required units have been offered in German, the work heretofore described by the College Entrance Examination Board as “intermediate” is expected. For a fourth credit unit, the work described as “advanced” is expected.

No examination for a third unit in German will be given unless the candidate has presented elementary German upon certificate, or has written the examination in elementary German.

No examination for a fourth credit in German will be given unless the candidate has presented both elementary and intermediate German upon certificate, or has written the examination for both elementary and intermediate German.

GREEK. — Greek will receive credit as an elective requirement upon either examination or certification, as follows. (**The examination in Greek A and Greek B will be given in September only.**)

A. Two credit units will be allowed if satisfactory proficiency is shown (including grammar) in (a) the translation of a passage or passages taken from the first four books of Xenophon’s “Anabasis,” and (b) the translation of passages of Attic prose at sight.

B. A third credit unit will be allowed if, in addition to the above, satisfactory proficiency be shown in (a) the translation of a passage or passages from the first six books of Homer’s “Iliad,” and (b) translation of passages of Homer’s “Iliad” at sight, with questions on the form and constructions of the passages.

LATIN. — Latin will receive credit as an elective requirement upon either examination or certification, as follows: —

A. Two credit units will be allowed if satisfactory proficiency is shown (including grammar) in (a) the translation of a passage or passages taken from Cæsar’s “Gallic War,” covering at least four books, and (b) the translation of passages of Latin prose at sight.

B. A third credit unit will be allowed if, in addition to the above, satisfactory proficiency be shown in (a) the translation of a passage or passages selected from either Books I. to VI. of Virgil’s “Æneid,” or six orations of Cicero, including those against Catiline; and (b) the translation into Latin prose of a passage of connected English narrative based on some portion of Cæsar’s “Gallic War,” Books I. to IV.

COMMERCIAL GEOGRAPHY.¹— Preparation should be made in a course equivalent to that laid down in Adams' "Commercial Geography," Trotter's "Geography of Commerce," or a similar work. (No examination given.)

DRAWING.¹— The applicant may offer either freehand or mechanical drawing or both. He must be able to make an accurate freehand sketch, in either outline or light and shade, of the appearance of a group of geometric solids, and have a sufficient knowledge of perspective to enable him to draw correctly a simple geometric model from memory; or, if he present mechanical drawing, he must have working familiarity with drawing instruments, and be able to make an accurate inked working drawing, in orthographic projection, of some simple object. Emphasis is laid on facility in doing good freehand lettering. For a limitation of the work that may be presented, see "Manual Training." (No examination given.)

MANUAL TRAINING.¹— An entrance credit of one-half or one unit is allowed for manual training, on the presentation of a certificate from the principal of the school showing the scope and character of the applicant's work. The preparation may include mechanical drawing, working in wood, metals, leather, etc. When mechanical drawing is presented as a part of the work in manual training, no other credit for drawing will be allowed. No examination is given in this subject; applicants must present certificates to secure credit.

E. ADMISSION TO ADVANCED STANDING.

Candidates for admission to advanced standing, in addition to meeting the regular entrance requirements, must also pass examinations in those subjects already pursued by the class they desire to enter. To meet this requirement, a student transferring to this college from another college or university of recognized standing must present the following credentials:—

1. A letter of honorable dismissal from the institution with which he has been connected.
2. A statement or certificate of his entrance record.
3. A statement from the proper officer showing a complete record of his work while in attendance.
4. A marked catalogue showing the courses pursued.

These credentials should be presented to the registrar. Applications will be judged wholly on their merits and the college may prescribe additional tests before accepting applicants or determining the standing to be granted them.

F. OTHER INFORMATION ABOUT ENTRANCE.

1. The privileges of the college may be withdrawn from any student at any time if such action is deemed advisable. (It is immaterial whether the pupil has entered by certificate or by examination.)

2. The examination in each subject may be either oral or written, or both. The standard required for passing an entrance examination is 65 per cent.

3. Candidates must receive credit for twelve units out of the total number required for entrance, and will be conditioned in those subjects not passed. Not more than five and one-half credits from the elective group will be accepted. No candidate deficient in both algebra and plane geometry will be admitted.

¹ On certificate only; no examination given.

4. Examinations for the removal of entrance conditions will be held as follows: (1) First entrance condition examination during the first week of the second term. (2) Second entrance condition examination before the beginning of the period of final examinations of the second term, upon the payment of a fee of \$5 to the treasurer.

5. Credits for entrance requirements, whether gained by certificate or by examination, will hold good for one year.

6. Examinations in part of the subjects required for entrance may be taken one year before entering college.

7. For information concerning expenses, scholarships, etc., see "General Information."

8. For information concerning admission to short courses see "Short Courses."

G. UNCLASSIFIED STUDENTS.

All requests for information concerning admission of unclassified students should be addressed to Dean Edward M. Lewis, chairman of committee on unclassified students.

Students not candidates for a degree (unclassified students) are admitted under the following provisions:—

1. All unclassified students are subject to the supervision of a special committee.

2. No applicant under eighteen years of age will be admitted as an unclassified student.

3. No entrance examination is required, but applicants must bring certificates showing that they have finished a four-year high school course or its equivalent, or that they are graduates of a county agricultural school of Massachusetts, and furnish satisfactory testimonials as to moral character.

4. No student of this or any other institution who has not done efficient work therein shall be permitted to register as an unclassified student.

5. Each unclassified student must take from the regular technical elective courses, and necessary prerequisites, a minimum of twelve credit hours a week.

6. In order to be admitted to any course, an unclassified student must have had all prerequisite subjects for that course.

7. Every unclassified student must do all the work of the courses elected, and take all examinations therein. In order to pass such courses he must attain a grade of at least 60 per cent. An unclassified student who passes in less than 60 per cent of his work will be dropped from college.

8. Any unclassified student may be dropped from college at any time if his presence in any class is undesirable or his work is unsatisfactory; and no unclassified student will be allowed to remain in college more than six terms without the special permission of the faculty.

9. No unclassified student shall be allowed to participate in any inter-collegiate contests.

10. Unclassified students are subject to the general regulations applying to classified students.

11. Every unclassified student should clearly understand that before any application for transfer to the regular registration for the Bachelor of Science degree will be considered by the registrar, he must present all entrance credits either by certificate or by examination in the same way as is required of a student who enters regularly.

COURSES OF INSTRUCTION.

TABLE OF FRESHMAN AND SOPHOMORE SUBJECTS.

[The figures indicate the number of credit hours a week. For details, see the descriptions of courses.]

FRESHMAN YEAR.

FIRST TERM.

All work required.

SUBJECT.	Courses and Numbers.	Credit Hours per Week.
Chemistry,	Chemistry 1 or 4,	3
Algebra,	Mathematics 1,	5
Language,	French or German 1 or 4,	3
English,	English 1,	3
Agriculture,	Agromony 1, Horticulture 1,	3
Tactics,	Military 1,	1
Drill,	Military 4,	1
Hygiene,	Physical Education 1,	1
Public speaking,	Public Speaking 1 (one-third of the class),	1
		21

College life (attendance without credit).

SECOND TERM.

Chemistry,	Chemistry 2 or 5,	3
Algebra,	Mathematics 2,	2
Trigonometry,	Mathematics 5,	3
Language,	French or German 2 or 5,	3
English,	English 2,	3
Agriculture,	Poultry 1, Animal Husbandry 1,	3
Tactics,	Military 2,	1
Drill,	Military 5,	1
Geology,	Geology 2,	2
Public speaking,	Public Speaking 1 (one-third of class),	1
		22

College life (attendance without credit).

FRESHMAN YEAR — *Concluded.*

THIRD TERM.

SUBJECT.	Courses and Numbers.	Credit Hours per Week.
Chemistry,	Chemistry 3 or 6,	3
Solid geometry,	Mathematics 3,	3
Mensuration,	Mathematics 6,	2
Language,	French or German 3 or 6,	3
English,	English 3,	3
Botany,	Botany 3,	3
Tactics,	Military 3,	1
Drill,	Military 6,	1
Recreation,	Physical Education 3,	1
Public speaking,	Public Speaking 1 (one-third of class),	1
		21

College life (attendance without credit).

SOPHOMORE YEAR.

FIRST TERM.

SUBJECT.	Course Number.	Class Hours.	Two Hour Laboratory Periods.	Credit Hours per Week.
<i>Required.</i>				
Physics,	25	3	1	4
Zoölogy,	25	2	2	4
Botany,	25	1	2	3
English,	25	2	-	2
Military,	25	1	-	1
Military,	28	-	2	1
Total required,	-	-	-	15
<i>Elective.</i>				
Chemistry,	25	1	2	3
French,	25 or 28	3	-	3
German,	25 or 28	3	-	3
Drawing,	25	-	3	3
Animal husbandry,	25	2	1	3
Rural engineering,	25	-	2	2

Minimum credit for first term, 18.

Maximum credit for first term, 21.

SOPHOMORE YEAR — *Concluded.*

SECOND TERM.

SUBJECT.	Course Number.	Class Hours.	Two Hour Laboratory Periods.	Credit Hours per Week.
<i>Required.</i>				
Physics,	26	2	1	3
Agricultural economics,	26	5	-	5
English,	26	2	-	2
Military,	26	1	-	1
Military,	29	-	2	1
Total required,	-	-	-	12
<i>Elective.</i>				
Chemistry,	26	1	2	3
French,	26 or 29	3	-	3
German,	26 or 29	3	-	3
Mathematics,	26	2	-	2
Drawing,	26	-	3	3
Entomology,	26	3	-	3
Animal husbandry,	26	2	1	3
Rural engineering,	26	-	2	2
Botany,	26	1	2	3
Economic sociology,	26	5	-	5

Minimum credit for second term, 18.

Maximum credit for second term, 20.

THIRD TERM.

<i>Required.</i>				
Rural sociology,	27	3	-	3
Agronomy,	27	4	1	5
English,	27	2	-	2
Military,	27	1	-	1
Military,	30	-	2	1
Physical education, ¹	26	-	1	1
Total required,	-	-	-	13
<i>Elective.</i>				
Chemistry,	27	1	4	5
Chemistry,	30	3	2	5
French,	27 or 30	3	-	3
German,	27 or 30	3	-	3
Mathematics,	27	-	3	3
Drawing,	27	-	3	3
Entomology,	27	-	2	2
Geology,	27	3	2	5
Physics,	27	4	1	5
Horticulture,	27	2	1	3
Zoology,	27	1	2	3

Minimum credit for third term, 19.

Maximum credit for third term, 22.

¹ Credit for Physical Education 2 and 3 given in third term.

MAJORS: JUNIOR AND SENIOR YEARS.

GENERAL STATEMENT.

A major consists of 45 credit hours of correlated work, to be arranged by the student and an instructor called the adviser.

The list of courses found under each major on subsequent pages should not be considered as necessarily a rigid program to be followed. The heads of departments have suggested this series of courses as the best for the average man majoring in their departments. Advisers may, however, make modifications to suit the particular needs of the student, provided these modifications conform precisely to the class schedule as published for the year.

RULES GOVERNING MAJORS.

RULE 1. *Election.* — Each student, before the first term of his junior year, shall elect a major subject from the list of majors given below; and this major shall consist of 45 credit hours of correlated work.

RULE 2. *Minimum Credits.* — The minimum number of credits for graduation shall be 237 credit hours, inclusive of military drill and physical education.

RULE 3. *Maximum Credits.* — The maximum number of credits for any term of the junior or senior year shall be 22; the minimum shall be 19.

RULE 4. *Humanities and Rural Social Science.* — A minimum of 18 credit hours in the Divisions of the Humanities and Rural Social Science will be required of all students during their junior and senior years, with the following restriction: that a minimum of 5 credit hours will be required in each of the divisions.

RULE 5. *Advisers.* — The work of each junior and senior will be under the immediate supervision of an instructor designated as major adviser. Ordinarily, the major adviser will be the head of the department in which the student intends to elect his major. Each student should consult with the adviser as soon as possible. The adviser has full authority to prescribe the student's work up to 45 hours. It is understood, however, that so far as practicable the individual needs of the student will be recognized. It is also hoped and expected that students will be disposed to seek the counsel of the adviser with respect to the remaining courses required for graduation.

RULE 6. *Free Electives.* — Each student during his junior and senior years is required to take 45 hours in his major and also 18 hours in the Divisions of the Humanities and Rural Social Science, making a total of 63 hours (but see Rule 4). He is allowed free choice of courses to complete his required hours.

RULE 7. *Registration.* — No junior or senior shall register until his major course of study is approved by his adviser.

(1) Course cards for recording the election of majors will be issued from the registrar's office three weeks before the close of each term.

(2) This card must be submitted by each student to his major adviser, who will lay out the course for the succeeding term and countersign the card.

(3) Each course card must be filled out, giving the name of student, his college address, the name of parent or guardian, and the student's home address. When the major courses have been entered on this card, and the hours

of free elections added by the student, the card must be returned to the registrar one week before the beginning of the final examination period.

RULE 8. *Changes.* — Applications for changes may be made to the dean in writing at any time; when approved by him and by the committee on scholarship, they become operative at the beginning of the term following, provided that no change in the selection of a major may be made by any student after registration day of his senior year.

AGRICULTURE. (Major.)

PROFESSOR JAMES A. FOORD, Adviser.

[The heavy-faced type indicates the term in which the course is given.]

COURSE.	Number.		Term.	Sophomore.		Junior.	Senior.	
	50 I.	75 I.		Credit.	Credit.		Credit.	Credit.
Agronomy,	50 I.	75 I.	I.	Animal Husbandry 25,	3	Agronomy 50,	Animal Husbandry 75,	3
Agronomy,	76 III.	76 II.		Rural Engineering 25,	2	Dairying 50,	Rural Engineering 75,	5
Animal Husbandry,	51 III.	50 I.					Farm Management 75,	3
Animal Husbandry,	75 I.	75 I.	II.	Mathematics 26,	2		Animal Husbandry 76,	3
Animal Husbandry,	76 II.	76 II.		Animal Husbandry 26,	3			
Dairying,	50 I.	50 I.		Rural Engineering 26,	2			
Farm Management,	75 II.	75 II.	III.	Chemistry 30,	5	Microbiology 50,	Agronomy 76,	5
Farm Management,	76 III.	76 III.		Mathematics 27,	3	Animal Husbandry 51,	Farm Management 76,	5
Microbiology,	50 I.	50 I.		Horticulture 27,	3			
or								
Microbiology,	50 III.	50 III.	IV.					
Rural Engineering,	75 I.	75 I.						
					42			

SOPHOMORE ELECTIVE PREREQUISITES (REQUIRED). — Animal Husbandry 25 and 26, Rural Engineering (shop work) 25 and 26, Chemistry 30 or Chemistry 6, Freshman, Mathematics 26 and 27, and Horticulture 27.

ADDITIONAL INFORMATION. — Dairying 75, Pomology 50 and 51, Rural Engineering 78, and Veterinary 51 and 78 are suggested as additional courses for the student fitting himself for general agriculture.

AGRONOMY. (Major.)

Professor ARTHUR B. BEAUMONT, *Adviser.*

[The heavy-faced type indicates the term in which the course is given.]

COURSE.	Number.	Credit.	Term.	Sophomore.		Junior.		Senior.	Credit.	
					Credit.		Credit.			
Agronomy,	50 I.	5	I.	Chemistry 25, . . . . .	. . . . . 3	Agronomy 50, . . . . .	. . . . . 5	Agronomy 75, . . . . .	. . . . . 5
Agronomy,	51 III.	5		German 25 or 28, . . . . .	. . . . . 3	Chemistry 51, . . . . .	. . . . . 8	Animal Husbandry 75, . . . . .	. . . . . 3
Agronomy,	75 I.	5								
Agronomy,	77 II.	5	II.	Botany 26, . . . . .	. . . . . 3	Chemistry 52, . . . . .	. . . . . 8	Agronomy 77, . . . . .	. . . . . 5
Animal Husbandry,	75 I.	3		Chemistry 26, 3					
Chemistry,	51 I.	8		German 26 or 29, 3					
				Mathematics 26, . . . . .	. . . . . 2				
Chemistry,	52 II.	8	III.	German 27 or 30, . . . . .	. . . . . 3	Agronomy 51, . . . . .	. . . . . 5	Farm Management 76, . . . . .	. . . . . 5
Farm Management,	76 III.	5		Mathematics 27, 3					
				Geology 27, 5					
		44	IV.							

SOPHOMORE ELECTIVE PREREQUISITES (REQUIRED). — Chemistry 25 and 26, German 25 or 28, 26 or 29, 27 or 30, Geology 27, Botany 26. ADVISED. — Mathematics 26 and 27.

ANIMAL HUSBANDRY. (Major.)
Professor JOHN C. MCNUTT, Adviser.

[The heavy-faced type indicates the term in which the course is given.]

Course.	Number.	Credit.	Term.	Sophomore.		Junior.		Senior.	Credit.
				Animal Husbandry 25, . 3	Credit.	Agronomy 50, . . . 5 Veterinary 50, . . . 5 Dairying 50, . . . 5	Credit.		
Agronomy,	50 I.	5	I.	Animal Husbandry 25, . 3		Agronomy 50, . . . 5		Animal Husbandry 75, . 3	
Animal Husbandry,	51 III.	3				Veterinary 50, . . . 5		Farm Management 75, . 3	
Animal Husbandry,	50 II.	1				Dairying 50, . . . 5			
Animal Husbandry,	52 III.	3	II.	Animal Husbandry 26, . 3		Animal Husbandry 50, . 3		Animal Husbandry 76, . 3	
Animal Husbandry,	75 I.	3						Animal Husbandry 78, . 3	
Animal Husbandry,	76 II.	3							
Animal Husbandry,	77 III.	3	III.	Chemistry 30, 5		Animal Husbandry 51, . 3		Animal Husbandry 80, . 1	
Animal Husbandry,	78 II.	3				Animal Husbandry 52, . 3		Animal Husbandry 77, . 3	
Animal Husbandry,	80 III.	1						Farm Management 76, . 5	
Dairying,	50 I.	5	IV.						
Farm Management,	75 II.	3							
Farm Management,	76 III.	5							
Veterinary,	50 I.	5							
		43							

SOPHOMORE ELECTIVE PREREQUISITES (REQUIRED). — Animal Husbandry 25 and 26, Chemistry 30.
ADDITIONAL INFORMATION. — The balance of the sophomore electives allowed are left to the student to choose.

DAIRYING. (Major.)

Professor WILLIAM P. B. LOCKWOOD, *Adviser.*

[The heavy-faced type indicates the term in which the course is given.]

COURSE.	Number.	Credit.	Term.	Sophomore.		Junior.		Senior.	Credit.
				Credit.		Credit.			
Animal Husbandry,	52 III.	3	I.	Animal Husbandry 25,	3	Dairying 50,	5	Animal Husbandry 75,	3
Animal Husbandry,	75 I.	3		Rural Engineering 25,	2	Microbiology 50,	5	Microbiology 82,	5
Animal Husbandry,	76 II.	3						Farm Management 75,	3
Dairying,	50 I.	5	II.	Animal Husbandry 26,	3	Rural Engineering 77,	5	Animal Husbandry 76,	3
Dairying,	51 III.	5		Rural Engineering 26,	2	Microbiology 51,	5	Dairying 75,	5
Dairying,	75 II.	5				(Prerequisite to 82.)			
Dairying,	76 III.	5	III.	Chemistry 30,	5	Animal Husbandry 52,	3	Dairying 76,	5
Farm Management,	75 II.	3				Dairying 51,	5		
Microbiology,	50 I.	5							
Microbiology,	82 I.	5							
Rural Engineering,	77 II.	5	IV.						
		47							

SOPHOMORE ELECTIVE PREREQUISITES (REQUIRED). — Animal Husbandry 25 and 26, Rural Engineering 25 and 26, Chemistry 30.
 ADDITIONAL INFORMATION. — The balance of the sophomore electives allowed are left to the student to choose.

POULTRY HUSBANDRY. (Major.)

Professor JOHN C. GRAHAM, *Adviser.*

[The heavy-faced type indicates the term in which the course is given.]

Course.	Number.	Credit.	Term.	Sophomore.	Credit.	Junior.	Credit.	Senior.	Credit.
Animal Husbandry,	51 III.	3	I.			Poultry 50,	3	Poultry 76,	5
Poultry Husbandry,	50 I.	3				Poultry 51,	2	Poultry 77,	5
								Pomology 50,	3
Poultry Husbandry,	51 I.	2	II.			Poultry 52,	3	Poultry 75,	5
Poultry Husbandry,	52 II.	3						Veterinary 86,	3
Poultry Husbandry,	53 III.	5						Poultry 55,	1-5
Poultry Husbandry,	55	1-5							
Poultry Husbandry,	54 III.	2	III.			Poultry 53,	5		
Poultry Husbandry,	75 II.	5				Poultry 54,	2		
Poultry Husbandry,	76 I.	5				Animal Husbandry 51,	5		
Agricultural Economics,	53 III.	5				Agricultural Economics 53,	5		
Poultry Husbandry,	77 I.	5	IV.						
Pomology,	50 I.	3							
Veterinary Science,	86 II.	3							
		45-49							

SOPHOMORE RECOMMENDATIONS. — Students intending to major in Poultry Husbandry are urged to take Zoology 27.
 ADVISED. — Juniors who did not take Zoology 27 as sophomores are strongly advised to include it in their program.

FLORICULTURE.

Associate Professor CLARK L. THAYER, *Adviser.*

[The heavy-faced type indicates the term in which the course is given.]

Course.	Number.	Credit.	Term.	Sophomore.		Junior.		Senior.	Credit.	
					Credit.		Credit.			
Botany,	50 I.	2	I.	Drawing 25,	. . . . . 3	Floriculture 50,	. . . . . 4	Floriculture 75,	. . . . . 3	
Botany,	51 II.	2					Floriculture 53,	. . . . . 3	Horticulture 50,	. . . . . 5
Entomology,	26 II.	3					Botany 50,	. . . . . 2		
Floriculture,	50 I.	4	II.	Drawing 26,	. . . . . 3	Floriculture 51,	. . . . . 4	Floriculture 77,	. . . . . 3	
Floriculture,	51 II.	4			Entomology 26,	. . . . . 3	Floriculture 54,	. . . . . 3	Floriculture 76,	. . . . . 3
Floriculture,	52 III.	4			Botany 26,	. . . . . 3	Entomology 26,	. . . . . 5		
						Botany 51,	. . . . . 2			
Floriculture,	53 I.	3	III.	Drawing 27,	. . . . . 3	Floriculture 52,	. . . . . 4	Floriculture 80,	. . . . . 3	
Floriculture,	54 II.	3			Entomology 27,	. . . . . 2	Floriculture 78,	. . . . . 3	Horticulture 51,	. . . . . 5
Floriculture,	75 I.	3			Horticulture 27,	. . . . . 3				
Floriculture,	76 II.	3								
Floriculture,	77 II.	3	IV.							
Floriculture,	78 III.	3								
Floriculture,	80 III.	3								
Horticulture,	50 I.	5								
Horticulture,	51 III.	5								
		50								

SOPHOMORE ELECTIVE PREREQUISITES. — Drawing 25, 26 and 27, Entomology 26 and 27, Botany 26 and Horticulture 27.

ADDITIONAL INFORMATION. — The rest of the sophomore electives allowed are left to the student to choose. Horticulture 50 and 51 will be taken by seniors.

ADVISED. — The department advises all students who major in this subject to take Botany 78, Entomology 50 and Landscape Gardening 75.

FORESTRY. (Major.)

PROFESSOR WILLIAM D. CLARK, Adviser.

[The heavy-faced type indicates the term in which the course is given.]

Course.	Term.		Sophomore.	Credit.	Junior.	Credit.	Senior.	Credit.
	Number.	Credit.						
Botany,	50 I.	2	Drawing 25, 3 Rural Engineering 25, 2		Forestry 50, 3 Landscape Gardening 50, 5 Horticulture 50, 5 Botany 50, 2		Forestry 75, 5	
Botany,	50 II.	2						
Entomology,	75 III.	4						
Forestry,	50 I.	3	Drawing 26, 3		Forestry 51, 3			
Forestry,	51 II.	3	Mathematics 26, 2		Botany 51, 2			
Forestry,	53 III.	3	Entomology 26, 3		Landscape Gardening 51, 4			
Forestry,	54 IV.	5	Botany 26, 3					
Forestry,	75 I.	5	Drawing 27, 3		Forestry 53, 3		Forestry 78, 3	
Forestry,	78 III.	3	Mathematics 27, 2		Horticulture 51, 5			
Horticulture,	50 I.	5	Entomology 27, 3 Horticulture 27, 3		Entomology 75, 4			
Horticulture,	51 III.	5			Landscape Gardening 53, 5			
Landscape Gardening,	50 I.	5			Forestry 54, 5			
Landscape Gardening,	51 II.	4						
		49						

SOPHOMORE ELECTIVE PREREQUISITES (REQUIRED). — Drawing 25, 26 and 27, Rural Engineering 25, Mathematics 26 and 27, Entomology 26 and 27, Botany 26, Horticulture 27.

ADDITIONAL INFORMATION. — Substitutions according to individual needs may be made in conference with the adviser.

LANDSCAPE GARDENING. (Major.)

Professor FRANK A. WAUGH, *Adviser.*

[The heavy-faced type indicates the term in which the course is given.]

COURSE.	Number.	Credit.	Term.	Sophomore.		Junior.		Senior.	Credit.
					Credit.		Credit.		
Floriculture,	78 III.	3	I.	Drawing 25,	3	Landscape Gardening 50,	5	Landscape Gardening 75,	3
Horticulture,	50 I.	5				Horticulture 50,	5	Landscape Gardening 53, (when not taken in Term IV.),	5
Horticulture,	51 III.	5							
Landscape Gardening,	50 I.	5							
Landscape Gardening,	51 II.	4	II.	Drawing 26,	3	Landscape Gardening 51,	4	Landscape Gardening 76,	4
Landscape Gardening,	52 III.	5		Mathematics 26,	2				
Landscape Gardening,	53 IV.	5		Entomology 26,	3				
Landscape Gardening,	75 I.	3	III.	Drawing 27,	3	Landscape Gardening 52,	5	Landscape Gardening 78 or 79,	3
Landscape Gardening,	76 II.	4		Mathematics 27,	3	Horticulture 51,	5	Landscape Gardening 77,	4
Landscape Gardening,	77 III.	4		Horticulture 27,	3	Landscape Gardening 78 or 79,	3	Floriculture 78,	3
Landscape Gardening, or Landscape Gardening,	78 III. 79 III.	3 3	IV.			Landscape Gardening 53,	5		
		49							

SOPHOMORE ELECTIVE PREREQUISITES (REQUIRED). — Drawing 25, 26 and 27, Mathematics 26 and 27, Horticulture 27.
ADDITIONAL INFORMATION. — Modifications may be permitted when they appear advisable.

POMOLOGY. (Major.)

Professor FRED C. SEARS, Adviser.

[The heavy-faced type indicates the term in which the course is given.]

COURSE.	Number.	Credit.	Term.	Sophomore.	Credit.	Junior.	Credit.	Senior.	Credit.
Agronomy,	77 II.	5	I.			Pomology 50,		Pomology 75,	3
Agronomy,	75 I.	5				Agronomy 76,		Pomology 77,	3
Horticultural Manufactures,	75 I.	5						Pomology 80,	5
								Agronomy 75,	1
								Horticultural Manuf.,	5
									5
Pomology,	50 I.	3	II.			Pomology 51,		Pomology 76,	3
Farm Management,	75 II.	3				Farm Management 75,		Pomology 81,	3
Horticultural Manufactures,	76 II.	3						Agronomy 77,	1
								Horticultural Manuf.,	5
									3
Pomology,	51 II.	3	III.	Horticulture 27,	3			Pomology 78,	3
Pomology,	52 III.	3						Pomology 82,	1
Pomology,	75 I.	3				Rural Engineering 78,		Agricultural Economics 53,	5
Rural Engineering,	78 I.	5							
Agricultural Economics,	53 III.	5							
Pomology,	76 II.		IV.			Pomology 53,			5
Pomology,	77 I.								
Pomology,	78 III.								
Pomology,	80 I.								
Pomology,	81 II.								
Pomology,	82 III.								
		43							

SOPHOMORE ELECTIVE PREREQUISITES (REQUIRED). — Horticulture 27.

ADVISED. — Rural Engineering 26, Entomology 26 and 27.

ADDITIONAL INFORMATION. — The rest of the sophomore electives allowed are left to the student to choose.

VEGETABLE GARDENING. (Major.)

Associate Professor A. L. DACY, *Adviser.*

[The heavy-faced type indicates the term in which the course is given.]

COURSE.	Number.	Credit.	Term.	Sophomore.	Credit.	Junior.	Credit.	Senior.	Credit.
Agronomy,	75 I.	5	I.			Vegetable Gardening 51, . . . 3		Vegetable Gardening 75, . . . 5	
Agronomy,	77 II.	5				Botany 50, 2		Agronomy 75, 5	
Botany,	50 I.	2						Vegetable Gardening 78, . . . 1	
Botany,	51 II.	2							
Vegetable Gardening,	51 I.	3	II.	Botany 26, 3		Vegetable Gardening 52, . . . 3		Vegetable Gardening 76, . . . 5	
Vegetable Gardening,	52 II.	3				Botany 51, 2		Vegetable Gardening 79, . . . 1	
Vegetable Gardening,	53 III.	3						Agronomy 77, 5	
Vegetable Gardening,	54 IV.	5	III.	Horticulture 27, 3		Vegetable Gardening 53, . . . 3		Vegetable Gardening 77, . . . 5	
Vegetable Gardening,	75 I.	5						Vegetable Gardening 80, . . . 1	
Vegetable Gardening,	76 II.	5	IV.			Vegetable Gardening 54, . . . 5			
Vegetable Gardening,	77 III.	5							
Vegetable Gardening,	78	1							
Vegetable Gardening,	79	1							
Vegetable Gardening,	80	1							
		46							

SOPHOMORE ELECIIVE PREREQUISITES (REQUIRED). — Botany 26, Horticulture 27.

ADVISED. — Rural Engineering 26, Entomology 26 and 27.

ADDITIONAL INFORMATION. — The rest of the sophomore electives allowed are left to the student to choose.

ECONOMIC BOTANY. (Major.)
 Professor A. VINCENT OSMUN, *Advisor.*

[The heavy-faced type indicates the term in which the course is given.]

Course.	Number.	Credit.	Term.	Sophomore.	Credit.	Junior.	Credit.	Senior.	Credit.
Botany,	52 I.	3	I.	Chemistry 25,	3	Botany 52,	3	Botany 75,	5
Botany,	53 II.	3		German 25 or 28,	3	Botany 55,	3	Botany 76,	5
Botany,	54 III.	3				Chemistry 51,	8	Botany 78,	5
Botany,	55 I.	3						Botany 86,	1
Botany,	56 II.	3							
Botany,	75 I.	5	II.	Chemistry 26,	3	Botany 53,	3	Botany 76,	5
Botany,	76 II.	5		German 26 or 29,	3	Botany 56,	3	Botany 79,	5
Botany,	77 III.	5		Botany 26,	3			Botany 82,	3
Botany,	78 I.	5						Botany 87,	1
Botany,	79 II.	5							
Botany,	80 III.	5							
Botany,	82 II.	3	III.	German 27 or 30,	3	Botany 54,	3	Botany 77,	5
Botany,	83 III.	3						Botany 80,	5
Botany,	86 I.	1						Botany 83,	3
Botany,	87 II.	1						Botany 88,	1
Botany,	88 III.	1							
Chemistry,	51 I.	8							
		62	IV.						

SOPHOMORE ELECTIVE PREREQUISITES (REQUIRED). — German 25 or 28, 26 or 29, 27 or 30, Botany 26. ADVISED. — Chemistry 25 and 26. ADDITIONAL INFORMATION. — The balance of the sophomore electives allowed are left to the student to choose. Selection of 45 credits of the above (Pathology 75, 76 and 77, Physiology 78, 79 and 80).

AGRICULTURAL CHEMISTRY. (Major.)
 PROFESSOR CHARLES A. PETERS, *Adviser.*

[The heavy-faced type indicates the term in which the course is given.]

Course.		Number.	Credit.	Term.	Sophomore.	Credit.	Junior.	Credit.	Senior.	Credit.
Chemistry,	. . . . .	51 I.	8	I.	Chemistry 25,	. . . . . 3	Chemistry 51,	. . . . . 8	Chemistry 76,	. . . . . 5
Chemistry,	. . . . .	52 II.	8		German 25 or 28,	. . . . . 3	Chemistry 60,	. . . . . 3	Chemistry 80,	. . . . . 5
Chemistry,	. . . . .	62 III.	5							
Chemistry,	. . . . .	65 III.	5	II.	Chemistry 26,	. . . . . 3	Chemistry 52,	. . . . . 8	Chemistry 77,	. . . . . 3
Chemistry,	. . . . .	76 I.	5		German 26 or 29,	. . . . . 3	Chemistry 61,	. . . . . 3	Chemistry 90, 92, 94,	. . . . . 3
Chemistry,	. . . . .	77 II.	5							
Chemistry,	. . . . .	80 I.	5							
Chemistry,	. . . . .	87 III.	3							
Chemistry,	. . . . .	90 II.	3 ¹							
Chemistry,	. . . . .	92 II.	3 ¹							
Chemistry,	. . . . .	94 II.	3 ¹							
Chemistry,	. . . . .	91 III.	5	III.	Chemistry 27,	. . . . . 5	Chemistry 62,	. . . . . 5	Chemistry 91, 93, 95,	. . . . . 5
Chemistry,	. . . . .	93 II.	5		German 27 or 30,	. . . . . 3	Chemistry 65,	. . . . . 5	Chemistry 87,	. . . . . 3
Chemistry,	. . . . .	95 III.	5							
			50 ²	IV.						

SOPHOMORE ELECTIVE PREREQUISITES (REQUIRED). — Chemistry 25, 26 and 27.

ADVISED. — German 25 or 28, 26 or 29, 27 or 30, Entomology 26 and 27.

ADDITIONAL INFORMATION. — The balance of the sophomore electives allowed are left for the student to choose.

¹ Courses 90, 92, 94 may be changed from 3 credits to an option of 3 or 5 credits. Students will select one course from groups 90, 92, 94, and 91, 93, 95 respectively.

² Only 45 credits required.

ECONOMIC ENTOMOLOGY. (Major.)

PROFESSOR HENRY T. FERNALD, *Adviser.*

[The heavy-faced type indicates the term in which the course is given.]

Course.	Number.	Credit.	Term.	Sophomore.	Credit.	Junior.		Senior.	Credit.
Botany, or Botany, Entomology, Entomology,	50 I. 52 I. 50 I. 51 II.	3 3 3 3	I.	French 25 or 28, or German 25 or 28, Chemistry 25.	3 3 3 3	Entomology 50, Entomology 52, Botany 50 or 52, Zoology 50 or 53, or Chemistry 51.	3 5 3 3 3	Entomology 76, Vegetable gardening 50, Horticulture 50.	5 3 5 5
Entomology, Entomology, Entomology, Entomology, Entomology,	53 I. 54 II. 55 III. 75 III. 76 I.	5 3 3 4 5	II.	French 26 or 29, or German 26 or 29, Entomology 26, Botany 26.	3 3 3 3 3	Entomology 51, Entomology 54, Microbiology 50,	3 3 5	Entomology 77, Entomology 90.	3 3
Entomology, Entomology, Entomology,	77 II. 78 III. 90 II.	3 4 3	III.	French 27 or 30, or German 27 or 30, Entomology 27.	3 3 2	Entomology 55, Entomology 75, Horticulture 27, Pomology 79.	3 4 3 3	Entomology 78, Horticulture 51, Pomology 78.	4 5 3 3
Zoology, or Zoology, or Chemistry,	50 I. 53 I. 51 I.	3 3 8	IV.						
		42 or 47							

SOPHOMORE ELECTIVE PREREQUISITES (REQUIRED). — Entomology 26 and 27, Botany 26.

ADVISED. — French or German 25 to 27 or 28 to 30, Chemistry 25; the other subjects (except Entomology) in the last three columns above are merely suggested as desirable to choose from.

MICROBIOLOGY. (Major.)

Professor CHARLES E. MARSHALL, *Advertiser*.

[The heavy-faced type indicates the term in which the course is given.]

COURSE.	Number.	Credit.	Term.	Sophomore.		Junior.	Senior.	Credit.	
					Credit.				
Chemistry,	51 I.	8	I.	Chemistry 25,	3	Microbiology 50,	Microbiology 81,	5	
Chemistry,	52 II.	8		German or French 25 or 28, 3	5	Chemistry 51,	Microbiology 82,	5	
Microbiology,	50 I.	5					Microbiology 83,	5	
or									
Microbiology,	50 II.		II.	German or French 26 or 29, 3	5	Microbiology 51,	Microbiology 75,	5	
or							Chemistry 52,	Microbiology 80,	5
Microbiology,	50 III.						Microbiology 50,	Dairying 75,	5
or									
Microbiology,	51 II.	5	III.	Chemistry 27,	5	Microbiology 50,	Microbiology 76,	5	
or					German or French 27 or 30, 3	5	Microbiology 51,		
Microbiology,	51 III.				Physics 27,	5	Microbiology 52,		
or									
Microbiology,	52 III.	5	IV.						
or									
Microbiology,	81 I.	5							
or									
Microbiology,	82 I.	5							
or									
Microbiology,	83 I.								
or									
Microbiology,	80 II.								
or									
Microbiology,	75 II.	5							
or									
Dairying,	75 I.								
		41							

SOPHOMORE ELECTIVE (RECOMMENDATIONS). — German or French 25 or 28, 26 or 29, 27 or 30, Chemistry 25 and 27, and Physics 27.

ADDITIONAL INFORMATION. — The rest of the sophomore electives allowed are left for the student to choose. Microbiology 51, fall term, will be taken by students who have had Microbiology 50 the preceding spring, and by those who are permitted to omit Microbiology 50.

RURAL JOURNALISM. (Major.)
 Associate Professor ROBERT W. NEAL, *Advertiser*.

[The heavy-faced type indicates the term in which the course is given.]

Course.	Number.	Credit.	Term.	Sophomore.	Credit.	Junior.	Credit.	Senior.	Credit.
Rural Journalism,	50 I.	3	I.			Journalism 50,	3	Journalism 77,	3
Rural Journalism,	51 II.	3				Journalism 51,	3	Journalism 80,	4 (5)
Rural Journalism,	52 III.	3				Agricultural Economics 51,	5		
Two out of three: —			II.						
Rural Journalism,	53 I.	3			Economics and Sociology 26, 5			Journalism 78,	3
Rural Journalism,	54 II.	3					Journalism 54,	3	Journalism 81,	4 (5)
Rural Journalism,	55 III.	3				Economics and Sociology 51,	5		
Two out of three: —			III.						
Rural Journalism,	77 I.	3						Journalism 79,	3
Rural Journalism,	78 II.	3					Journalism 55,	3	Journalism 82,	4 (5)
Rural Journalism,	79 III.	3				Journalism 52,	3		
One from: —									
Entomology,	90 II.	3							
Animal Husbandry,	51 III.	3							
Landscape,	75 I.	3							
Chemistry,	87 III.	3							
All: —									
Rural Journalism,	80 I.	4 (5)							
Rural Journalism,	81 II.	4 (5)							
Rural Journalism,	82 III.	4 (5)							
Rural Sociology,	78 II.	5	IV.						
Agricultural Economics,	51 III.	5							
Economics and Sociology,	51 I.	5							
		45-47							

SOPHOMORE PREREQUISITES. — All sophomore English.

SOPHOMORE RECOMMENDATIONS. — French or German; Drawing 25. For agricultural journalism especially: Animal Husbandry 25, 26, Chemistry 30, Entomology 26, 27.

AGRICULTURAL ECONOMICS. (Major.)

Professor ALEXANDER E. CANCE, Adviser.

[The heavy-faced type indicates the term in which the course is given.]

Course.	Number.	Credit.	Term.	Sophomore.	Credit.	Junior.	Credit.	Senior.	Credit.
Agricultural Economics,	50 I.	5	I.			Agricultural Economics 50, 5		Agricultural Economics 77, 5	
Agricultural Economics,	52 II.	5				Economic Sociology 51, . 5			
Agricultural Economics,	53 III.	5							
Agricultural Economics,	78 III.	3							
Agricultural Economics, or	76 II.	5	II.			Agricultural Economics 52, 5		Agricultural Economics 76, 5	
Agricultural Economics,	77 I.					Rural Sociology 51, . . 3		Rural Sociology 78, . . 5	
Economic Sociology,	51 I.	5				Economic Sociology 50, . 5			
Economic Sociology,	50 II.	5	III.			Rural Sociology 52, . . 3		Farm Management 76, . 5	
Farm Management,	76 III.	5				Agricultural Economics 53, 5		Agricultural Economics 78, 3	
Rural Sociology, or	51 II.	3							
Rural Sociology,	52 III.		IV.						
Rural Sociology,	78 II.	5							
		46							

ADDITIONAL INFORMATION. — The sophomore electives are left to the student to choose. Animal husbandry is suggested for terms I. and II., and Economic Sociology for term III.

AGRICULTURAL EDUCATION. (Major.)

Professor WILLIAM R. HART, Adviser.

[The heavy-faced type indicates the term in which the course is given.]

COURSE.	Number.	Credit.	Term.	Sophomore.	Credit.	Junior.	Credit.	Senior.	Credit.
Agricultural Education (Educational Psychology).	50 I.	5	I.	Animal Husbandry 25, . . . 3		Agricultural Education 50, 5		Agricultural Education 75, 3	
Agricultural Education (Principles of Teaching).	51 II.	5		Rural Engineering 25, . . . 2		Agricultural Education 76, 3		Agricultural Education 80, 1-5	
Agricultural Education (History and Philosophy).	52 III.	5						Agricultural Education 76, 3	
Agricultural Education (Secondary Education).	75 I.	3							
Agricultural Education (Methods in Vocational Agriculture).	76 I.	3	II.	Entomology 26, . . . 3		Agricultural Education 51, 5		Agricultural Education 76, 3	
Agricultural Education (Methods in Vocational Agriculture).	76 II.	3		Rural Engineering 26, . . . 2		Agricultural Education 76, 3		Agricultural Education 77, 5	
Agricultural Education (Methods in Vocational Agriculture).	76 III.	3		Animal Husbandry 26, . . . 3				Agricultural Education 80, 1-5	
Agricultural Education (county agent work).	77 II.	5							
Agricultural Education (county agent work).	77 III.	5	III.	Entomology 27, . . . 3		Agricultural Education 52, 5		Agricultural Education 76, 3	
Agricultural Education (apprentice teaching).	80 I.	1-5		Horticulture 27, . . . 3		Agricultural Education 76, 3		Agricultural Education 77, 5	
Agricultural Education (apprentice teaching).	80 II.	1-5				Agricultural Education 77, 5		Agricultural Education 80, 1-5	
Agricultural Education (apprentice teaching).	80 III.	1-5							
Agricultural Education (apprentice teaching).	80 IV.	1-5	IV.						

Courses available in the Summer School: Agricultural Education 51, 75, 76, 80, and special courses leading to positions as supervisors and directors of agricultural teaching and to college positions in Agricultural Education.

ADDITIONAL INFORMATION. — Courses 50, 51, 76 and 80 or their equivalents are required of all candidates for teaching; credits vary from 14 to 18. Courses 51 and 77 are required of all candidates for county agent work. Students who are intending to teach are recommended to take as many of the sophomore electives listed above as possible in the sophomore year. Programs for juniors and seniors are planned on the basis of individual needs, with a view to the most desirable preparation for the attainment of the student's aim. Some of the aims for which programs are planned are as follows: teaching vocational agriculture; teaching non-agricultural subjects in vocational agricultural schools and departments; teaching agriculture in high schools not of the vocational type; county agent work and Junior Extension work; directing physical education and county Y. M. C. A. work; rural school supervision and rural leadership; positions as supervisors and directors of agricultural teaching; and college positions in Agricultural Education.

RURAL SOCIOLOGY. (Major.)

Professor JOHN PHELAN, *Adviser.*

[The heavy-faced type indicates the term in which the course is given.]

Course.	Number.	Credit.	Term.	Sophomore.	Junior.	Credit.	Senior.	Credit.
Agricultural Economics,	50 I.	5	I.		Agricultural Economics 50,	5	Rural Sociology 75,	3
Agricultural Economics,	52 II.	5			Rural Sociology 50,	3	Economics and Sociology 75,	5
Economics and Sociology,	51 II.	5						
Economics and Sociology,	75 I.	5						
Economic Sociology,	76 III.	5	II.		Rural Sociology 51,	3	Rural Sociology 77,	3
Rural Journalism,	55 III.	3			Agricultural Economics 52,	5	Rural Sociology 78,	5
					Agricultural Education 52,	5		
					Economic Sociology 51,	5		
Rural Sociology,	50 I.	3	III.		Rural Journalism 55,	3	Economic Sociology 76,	5
Rural Sociology,	52 III.	3			Rural Sociology 52,	3		
Rural Sociology,	51 II.	3						
Rural Sociology,	77 II.	3	IV.					
Rural Sociology,	75 I.	3						
Agricultural Education,	52 II.	5						
Rural Sociology,	78 II.	5						
		48						

ADDITIONAL INFORMATION. — The sophomore electives allowed are left to the student to choose.

DESCRIPTION OF COURSES

DESCRIPTION OF COURSES.

DIVISION OF AGRICULTURE.

Professor FOORD.

[Heavy-faced Roman numerals indicate the term in which the course is given. Numbering of courses: 1 to 24, inclusive, freshmen; 25 to 49, inclusive, sophomores; 50 to 74, inclusive, juniors; 75 to 99, inclusive, seniors.]

AGRICULTURE AND HORTICULTURE. Freshmen. This course continuing through the year constitutes the required elementary work dealing with the foundations of the subjects of live stock and the crops of the field, orchard and the garden. Several departments collaborate in giving the work; three credits each term are assigned to this course. For a description of the work see —

Agronomy 1, I.
Animal Husbandry 1, II.
Horticulture, 1, I.
Poultry Husbandry 1, II.

Agronomy.

Professor BEAUMONT, Assistant Professor COOPER, Mr. MERKLE, Mr. THAYER, Mr. PURINGTON, Mr. MALLOREY.

The courses in agronomy are designed to give the student fundamental knowledge concerning the soil and the principal products of the field. The basic course in soils is required of all students. The electives purpose to meet the needs of those specializing in soils and field crops and other specialized fields including both pure and applied science.

The laboratories for soils and fertilizers include one for elementary work, supplied with locker equipment for 200 students, and one for advanced work, accommodating 80 students. These laboratories are equipped with steam and electric ovens, balances, centrifuge, microscopes and other apparatus necessary for a study of soils and fertilizers. Storerooms, stock rooms, and balance rooms are located convenient to the laboratories. There is also a workroom attached, equipped with power machinery for grinding soils, fodders and the like.

The crops' laboratories include one for seed study, having a locker equipment for 50 students, and a laboratory for the study of cereals, forage crops, roots, etc., with lockers for 64 students. The equipment of these laboratories includes steam ovens, constant temperature electric ovens, ovens for seed germination, Brown-Duval moisture apparatus, balances, microscopes, and collections of seeds, grasses, tubers, weeds, etc. A balance room, root cellar and two storerooms, one of which is mouse-proof, are also used for crop work.

A modern steam-heated greenhouse 25 by 35 feet, used for work in soils and crops, is a valuable part of the equipment. Near the greenhouse is a crop

garden on which different varieties of corn, grasses, clovers, etc., are grown for demonstration purposes, and as a source of material for class work. In addition, the general college farm of 250 acres is used for field study in soils and crops, and as a source of material.

Required Courses.

1. **I. AGRONOMY.** — Freshmen. Given as part of the freshman agriculture and horticulture. This course aims, by actual contact with the plants and the plant products, to make the students familiar with the common field, garden and orchard crops of Massachusetts.

Assistant Professor COOPER and the DEPARTMENT.

27. **III. SOILS AND FERTILIZERS.** — Sophomores. A study of soils and their properties, soil management, methods of soil improvement and maintenance of fertility, including the use of farm manures, commercial fertilizers and soil amendments.

4 class hours.

1 2-hour laboratory period, credit, 5.

Professor BEAUMONT and the DEPARTMENT.

Prerequisites, Freshman-required Chemistry.

Elective Courses.

50. **I. FIELD AND FORAGE CROPS.** — For juniors; seniors may elect. History, classification and production of corn and of those grasses, legumes, root and tuber crops suited to New England conditions. Crops of less importance in New England are briefly considered. The work includes lecture, laboratory and field study.

2 class hours.

3 2-hour laboratory periods, credit, 5.

Assistant Professor COOPER and the DEPARTMENT.

Prerequisites, Agronomy 27, Botany 3.

51. **III. ADVANCED FIELD CROPS.** — For juniors; seniors may elect. Study of the cereals and other field crops not taken up or only briefly considered in Course 50. General problems of crop production are also considered, and the work is not entirely confined to New England conditions. The laboratory work includes a study of the cereals, the quality of seeds, grains and crop products, crop problems and field work with such crops as are available.

3 class hours.

2 2-hour laboratory periods, credit, 5.

Assistant Professor COOPER and the DEPARTMENT.

Prerequisite, Agronomy 50.

75. **I. ADVANCED SOILS.** — For seniors; juniors may elect. A field, lecture and laboratory course on soils and their adaptability to different uses. The field work consists of a detailed study of soil textures, natural and spontaneous vegetation and other factors which indicate the fertility and adaptation of the soil; accompanied by a laboratory study of the physical properties of the soils sampled.

2 class hours.

1 4-hour and 1 2-hour laboratory period, credit, 5.

Professor BEAUMONT and Mr. MERKLE.

Prerequisite, Agronomy 27. Advised, Geology, 27.

76. **III. DRAINAGE AND IRRIGATION.** — For seniors; juniors may elect. A field and lecture course on soil improvement by drainage and irrigation, with special reference to problems of this nature as faced by Massachusetts farmers. To accompany Rural Engineering 79, **III.**

1 class hour.

1 2-hour laboratory period, credit, 2.

Mr. MERKLE.

Prerequisites, Mathematics 26 and 27, Agronomy 27.

77. **II. MANURES AND FERTILIZERS.** — Seniors. An advanced course, giving a general discussion of the different theories which have been held relative to the functions and importance of manures and fertilizers, and leading up to the views at present accepted. Considerable attention is devoted to consideration of the experimental work which has been done, and which is now in progress. The laboratory work consists of a study of fertilizers, fertilizer mixtures, limes and culture work.

3 class hours.

2 2-hour laboratory periods, credit, 5.

Professor BEAUMONT and Mr. MERKLE.

Prerequisite, Agronomy 27. Advised, Chemistry 27.

78. **II. BREEDING* OF FIELD CROPS.** — Seniors. This course deals with the improvement, by selection and breeding, of the crops studied in Courses 50 and 51.

2 class hours.

1 2-hour laboratory period, credit, 3.

Assistant Professor COOPER.

Prerequisite, Agronomy 51.

Animal Husbandry.

Professor MCNUTT, Assistant Professor RICE, Mr. HOLDEN.

It is the purpose of this department to give students a broad, comprehensive knowledge of the subject of animal husbandry. The courses are arranged so that a student first studies the breeds of live stock and types and market classes of live stock. These courses are followed with courses in judging, breeding, feeding and management, so that the student has an opportunity to secure a thorough training in animal husbandry.

The department is equipped with an excellent laboratory, Grinnell Arena, which has a seating capacity of 180, and which is fully adapted to the requirements. There are upwards of 125 head of dairy cattle of various ages available for classroom work; among these are included superior representatives of the Jersey, Guernsey, Ayrshire and Holstein, of the best breeding and individuality. Considerable numbers of pure-bred Berkshire and Chester White pigs are maintained. The college possesses pure-bred Percherons besides several work teams of different types, which are available for classroom purposes. A set of plaster of Paris models of individuals of foreign and domestic breeds of horses, cattle, sheep and swine, and a collection of the different foodstuffs available for the use of the New England farmer, are included in the equipment for this work. An excellent set of upward of 250 lantern slides portraying the leading prize-winning, producing and breeding animals of the leading breeds, — horses, cattle, sheep and swine, — belongs to this department, and is regularly used in instructional work. This equipment is being added to from time to time as funds are available.

Required Course.

1. **II. ANIMAL HUSBANDRY.**— Freshmen. Given as part of the freshman agriculture and horticulture. This course acquaints the student with the foundations of the live-stock industry. In the lectures the types and market classes of farm animals, and their uses, are considered; in the laboratory period elementary judging practice familiarizes the student with animals of the various types.

1 class hour.

1 2-hour laboratory period, credit, 2.

Mr. HOLDEN.

Elective Courses.

25. **I. BREEDS AND TYPES OF LIVE STOCK.**— Sophomores. A course covering the origin, history, development and characteristics of the different breeds of horses, cattle, sheep and swine. Textbook, Plumb's "Breeds and Types of Farm Animals."

2 lectures.

1 2-hour laboratory period, credit, 3.

Assistant Professor RICE and Mr. HOLDEN.

26. **II. BREEDS AND TYPES OF LIVE STOCK.**— Sophomores. Continuation of Course 25.

2 lectures.

1 2-hour laboratory period, credit, 3.

Assistant Professor RICE and Mr. HOLDEN.

Prerequisite, Animal Husbandry 25.

50. **II. LIVE-STOCK MANAGEMENT.**— For juniors; seniors may elect. The work of this course consists of laboratory work by the individual students in the handling of live stock; with horses, such work as halter breaking, harnessing, casting and fitting for show will be done; similarly, the practical handling of cattle, sheep and swine will be fully treated. Special study is given to halter making, splicing, hitches, knots and all rope work.

2 lectures.

1 2-hour laboratory period, credit, 3.

Professor McNUTT.

Prerequisites, Animal Husbandry 25 and 26.

51. **III. PRINCIPLES OF BREEDING.**— For juniors; seniors may elect. This course is designed to familiarize the student with the problems that are involved in animal improvement; to acquaint him with the facts which are already established; to scrutinize prevailing theories; and to indicate the lines and methods of further work. Some of the subjects studied are: variations, their causes and heritability; DeVrie's theory of mutations; the inheritance of acquired characters; the pure line; Mendelian law; the making of new types; the determination of sex; applications to human heredity. A few periods at the end of the course are devoted especially to the application of principles in live-stock improvement. "Genetics," by Herbert E. Walter. Supplementary reading.

3 class hours.

Credit, 3.

Assistant Professor RICE.

Prerequisite, Zoölogy 25.

52. **III. ADVANCED STOCK JUDGING.** — For juniors; seniors may elect. This course is designed to equip animal husbandry students in the judging of classes of different types of live stock; to strengthen them in the selection of superior sires; and equip them for stock judging at fairs. Visits will be made to the best herds for the various breeds of stock in the State. Judging teams to represent the college will be selected from this class.

1 2-hour and 1 4-hour laboratory period, credit, 3.
Professor McNUTT.

Prerequisite, Animal Husbandry 50.

75. **I. FEEDING AND MANAGEMENT.** — For seniors; juniors may elect. A study of the principles of animal nutrition; of the composition and qualities of feeding materials. Textbook, Henry's "Feeds and Feeding."

3 class hours.

Credit, 3.

Assistant Professor RICE.

Prerequisite, Chemistry 30 or 51.

76. **II. FEEDING AND MANAGEMENT.** — For seniors; juniors may elect. A study of the feeding, care and management of dairy cattle from birth to maturity, with especial attention to economic production. Textbook, Henry's "Feeds and Feeding."

3 class hours.

Credit, 3.

Assistant Professor RICE.

Prerequisite, Chemistry 30 or 51.

77. **III. FEEDING AND MANAGEMENT.** — For seniors; juniors may elect. A continuation of Courses 75 and 76, dealing in a similar manner with horses, sheep, beef cattle and swine.

3 class hours.

Credit, 3.

Assistant Professor RICE.

Prerequisite, Animal Husbandry 75.

78. **II. HERD AND STUD-BOOK STUDY.** — For seniors; juniors may elect. An advanced course in the study of the breeds of live stock, familiarizing the student with the detailed history of the breed, the most productive sires and dams of the various breeds, and the successful lines and methods of breeding.

1 class hour.

2 2-hour laboratory periods, credit, 3.

Professor McNUTT.

Prerequisite, Animal Husbandry 75.

80. **III. SEMINAR.** — For seniors majoring in animal husbandry only. Advanced study upon questions pertaining to live stock and live-stock production. Each student electing this work will choose some particular line of work in which he is specially interested, and will pursue study in this subject by reading, compilation and research. There will be no regular lecture period, but seminars will be held. A satisfactory report of the results must be presented in a thesis.

1 2-hour laboratory period, credit, 1.

Professor McNUTT.

Dairying.

Professor LOCKWOOD, Associate Professor JUDKINS, Assistant Professor YAXIS, Mr. VAN HORN, Mr. WHEELER.

The dairy manufactures building is new, well lighted and of sanitary construction. It is designed and equipped especially for teaching dairy manufactures. The equipment includes all kinds of machinery that are considered essential to the proper handling of milk and the making of cream, butter, ice cream and soft cheeses.

Course 77 is given for students who wish to get a general idea of dairy work and manufacturing processes. Part of the courses are arranged to give instruction in general dairy work as associated with Massachusetts agriculture; part are arranged to give to a smaller group of students more complete work in manufactures.

Elective Courses.

50. **I. MILK AND MILK COMPOSITION.** — For juniors; seniors may elect. The development of the dairy business in the United States; the composition, secretion and general characteristics of milk; contamination and fermentation; the study of analysis of milk products by use of the Babcock test for fat, tests for acidity and adulteration, and ordinary preservatives; moisture tests for butter; methods for testing herds and developing them to higher efficiency; problems.

3 class hours.

2 2-hour laboratory periods, credit, 5.

Professor LOCKWOOD and Mr. WHEELER.

51. **III. BUTTER MAKING.** — For juniors; seniors may elect. A study of separators and cream separation; handling milk and cream for butter making; preparation of starters, and ripening cream; churning; markets and their requirements; marketing, scoring and judging butter; management; problems; dairy machinery and care thereof.

2 class hours.

2 3-hour laboratory periods, credit, 5.

Associate Professor JUDKINS and Mr. VAN HORN.

Prerequisite, Dairying 50.

75. **II. MARKET MILK.** — For seniors; juniors may elect. A study of market-milk conditions; extent and development of the business; supply and delivery; food value of milk and its uses as food; milk and its relation to the public health; proper methods for handling milk and cream for direct consumption; certified milk, requirements and production; pasteurizing; sterilizing; standardizing and modifying; milk laws and inspection.

3 class hours.

2 2-hour laboratory periods, credit, 5.

Professor LOCKWOOD and the DEPARTMENT.

Prerequisite, Dairying 50.

76. **III. MILK PRODUCTS.** — For seniors; juniors may elect. The manufacture of milk products other than butter, including cheddar cheese, soft and fancy cheese, ice cream, condensed milk, casein, milk powder, etc. Laboratories, largely the making of soft and fancy cheese and ice cream.

2 class hours.

2 3-hour laboratory periods, credit, 5.

Mr. WHEELER.

Prerequisite, Dairying 75.

77. **I. DAIRYING.** — For seniors; juniors may elect. A general course designed primarily for students who wish to take only one course in dairying. The work given will cover briefly the composition and secretion of milk, the Babcock fat test, the relation of bacteria to dairy work and principles of creaming; separators; elementary butter making; proper methods of handling milk and cream; and the relation of market milk to the public health.

3 lecture hours.

2 2-hour laboratory periods, credit, 5.

Mr. WHEELER and the DEPARTMENT.

Farm Management.

Professor FOORD, Assistant Professor ABELL, Mr. SPENCER.

The purpose of the courses in this department is to introduce the student to a consideration of farming as a business. This involves a knowledge of the cost of production and the profit from the different enterprises such as dairy, poultry or orchard, and a study of the enterprises, and the relative amounts of each that will give the best use of labor and equipment on the farm under consideration.

The college farm of 250 acres is under the general supervision of the Department of Farm Management, and furnishes demonstration material. It includes improved land, pasture land and a farm wood lot. The improved land illustrates the value of good culture and the best known methods for the maintenance of fertility. The farm is equipped with suitable buildings and good machinery for the work carried on, of which the production of certified milk is an important branch. Several good farms in the vicinity, illustrating types of both special and general agriculture, may be inspected and studied. The offices of the department are in Stockbridge Hall.

Elective Courses.

75. **I. FARM COST ACCOUNTING.** — For seniors; juniors may elect. A study of farm inventories, single-enterprise accounts, complete farm accounts, and farm records. Special emphasis is given to the interpretation of results and their application in the organization and management of the farm.

1 class hour.

2 2-hour laboratory periods, credit, 3.

Mr. SPENCER.

76. **III. FARM MANAGEMENT.** — For seniors; juniors may elect. The student should have had considerable farm experience before taking this course. Discussion and study of farming as a business; size, diversity and production and their influence on the farmer's labor income; relation of live stock to profits; regions and types of farming; cropping systems; arrangement of fields and buildings; use of labor, horses and machinery; marketing; methods of renting land; proper division of capital; choosing and buying a farm.

3 class hours.

2 2-hour laboratory periods, credit, 5.

Professor FOORD.

Prerequisites, Agronomy 50, Animal Husbandry 25 and 26.

Poultry Husbandry.

Professor GRAHAM,¹ Associate Professor PAYNE, Dr. GOODALE, Mr. BANTA, Mr. DEAN.

The introductory courses (1, 50, 51, 52, 53, 54) give a knowledge of the general routine of elementary poultry keeping. The advanced studies prepare men for the successful operation of poultry plants, either as owners or managers. In the graduate work further preparation may be secured for teaching, extension or investigation.

The poultry plant consists of 8 acres of land sloping gently to the west. The buildings consist of three incubator cellars equipped with a number of lamp incubators and two mammoth machines with a total capacity of 9,000 eggs; a pipe brooder house (open pipe system) and 40 colony brooder houses which give a brooding capacity for 7,000 chicks, the equipment for these houses including a large variety of coal-stove brooders and kerosene hovers; a long laying house 14 by 180 feet, which accommodates 500 layers, furnishing facilities for student work in pen management, utility and fancy judging, etc.; and a laboratory 14 by 80, for killing, picking, drawing, trussing, packing, crate fattening and cramming. The fattening equipment consists of a modern sanitary all-steel battery with 16 compartments and 10 wooden crates, accommodating, altogether, 350 birds. There are also a storage building, 28 by 64 feet, for root cellar, poultry carpentry, poultry mechanics, feed room and storage; an experimental breeding house, 18 by 60; a combination laying, testing and breeding house, 18 by 72, for experimental purposes; a model laying house, 18 by 30, for 100 hens, and a house 20 by 40, for 200 hens. The six old experiment-station houses, each 12 by 18 feet, are used as special mating and overflow pens. The total capacity for laying hens is 1,600. A manure shed 14 by 18 feet; an oil and tool house 10 by 12; an incinerator 10 by 10; and two backyard model poultry houses 8 by 10 and 8 by 8 give a total of 76 buildings, not including a pheasant run, 16 roosting sheds 10 by 10, and numerous small coops for natural incubation and brooding.

Required Course.

1. I. POULTRY HUSBANDRY. — Given as part of the freshman agriculture and horticulture. The object of this course is to familiarize the student in a general way with the fundamental principles of poultry husbandry, — breeds and varieties of poultry, types of houses, feeds and feeding, management, marketing and the principles of incubation and brooding.

1 2-hour period, credit 1.

Mr. BANTA.

Elective Courses.

50. I. ELEMENTS OF POULTRY CULTURE. — For juniors; seniors may elect. This course consists of a comprehensive study of opportunities in poultry culture, poultry-house construction, poultry-house equipment, feeds and feeding, winter-egg production, types and breeds of poultry.

3 class hours.

Credit, 3.

Professor GRAHAM, Associate Professor PAYNE and Mr. BANTA.

¹ On leave of absence, 1919.

51. **I. POULTRY PRACTICE WORK.** — For juniors; seniors may elect. This is a practical laboratory course providing a study of external parasites, insecticides, poultry carpentry, caponizing, killing and picking; dressing and packing poultry.

2 2-hour laboratory periods, credit, 2.

Associate Professor PAYNE.

Prerequisite, must be accompanied by Poultry 50.

52. **II. ELEMENTS OF POULTRY CULTURE.** — For juniors; seniors may elect. This course treats the subjects of incubation, brooding, care of growing stock, breeding for egg-production and diseases of poultry.

3 class hours.

Credit, 3.

Associate Professor PAYNE and Mr. BANTA.

Prerequisite, Poultry 50.

53. **III. INCUBATION AND BROODING.** — For juniors; seniors may elect. In this course students are required to set up and operate incubators and brooders, make a systematic study of the development of the chick in the egg and the care of sitting hens. Laboratory time by arrangement.

1 class hour.

4 2-hour laboratory periods, credit, 5.

Associate Professor PAYNE.

Prerequisite, Poultry 52.

54. **III. PEN MANAGEMENT.** — For juniors; seniors may elect. This is a practical laboratory course. Students are required to care for a pen of fowls, keeping accurate records of eggs produced, food consumed, weather conditions, health of fowls and profit and loss.

1 2-hour laboratory period, credit, 1.

Mr. BANTA.

Prerequisite, Poultry 50.

55. **I., II. and III. INVESTIGATIONAL WORK.** — Seniors. This course is designed especially for students who are planning to do experiment station work. Students will be assigned specific problems to work out experimentally, or they may be required to assist in carrying on such work.

1 to 5 2-hour laboratory periods, credits, 1 to 5.

Dr. GOODALE.

75. **II. POULTRY MANAGEMENT.** — Seniors. A detailed study of large poultry farms and their equipment, such as bone cutters, feed cutters, cramming machines, etc.; the laying out and planning of poultry buildings of all kinds; mating of fowls. Attention to poultry diseases and investigation work carried on by experiment station is prominent. A few good poultry plants will be visited by the class for practical demonstrations.

5 class hours.

Credit, 5.

Professor GRAHAM.

Prerequisites, Poultry 53, 54, 76 and 77.

76. **I. ADVANCED POULTRY JUDGING.** — Seniors. This course includes a study of the origin and history of breeds and varieties, poultry organizations and poultry shows. The laboratory work covers score card and compara-

tive judging of exhibition and utility poultry; conditioning show birds, and applying the latest methods of selecting high and low producing hens. A few of the best Connecticut Valley poultry shows will be visited by the class. The American Standard of Perfection will be used as a text.

2 class hours.

3 2-hour laboratory periods, credit, 5.

Mr. BANTA.

Prerequisite, Poultry 53.

77. I. MARKET POULTRY AND POULTRY PRODUCTS.—Seniors. This course includes the study of market classifications of poultry, eggs and feathers, the requirements of different markets, methods of marketing, advantages and disadvantages of cold storage of poultry and eggs. Students will be required to fatten several lots of chickens by different methods and rations. Accurate data must be kept showing the gain in weight and quality, also the cost of feed, labor, etc., and the profit and loss. Preserving eggs, judging and scoring of market poultry, both alive and dressed, and market eggs will be an important feature of this course.

2 class hours.

3 2-hour laboratory periods, credit, 5.

Associate Professor PAYNE.

Prerequisites, Poultry 50, 51 and 52.

Rural Engineering.

Professor GUNNESS, Assistant Professor STRAHAN, Mr. PUSHEE, Mr. NEWLON.

The courses in rural engineering are planned to give a working knowledge of those phases of engineering which apply directly to the farm. It is expected that the student will get a clear understanding of modern farm practice as it relates to permanent improvements of the farm and the farmstead, and in the selection and use of farm equipment.

This department has an office and the use of a lecture room in Stockbridge Hall. The work on farm structures is given in the large drawing room in the same building. This room is fitted with thirty drawing tables. Models and blue prints are available for the study of farm buildings. A set of post molds and a machine for making cement tile afford opportunity for practical work with cement.

The rural engineering shop building is a one-story structure 68 by 126 feet. The carpenter shop in this building is fitted with benches fully equipped with tools for each student. A saw table is available for getting out material. The general repair shop is equipped with forges, benches, a drill press and grinders. The laboratory for farm machinery and farm motors is equipped with a complete line of field machines, gasoline engines, tractors and pumps. A complete assortment of engine accessories, consisting of carburetors, magnetos, etc., is available for thorough instruction in gas engines. A small dynamo and switchboard are used in the study of farm-lighting systems. The work on the small field machines is given in the basement of Stockbridge Hall, and the work on steam engines and steam heating is given in Flint Laboratory.

Elective Courses.

25. **I. and III. CARPENTRY.** — For sophomores; juniors and seniors may elect. Practice in the use of tools by exercises in bench work, repair of farm equipment and farm building construction.

2 2-hour laboratory periods, credit, 2.
Mr. PUSHEE.

26. **II. and III. REPAIR OF FARM EQUIPMENT.** — For sophomores; juniors and seniors may elect. Exercises in forge work, pipe fitting, soldering, babbitting and fitting bearings, lining up shafting, lacing belts and splicing rope. Practice in the use of machinist's tools, such as file, cold chisel, drill press, taps and dies.

2 2-hour laboratory periods, credit, 2.
Mr. NEWLON.

75. **I.** For seniors; juniors may elect. Study of the strength and durability of building materials; water supply; lighting and heating systems for the farm; lightning protection; drawing plans, writing specifications and estimating the cost of buildings; concrete construction as applied to foundations, silos, tanks, posts, floors and walks.

3 class hours.

2 2-hour laboratory periods, credit, 5.
Assistant Professor STRAHAN.

77. **II. POWER MACHINERY.** — For seniors; juniors may elect. Steam and gasoline engines, refrigerating machinery, electric motors and dynamos. Practice in pipe fitting, soldering, babbitting and fitting bearings, lacing belts and packing valves. Course 77 is intended primarily for dairy students, but would be valuable to any man who would expect to use engines, pumps or electrical machinery.

2 class hours.

3 2-hour laboratory periods, credit, 5.
Professor GUNNESS.

78. **III. FARM MACHINERY.** — For seniors; juniors may elect. Study of the care and operation of tillage, seeding, harvesting, pumping and spraying machinery; steam and gas engines and gas tractors. Special attention will be given to the use of power on the small farm.

2 class hours.

3 2-hour laboratory periods, credit, 5.
Professor GUNNESS.

79. **III. DRAINAGE AND IRRIGATION ENGINEERING.** — For seniors; juniors may elect. This course covers the engineering phase of drainage and irrigation. The various systems are studied, and practice is given in the design of drainage and irrigation systems. Field work gives practice in surveying for drains, platting, locating drains, erecting batterboards and laying tile. Practice is given in assembling equipment for spray irrigation, and the flow of water through nozzles is studied by means of laboratory tests.

1 class hour.

1 4-hour laboratory period, credit, 3.
Assistant Professor STRAHAN.

Prerequisite, must be taken with Agronomy 76.

DIVISION OF HORTICULTURE.

Professor WAUGH.

[Heavy-faced Roman numerals indicate the term in which the course is given. Numbering of courses: 1 to 24, inclusive, freshmen; 25 to 49, inclusive, sophomores; 50 to 74, inclusive, juniors; 75 to 99, inclusive, seniors.]

Floriculture.

Associate Professor THAYER.

The courses in floriculture are intended to give the student a general knowledge of all phases of greenhouse design, construction, heating and management, the culture of florists' crops (under glass and in the field), floral decoration and arrangement. The department aims to train students so that they may take up commercial floriculture (either in the growing or retail business) and the management of conservatories on private estates, in parks and cemeteries.

The department is especially well equipped for the teaching work, probably being surpassed in no other agricultural college. French Hall, with its laboratories, classrooms and offices, furnishes excellent facilities for the purposes of instruction. The glass area of the department consists of approximately 20,000 square feet, divided as follows: French Hall range of 7,200 square feet, a durable, practical, commercial range composed of palm and fern, violet, carnation, rose and students' houses; the old Durfee range of 7,400 square feet, devoted to the growing of decorative, conservatory and bedding plants and chrysanthemums; one house of 3,200 square feet, suitable for propagating work and general plant culture; and approximately 2,200 square feet in cold frames and hotbeds.

In addition, the department has 2 acres of land used for the summer culture of carnations, violets, gladioli, dahlias, sweet peas, bedding plants, etc. This also includes a small garden of about 4,700 square feet devoted to the culture of annuals. A large collection of biennials and herbaceous perennials is maintained and is being enlarged from year to year; at the present time the collection consists of 700 species and varieties, and provides an excellent opportunity for the study of garden flowers.

Elective Courses.

50. **I. GREENHOUSE MANAGEMENT.** — For juniors; seniors may elect. This course is designed to familiarize students with the methods followed in the management of greenhouse crops. The students are instructed in the practical operations of watering, potting, fumigating, ventilating and in the methods of propagation of plants. In addition the use of cut flowers and plants in decorative work, arrangement of flowers in baskets, designs, vases, table and home decorations will be considered. Students will be expected to arrange their hours according to the needs of the work.

2 class hours.

1 4-hour laboratory period, credit, 4.

Associate Professor THAYER.

Prerequisite, Horticulture 27.

51. **II. GREENHOUSE MANAGEMENT.** — For juniors; seniors may elect.
Continuation of Course 50.
2 class hours. 1 4-hour laboratory period, credit, 4.
Associate Professor THAYER.

Prerequisite, Floriculture 50.

52. **III. GREENHOUSE MANAGEMENT.** — For juniors; seniors may elect.
A continuation of Courses 50 and 51.
2 class hours. 1 4-hour laboratory period, credit, 4.
Associate Professor THAYER.

Prerequisite, Floriculture 51.

53. **I. GREENHOUSE CONSTRUCTION.** — For juniors; seniors may elect.
The location, arrangement, construction, cost, heating and ventilating of
greenhouse structures; also the drawing of plans and drafting of specifications
for commercial houses and private ranges. Such practical work as glazing,
the construction of concrete benches and cold frames will be included in this
course.
2 class hours. 1 2-hour laboratory period, credit, 3.
Associate Professor THAYER.

Prerequisite, should be taken with Floriculture 50.

54. **II. GREENHOUSE CONSTRUCTION.** — For juniors; seniors may elect.
A continuation of Course 53.
2 class hours. 1 2-hour laboratory period.
Associate Professor THAYER.

Prerequisite, Floriculture 53.

75. **I. COMMERCIAL FLORICULTURE.** — Seniors. A detailed study will be
made of the methods of culture for greenhouse plants and cut flowers for
wholesale and retail markets. The care and marketing of all florists' crops
will also be considered. Assigned readings on these topics.
2 class hours. 1 2-hour laboratory period, credit, 3.
Associate Professor THAYER.

Prerequisite, Floriculture 52.

76. **III. COMMERCIAL FLORICULTURE.** — Seniors. As stated under
Course 75.
2 class hours. 1 2-hour laboratory period, credit, 3.
Associate Professor THAYER.

Prerequisites, Floriculture 75 and 80.

77. **II. CONSERVATORY WORK AND DECORATIVE PLANTS.** — Seniors. A
study of the tropical and subtropical foliage and flowering plants used in con-
servatory work. Their arrangement and care will also be considered. Assigned
readings.
2 class hours. 1 2-hour laboratory period, credit, 3.
Associate Professor THAYER.

Prerequisite, Floriculture 75.

78. **III. GARDEN FLOWERS AND BEDDING PLANTS.** — Juniors and seniors. This course aims to make the student familiar with those annuals, herbaceous perennials, bulbs and bedding plants used in landscape work. Their propagation, culture and uses will be considered. Assigned readings and field trips. 2 class hours. 1 2-hour laboratory period, credit, 3.

Associate Professor THAYER.

79. **III. SEMINAR.** — For seniors majoring in floriculture only. Advanced study of subjects pertaining to commercial floriculture or private garden work. All students electing this work will be assigned a specific problem, and will pursue study in these problems by reading and research. No regular lectures will be given, but seminars will be conducted each week. A satisfactory report of the results must be presented. 2 to 6 laboratory hours.

Not to exceed 3 credits.

Associate Professor THAYER.

80. **II. COMMERCIAL FLORICULTURE.** — Seniors. As stated under Course 75.

2 class hours.

1 2-hour laboratory period, credit, 3.

Associate Professor THAYER.

Prerequisite, Floriculture 75.

Forestry.

Professor CLARK.

The forestry major is designed to give the student a grounding in the branches of natural science upon which forest development is based. It continues, further, to give him a knowledge of such practical forestry details as the distinguishing characteristics of the various species of trees and commercial lumber, the principles of silviculture, forest management, forest utilization, and forest nursery practice.

The department has an unusually complete equipment of the various instruments used in forest mensuration, forest mapping and engineering, timber estimating, log scaling, board measuring, etc.; and a large assortment of boards illustrative of the various commercial woods found in the lumber markets. The State Forest Nursery, comprising 6 acres of land and containing, approximately, 5,000,000 trees, transplants and seedlings, is on the college farm. Extensive forests containing every variety of tree common to New England are within walking distance of the college. The college campus affords an arboretum containing an exceptionally large number of trees not native to New England. The Mount Toby Demonstration Forest has an area of approximately 750 acres, and contains the various types of forest growth found throughout the State. It serves as a field laboratory in which students have the privilege of working out problems in silviculture, forest mensuration and management. Improvement cuttings, cuttings for utilization, and forest plantings are conducted by the forestry department, and every opportunity is offered the student to familiarize himself with the practical side of forest work.

Elective Courses.

50. **I. DENDROLOGY.** — For juniors; seniors may elect. During the first part of the term frequent field trips will be made to identify and study the habits of our native forest trees. Later, the classification, range, distribution, forest habits, quality, uses and identification of wood of the commercial timber trees of the United States will be studied. Lectures, recitations, laboratories or field work at option of instructor.

3 2-hour laboratory periods, credit, 3.
Professor CLARK.

51. **II. WOOD TECHNOLOGY.** — For juniors; seniors may elect. A study of the commercial woods found in the lumber markets, methods of identification, uses, strength values, technical qualities, decay and methods of preservation.

1 class hour.

2 2-hour laboratory periods, credit, 3.
Professor CLARK.

52. **III. PRINCIPLES OF FORESTRY.** — For juniors; seniors may elect. A lecture course for the purpose of giving the students a general view of the whole field of forestry and what forestry attempts to accomplish and has accomplished. Not required of students who propose to major in forestry.

2 class hours.

Credit, 2.
Professor CLARK.

53. **III. SILVICULTURE.** — For juniors; seniors may elect. Factors influencing forest growth; forest types; silvicultural systems; care and protection of forests; forest description; forest nursery practice and forest planting.

1 class hour.

1 4-hour laboratory period, credit, 3.
Professor CLARK.

Prerequisite, Forestry 50.

54. **IV. ARBORICULTURE.** — For juniors; seniors may elect. A course dealing with problems of shade tree propagation, protection and repair; the choice and grouping of species; shade tree laws. Assigned readings.

120 hours' field work, credit, 5.
Professor CLARK.

75. **I. FOREST MENSURATION.** — For seniors; juniors may elect. Methods of determining the volume of trees, logs and entire forests. Methods of computing volume tables, tree and forest growth and yield tables. Timber estimating.

3 class hours.

72 hours' field work, credit, 5.
Professor CLARK.

78. **III. SEMINAR — REPORT.** — Seniors. This may involve research, laboratory or field work in the investigation of some subject, together with a review of the literature relating to it and an original written report evidencing the results. Subject to be chosen in conference with Professor Clark.

6 laboratory hours, credit, 3.
Professor CLARK.

Horticultural Manufactures.

Professor CHENOWETH.

The courses offered aim to give the student a practical knowledge of the problems connected with food preservation. Emphasis is placed upon the conservation of the cheaper grades of fruits and vegetables, to the end that the whole crop may be marketed at a profit and that good wholesome food products may result from what would otherwise be lost.

The social and economic values of this line of work are constantly emphasized with the intent of broadening and liberalizing the students' view of these problems.

The department occupies three laboratory rooms in Flint Laboratory, two in Fisher Laboratory, with offices in Wilder Hall and French Hall. The laboratories are fitted with desks for 18 students. The desk equipment contains the necessary utensils for doing general laboratory work in food preservation. The general equipment of the department, both for the use of students and for manufacturing purposes, may be grouped under the following heads:—

1. *Canning.*—A modern canning outfit, including both steam-pressure cookers and hot-water baths, hand and power can sealers, peeling and slicing machines, a string-bean cutter, heat-penetration thermometers, electric incubator and a large assortment of all types of home canning equipment.

2. *Evaporation.*—Two small orchard evaporators, a tunnel drier, peeling machines, slicers and a general assortment of driers adapted to home evaporation.

3. *Fruit Juices, Butters, etc.*—A hand cider mill, a motor-driven hydraulic press, a steam-jacketed kettle, an apple-butter cooker, and cider and vinegar testing apparatus.

Elective Courses.

75. I. HORTICULTURAL MANUFACTURES.—For seniors and graduate students. A practical course in food preservation dealing primarily with fruits and vegetables. The canning of fruits and vegetables as practiced in the home and in commercial canneries; evaporation of fruits and vegetables, the various types of equipment and methods of preparation of products. The manufacture of (a) fruit products, such as butters, jams, jellies, fruit juices, marmalades, preserves, vinegars, pastes, etc.; (b) vegetable products, as pickles, piccalilli, sauerkraut, soups, etc. Particular attention will be given to study and use of all types of equipment suitable for use in the home or small factory, together with methods for testing a large variety of manufactured products. During this term the emphasis will be on canning, drying and study of equipment.

2 class hours.

3 2-hour laboratory periods per week, credit, 5.

Professor CHENOWETH.

76. II. HORTICULTURAL MANUFACTURES.—For seniors and graduate students. A continuation of Course 75. The emphasis in this course is placed on the manufacturing and testing of fruit and vegetable products.

1 class hour.

2 laboratory periods per week, credit, 3.

Professor CHENOWETH.

Prerequisite, Horticultural Manufactures 75.

Horticulture.

Professor WAUGH, Assistant Professor THOMPSON.

The general subject of horticulture divides naturally into subjects of pomology, floriculture, forestry, landscape gardening and market gardening. A number of courses relate to more than one of these subjects, and are therefore grouped here under the general designation of horticulture.

Required Course.

1. **I. 2. II. 3. III.** HORTICULTURE. — Freshmen. Given as part of the freshman agriculture and horticulture.

Elective Courses (General).

27. **III.** NURSERY PRACTICE. — For sophomores; juniors and seniors may elect. This course treats of the fundamental methods of plant propagations by seeds, cuttings, budding, grafting, etc. Lectures and practicums.

2 class hours.

1 2-hour laboratory period, credit, 3.

Assistant Professor THOMPSON.

50. **I.** PLANT MATERIALS. — For juniors; seniors may elect. This course aims to make the student familiar with the character of the trees, shrubs and herbaceous perennials used in ornamental work, and with the methods of propagating them.

3 class hours.

2 2-hour laboratory periods, credit, 5.

Assistant Professor THOMPSON.

Prerequisite, Horticulture 27.

51. **III.** PLANT MATERIALS. — For juniors; seniors may elect. A continuation of Course 50, taking up the field use of trees, shrubs and herbaceous plants, their native habitats, soils and plant associations, with a view to supplying to students in landscape gardening and floriculture a knowledge of plant species. Frequent practicums and field excursions.

3 class hours.

2 2-hour laboratory periods, credit, 5.

Assistant Professor THOMPSON.

Prerequisite, Horticulture 50.

Landscape Gardening.

Professor WAUGH, Assistant Professor HARRISON.

The purposes of the courses in landscape gardening are: (1) to train men for the profession in all its branches. As a rule graduates should first enter the employ of established landscape architects, nurserymen or park superintendents, and after an apprenticeship of several years those who have the requisite technical and business ability may set up for themselves. (2) To train men for public-service work in national, State and municipal parks and forests. (3) To train men for country planning, this function being exercised through various public institutions and organizations. (4) To train teachers and extension workers in lines of landscape gardening and civic improvement. (5) To give a broad and liberal general education stressing the fundamental principles of art.

The department has large, well-lighted drafting rooms, with all necessary equipment, such as planimeters, eidograph, pantograph, blue-printing outfit, etc.; and a complete outfit of surveying instruments, including transits, levels, plane tables, prismatic compasses, hand levels, etc. The college campus presents an unusually good collection of the plant materials used in landscape gardening.

Elective Courses.

50. **I. MAPPING AND TOPOGRAPHY.** — Juniors. Reconnaissance surveys and mapping, with special reference to the methods used in landscape gardening; detailed study of selected designs of leading landscape gardeners; grade design, road design and field work. Must be followed by Course 51.

2 2-hour laboratory periods; 2 3-hour laboratory periods, credit, 5.

Assistant Professor HARRISON.

Prerequisites, Mathematics 26 and 27, Drawing 25, 26 and 27, Horticulture 27.

51. **II. ELEMENTS OF LANDSCAPE GARDENING.** — Juniors. As stated under Course 50.

3 3-hour laboratory periods, credit, 4.

Assistant Professor HARRISON.

Prerequisite, Landscape Gardening 50.

52. **III. GENERAL DESIGN.** — Juniors. Field notes; examination of completed works and those under construction; design of architectural details, planting plans, gardens, parks and private grounds; written reports on individual problems. Must be followed by Course 53.

2 2-hour laboratory periods; 2 3-hour laboratory periods, credit, 5.

Assistant Professor HARRISON.

Prerequisites, Landscape Gardening 50 and 51, and either plant materials (Horticulture 50 and 51) or advanced mathematics.

80. **I. GENERAL DESIGN.** — Juniors. As stated under Course 52. [Will be given in the summer term when that is established; meantime, will be given in term I, senior year.]

120 laboratory hours, credit, 5.

Professor WAUGH.

Prerequisite, Landscape Gardening 52.

75. **I. THEORY OF LANDSCAPE ART.** — For seniors and graduates. The general theory and applications of landscape study, including a brief history of the art.

3 class hours.

Credit, 3.

Professor WAUGH.

76. **II. CIVIC ART.** — Seniors. The principles and applications of modern civic art, including city planning, city improvement, village improvement and rural improvement, with special emphasis upon country planning. Must be followed by Course 77.

3 3-hour laboratory periods, credit, 4.

Professor WAUGH.

Prerequisite, Landscape Gardening 53.

77. **III. COUNTRY PLANNING.** — Seniors. As stated under Course 76.
3 3-hour laboratory periods, credit, 4.
Professor WAUGH.

Prerequisite, Landscape Gardening 76.

78. **III. ARCHITECTURE.** — Alternating with Course 79; given in 1918-19. Juniors and seniors. The history of architectural development, the different historic types, with special reference to the underlying principles of construction and design and their relations to landscape design. Illustrated lectures, conferences, practice in designing.

3 class hours.

Credit, 3.

Assistant Professor HARRISON.

79. **III. CONSTRUCTION AND MAINTENANCE.** — Alternating with Course 78; given in 1919-20. Juniors and seniors. Detailed instruction in methods of construction and planting in carrying out plans, in organization, reporting, accounting, estimating, etc.; maintenance work in parks and on estates, its organization, management, cost, etc.

3 class hours.

Credit, 3.

Assistant Professor HARRISON.

Pomology.

Professor SEARS, Assistant Professor DRAIN, Mr. GOULD.

The object of the courses in pomology is to give the student a training which shall be at once thoroughly practical and yet scientific. This will fit the men to enter the field of practical fruit-growing, or it will furnish an excellent foundation for further study in case the student elects to take up research or teaching work.

The department has 50 acres in fruit plantations. The apple orchards are the most extensive, comprising about 35 acres of various ages, but there are also blocks of pears, peaches, plums and cherries. In small fruits there are plantings of strawberries, raspberries, blackberries, currants and gooseberries. There are three vineyards, with a total area of 5 acres, in which the leading varieties and the principal types of pruning and training are represented. In these plantations are 50 varieties of grapes, representing three native American species and many hybrids; 20 varieties of peaches; 20 varieties of pears; 25 of plums, including five species and many hybrids; and 100 varieties of apples.

The department has an excellent equipment of spraying and dusting machinery, including various styles and sizes of power sprayers, and many types of barrel pumps and smaller sprayers. There is also an excellent assortment of orchard tools, including plows, harrows, fertilizer sowers, etc.

Fisher Laboratory is one of the best planned and equipped packing and storage plants to be found in the United States. It includes six refrigerated rooms of various sizes; four storage rooms not refrigerated; one large laboratory room and one classroom, besides ample storage room for fruit packages and equipment. The equipment for the building itself includes four types of apple sizers; packing tables and box and barrel presses of various types, besides all kinds of packages and the smaller equipment necessary for thor-

oughly modern work in grading and packing fruit. The department is well equipped with lockers and with pruning and other tools for the use of students in laboratory work. Such work is made a leading feature in all the courses in pomology.

Elective Courses.

50. **I. PRACTICAL POMOLOGY.** — For juniors; seniors may elect. A study of the general principles of the growing of fruits, dealing with such questions as selection of site, soils, windbreaks, laying out plantations, choice of nursery stock, pruning, culture of orchards, orchard fertilizers, cropping orchards, etc. Lectures, supplemented with text and reference books; field and laboratory exercises.

2 class hours.

1 2-hour laboratory period, credit, 3.

Professor SEARS.

Prerequisite, Horticulture 27.

51. **II. PRACTICAL POMOLOGY.** — For juniors; seniors may elect. As stated under Course 50.

2 class hours.

1 2-hour laboratory period, credit, 3.

Professor SEARS.

Prerequisite, Pomology 50.

52. **III. PRACTICAL POMOLOGY.** — For juniors; seniors may elect. As stated under Course 50.

2 class hours.

1 2-hour laboratory period, credit, 3.

Professor SEARS.

Prerequisite, Pomology 51.

53. **IV. (Summer.) SMALL FRUITS.** — For juniors; seniors may elect. The growing, harvesting, marketing and storing of small fruits, including currants, gooseberries and grapes, together with thinning, spraying, picking and marketing of tree fruits at the college orchards and in private commercial orchards.

120 laboratory hours, credit, 5.

The DEPARTMENT.

75. **I. SYSTEMATIC POMOLOGY.** — Seniors. A study of the varieties of the different fruits and of nomenclature, with critical descriptions; special reference being given to relationships and classification. Lectures, laboratory and field exercises.

1 class hour.

2 2-hour laboratory periods, credit, 3.

Assistant Professor DRAIN.

Prerequisite, Pomology 52.

76. **II. SYSTEMATIC POMOLOGY.** — Seniors. As stated under Course 75.

1 class hour.

2 2-hour laboratory periods, credit, 3.

Assistant Professor DRAIN.

Prerequisite, Pomology 75.

77. **I. COMMERCIAL POMOLOGY.** — Seniors only, majoring in pomology. The picking, handling, storing and marketing of fruits, including a discussion of storage houses, fruit packages, methods of grading and packing. Especial

emphasis is placed upon laboratory and field work, where the student is given actual practice in the picking and packing of all the principal fruits.

1 class hour.

2 2-hour laboratory periods, credit, 3.

Assistant Professor DRAIN.

Prerequisite, Pomology 52.

78. **III. SPRAYING.** — Seniors. A study of (a) spraying materials, their composition, manufacture and preparation for use; the desirable and objectionable qualities of each material, formulas used, cost, tests of purity. (b) Spraying machinery, including all the principal types of pumps, nozzles, hose and vehicles; their structure and care. (c) Orchard methods in the application of the various materials used, with the important considerations for spraying each fruit and for combating each orchard pest. This course is designed especially to familiarize the student with the practical details of actual spraying work in the orchard. Spray materials are prepared, spraying apparatus is examined and tested, old pumps are overhauled and repaired, and the actual spraying is done in the college orchards and small-fruit plantations.

1 class hour.

2 2-hour laboratory periods, credit, 3.

Professor SEARS.

Prerequisite, Pomology 52.

79. **III. GENERAL POMOLOGY.** — For seniors; juniors may elect. This course is planned to meet the needs of those students who cannot devote more than one term to the subject but who want a general knowledge of fruit growing. The work will consist of lectures and laboratory exercises on such topics as choosing the locations, kinds and varieties of fruits to grow, securing and setting the plants, care and cultivation, pruning, spraying, pests, harvesting and storing.

2 class hours.

1 2-hour laboratory period, credit, 3.

Assistant Professor DRAIN.

80. **I. SEMINAR.** — For seniors majoring in pomology. Advanced study of problems relating to the business of fruit growing. Each student will be assigned a major and a minor problem in lines of work in which he is particularly interested. He will pursue his studies both by reading and research, and the materials obtained will be worked into theses which will be presented to the seminar for discussion. Reports on minor problems will be taken up first. No lectures will be given, but seminar meetings will be held for one period each week.

Credit, 1.

Professor SEARS.

81. **II. SEMINAR.** — For seniors majoring in pomology. A continuation of Course 80. One seminar meeting each week.

Credit, 1.

Professor SEARS.

82. **III. SEMINAR.** — For seniors majoring in pomology. A continuation of Course 81. One seminar meeting each week.

Credit, 1.

Professor SEARS.

Vegetable Gardening.

Professor TOMPSON, Associate Professor DACY.

Course 50 is offered for students who desire a general view of the subject, which may be secured in one term. The other courses cover very thoroughly the principles and practices of the commercial production of vegetables in the open, and the forcing of vegetables in cold frames, hotbeds and greenhouses. They are designed for students who wish to engage in the business for themselves or for others, or who wish to become teachers or investigators in the more technical phases of the subject.

The department has 12 acres of land, greenhouses, hotbeds and cold frames, with modern equipment devoted to the production of a wide variety of crops. These afford excellent subject-matter for study, and opportunity for close contact with the actual problems of the business.

Elective Courses.

50. **I. GENERAL VEGETABLE GARDENING.** — Juniors; seniors may elect. A general course for students not specializing in vegetable gardening. Designed to teach the fundamentals of vegetable gardening. Soils, fertilizers, garden crops, general methods of management. [Offered for first time in 1919-20.]

2 class hours.

1 2-hour laboratory period, credit, 3.
Associate Professor DACY.

51. **I. PRACTICAL VEGETABLE GARDENING.** — Juniors; seniors may elect. A study of the principles of vegetable gardening. Deals with such questions as the selection of a location; soils, manures and fertilizers, green manure and cover crops; seeds and seeding; the construction and management of hotbeds and cold frames; garden planning, planting, tillage, irrigation; control of insects and diseases; harvesting, marketing and storing. Includes a detailed study of the cultural requirements of the common vegetable crops, and the principles of rotation and double cropping. Text and reference books. Laboratory and field exercises.

2 class hours.

1 2-hour laboratory period, credit, 3.
Associate Professor DACY.

Prerequisite, Horticulture 27.

52. **II. PRACTICAL VEGETABLE GARDENING.** — Juniors; seniors may elect. As stated under Course 51.

2 class hours.

1 2-hour laboratory period, credit, 3.
Associate Professor DACY.

Prerequisite, Vegetable Gardening 51.

53. **III. PRACTICAL VEGETABLE GARDENING.** — Juniors; seniors may elect. As stated under Course 51.

2 class hours.

1 2-hour laboratory period, credit, 3.
Associate Professor DACY.

Prerequisite, Vegetable Gardening 52.

54. **IV. VEGETABLE GARDENING PRACTICE.** — Field work in summer term after junior year. The work of this course will be under the direct supervision of an instructor, and will give the student an unusual opportunity to learn, at first hand, the methods and problems of commercial vegetable growing. Most of the work will be in the field devoted to seed planting, cultural practices, harvesting and preparing for market. Required of those majoring in vegetable gardening.

120 laboratory hours, credit, 5.

Prerequisite, Vegetable Gardening 53.

75. **I. SYSTEMATIC VEGETABLE GARDENING.** — Seniors. This course will include the systematic study of varieties, types and strains of the leading vegetable crops; the establishing of types, determination of quality of varieties; seed growing, variety improvement, roguing, seed harvesting, curing and storing.

3 class hours.

2 2-hour laboratory periods, credit, 5.

Associate Professor DACY.

Prerequisite, Vegetable Gardening 54.

76. **II. GREENHOUSE CONSTRUCTION AND VEGETABLE FORCING.** — Seniors. A study of types, materials, construction, location, arrangement, capacity and cost of greenhouses for growing vegetables. A brief consideration of the heating plant, — the type, installation, piping and management; also the study of greenhouse vegetable crops and their production as practiced by commercial growers.

3 class hours.

2 2-hour laboratory periods, credit, 5.

Associate Professor DACY.

Prerequisite, Vegetable Gardening 75.

77. **III. COMMERCIAL VEGETABLE GROWING.** — Seniors. A consideration of vegetable growing as a business. A study of this specialized type of farming, including places where developed, types, extent, economic importance, capitalization, equipment and other fundamental problems of commercial vegetable gardening. Students will assist in the planning and operation of a typical market-gardening area. Visits will be made to market-gardening and truck-gardening farms.

3 class hours.

2 2-hour laboratory periods, credit, 5.

Associate Professor DACY.

Prerequisite, Vegetable Gardening 76.

78. **I. SEMINAR.** — For seniors majoring in vegetable gardening. Each student will be assigned problems relating to the business of vegetable gardening. Reports on the work on these problems will be made each week to the seminar, and the results presented as a thesis.

Credit, 1.

Professor TOMPSON and Associate Professor DACY.

79. **II. SEMINAR.** — For seniors majoring in vegetable gardening. A continuation of Course 78. One seminar meeting each week.

Credit, 1.

Professor TOMPSON and Associate Professor DACY.

80. **III. SEMINAR.** — For seniors majoring in vegetable gardening. A continuation of Course 79. One seminar meeting each week.

Credit, 1.

Professor TOMPSON and Associate Professor DACY.

Drawing.

Elective Courses.

25.¹ **I. FREE-HAND DRAWING.** — For sophomores; juniors and seniors may elect. Lettering; free-hand perspective; sketching from type models, leaves, flowers and trees, houses, etc.; laying flat and graded washes in water colors; water-color rendering of leaves, flowers and trees; conventional coloring and map rendering in water colors; conventional signs and mapping in ink.

3 2-hour laboratory periods, credit, 3.

26.¹ **II. MECHANICAL DRAWING.** — For sophomores; juniors and seniors may elect. Inking exercises; geometric problems; projection; intersections; isometric; shades and shadows; parallel; angular and oblique perspective; perspective drawing of buildings. Students should have preparation in plane and solid geometry.

3 2-hour laboratory periods, credit, 3.

27.¹ **III. MECHANICAL DRAWING.** — For sophomores; juniors and seniors may elect. As stated under Course 26.

3 2-hour laboratory periods, credit, 3.

Prerequisite, Drawing 26.

¹ Given by Assistant Professor Harrison.

DIVISION OF SCIENCE.

Professor FERNALD.

[Heavy-faced type indicates the term in which the course is given. Numbering of courses: 1 to 24, inclusive, freshmen; 25 to 49, inclusive, sophomores; 50 to 74, inclusive, juniors; 75 to 99, inclusive, seniors.]

Botany.

Professor OSMUN, Associate Professor ANDERSON, Assistant Professor CLARK, Assistant Professor McLAUGHLIN, Dr. TORREY.

A knowledge of the principles of plant life is fundamental in agricultural education. The required courses in botany are planned with this and the general educational value of the subject in view. Elective courses are of two types: (1) those which have for their chief aim the direct support of technical courses in agriculture and horticulture, and (2) those providing broader, more intensive training in the science. Courses in the second group may lead, when followed by postgraduate study, to specialization in the field. They also furnish excellent training for those specializing in other sciences and in scientific agriculture. In all undergraduate courses the relation of the science of botany to agriculture is emphasized.

The department occupies Clark Hall, a brick building 55 by 95 feet, two stories high, with basement and attic. The building has two lecture rooms with seating capacity of 154 and 72, respectively; one seminar and herbarium room; large laboratories for general and special work; and smaller rooms for advanced students. A glass-enclosed laboratory for plant physiology adjoins the main building and provides unusual facilities for the study of phenomena of plant life. In addition, a greenhouse 28 by 70 feet is connected with the building. This is for experimental work in plant pathology and physiology, and for growing plants needed for instruction. The experiment station laboratories devoted to botanical research are in this building.

The laboratories and lecture rooms are of modern construction, finely lighted, and equipped with compound and dissecting microscopes, microtomes, paraffin and drying ovens, physiological and other apparatus, and a large collection of charts. The herbarium contains about 20,000 sheets of seed plants and ferns, 1,200 sheets of liverworts and mosses, and 25,000 specimens of fungi. Facilities and equipment for the study of plant physiology and pathology are excelled in few other institutions.

Required Courses.

3. **III.** INTRODUCTORY BOTANY. — Freshmen. This course presents the seed plants as plastic organisms molded by their environment. It also introduces the student to methods of identifying and classifying plants.

An herbarium, illustrative of systematic, ecological and economic features, is started in the spring, but need not be presented until fall when credit is given in Course 25. This makes it possible for the interested student to familiarize himself with the flora of the full growing season.

1 class hour.

2 2-hour laboratory periods, credit, 3.

Dr. TORREY and Assistant Professor McLAUGHLIN.

25. **I. INTRODUCTORY BOTANY.**—Sophomores. The anatomy and physiology of the seed plants (Phanerogamia), with a brief summary of the lower forms of plant life. The herbarium started in connection with Botany 3 is presented as part of this course.

1 class hour.

2 2-hour laboratory periods, credit, 3.

Dr. TORREY.

Prerequisite, Botany 3.

Elective Courses.

26. **II. MORPHOLOGY AND TAXONOMY OF THE LOWER PLANTS (CRYPTOGAMIA).**—Sophomores. Systematic study of typical forms of bacteria, algæ, fungi, lichens, mosses, ferns. (Courses 3, 25 and 26 constitute a general elementary course in botany, and are prerequisites of all subsequent work taken in the Department of Botany.)

1 class hour.

2 2-hour laboratory periods, credit, 3.

Professor OSMUN and Dr. TORREY.

Prerequisite, Botany 25.

50. **I. DISEASES OF CROPS.**—For juniors; seniors may elect. The lectures are general and are taken by all who elect the course, but in order to permit students to specialize on the diseases of crops most closely related to their majors or in which they are most interested, the course is divided for laboratory work into the following sections: (I) diseases of truck and field crops; (II) diseases of floricultural crops and ornamentals; (III) diseases of fruit crops; (IV) diseases of shade and forest trees. One, two or three laboratory sections may be taken.

1 class hour.

1, 2 or 3 2-hour laboratory periods, credits, 2, 3 or 4.

Assistant Professor McLAUGHLIN.

Prerequisite, Botany 26.

51. **II. DISEASES OF CROPS.**—For juniors; seniors may elect. As stated under Course 50.

1 class hour.

1, 2 or 3 2-hour laboratory periods, credits, 2, 3 or 4.

Assistant Professor McLAUGHLIN.

Prerequisite, Botany 50.

52. **I. SYSTEMATIC MYCOLOGY.**—For juniors; seniors may elect. Morphology and development of typical species representing the orders and families of fungi; practice in identification, collection and preservation of fungi; study of systems of classification; collateral reading. A prerequisite of the senior course in plant pathology, but open to all.

1 class hour.

2 2-hour laboratory periods, credit, 3.

Associate Professor ANDERSON.

Prerequisite, Botany 26.

53. **II. SYSTEMATIC MYCOLOGY.**—For juniors; seniors may elect. As stated under Course 52.

1 class hour.

2 2-hour laboratory periods, credit, 3.

Associate Professor ANDERSON.

Prerequisite, Botany 52.

54. **III. SYSTEMATIC MYCOLOGY.** — For juniors; seniors may elect. As stated under Course 52.

1 class hour.

2 2-hour laboratory periods, credit, 3.

Associate Professor ANDERSON.

Prerequisite, Botany 53.

55. **I. PLANT HISTOLOGY.** — For juniors; seniors may elect. Comparative study of the tissues of plants; training in histological methods, including the use of precision microtomes, methods of killing, fixing, sectioning, staining and mounting; collateral reading and conferences. This course offers valuable training in preparation for further work in botany.

3 2-hour laboratory periods, credit, 3.

Professor OSMUN and Assistant Professor McLAUGHLIN.

Prerequisite, Botany 26.

56. **II. PLANT HISTOLOGY.** — For juniors; seniors may elect. As stated under Course 55.

3 2-hour laboratory periods, credit, 3.

Professor OSMUN and Assistant Professor McLAUGHLIN.

Prerequisite, Botany 55.

75. **I. PLANT PATHOLOGY.** — Seniors. Comprehensive study of diseases of plants; training in laboratory methods and technique, including culture work and artificial inoculation of hosts; miscellaneous diagnosis; study of literature and representative life histories of pathogens. Prepares for civil service, experiment station and college work.

1 class hour.

4 2-hour laboratory periods, credit, 5.

Professor OSMUN and Associate Professor ANDERSON.

Prerequisite, Botany 54.

76. **II. PLANT PATHOLOGY.** — Seniors. As stated under Course 75.

1 class hour.

4 2-hour laboratory periods, credit, 5.

Professor OSMUN and Associate Professor ANDERSON.

Prerequisite, Botany 75.

77. **III. PLANT PATHOLOGY.** — Seniors. As stated under Course 75.

1 class hour.

4 2-hour laboratory periods, credit, 5.

Professor OSMUN and Associate Professor ANDERSON.

Prerequisite, Botany 76.

78. **I. PLANT PHYSIOLOGY.** — Seniors. Study of the factors and conditions of (a) Plant Nutrition, including the taking up of water and mineral substances, the assimilation of carbon and nitrogen, and the release of energy due to the processes of dissimilation; (b) Plant Growth, including the influence of internal and external factors on growth, the development of reproductive and vegetative organs, and touching on plant inheritance and the origin of new varieties; (c) Plant Movements, including those due to the taking up of water, and those movements of both motile and fixed forms in response to external stimuli. Special emphasis is laid on the development of

skill in the manipulation of apparatus in the laboratory; weekly conferences are held at which students report on assignments to a large range of original papers.

2 class hours.

3 2-hour laboratory periods, credit, 5.
Assistant Professor CLARK.

Prerequisites, Botany 26 and Chemistry 51.

79. **II. PLANT PHYSIOLOGY.** — Seniors. As stated under Course 78.

2 class hours.

3 2-hour laboratory periods, credit, 5.
Assistant Professor CLARK.

Prerequisite, Botany 78.

80. **III. PLANT PHYSIOLOGY.** — Seniors. As stated under Course 78.

2 class hours.

3 2-hour laboratory periods, credit, 5.
Assistant Professor CLARK.

Prerequisite, Botany 79.

82: **II. CYTOLOGY AND EMBRYOLOGY.** — Seniors. Morphology and physiology of the cell; cell-division; embryonal development.

3 2-hour laboratory periods, credit, 3.
Assistant Professor McLAUGHLIN.

Prerequisites, Botany 26 and 55.

83. **III. CYTOLOGY AND EMBRYOLOGY.** — Seniors. As stated under Course 82.

3 2-hour laboratory periods, credit, 3.
Assistant Professor McLAUGHLIN.

Prerequisite, Botany 82.

86. **I. SEMINAR.** — For seniors and graduate students. Presentation and discussion of important current botanical papers. A major requirement.

1 class hour.

Credit, 1.

The DEPARTMENT.

General and Agricultural Chemistry.

Professor LINDSEY, Professor WELLINGTON, Professor CHAMBERLAIN, Professor PETERS,
Professor —, Mr. EEREX, Mr. STURGIS, Mr. JEWELL, Mr. FANEUF.

In teaching the courses in chemistry, emphasis is laid on both their educational and their vocational value. The courses in the freshman year are intended to deal with fundamental principles, and to give the student such an understanding of the subject as will enable him to apply it in farm practice. The more advanced courses, including quantitative analysis and organic, physiological and physical chemistry, are intended primarily for those who intend to become teachers and workers in the allied sciences, or who desire to follow agricultural chemistry as a vocation. Advanced training is given by means of postgraduate courses (see Graduate School).

Those completing the undergraduate courses are fitted for positions in the agricultural industries, — fertilizer, feed and insecticide manufacture, — as well as in other lines of industry, and in the State experiment stations and in commercial laboratories. Postgraduate students are prepared for positions as teachers in high schools and colleges, and for more advanced positions in

industry and in the experiment stations. All men who were worthy of recommendation have secured positions.

An entire building is devoted to the needs of the department. The basement is used for the storage of apparatus and chemicals. The first floor contains laboratories for organic, physiological and physical chemistry, and qualitative analysis. The second floor is occupied by the general lecture room, the reading room, offices for the several members of the staff, and laboratories for analytical chemistry. The third floor has desk room and hoods sufficient to accommodate 90 students at one time in general chemistry. On this floor is also a lecture room seating 56 students.

The entire laboratory is well equipped with the necessary apparatus and chemicals for all students who desire to perfect themselves as expert chemists, or who wish to study chemistry as a supplement to some other kind of practical or scientific work. The equipment includes a valuable and growing collection of specimens and samples of minerals, soils, raw and manufactured fertilizers, foods, milk products, fibers, various other vegetable and animal products, and artificial preparations of mineral and organic compounds; and also a series of preparations for illustrating the various stages of different manufactures from raw material to finished product.

Required Courses.

1. **I. GENERAL CHEMISTRY.** — Freshmen. An introduction to the fundamental chemical laws, together with a study of the common acid-forming elements and their compounds. Textbook, Kahlenberg's "Outlines of Chemistry." This course is for those students who do not present chemistry for entrance, and who begin the subject in college.

2 class hours.

1 2-hour laboratory period, credit, 3.

Professor PETERS, Mr. SEREX and Assistants.

2. **II. GENERAL CHEMISTRY.** — Freshmen. A continuation of Course 1. A study of metals and their compounds. The laboratory work is the same as described under Course 4.

2 class hours.

1 2-hour laboratory period, credit, 3.

Professor PETERS and Assistants.

3. **III. INORGANIC AGRICULTURAL CHEMISTRY.** — Freshmen. As stated under Course 5, **II.**

2 class hours.

1 2-hour laboratory period, credit, 3.

Mr. SEREX and Assistants.

4. **I. ADVANCED GENERAL CHEMISTRY.** — Freshmen. A review of the fundamental chemical laws, together with the common acid and base-forming elements and their compounds. Textbook, Kahlenberg's "Outlines of Chemistry." The laboratory work takes the synthetic form. Substances of agricultural importance are prepared in quantity and studied in detail by the student. These include ammonium sulfate, superphosphate, muriate and sulfate of potash, arsenate of lead, Paris green, Bordeaux mixture, lime-sulfur and emulsions.

2 class hours.

1 2-hour laboratory period, credit, 3.

Mr. SEREX and Assistants.

Prerequisite, Entrance Chemistry.

5. **II. INORGANIC AGRICULTURAL CHEMISTRY.** — Freshmen. A study of the chemical composition, properties and reactions of soils, fertilizers, fungicides and insecticides. The laboratory work is divided into three parts, as follows: (a) qualitative examination of soil, plant ash and superphosphate; (b) approximate quantitative determination of moisture, ash, carbonic acid, phosphoric acid, potash, etc.; (c) special work on retention of salts by soil, leaching of lime from the soil by carbonated water, etc.

2 class hours.

1 2-hour laboratory period, credit, 3.

Mr. SEREX and Assistants.

6. **III. ORGANIC AGRICULTURAL CHEMISTRY.** — Freshmen. The course embraces the study of the most important groups of organic compounds of plants and animals, the composition of plants, the chemistry of plant growth, plants as food and as industrial material, the composition of animals, the chemistry of digestion, also the study of some of the products related to plants and animals, such as milk, butter, cheese, sugar and alcohol. The treatment of the subject will be general, avoiding (so far as possible) complicated chemical facts and relationships, and endeavoring simply to make the student acquainted with the general chemistry of plants and animals and agricultural processes and products.

2 class hours.

1 2-hour laboratory period, credit, 3.

Professor CHAMBERLAIN and Assistants.

Elective Courses.

25. **I. QUALITATIVE ANALYSIS.** — *Basic.* — Sophomores. A course in the systematic analysis of metallic salts, presented from the ionic viewpoint. The student studies closely the tests used in the separation and identification of the metals; he then applies these tests to unknown mixtures. Text, Medicus' "Qualitative Analysis," with Stieglitz' "Qualitative Analysis" and Gooch & Browning's "Qualitative Analysis" for reference. This course should be taken, particularly, by all intending to follow chemistry as a vocation.

1 class hour.

2 2-hour laboratory periods, credit, 3.

Mr. SEREX and Mr. STURGIS.

Prerequisite, Chemistry 3 or 6.

26. **II. QUALITATIVE ANALYSIS.** — *Acidic.* — Sophomores. A continuation of Course 25.

1 class hour.

2 2-hour laboratory periods, credit, 3.

Mr. SEREX and Mr. STURGIS.

27. **III. QUANTITATIVE ANALYSIS.** — For sophomores; juniors and seniors may elect. Instruction in this course includes the gravimetric and volumetric determinations of some of the commoner metals and non-metals. Talbot's "Quantitative Chemical Analysis" is used as a text.

1 class hour.

2 4-hour laboratory periods, credit, 5.

Professor WELLINGTON and Professor PETERS.

Prerequisite, Chemistry 25. Course 26 is prerequisite for those majoring in chemistry.

30. **III. ORGANIC AGRICULTURAL CHEMISTRY.** — For sophomores; juniors and seniors may elect. As described in Course 6. To be elected by those who have not had Chemistry 6.

3 class hours.

2 2-hour laboratory periods, credit, 5.

Professor CHAMBERLAIN and Mr. FANEUF.

51. **I. ORGANIC CHEMISTRY.** — For juniors; seniors may elect. This course consists of a systematic study, both from texts and in the laboratory, of the more important compounds in the entire field of organic chemistry. Especial attention is given to those compounds which are found in agricultural products or are manufactured from them. These include alcohols, acids, esters, fats, carbohydrates and proteins. The work forms a foundation for courses in physiological chemistry and agricultural analysis, and is especially planned for those majoring in chemistry or the other sciences. Those electing Course 51 are expected to elect Course 52.

5 class hours.

2 3-hour laboratory periods, credit, 8.

Professor CHAMBERLAIN and Mr. FANEUF.

Prerequisites, Chemistry 3 or 6, and Chemistry 27 for those majoring in chemistry.

52. **II. ORGANIC CHEMISTRY.** — For juniors; seniors may elect. A continuation of Course 51, dealing principally with compounds of the benzene series.

5 class hours.

2 3-hour laboratory periods, credit, 8.

Professor CHAMBERLAIN and Mr. FANEUF.

62. **III. ADVANCED QUANTITATIVE ANALYSIS.** — For juniors; seniors may elect. Advanced work on subjects as stated under Course 27, together with the analysis of insecticides or the analysis of soils and fertilizers.

1 class hour.

2 4-hour laboratory periods, credit, 5.

Professor WELLINGTON and Professor PETERS.

Prerequisite, Chemistry 27.

65. **III. PHYSICAL CHEMISTRY.** — For juniors; seniors may elect. A résumé of general chemistry from the viewpoint of physical chemistry, and the application of physical chemistry to agricultural chemistry.

3 class hours.

2 2-hour laboratory periods, credit, 5.

Mr. SEREX and Mr. STURGIS.

Prerequisite, Chemistry 27.

76. **I. MILK AND BUTTER ANALYSIS.** — For seniors; juniors may elect. A study of milk and butter analytically.

1 class hour.

2 4-hour laboratory periods, credit, 5.

Professor PETERS and Mr. JULIAN.

Prerequisite, Chemistry 27.

77. **II. CATTLE FEED, WATER AND MISCELLANEOUS ANALYSIS.** — For seniors; juniors may elect. The analysis of cattle feeds and water, with interpretations. Other materials may be analyzed.

1 class hour.

2 4-hour laboratory periods, credit, 5.

Professor PETERS and Mr. JULIAN.

Prerequisite, Chemistry 27.

80. **I. PHYSIOLOGICAL CHEMISTRY.** — Seniors. This course is intended to be supplementary to Courses 51 and 52. To those who expect to take up scientific work in microbiology, botany, agronomy, animal husbandry, etc., and who have had Courses 51 and 52, it will give acquaintance with the chemistry of the physiological processes in plants and animals, by means of which some of the important organic compounds studied in Courses 51 and 52 are built up in the living organism or are used as food by it. In the lectures the study of food and nutrition as related to both human and domestic animals is the principal subject. In the laboratory experimental studies are made of the animal body and the processes and products of digestion, secretion and excretion.

3 class hours.

2 2-hour laboratory periods, credit, 5.

Professor CHAMBERLAIN and Mr. FANEUF.

87. **III. HISTORY OF CHEMISTRY.** — Seniors. An exposition of the development of chemical knowledge from the earliest times to the present. Although the entire history will be included, the larger portion of it will receive only brief mention in order that the questions of vital interest in modern life and industry may be studied at greater length. Particular attention will be given to the questions of plant and animal industry. Chemists are strongly advised to take this course.

3 class hours.

Credit, 3.

Professor WELLINGTON.

90. **II. SPECIAL WORK IN AGRICULTURAL CHEMICAL ANALYSIS.** — Seniors. The student is given a problem to solve either in analytical chemistry or related to the agricultural industries. This is to acquaint him with the methods used in research and with the literature, and show him how to handle problems in this field of chemistry when occasion arises.

6 or 10 laboratory hours, credit, 3 or 5.

Professor PETERS.

91. **III. SPECIAL WORK IN AGRICULTURAL CHEMICAL ANALYSIS.** — Seniors. As stated in Course 90.

10 laboratory hours, credit, 5.

Professor PETERS.

Prerequisite, Chemistry 90.

92. **II. SPECIAL WORK IN PHYSIOLOGICAL AND ORGANIC AGRICULTURAL CHEMISTRY.** — Seniors. In this course, as in Courses 90 to 95, the student will be able to give his attention primarily to one line of chemical study. To those whose tastes and interests are in connection with the organic and physiological problems of agricultural chemistry, many subjects of study present themselves, among which may be mentioned: proteins, carbohydrates, fats, organic nitrogenous compounds in fertilizers and soils and their relation to plants, the commercial production of alcohol from agricultural products, dyes, digestion and dietary studies, the chemical study of dairy products, etc.

6 or 10 laboratory hours, credit, 3 or 5.

Professor CHAMBERLAIN.

Prerequisites, Chemistry 51, 52 and 80.

93. **III. SPECIAL WORK IN PHYSIOLOGICAL AND ORGANIC AGRICULTURAL CHEMISTRY.** — Seniors. As stated under Course 92.

10 laboratory hours, credit, 5.

Professor CHAMBERLAIN.

Prerequisite, Chemistry 92.

94. **II. SPECIAL WORK IN PHYSICAL CHEMISTRY.** — Seniors. The field of agricultural chemistry offers many problems that have been attacked through the methods of physical chemistry; such, for example, are the hydrolysis of salts and of minerals and the absorption of salts and fertilizers by soils. Each student will select one line of work and follow it through the course, repeating some of the original work.

6 or 10 laboratory hours, credit, 3 or 5.

Mr. SEREX.

Prerequisite, Chemistry 65.

95. **III. SPECIAL WORK IN PHYSICAL CHEMISTRY.** — Seniors. As stated under Course 94.

10 laboratory hours, credit, 5.

Mr. SEREX.

Prerequisite, Chemistry 94.

Entomology.

Professor FERNALD, Professor CRAMPTON, Associate Professor REGAN.

The introductory Courses 26 and 27, taken together, present a comprehensive view of the relation of insects to man, particularly as crop pests. The most important pests are carefully studied, together with the methods for their control. Courses 50 and 51 are arranged for special study of the pests of any one line of agricultural or horticultural occupation, selected by the student according to his plan of future work, with the intent of making him thoroughly familiar with the pests he will meet in his selected work after graduation, and the means of controlling them. The remaining courses are for the training of men as State or experiment station entomologists; for those going into the care of trees, etc., on estates, or for cities and towns; and as entomological experts, for which the demand has been very large.

A recently erected building provides excellent lecture rooms and laboratories. The laboratories are provided with individual desks, equipped with microscopes and all needed apparatus of all kinds. Dissecting microscopes, binoculars, microtomes, photographic apparatus, glassware and reagents are available for use and electric light and gas are connected with each desk. Two laboratories, one for juniors and seniors, the other for graduate students, are thus equipped. A department library containing all the more important works on insects, supplemented by others on the subject in the main library, and by the private libraries of the professors, make available more than 25,000 books and pamphlets on this subject. In addition, all the current magazines are received and their files are accessible to every one. A card catalogue giving references to the published articles on different insects contains about 65,000 cards, and is probably the largest index of its kind in the world. Spray pumps, nozzles and spraying appliances of all kinds are in use in various parts of the courses, and a large collection of insecticides is accessible for study. Photographic rooms are specially prepared for the

photography of insects, and the greenhouses, gardens, orchards and the grounds of the college provide wide opportunities for the study, under natural conditions, of insect pests.

Elective Courses.

26. **II.** 27. **III.** GENERAL AND ECONOMIC ENTOMOLOGY. — For sophomores; juniors and seniors may elect. This course is planned to meet the needs of students who desire some knowledge of insects, but who cannot give more than two terms to the subject. It also serves as an introduction to the later courses for those who intend to follow entomology farther. It touches briefly upon the structure of insects so far as this is needed for such a course; deals with metamorphosis, classification to the larger groups, and discusses the most important methods and materials used for control. The greater part of the time is devoted to special study of the most important insect pests, particularly of New England, showing their modes of life, the injuries they cause, and the best methods of control. In this way the most serious pests of fruit trees, ornamental trees and shrubs, market-garden and greenhouse pests, those attacking field crops and those affecting animals and man, are treated. During the winter term and in the spring term until about the first of May instruction is given by lectures and recitations; from about the first of May field work takes the place of the lectures. In this part of the course the students are shown how to find and recognize the work of the various insect pests which may be accessible at that season of the year, and they also make and preserve a collection of insects.

3 class hours.

Credit, 3.

Professor FERNALD.

27. **III.** GENERAL AND ECONOMIC ENTOMOLOGY. — As stated under Course 26, **II.**

2 class hours till about May 1; thereafter 2 2-hour field periods. Credit, 2.

Professor FERNALD, Professor CRAMPTON and Associate Professor REGAN.

50. **I.** PESTS OF SPECIAL CROPS. — For juniors; seniors may elect. For students not majoring in entomology, and also for those majoring in entomology. The laboratory work is largely individual in this term. Accordingly, students majoring in subjects other than entomology, but who desire a more complete knowledge of the insects connected with their own major line of work, can obtain it here. A student majoring in floriculture, for example, will devote his laboratory time to a careful study of the insects injuring floricultural crops, learning how to recognize them and their work in their different stages, and the best methods for their control. Courses of this kind are available on the insects attacking field crops, market-garden crops, tree fruits, small fruits, shade trees and shrubs, flowers, forest trees, the domesticated animals and man. This work may be continued in the winter term also. (See 51, **II.**)

3 2-hour laboratory periods, credit, 3.

Professor FERNALD.

Prerequisites, Entomology 26 and 27.

51. **II.** PESTS OF SPECIAL CROPS. — As stated in 50, **I.**

3 2-hour laboratory periods, credit, 3.

Professor FERNALD.

Prerequisite, Entomology 50.

53. **I. INSECT MORPHOLOGY.** — For juniors; seniors may elect. For students majoring in entomology. The lectures of this course treat of the external and internal anatomy of insects, particularly of those characters used in identification, a knowledge of which is needed in the accompanying laboratory work. In the laboratory the external anatomy of the most important groups is studied, followed by the identification of insects of these groups, to show how the characters are made use of in learning the names of insects, and to teach the use of analytical keys.

2 class hours.

3 2-hour laboratory periods, credit, 5.

Professor CRAMPTON.

Prerequisites, Entomology 26 and 27.

54. **II. INSECT CLASSIFICATION.** — For juniors; seniors may elect. For students majoring in entomology. Systematic identification of insects of various groups. Study of various entomological publications and methods of finding the literature on any insect.

3 2-hour laboratory periods, credit, 3.

Associate Professor REGAN.

Prerequisite, Entomology 53.

55. **III. ECONOMIC ENTOMOLOGY.** — For juniors; seniors may elect. Special studies on the most serious insect pests, their habits, nature of the injuries they cause and methods of control. In the lectures the composition, preparation and methods of application of the more important insecticides, their merits and defects, and studies of insecticide apparatus and other methods of control are treated. A portion of the laboratory time will be used in practical work on the topics taken up in the lectures.

1 class hour.

2 2-hour laboratory periods, credit, 3.

Professor FERNALD, Professor CRAMPTON and Associate Professor REGAN.

Prerequisite, Entomology 54.

75. **III. FOREST AND SHADE-TREE INSECTS.** — For juniors; seniors may elect. The lecture work deals with the principles and methods of controlling insects which attack forests and forest products, shade trees, etc. The laboratory periods are devoted to a study of the more important species, their identification, biology and specific control measures. Field work will supplement laboratory study if time permits.

1 class hour.

3 2-hour laboratory or field periods, credit, 4.

Associate Professor REGAN.

Prerequisites, Entomology 26 and 27; 53 and 54 desirable.

76. **I. ADVANCED ENTOMOLOGY.** — For seniors. During this year studies of scale insects (coccidology), life histories of important pests, the preparation of bibliographies, methods of rearing, photography of insects, methods for experimental work and record keeping, and studies of the early stages of insects will be given. Insects as disease carriers, insect bionomics, and a study of the animals not insects with which entomologists are expected to deal, will also be included in this course.

2 class hours.

3 2-hour laboratory periods, credit, 5.

Professor FERNALD, Professor CRAMPTON and Associate Professor REGAN.

Prerequisite, Entomology 55.

77. **II. ADVANCED ENTOMOLOGY.** — As stated in Course 76, **I.**

3 2-hour laboratory periods, credit, 3.

Professor FERNALD, Professor CRAMPTON and Associate Professor REGAN.

Prerequisite, Entomology 76.

78. **III. ADVANCED ENTOMOLOGY.** — As stated in Course 76, **I.**

1 class hour.

3 2-hour laboratory or field periods, credit, 4.

Professor FERNALD, Professor CRAMPTON and Associate Professor REGAN.

Prerequisite, Entomology 77.

90. **II. EVOLUTION.** — For juniors; seniors may elect. In order to demonstrate the universal scope and operation of the laws of evolution, the course includes a brief sketch of the probable origin and evolution of matter as viewed in the light of modern physical and chemical research; the evolution of the solar system, leading to the formation of the earth; the changes in the earth, preparatory to the production of life; the physical and chemical basis of life; the probable steps in the formation of living matter, and the theories concerning it; the evolution of living things; the developmental history of man, and of the races of mankind, the evolution of human intelligence, languages, culture, institutions, etc., and man's probable future in the light of his past development. Especial consideration is given to the factors of evolution, the basic principles of heredity, sex-determination, variation and similar topics, with particular reference to their application to human welfare; and the recent contributions in the field of entomology to the advancement of our knowledge of these fundamental principles are briefly reviewed.

3 class hours.

Credit, 3.

Professor CRAMPTON.

Mathematics and Civil Engineering.

Professor OSTRANDER, Associate Professor MACHMER, Assistant Professor MOORE, Mr. PARKER.

The work of the freshman year is required. It is intended to furnish the necessary drill and groundwork needed for many of the scientific and practical courses of other departments. Thoroughness and accuracy are insisted upon. The advanced work in mathematics is taught from a practical standpoint, and many of its applications to other subjects are given. The courses in surveying and civil engineering are given to furnish the groundwork for a professional career. Special emphasis is given to the subjects bearing on highway construction and maintenance.

For drawing, a room on the north side is used for the draughting. It has draughting tables, T squares, scales, etc., for twenty students. Vernier protractors, parallel rules and steel T squares are available for precise work. A small room is devoted to blue-printing.

In surveying, the department has a considerable number of chains and tapes, two railroad compasses, a builder's level, two dumpy levels, two Y levels and two old levels used for teaching the adjustments. Six transits are available for student use. Two are provided with solar attachments. An omnimeter with vernier reading to ten seconds is available for geodetic work. A hand level, mining aneroid barometer, and prismatic compass are provided for reconnaissance work. A set of Gilmore's needles and a Fairbanks machine are used for cement testing.

Required Courses.

1. **I. HIGHER ALGEBRA.** — Freshmen. A brief review of radicals, quadratic equations, ratio and proportion, and progressions; graphs, binomial theorem, undetermined coefficients, summation of series, variation, continued fractions, determinants, permutations and combinations, logarithms, theory of equations. Reitz and Crathorne's "College Algebra."
5 class hours.

Credit, 5.

The DEPARTMENT.

2. **II. HIGHER ALGEBRA.** — As stated under Course 1.
2 class hours.

Credit, 2.

The DEPARTMENT.

3. **III. SOLID GEOMETRY.** — Freshmen. Theorems and exercises on the properties of straight lines and planes, dihedral and polyhedral angles, prisms, pyramids and regular solids; cylinders, cones and spheres; spherical triangles and the measurement of surfaces and solids. Wentworth and Smith's "Solid Geometry." Required unless accepted for admission.
3 class hours.

Credit, 3.

The DEPARTMENT.

5. **II. PLANE TRIGONOMETRY** (in charge of Department of Physics). — Freshmen. The trigonometric functions as lines and ratios; proofs of the principal formulas, transformations; inverse functions, use of logarithms; the applications to the solution of right and oblique triangles; practical applications. Bowser's "Elements of Plane and Spherical Trigonometry."
3 class hours.

Credit, 3.

Professor HASBROUCK and Associate Professor ROBBINS.

6. **III. MENSURATION AND COMPUTATION.** — Freshmen. The course includes a review of methods of computation, with special emphasis on short and abbreviated processes, together with methods of checking computations and of forming close approximations; use of slide rule. Also the graph, mensuration of plane and solid figures, weights and measures and elementary mechanism. Numerous practical problems are selected from such subjects as the following: the mathematics of woodworking; rough lumber; general construction; forestry methods in heights of trees; pulleys, belts and speeds; power and its transmission; dairying; agronomy; computation of areas from simple measurements.

2 class hours.

Credit, 2.

The DEPARTMENT.

Elective Courses.

26. **II. PLANE SURVEYING.** — For sophomores; juniors and seniors may elect. The elements of the subject, including the adjustment and use of the usual instruments. Textbook and lectures.
2 class hours.

Credit, 2.

The DEPARTMENT.

27. **III. PLANE SURVEYING.**—For sophomores; juniors and seniors may elect. As stated under Course 26. Includes field work.

3 2-hour laboratory periods, credit, 3.

The DEPARTMENT.

Prerequisite, Mathematics 26.

50. **I. ANALYTIC GEOMETRY.**—For juniors; seniors may elect. A discussion of the geometry of the line, the circle, conic sections, and the higher plane curves. Fine and Thompson's "Co-ordinate Geometry."

3 class hours.

Credit, 3.

The DEPARTMENT.

Prerequisites, Mathematics 1, 2, 3 and 5.

51. **II. DIFFERENTIAL AND INTEGRAL CALCULUS.**—For juniors; seniors may elect. A first course in the subject, with some of the more important applications. Granville's "Differential and Integral Calculus."

5 class hours.

Credit, 5.

The DEPARTMENT.

Prerequisites, Mathematics 1, 2, 3 and 5.

52. **III. INTEGRAL CALCULUS.**—For juniors; seniors may elect. A continuation of Course 51.

5 class hours.

Credit, 5.

The DEPARTMENT.

Prerequisite, Mathematics 51.

53. **II. ELEMENTARY STRUCTURES.**—For juniors; seniors may elect. An elementary course in roofs and bridges. Textbook and lectures.

3 class hours.

1 2-hour laboratory period, credit, 4.

The DEPARTMENT.

75. **I. HYDRAULICS AND SANITARY ENGINEERING.**—For seniors; juniors may elect. Hydrostatics, theoretical hydraulics, orifices, weirs, pipes, conduits, water supply, hydraulic motors, sewers and sewage treatment. Textbook and lectures.

5 class hours.

Credit, 5.

The DEPARTMENT.

76. **I. MATERIALS OF CONSTRUCTION, FOUNDATIONS AND MASONRY CONSTRUCTION.**—For seniors; juniors may elect. Textbook and lectures.

4 class hours.

1 2-hour laboratory period, credit, 5.

The DEPARTMENT.

77. **II. ROADS AND RAILROADS.**—For seniors; juniors may elect. Topographic and higher surveying, highway construction, earthwork, pavements and railroad construction. Textbook and lectures.

3 class hours.

Credit, 3.

The DEPARTMENT.

78. **III.** ROADS AND RAILROADS. — For seniors; juniors may elect. As stated under Course 77.

3 2-hour laboratory periods, credit, 3.
The DEPARTMENT.

Prerequisite, Mathematics 77.

79. **I.** APPLIED MECHANICS. — Seniors. A course in applied mechanics, based on the calculus, with problems. Textbooks and lectures.
5 class hours.

Credit, 5.
The DEPARTMENT.

Prerequisites, Mathematics 51, 52.

Microbiology.

Professor MARSHALL, Associate Professor ITANO, Mr. HOOD, Mr. NEILL.

Three objectives are sought in the arrangement of the courses following: (1) An introductory course (50) needed in the general training of every college student. (2) An introductory course (50) followed by a specific course (as 80, 81, 82, 83), necessary to every student engaged in the Division of Agriculture, with which the specific course deals. (3) An introductory course (50) followed by Courses 51, 52, 75, 76, and 81, preparatory for students who are aiming to specialize in agricultural microbiology. (Courses 75, 76, and 81 are adapted to those having Course 50 only, and are also adapted to those majoring in microbiology).

The microbiological work is housed in a newly constructed building especially designed for it. There are 4 class laboratory rooms, 8 private laboratory rooms, 1 lecture room, 5 incubator rooms, 3 sterilizing rooms, 3 hood rooms, 3 washing rooms, 3 inoculating rooms, 3 weighing rooms, an animal room, a photographic and a dark room, a sub-basement refrigerator room, a library and 4 office rooms.

The class laboratory rooms are so arranged that individual desks are available for student use. Hot and cold water and gas connections are convenient for each desk; high-pressure steam and electric connections are also available. The building is well lighted and of sanitary construction; all the walls are of brick, and the building is fireproof.

The library is equipped with such books and current periodicals as are useful in the conduct of bacteriological work and investigations. Twenty-four scientific magazines are available regularly.

There are incubators, both electric and gas, hot-air sterilizers, ordinary steam sterilizers, autoclaves, an inspissator, blood-testing apparatus, vacuum apparatus, air-pressure apparatus, shaker, grinder, centrifugal machines, a water still of 5 gallons per hour capacity, Hoskins combustion furnace, a balopticon, complete microphotographic equipment, microscopes, microtome, and such other apparatus, glassware and chemicals as are needed for extensive and intensive work.

Elective Courses.

50. **I., II. and III.** INTRODUCTORY AND GENERAL MICROBIOLOGY. — For juniors; seniors may elect. Aims to provide elementary basis for microbial studies and interpretation, to enable students to pursue special pertinent courses which will serve as supports in practical electives or majors, and to

furnish students with such material as will be valuable in understanding public health problems. Three hours scheduled, five hours by arrangement. 2 class hours. 6 laboratory hours, credit, 5.

Professor MARSHALL, Associate Professor ITANO and Mr. NEILL.

51. **II.** and **III.** MORPHOLOGICAL, CULTURAL AND PHYSIOLOGICAL MICROBIOLOGY. — For juniors; seniors may elect. Types of micro-organisms, technic of handling, methods of culture and functions of micro-organisms are considered. This course is fundamental to all advanced and extended microbiological studies. One hour will be scheduled.

10 laboratory hours, credit, 5.

Associate Professor ITANO and Mr. NEILL.

52. **III.** ADVANCED MORPHOLOGICAL, CULTURAL AND PHYSIOLOGICAL MICROBIOLOGY. — For juniors; seniors may elect. The purpose of this course is to prepare the student for a more intimate knowledge of microbiological agricultural problems. To accomplish this object it is necessary to provide more advanced technic and methods of culture, together with a more extensive knowledge of micro-organisms and their functions. One hour will be scheduled.

10 laboratory hours, credit, 5.

Associate Professor ITANO and Mr. NEILL.

Prerequisite, Microbiology 50.

75. **II.** AGRICULTURAL MICROBIOLOGY. — For seniors; juniors may elect. This general comprehensive course is designed to cover in an elementary manner those subjects only which confront the student of general agriculture, — the microbiological features of air, water, sewage, soil, dairy, fermentations, food, vaccines, antisera, microbial plant infections, methods and channels of infections, immunity and susceptibility, microbial infections of man and animals, methods of control or sanitary and hygienic practices. One hour will be scheduled.

10 laboratory hours, credit, 5.

Professor MARSHALL, Associate Professor ITANO and Mr. NEILL
or Mr. HOOD.

Prerequisite, Microbiology 50.

76. **III.** AGRICULTURAL MICROBIOLOGY. — For seniors; juniors may elect. As stated under Course 75. One hour will be scheduled.

10 laboratory hours, credit, 5.

Professor MARSHALL, Associate Professor ITANO and Mr. NEILL
or Mr. HOOD.

Prerequisites, Microbiology 50 and 75.

80. **II.** SOIL MICROBIOLOGY. — For seniors; juniors may elect. Such subjects as the number and development of micro-organisms in different soils; the factors which influence their growth, food, reaction, temperature, moisture and aeration; the changes wrought upon inorganic and organic matter in the production of soil fertility, ammonification, nitrification and denitrification;

fixation of nitrogen symbiotically and non-symbiotically; methods of soil inoculation receive attention. One hour will be scheduled.

10 laboratory hours, credit, 5.
Associate Professor ITANO.

Prerequisite, Microbiology 50.

81. **I. HYGIENIC MICROBIOLOGY.** — For seniors; juniors may elect. An attempt will be made to select for this course certain material which should be the possession of every individual, and which is basic to public hygiene and sanitation, as applied to man and animals. The microbiology of water supplies, food supplies, vaccines, antisera or antitoxins; the channels by which micro-organisms enter the body, the influence of body fluids and tissues upon them, body reactions with micro-organisms (susceptibility and immunity); the micro-organisms of some of the most important infectious diseases, methods of control, including disinfectants and disinfection, antiseptics, antiseptis and asepsis, will be treated. One hour will be scheduled.

10 laboratory hours, credit, 5.

Professor MARSHALL and Mr. HOOD, or Associate Professor ITANO
and Mr. NEILL.

Prerequisite, Microbiology 50.

82. **I. DAIRY MICROBIOLOGY.** — For seniors; juniors may elect. Special emphasis will be placed upon milk supplies. The microbial content of milk, its source, its significance, its control; microbial taints and changes in milk; groups or types of organisms found in milk; milk as a carrier of disease-producing organisms; the value of straining, aeration, clarification, centrifugal separation, temperature, pasteurization; the abnormal fermentations of milk; bacteriological milk standards and their interpretation; ripening of milk and cream; the bacterial content of butter; a passing survey of the microbiology of cheeses; a study of special dairy products, as ice cream, condensed milk, artificial milk drinks (the products of microbial actions), represents a list of topics considered.

10 laboratory hours, credit, 5.

Professor MARSHALL and Mr. HOOD.

Prerequisite, Microbiology 50.

83. **I. FOOD MICROBIOLOGY.** — For seniors; juniors may elect. A study of the principles of food preservation, and food preservation by means of drying, canning, refrigerating and addition of chemicals, will be pursued. Food fermentations, as illustrated by bread, pickles, sauerkraut, ensilage, vinegar, wine, etc., will be examined. Decomposition of foods, as may be seen in meat, oysters, fish, milk, etc., as well as diseased and poisonous foods, will receive consideration. Contamination of food supplies by means of water, sewage, handling, exposure, diseased persons, etc., is of especial significance, and will be demonstrated by laboratory exercises. Laboratory inspection of foods is now a subject of great import and will be given attention. One hour will be scheduled.

10 laboratory hours, credit, 5.

Professor MARSHALL and Mr. HOOD.

Prerequisite, Microbiology 50.

SPECIAL COURSES FOR WOMEN.

1. **I. ELEMENTARY MICROBIOLOGY.**— For freshmen. The course will be devoted to the various types of micro-organisms, their distribution in nature and their characterization. Such methods as are essential for examination, manipulation and culturing will be studied and employed.

6 laboratory periods, credit, 3.

Associate Professor ITANO and Mr. NEILL.

In place of Military 1, tactics; Military 4, drill; fall term, freshmen.

3. **III. ELEMENTARY MICROBIOLOGY.**— For freshmen. Continuation of 1.

4 laboratory periods, credit, 2.

Associate Professor ITANO and Mr. NEILL.

In place of Military 3, tactics; Military 6, drill; spring term, freshmen.

25. **I. PERSONAL HYGIENE.**— For sophomores. Such subjects as the hygiene of the mouth and teeth, the gastro-intestinal tract, food, the skin, respiration apparatus, ear, eye and nervous system are reviewed. The value of bathing, clothing, physical exercise, etc., are considered. Attention will be given to emergencies, accidents of "first aid," and such other matters as usually fall within this category.

2 class hours, credit, 2.

Professor MARSHALL.

In place of Military 27, tactics; Military 28, drill; fall term, sophomores.

27. **III. SANITARY SCIENCE.**— For sophomores. The usual topics of sanitary science, as ventilation, heating, plumbing, water supply, sewage disposal, food control and communicable diseases, will be treated wholly from the standpoint of individual and public health control.

2 class hours, credit, 2.

Professor MARSHALL.

In place of Military 27; Military 30; spring term, sophomores.

Physics.

Professor HASBROUCK, Associate Professor ROBBINS, Mr. THOMPSON,¹ Mr. BURT.

The fundamental and basic importance of the laws and phenomena of physics makes necessary no explanation of the introduction of this subject into the curriculum of an agricultural college. The logical development of the subject emphasizes the importance of physics as a science in itself. Special emphasis is laid, however, on the correlation of the principles studied with the sciences of agriculture, botany, chemistry and zoölogy, thus furnishing an extra tool by use of which the student's work in all the subjects may be more effective.

¹ Second and third terms, 1920.

In Courses 25, 26 and 27 the subject-matter is presented with the idea of its special application primarily in the work in agriculture and general science. The full year's work is advised for all students continuing work specifically in the Division of Science. Courses 25 and 26 are required of all students. Course 29 is advised for students expecting to do special work in farm mechanics or general farm practice. The subject-matter is especially selected and arranged for its practical application rather than its theoretical development. Courses 50, 51 and 52 are advised for students in chemistry, general biology, microbiology and general science. The subject-matter is selected, and the courses developed, with the idea of making the student proficient in laboratory manipulation. Sufficient theory is given in connection with the work to enable the student to apply the knowledge and practice thus gained in the departments indicated above.

The department has at its command a building on the east campus, containing a general lecture room and laboratory for sophomore work, a laboratory for junior work, and in the basement one small laboratory for quantitative work in light measurement. There is also in the basement a fairly well-equipped shop for the repair and construction of apparatus used in the department work. The usual apparatus for the demonstration in the lecture room is in the possession of the department. The laboratory equipment is such as to enable the department to offer qualitative work in mechanics, heat, electricity and light.

Required Courses.

25. **I. GENERAL PHYSICS.**—Sophomores. Mechanics of solids and fluids. This course includes statics, with equilibrium of rigid bodies, work, energy and friction; kinetics, considering rectilinear motion and motion in a curved path; harmonic motion; rotation of rigid bodies, including kinematics of rotation; liquids and gases, with properties of fluids at rest and in motion; properties of matter and its internal forces, including elasticity, capillarity, surface tension.

3 class hours.

1 2-hour laboratory period, credit, 4.

Professor HASBROUCK and Associate Professor ROBBINS.

26. **II. ELECTRICITY AND MAGNETISM.**—Sophomores. The work in electricity includes such subject-matter as magnetism, electrostatics, electric currents with their production, chemical, heating and mechanical effects; battery cells, measurement of voltage, current flow and resistance, motors and generators.

2 class hours.

1 2-hour laboratory period, credit, 3.

Associate Professor ROBBINS.

Elective Courses.

27. **III. HEAT AND LIGHT.**—For sophomores; juniors and seniors may elect. Thermometry, expansion, colorimetry and specific heat, transmission of heat, changes of state, radiation and absorption. Wave theory of light, optical instruments, analysis of light, color, interference, diffraction, polarization.

4 class hours.

1 2-hour laboratory period, credit, 5.

Professor HASBROUCK and Associate Professor ROBBINS.

29. **III. INDUSTRIAL ELECTRICITY.** — For sophomores; juniors and seniors may elect. Wiring and testing of commercial equipment, such as storage cells, dynamos; motors, engine ignitors and distributors, heaters, transformers, etc. Laboratory work, accompanied by notes and required reading. Elective only by arrangement with instructor.

1 class hour.

2 2-hour laboratory periods, credit, 3.

Associate Professor ROBBINS.

Prerequisite, Physics 26.

50. **I. ELECTRICITY, HEAT AND LIGHT.** — For juniors; seniors may elect.

1 class hour.

2 2-hour laboratory periods, credit, 3.

Mr. THOMPSON.

Prerequisite, Physics 27.

51. **II. ELECTRICITY, HEAT AND LIGHT.** — For juniors; seniors may elect.

Continuation of Course 50.

1 class hour.

2 2-hour laboratory periods, credit, 3.

Mr. THOMPSON.

Prerequisite, Physics 50.

52. **III. ELECTRICITY, HEAT AND LIGHT.** — For juniors; seniors may elect. Continuation of Courses 50 and 51.

1 class hour.

2 2-hour laboratory periods, credit, 3.

Mr. THOMPSON.

Prerequisite, Physics 51.

Veterinary Science.

Professor PAIGE, Associate Professor GAGE.

The courses in veterinary science have been arranged to meet the needs (1) of students who propose following practical agriculture; (2) of prospective students of human and veterinary medicine; and (3) of teachers and laboratory workers in the biological sciences.

The department occupies a modern laboratory and hospital stable, built in accordance with the latest principles of sanitation. Every precaution has been taken in the arrangement of details to prevent the spread of disease, and to provide for effective heating, lighting, ventilation and disinfection.

The main building contains a large working laboratory for student use, and several small private laboratories for special work. There is a lecture hall, a museum, a demonstration room, a photographing room and a workshop. The hospital stable contains a pharmacy, an operating hall, a post-mortem and dissecting room, a poultry section, a section for cats and dogs, and 6 sections, separated from each other, for horses, cattle, sheep and swine. The laboratory equipment consists of a dissectible Auzoux model of the horse and Auzoux models of the foot and the leg, showing the anatomy and the diseases of every part. The laboratories also have modern, high-power microscopes, microtomes, incubators and sterilizers, for work in every department of veterinary science, including pathology, serology and parasitology. There are skeletons of the horse, the cow, the sheep, the dog and the pig, and a growing collection of anatomical and pathological specimens. The lecture room is provided with numerous maps, charts and diagrams.

Elective Courses.

50. **I. VETERINARY HYGIENE AND STABLE SANITATION.** — For juniors; seniors may elect. This course is intended to familiarize the student with the relation of water, food, air, light, ventilation, care of stables, disposal of excrement, individual hygiene, etc., to the prevention of disease in farm animals. 5 class hours.

Credit, 5.
Professor PAIGE.

75. **I. GENERAL VETERINARY PATHOLOGY. MATERIA MEDICA AND THERAPEUTICS.** — For juniors; seniors may elect. In this course such fundamental and general pathological conditions are studied as inflammation, fever, hypertrophy, atrophy, etc., a knowledge of which is essential in the diagnosis, prevention and treatment of disease. The course in pathology is followed by one in materia medica and therapeutics, dealing with the origin, preparation, pharmacology, pharmacy, administration and therapeutic use of the more common drugs. Poisonous plants and symptoms and treatment of plant poisoning are also considered.

5 class hours.

Credit, 5.
Professor PAIGE.

51. **II. COMPARATIVE (VETERINARY) ANATOMY.** — For seniors; juniors may elect. The anatomy of the horse is studied in detail, and that of other farm animals compared with it where differences exist. This course is essential for those students wishing to elect Course 76.

5 class hours.

Credit, 5.
Professor PAIGE.

76. **II. THEORY AND PRACTICE OF VETERINARY MEDICINE; GENERAL, SPECIAL AND OPERATIVE SURGERY.** — For seniors; juniors may elect. A course intended to familiarize the student with the various medical and surgical diseases of the different species of farm animals. Particular attention is given to diagnosis and first-aid treatment. The student is taught the technique of simple surgical operations that can with safety be performed by the stock owner. Lectures, demonstrations and practice. This course should be taken in conjunction with Course 51.

5 class hours.

Credit, 5.
Professor PAIGE.

Prerequisite, Veterinary 75.

78. **I. ESSENTIALS OF GENERAL PATHOLOGY.** — For seniors; juniors may elect. This course is planned to introduce the student to some of the essential anatomical, histological and general physiological phenomena essential to the understanding of some of the simple general pathological conditions found in domestic animals. Some of the common methods of diagnosis will be considered in the laboratory. The various chemical and biological reactions and tests will be presented from the standpoint of pure science, showing applications of chemistry and biology. The course will serve to liberally educate and stimulate in the student of agriculture the appreciation of some of the methods

used in animal pathology for detecting and controlling some of the more common animal diseases. Lectures, demonstration and laboratory work.

2 3-hour laboratory periods, credit, 3.

Associate Professor GAGE.

79. **II. ESSENTIALS OF GENERAL ANIMAL PATHOLOGY.**—For seniors; juniors may elect. This is a continuation of Course 78, and is devoted to a study of some of the common pathological conditions by means of prepared sections, the aim being to demonstrate to the student abnormal animal histological structures commonly observed when material from various cases of animal diseases is prepared for microscopical study. Some of the biological products used in protecting animals against disease will be considered.

2 3-hour laboratory periods, credit, 3

Associate Professor GAGE.

Prerequisite, Veterinary 78.

80. **III. ESSENTIALS OF GENERAL ANIMAL PATHOLOGY.**—For seniors; juniors may elect. As stated in Courses 78 and 79.

2 3-hour laboratory periods, credit, 3.

Associate Professor GAGE.

Prerequisite, Veterinary 79.

85. **I. AVIAN PATHOLOGY.**—For seniors; juniors may elect. A course in poultry diseases. The object of this course is to present information concerning the common diseases of poultry, their etiology, diagnosis and prevention. The work will consist of a systematic study of the diseases of the alimentary tract, liver and abdominal region, followed by a study of the diseases of the respiratory system, circulation and kidneys. The important disease-producing external and internal parasites will be considered; also diseases of the skin and reproductive organs. Lectures and demonstrations.

2 3-hour laboratory periods, credit, 3.

Associate Professor GAGE.

86. **II. AVIAN PATHOLOGY.**—For seniors; juniors may elect. As stated under Course 85, also devoted to the study of some of the special diseases of poultry. Recent methods used in the control of these diseases will be considered and opportunity offered the student for demonstrating various disease processes by means of prepared slides. Lectures, demonstrations and laboratory work.

2 3-hour laboratory periods, credit, 3.

Associate Professor GAGE.

Prerequisite, Veterinary 85.

87. **III. AVIAN PATHOLOGY.**—For seniors; juniors may elect. As stated under Courses 85 and 86.

2 3-hour laboratory periods, credit, 3.

Associate Professor GAGE.

Prerequisite, Veterinary 86.

54. **II. ELEMENTS OF HISTOLOGY.** — Juniors; seniors may elect.
3 2-hour laboratory periods, credit, 3.
Professor GORDON.

Prerequisite, Zoölogy 53.

55. **III. ELEMENTS OF HISTOLOGY.** — Juniors; seniors may elect.
3 2-hour laboratory periods, credit, 3.
Professor GORDON.

Prerequisite, Zoölogy 54.

58. **II. CONSERVATIONAL ZOÖLOGY.** — Juniors; seniors may elect. For students who are interested in the conservation of wild life, especially the natural fauna of the State. Not offered for the year 1919-20.
2 class hours. 1 2-hour laboratory period, credit, 3.
The DEPARTMENT.

75. **I. SPECIAL ZOÖLOGY.** — Juniors, seniors, graduates and others may apply for such special work as they are qualified to undertake.
1 class hour. 2 2-hour laboratory periods, credit, 3.
The DEPARTMENT.

76. **II. SPECIAL ZOÖLOGY.** — Same as Course 75.
1 class hour. 2 2-hour laboratory periods, credit, 3.
The DEPARTMENT.

77. **III. SPECIAL ZOÖLOGY.** — Same as Course 75.
1 class hour. 2 2-hour laboratory periods, credit, 3.
The DEPARTMENT.

78. **II. ORNITHOLOGY.** — Juniors, seniors and others. The taxonomic characters, migrations and distribution of the birds.
1 class hour. 2 2-hour laboratory periods, credit, 3.
The DEPARTMENT.

79. **III. ECONOMIC AND FIELD ORNITHOLOGY.** — A review and study in the field of the food and other habits of Massachusetts birds.
1 class hour. 2 2-hour laboratory periods, credit, 3.
The DEPARTMENT.

GEOLOGY.

Required Course.

2. **II. AGRICULTURAL GEOLOGY.** — Freshmen.
2 class hours. Credit, 2.
Professor GORDON.

Elective Course.

27. **III. GENERAL GEOLOGY.** — Sophomores; juniors and seniors may elect.
3 class hours. 2 2-hour laboratory periods, credit, 5.
Professor GORDON.

DIVISION OF THE HUMANITIES.

Professor SPRAGUE.

Economics and Sociology.

Professor SPRAGUE.

[Heavy-faced type indicates the term in which the course is given. Numbering of courses: 1 to 24, inclusive, freshmen; 25 to 49, inclusive, sophomores; 50 to 74, inclusive, juniors; 75 to 99, inclusive, seniors.]

The courses in economics and sociology are planned with the purpose of giving the student that knowledge and understanding of the important factors and problems in this field of study and life which every active citizen and educated man ought to have.

Elective Courses.

26. **II. CIVILIZATIONS, ANCIENT AND MODERN.** — For sophomores; others may elect. This course studies the evolutionary origin and history of man; characteristics of primitive man, departure from the animal status and beginnings of civilization; origin and development of industries, arts and sciences; the evolution of languages, warfare, migrations and social institutions; a study of the powerful natural and human forces that have brought man from the early stages to modern development; characteristic features of the leading civilizations and races of ancient and modern times; beneficial and dangerous factors in American life in view of the history of human civilization. 5 class hours.

Credit, 5.

Professor SPRAGUE.

50. **II. BUSINESS AND INDUSTRY.** — For juniors and seniors. The forms, organization, administration and labor problems of business. This course is devoted to the following subjects: methods of organizing, financing and administering corporations and partnerships; forms of business administration, wholesaling, jobbing, retailing, advertising, credits and collections; systems of industrial remuneration for wage earners, co-operation and preserving industrial peace; problems concerned with protective legislation for workmen and employers, sweated industries, prison labor, child labor and industrial education.

5 class hours.

Credit, 5.

Professor SPRAGUE.

51. **I. INTRODUCTION TO ECONOMIC PRINCIPLES AND PROBLEMS.** — For juniors. This course is devoted to the study of the following subjects: definitions of economic terms, such as wealth, capital, value, etc.; factors of production, exchange and consumption; principles of economic production, supply and demand, diminishing returns, division of labor, productive organization, concentration of capital and labor, trust and monopoly problems, public control of production and distribution; principles of exchange, theories of value, money and its problems; international trade, tariff and free trade theories, American merchant marine, reciprocity, and trade treaties; forms of income, wages, interest, rent, profits and the forces which govern them; principles of

spending, economy, luxury, conservation of individual and national resources; principles and agencies for saving, investments, banks, building associations, insurance of all kinds; schemes for social organization; socialism, communism, industrial democracy. Textbook and readings.

5 class hours.

Credit, 5.

Professor SPRAGUE.

75. **I. SOCIAL INSTITUTIONS AND SOCIAL REFORMS.** — For seniors; juniors by permission. This course is devoted to the study of the social institutions, such as the family, the State, property, religions; and to such current problems as eugenics, race suicide, divorce, crime and delinquent classes, prison reform, prevention and treatment of dependents and defectives, poverty, its causes and preventions; constructive modern social reform movements for insurance of wage earners, protection of childhood, assurance of safety, health and play time for all classes. The correctional and charitable institutions of Massachusetts will be studied in considerable detail.

5 class hours.

Credit, 5.

Professor SPRAGUE.

77. **III. PUBLIC FINANCE, TAXATION, MONEY AND BANKING.** — For seniors. This course studies systems and problems of taxation as they are found in Europe and America; objects for spending public revenue; public debts and methods of organizing them; systems of money and currency problems of America; types, methods and functions of banks; economic and financial crises and depressions in the United States; modern war finance. Readings and lectures.

5 class hours.

Credit, 5.

Professor SPRAGUE.

History and Government.

Elective Courses.

50. **III. GOVERNMENT.** — For juniors; seniors may elect. This course will cover subjects as follows: forms and working methods of the governments of Great Britain, Germany, France, Russia, Switzerland, New Zealand and Canada; historic types and theories of government; forms and methods of Federal, State and local governments in America; progress and problems of democracy and new reform movements in organization and administration; new tendencies towards social legislation and extension of governmental control over broader interests of the people.

5 class hours.

Credit, 5.

Professor SPRAGUE.

75. **II. HISTORY OF NEW ENGLAND.** — For seniors; juniors may elect. Treating New England as a geographical and political unit, this course aims to give a survey of its religious, social, economic and political history. The development of its institutions, the growth of its industries, the spread of its population to other sections of the country, its influence upon national character and politics are phases of the subject which will be discussed. Assigned readings and theses will be required.

3 class hours.

Credit, 3.

Languages and Literature.

Professor LEWIS, Professor PATTERSON, Professor MACKIMMIE, Associate Professor NEAL, Associate Professor ASHLEY, Assistant Professor PRINCE, Assistant Professor JULIAN, Mr. RAND, Miss GOESSMANN.

ENGLISH.

Required Courses.

1. **I.** 2. **II.** 3. **III.** ENGLISH. — Freshmen. Composition. Intended to teach straight thinking, sound structure, clear and correct expression. Lectures, recitations, theme writing and conferences.

3 class hours each term.

Credit, 3 each term.

Associate Professor NEAL, Assistant Professor PRINCE and Mr. RAND.

25. **I.** 26. **II.** 27. **III.** ENGLISH. — Sophomores. A general reading course in English literature.

2 class hours each term.

Credit, 2 each term.

Professor LEWIS and Miss GOESSMANN.

Elective Courses in English Language and Literature.

The elective courses in English fall into two groups. Both groups are intended to increase the student's understanding and appreciation of literature. Group one (Courses 50 to 58), besides introducing the student to individual writers, will emphasize the life and thought of the times. Group two (Courses 75, 79 and 80) will emphasize form-characteristics and the artistic quality or historical development of literary types.

50. **I.** ENGLISH POETRY OF THE ROMANTIC PERIOD (1921-22). — This course alternates with course 53. For juniors; seniors may elect. A course in history, appreciation and understanding. Some of the writers studied are Gray, Goldsmith, Burns, Scott, Wordsworth, Coleridge, Byron, Keats and Shelley.

3 class hours.

Credit, 3.

Professor PATTERSON.

51. **II.** ENGLISH POETRY IN THE NINETEENTH CENTURY. — This course alternates with Course 54. For juniors; seniors may elect. In general, this course is like Course 50. Tennyson, Browning, Mrs. Browning, Arnold, Clough, the Rossettis, Morris and Swinburne are among the writers to be studied.

3 class hours.

Credit, 3.

Professor LEWIS.

57. **III.** ENGLISH POETRY IN THE NINETEENTH CENTURY. — This course alternates with Course 58. For juniors; seniors may elect. As stated under Course 51.

2 class hours.

Credit, 2.

Professor LEWIS.

52. **III.** ENGLISH WRITERS FROM MILTON TO POPE. — For juniors; seniors may elect. A survey course that will emphasize the leading writers, literary currents and the thought of the period. Some of the writers studied are Milton, Dryden, Addison, Swift and Pope.

3 class hours.

Credit, 3.

Professor PATTERSON.

53. **I.** ENGLISH PROSE OF THE ROMANTIC PERIOD. — For juniors; seniors may elect. A course in English prose paralleling Course 51. Some of the writers studied are Goldsmith, Coleridge, Lamb, DeQuincey and Hazlitt.

3 class hours.

Credit, 3.

Professor PATTERSON.

54. **II.** ENGLISH PROSE IN THE NINETEENTH CENTURY (1921-22). — For juniors; seniors may elect. This course parallels Course 51. Among the writers considered will be Macaulay, Carlyle, Ruskin, Newman and Arnold.

3 class hours.

Credit, 3.

Professor LEWIS.

58. **III.** ENGLISH PROSE IN THE NINETEENTH CENTURY (1921-22). — For juniors; seniors may elect. As stated under Course 54.

2 class hours.

Credit, 2.

Professor LEWIS.

55. **II.** AMERICAN LITERATURE. — For juniors; seniors may elect. Intended to give a general survey of literature in America, especially in the nineteenth century, with an introduction to the work of the best known writers, and with especial attention to the relations between national life and history and national thought as expressed in literature. The usual authors — Irving, Cooper, Bryant, Poe, Longfellow, Emerson, Hawthorne, Whittier, Parkman, Lowell, Holmes, Whitman, Lanier — will be discussed, and attention will be given to southern and western authors. Present writers and tendencies will also receive some notice.

3 class hours.

Credit, 3.

Assistant Professor PRINCE.

56. **III.** AMERICAN LITERATURE. — For juniors; seniors may elect. As stated under Course 55.

2 class hours.

Credit, 2.

Assistant Professor PRINCE.

Prerequisite, English 55.

60. **I.** THE LITERATURE OF RURAL LIFE. — For juniors; seniors may elect. A critical and appreciative study of writers, both in prose and poetry, who have interpreted nature from the viewpoint of the lover of country life, and those who have idealized agriculture, horticulture and other rural pursuits, together with those who have upheld as an ideal the development of a rural environment in cities.

3 class hours.

Credit, 3

Miss GOESSMANN.

61. **II. THE LITERATURE OF RURAL LIFE.** — For juniors; seniors may elect. As stated under Course 60.
2 class hours.

Credit, 2.
Miss GOESSMANN.

Prerequisite, English 60.

75. **III. PROSE FICTION.** — The short story or the novel. For seniors; juniors may elect. Readings, reports and discussions. Texts (short story): Neal's "Short Stories in the Making" and "To-day's Short Stories Analyzed."
3 class hours or library equivalents.

Credit, 3.
Associate Professor NEAL.

79. **II. THE DRAMA.** — For seniors; juniors may elect. A cursory survey of early English drama, its origin, forms and meaning, will be followed by a careful study of Shakespeare. Four of his plays will be analyzed in detail, and many others will be read and discussed.
3 class hours.

Credit, 3.
Mr. RAND.

80. **III. THE DRAMA.** — For seniors; juniors may elect. The course will trace the development of modern drama, especial attention being given to plays by Congreve, Goldsmith, Sheridan, Robertson, Jones, Pinero, Fitch, Shaw, Moody and Ibsen.
2 class hours.

Credit, 2.
Mr. RAND.

APPLIED ENGLISH — RURAL JOURNALISM.

The courses in applied English and rural journalism have two chief aims: first, to turn the student's attention toward matters of contemporary concern, thus emphasizing the vital connection of thought and expression with citizenship and establishing a stimulating "contact" between the subject and the affairs of daily life; second, to provide training for students who may wish to enter journalism (especially agricultural or industrial journalism or non-urban newspaper work), or who are preparing for the numerous other vocations in which acquaintance with newspaper practices and requirements are of value. All of the courses afford constant practice in writing. Clearness of thought and expression, accuracy of statement, discrimination of the important from the unimportant, and interest and vigor of presentation are sought. So far as conditions permit, instruction is largely individual.

Courses 50 and 51 deal with the applications of the fundamental subjects of exposition and of narration and description. Course 52 provides more general practice in the same subjects, with their application to the purposes of the various kinds of periodical publications as a standard. Courses 53, 54 and 55 apply the principles of composition, and of significance and interest, to the reporting of fact. Courses 77, 78 and 79 provide reading in American history or in current events, and practice the student in commenting upon or interpreting topics of timely interest. Courses 80, 81 and 82 are temporarily withheld, the critical shortage of paper still compelling newspapers to extreme economy of space and even to reductions in size.

The newsroom, or laboratory, for the courses in applied English and journalism is equipped with typewriting machines; copytables; representative newspapers, reviews, agricultural papers and trade journals concerning journalism and writing; selected books on journalism; a small collection of yearbooks and other reference books; and a considerable "morgue" of indexed pamphlets, bulletins and clippings. The newsroom and office are in the recently completed Stockbridge Hall, near the library of the Division of Agriculture.

Elective Courses.

50. **I. ADVANCED COMPOSITION: EXPOSITION.**—For juniors; seniors may elect. Advanced composition; planning expository thought; expository structure; specimens, including contemporary articles from farm and rural life publications; some bulletin writing, including presentation of technical information for nontechnical readers.

3 class hours, or laboratory equivalents.

Credit, 3.

Associate Professor NEAL.

51. **II. ADVANCED COMPOSITION: NARRATION AND DESCRIPTION.**—For juniors; seniors may elect. The fundamental elements of style, word-choice, diction, sentence form and paragraph types. Description of persons, places, objects, industries and productional processes, the temper and characteristic aspects of public gatherings, moods, behavior and character-sketching. Narration of incident, sustained action, events in series and the like, as in biography, dramatic situation, history and fiction. [Not given in 1919–20.]

3 class hours, or laboratory equivalents.

Credit, 3.

Associate Professor NEAL.

52. **III. ADVANCED COMPOSITION: MAGAZINE WRITING.**—Presenting rural life and such other subjects as the student may elect, in form and manner suitable for use in farm journals, magazines and similar mediums.

3 class hours, or laboratory equivalents.

Credit, 3.

Associate Professor NEAL.

53. **I.** 54. **II.** 55. **III. NEWS-GATHERING AND NEWS-WRITING.**—For juniors; seniors may elect. The foundation aims and conceptions of journalism; reporting. Central purpose, to develop ability to pick out essentials from inessentials, perceive elements of interest, and present facts which appeal to the reader. Courses 53, 54 and 55 are suited to nonmajoring students whose vocation may require the popular presentation of technical or other information; *e.g.*, extension workers, county agents, agricultural-school instructors, experiment-station editors, survey and other social-service workers, men engaged in sociological or economic investigations, landscape architects and civil and sanitary engineers.

6 laboratory hours or class equivalents, credit, 3.

Associate Professor NEAL.

77. **I.** 78. **II.** 79. **III. EDITORIAL MATERIALS AND METHODS.**—For seniors; juniors may elect. Readings, quizzes, reports and personal conferences; American history or current events; reading of daily papers and

weekly reviews or rural-life periodicals; writing of editorial articles. Recommended to nonmajoring students who desire practice in discovering the significant aspects of matters of public attention and in effectively expressing comment thereon. Text, Neal's "Editorials and Editorial Writing." [Not given in term I., 1919-20.]

6 laboratory hours or class equivalents, credit, 3.
Associate Professor NEAL.

80. **I.** 81. **II.** 82. **III.** ADVANCED JOURNALISTIC PRACTICE. — Seniors. Preparation, editing and publication in a newspaper of a rural-life page. [Not given in 1919-20.]

8 or 10 laboratory hours, credits, 4 or 5.
Associate Professor NEAL.

PUBLIC SPEAKING.

Required Course.

1. **I., II.** and **III.** PUBLIC SPEAKING. — Freshmen. Freshman public speaking is required in the first, second or third term, at the option of the instructor. The course is concerned with the actual problems which confront the man who would speak convincingly and persuasively. Much attention, therefore, is given to the preparation and delivery of extempore speeches. Textbook, Robinson's "Effective Public Speaking," supplemented by class work and discussions. First, second or third terms, as directed.

1 class hour.

Credit, 1.

Assistant Professor PRINCE, Assistant Professor PATTERSON and
Mr. RAND.

Elective Courses.

50. **I.** ARGUMENTATION. — For juniors; seniors may elect. The course aims to present the fundamental principles of argumentation as applied to oral and written discourse, and intends to develop in the student power to handle argument convincingly and persuasively. Lectures, discussions of leading questions of the day, practice in brief-drawing and the writing of forensics. Textbook, Foster's "Argumentation and Debating." The course is recommended for those who desire to enter the intercollegiate debates.

3 class hours.

Credit, 3.

Assistant Professor PRINCE.

Prerequisites, Public Speaking, 1, 2 or 3.

51. **II.** OCCASIONAL ORATORY. — For juniors; seniors may elect. The course involves a study of the elements of vocal expression and action; speeches on assigned subjects; prescribed reading; the preparation and delivery of several formal orations. Textbook, Shurter's "The Rhetoric of Oratory." The course is recommended for those who wish to enter the Flint contest.

3 class hours.

Credit, 3.

Assistant Professor PRINCE.

Prerequisites, Public Speaking 1, 2 or 3.

French and Spanish.

Professor MACKIMMIE, —.

The aim of the courses in French and Spanish is to give the student a practical knowledge of these languages for the purpose of wider reading and research, to introduce him to some of their treasures in art and science, and through the literature to acquaint him with the people. In the elementary courses as much time as possible is given to oral work, to develop a speaking, as well as a reading, knowledge of the tongue.

FRENCH.

Required Courses.

1. **I.** 2. **II.** 3. **III.** **ELEMENTARY FRENCH.** — Freshmen; open upon arrangement to other students. The essentials of grammar are rapidly taught and will be accompanied by as much reading as possible. This course is required of freshmen presenting German for entrance who do not continue that language and have not studied French.

3 class hours each term.

Credit, 3 each term.

4. **I.** 5. **II.** 6. **III.** **INTERMEDIATE FRENCH.** — Freshmen; open upon arrangement to other students. Training for rapid reading. The reading of a number of short stories, novels and plays; composition, reports on collateral reading from periodicals and scientific texts in the library.

3 class hours each term.

Credit, 3 each term.

Professor MACKIMMIE.

Prerequisite, required of freshmen who present two years of French for entrance and do not take German.

Elective Courses.

25. **I.** **INTERMEDIATE FRENCH.** — For sophomores; open upon arrangement to other students. Training for rapid reading; the reading of a number of short stories, novels and plays; readings from periodicals and scientific texts in the library.

3 class hours.

Credit, 3.

Professor MACKIMMIE.

Prerequisites, French 1, 2 and 3.

26. **II.** **INTERMEDIATE FRENCH.** — For sophomores; open upon arrangement to other students. As stated under Course 25.

3 class hours.

Credit, 3.

Professor MACKIMMIE.

Prerequisite, French 25.

27. **III.** **INTERMEDIATE FRENCH.** — For sophomores; open upon arrangement to other students. As stated under Course 25.

3 class hours.

Credit, 3.

Professor MACKIMMIE.

Prerequisite, French 26.

28. **I. ADVANCED FRENCH.** — For sophomores; open upon arrangement to other students. A reading course. Balzac's "Eugénie Grandet" and "Le Père Goriot," and other masterpieces of the nineteenth century; Brunetière's "Honoré de Balzac" and Harper's "Masters of French Literature;" readings in the library and written reports.

3 class hours.

Credit, 3.

Prerequisites, French 4, 5 and 6.

29. **II. ADVANCED FRENCH.** — For sophomores; open upon arrangement to other students. As stated under Course 28.

3 class hours.

Credit, 3.

Prerequisites, French 4, 5 and 6.

30. **III. ADVANCED FRENCH.** — For sophomores; open upon arrangement to other students. General view of the history of French literature; Kastner and Atkins' "History of French Literature." Representative works of the important periods will be studied in class. Outside reading will be required.

3 class hours.

Credit, 3.

Prerequisites, French 25 and 26, or French 28 and 29.

50. **I. SCIENTIFIC FRENCH.** — For juniors; seniors may elect. This course is planned to meet the requirements of the individual student, and aims to equip him with exact English equivalents for the French scientific terms in his particular science. Word lists of scientific terms will be required, and also weekly readings and reports from scientific works in the subject in which he is majoring. Several scientific readers will be read.

3 class hours.

Credit, 3.

Prerequisites, French 4, 5 and 6, or French 25, 26 and 27.

51. **II. SCIENTIFIC FRENCH.** — For juniors; seniors may elect. As stated under Course 50.

3 class hours.

Credit, 3.

Prerequisites, French 4, 5 and 6, or French 25, 26 and 27.

52. **III. SCIENTIFIC FRENCH.** — For juniors; seniors may elect. As stated under Course 50.

3 class hours.

Credit, 3.

Prerequisites, French 4, 5 and 6, or French 25, 26 and 27.

75. **I. FRENCH LITERATURE.** — For seniors; juniors may elect. The object of Courses 75, 76 and 77 is to give an introduction to recent movements in French literature. Course 75 will deal with the drama, and plays by Augier,

A. Dumas, fils, Delavigne and some contemporary dramatists will be read and studied.

3 class hours.

Credit, 3.

Associate Professor MACKIMMIE.

Prerequisites, French 4, 5 and 6, or French 25, 26 and 27.

76. **II. FRENCH LITERATURE.** — For seniors; juniors may elect. This course deals with the novel. Works by Flaubert, the De Goncourts and Zola will be read. Written reports are required on outside reading.

3 class hours.

Credit, 3.

Associate Professor MACKIMMIE.

Prerequisites, French 4, 5 and 6, or French 25, 26 and 27.

77. **III. FRENCH LITERATURE.** — For seniors; juniors may elect. Modern criticism. Sainte-Beuve, "Causeries du Lundi" (Harper) and works by Taine and Renan. Reference book, Lanson's "Histoire de la Littérature Française."

3 class hours.

Credit, 3.

Associate Professor MACKIMMIE.

Prerequisites, French 4, 5 and 6, or French 25, 26 and 27.

SPANISH.

Elective Courses.

50. **I. ELEMENTARY SPANISH.** — For juniors; seniors may elect. Open to other students upon arrangement. Grammar, with special drill in pronunciation; exercises in conversation and composition. Reading from a reader and selected short stories.

3 class hours.

Credit, 3.

Associate Professor MACKIMMIE.

51. **II. ELEMENTARY SPANISH.** — For juniors; open to other students upon arrangement. As stated in Course 50.

3 class hours.

Credit, 3.

Associate Professor MACKIMMIE.

Prerequisite, Spanish 50.

52. **III. ELEMENTARY SPANISH.** — For juniors; open to other students upon arrangement. As stated in Course 50.

3 class hours.

Credit, 3.

Associate Professor MACKIMMIE.

Prerequisite, Spanish 51.

75. **I. MODERN SPANISH AUTHORS.** — Seniors. Reading from modern Spanish novel and drama. Translation of English into Spanish. Private reading.

3 class hours.

Credit, 3.

Associate Professor MACKIMMIE.

Prerequisite, Spanish 52.

76. **II. MODERN SPANISH AUTHORS.** — Seniors. As stated in Course 75.
3 class hours. Credit, 3.

Associate Professor MACKIMMIE.

Prerequisite, Spanish 75.

77. **III. MODERN SPANISH AUTHORS.** — Seniors. As stated in Course 75.
3 class hours. Credit, 3.

Associate Professor MACKIMMIE.

Prerequisite, Spanish 76.

German and Music.

Associate Professor ASHLEY, Assistant Professor JULIAN.

GERMAN.

The courses in German are intended to give the student a reading knowledge of the language and to introduce to him some of the masterpieces of German literature. To the student interested in pursuing advanced reading in scientific German, opportunity is given to do corollary reading in his major subject, in collaboration with the head of that department.

Required Courses.

1. **I. 2. II. 3. III. ELEMENTARY GERMAN.** — Freshmen; open upon arrangement to other students. Grammar, composition and reading. Especial attention is given to oral work in German and to translation of English into German. Required of those presenting French for entrance who do not continue that language and have not studied German.

3 class hours each term.

Credit, 3 each term.

Associate Professor ASHLEY and Assistant Professor JULIAN.

4. **I. 5. II. 6. III. INTERMEDIATE GERMAN.** — Freshmen; open upon arrangement to other students. Selected works of Schiller, Heine and Goethe. Grammar review and advanced prose composition.

3 class hours each term.

Credit, 3 each term.

Associate Professor ASHLEY.

Prerequisite, required of freshmen who present two years of German for entrance and do not take French.

Elective Courses.

25. **I. INTERMEDIATE GERMAN.** — For sophomores; open upon arrangement to other students. Reading of such works as Sudermann's "Frau Sorge," "Wilhelm Tell," "Die Journalisten," etc. Grammar review.

3 class hours.

Credit, 3.

Assistant Professor JULIAN.

Prerequisites, German 1, 2 and 3.

26. **II. INTERMEDIATE GERMAN.** — For sophomores; open upon arrangement to other students. As stated under Course 25.

3 class hours.

Credit, 3.

Assistant Professor JULIAN.

Prerequisite, German 25.

27. **III. INTERMEDIATE GERMAN.** — For sophomores; open upon arrangement to other students. As stated under Course 25.
3 class hours.

Credit, 3.

Assistant Professor JULIAN.

Prerequisite, German 26.

28. **I. ADVANCED GERMAN.** — For sophomores; open upon arrangement to other students. Reading and studying of Goethe's most important literary productions.
3 class hours.

Credit, 3.

Associate Professor ASHLEY.

Prerequisites, German 4, 5 and 6.

29. **II. ADVANCED GERMAN.** — For sophomores; open upon arrangement to other students. Development of the German novel; rapid reading of great novelists.
3 class hours.

Credit, 3.

Associate Professor ASHLEY.

Prerequisite, German 28.

30. **III. ADVANCED GERMAN.** — For sophomores; open upon arrangement to other students. As stated under Course 29.
3 class hours.

Credit, 3.

Associate Professor ASHLEY.

Prerequisite, German 29.

50. **I. SCIENTIFIC GERMAN.** — For juniors; seniors may elect. Reading in German of modern magazine articles and works of a scientific nature. Different work assigned according to needs of individual students.
3 class hours.

Credit, 3.

Associate Professor ASHLEY.

Prerequisites, German 4, 5 and 6, or German 25, 26 and 27.

51. **II. SCIENTIFIC GERMAN.** — For juniors; seniors may elect. As stated under Course 50.
3 class hours.

Credit, 3.

Associate Professor ASHLEY.

Prerequisite, German 50.

52. **III. SCIENTIFIC GERMAN.** — For juniors; seniors may elect. As stated under Course 50.
3 class hours.

Credit, 3.

Associate Professor ASHLEY.

Prerequisite, German 51.

75. **I. GERMAN LITERATURE.** — Seniors. Advanced language and literary study. Conducted entirely in German. Lectures on German literature and history; life, customs and travel in Germany. Collateral readings, including masterpieces of different epochs, such as "Niebelungenlied," Goethe's "Faust" and one modern typical drama.
3 class hours.

Credit, 3.

Associate Professor ASHLEY.

Prerequisites, German 28, 29 and 30.

76. **II.** GERMAN LITERATURE. — Seniors. As stated under Course 75.
3 class hours. Credit, 3.
Associate Professor ASHLEY.

Prerequisite, German 75.

77. **III.** GERMAN LITERATURE. — Seniors. As stated under Course 75.
3 class hours. Credit, 3.
Associate Professor ASHLEY.

Prerequisite, German 76.

78. **I.** CONVERSATION AND COMPOSITION. — For seniors; juniors may elect. Translating connected English into German. Reproducing outside readings in German orally in class.
1 class hour. Credit, 1.
Associate Professor ASHLEY.

Prerequisites, German 4, 5 and 6, or German 25, 26 and 27.

79. **II.** CONVERSATION AND COMPOSITION. — For seniors; juniors may elect. As stated under Course 78.
1 class hour. Credit, 1.
Associate Professor ASHLEY.

Prerequisite, German 78.

80. **III.** CONVERSATION AND COMPOSITION. — For seniors; juniors may elect. As stated under Course 78.
1 class hour. Credit, 1.
Associate Professor ASHLEY.

Prerequisite, German 79.

MUSIC.

Elective Courses.

50. **I.** HISTORY AND INTERPRETATION OF MUSIC. — For juniors; seniors may elect. History of music among the ancients; medieval and secular music; epoch of vocal counterpoint; development of monophony opera and oratorio; life and works of the greatest representatives of the classical school, — Bach, Händel, Haydn, Gluck and Mozart.
1 class hour. Credit, 1.
Associate Professor ASHLEY.

51. **II.** HISTORY AND INTERPRETATION OF MUSIC. — For juniors; seniors may elect. A continuation of Course 50. The Romantic school; Beethoven, Schubert, Weber, Mendelssohn, Schumann, Chopin, Berlioz and Liszt; Wagner and the opera.
1 class hour. Credit, 1.
Associate Professor ASHLEY.

52. **III.** HISTORY AND INTERPRETATION OF MUSIC. — For juniors; seniors may elect. The Modern school and Modern composers.
1 class hour. Credit, 1.
Associate Professor ASHLEY.

DIVISION OF RURAL SOCIAL SCIENCE.

President BUTTERFIELD.

[Heavy-faced type indicates the term in which the course is given. Numbering of courses 1 to 24, inclusive, freshmen; 25 to 49, inclusive, sophomores; 50 to 74, inclusive, juniors; 75 to 99, inclusive, seniors.]

Agricultural Economics.

Professor CANCE, Mr. SAWTELLE and Assistant Professor —.

Instruction in agricultural economics is designed to show that the agricultural industry justifies its existence chiefly as a supplier of food and raw textile materials for human consumption; that agricultural success is measured by production of values rather than by production of volume of agricultural products; that the goal of the farmer is the largest net profit over a long-time period; that agricultural production includes all processes from purchase of seed and fertilizer and preparation of seedbed until the product reaches the consumer, including collection, transportation, storage, financing, packing, handling and selling; that a knowledge of the business of agriculture and agricultural commerce is to-day more necessary than a knowledge of agricultural technique.

The work of this department is conducted by means of lectures, readings and research in both library and field. A catalogue, now containing some 12,000 cards, covering the various phases of agricultural economics, is maintained. The department is also supplied with a large collection of maps, charts and statistical reports on the prices and supply of agricultural products. A goodly number of regular reports of the Bureau of Markets and other divisions of the United States Department of Agriculture are on file in the office of the department, and available for the use of students. Two series of bound volumes of bulletins are kept in the department offices, with duplicate series in the college library; one series already contains 12 volumes on "Co-operation in Agriculture," and the other, 15 volumes on "Marketing of Farm Products."

Required Course.

26. **II. AGRICULTURAL INDUSTRY AND RESOURCES.** — Sophomores. A descriptive course dealing with agriculture as an industry and its relation to physiography, movement of population, supply of labor, commercial development, transportation, public authority and consumers' demand. The principal agricultural resources of the United States will be studied with reference to commercial importance, geographical distribution, present condition and means of increasing the value of the product and cheapening cost of production. Lectures, assigned readings, class topics and discussions.
5 class hours. Credit, 5.

Professor CANCE and Assistant Professor —.

Elective Courses.

50. **I. ELEMENTS OF AGRICULTURAL ECONOMICS.** — For juniors; seniors may elect. This course is designed to accompany or follow the course in elements of economics. It deals with the economic principles underlying the welfare

and prosperity of the farmer and those institutions upon which his economic success depends; the economic elements in the production and distribution of agricultural wealth; means of exchange; principles of rural credit; problems of land tenure and land values; taxation of farm property; and the maintenance of the economic status of the farmer. Lectures, text, readings, topics and field work.

5 class hours.

Credit, 5.

Professor CANCE.

51. **III. HISTORICAL AND COMPARATIVE AGRICULTURE.** — For juniors; seniors may elect. A general survey of agriculture, ancient and modern; feudal and early English husbandry; the later development of English agriculture; the course of agriculture in the United States, with special emphasis on the development of agriculture in New England. An attempt will be made to measure the influence of times, peoples and countries in producing different systems of agriculture, and to ascertain the causes now working to effect agricultural changes. Lectures, readings and library work. Students in education and rural journalism should find this course helpful.

5 class hours.

Credit, 5.

Mr. SAWTELLE.

52. **II. CO-OPERATION IN AGRICULTURE.** — For juniors; seniors may elect. The course treats of the history, principles and business relations of agricultural co-operation. (1) A survey of the development, methods and economic results of farmers' organizations and great co-operative movements; (2) the business organization of agriculture abroad, and the present aspects and tendencies in the United States; (3) the principles underlying successful co-operative endeavor among farmers, practical working plans for co-operative associations, with particular reference to credit and purchase and the marketing of perishable products. Lectures, text, assigned readings and practical exercises.

5 class hours.

Credit, 5.

Professor CANCE and Mr. SAWTELLE.

53. **III. THE AGRICULTURAL MARKET.** — For juniors; seniors and graduate students may elect. A study of the forces and conditions which determine the prices of farm products and the mechanism, methods and problems concerned with transporting, storing and distributing them. Supply and demand, course of prices, terminal facilities, the middleman system, speculation in agricultural products, protective legislation, the retail market and direct sales are taken up. The characteristics and possibilities of the New England market are given special attention. Lectures, readings, assigned studies and field work.

5 class hours.

Credit, 5.

Professor CANCE.

76. **II. TRANSPORTATION OF AGRICULTURAL PRODUCTS.** — For seniors and graduate students; juniors may elect. This course deals with the development of highway, waterway and railway transportation and its relation to the agricultural development of the country; the principles governing the operation and control of transportation agencies; present-day problems re-

lating to the shipment of farm products, rates, facilities and services; methods of reducing wastes in transportation; the economics of the good roads movement and of motor transportation. Lectures, text and field work.

5 class hours.

Credit, 5.

Professor CANCE and Mr. SAWTELLE.

77. **I. PROBLEMS IN AGRICULTURAL ECONOMICS.** — For seniors and graduate students; juniors may elect. An advanced course for students desirous of studying more intensively some of the economic problems affecting the farmer. Some of these are: land problems, — land tenure, size of farms, causes affecting land values, private property in land, taxation of farm property; special problems, — cost of producing farm products, farm labor in New England, immigration, agricultural credit. Opportunity will be given, if practicable, for field work, and students will be encouraged to pursue lines of individual interest.

5 class hours.

Credit, 5.

Professor CANCE.

78. **III. AGRICULTURAL CREDIT FACILITIES.** — For seniors and juniors. The legitimate use of credit in the production, storing and marketing of agricultural products. A brief survey of the development of credit institutions, National and State rural credit laws. Farm land banks, credit associations, and other means of securing personal credit. The topics will be discussed from the standpoints of dealers in agricultural produce, the landowning farmer, the tenant and the farm laborer; special attention will be given to the credit needs of the college graduate.

3 class hours.

Credit, 3.

Mr. SAWTELLE.

79. **I. AGRICULTURAL STATISTICS.** — For seniors, juniors and graduate students. This course is designed to deal with the collection, interpretation and presentation of the economic facts of the agricultural industry. The sources of information, methods of obtaining facts, of analyzing and drawing conclusions from economic data, and of presenting agricultural facts convincingly and truly will be treated. Opportunity will be given for laboratory exercises and class discussions on the interpretation of specific data commonly used by county agents, agricultural instructors, specialists and leaders.

1 lecture and 3 2-hour laboratory exercises, credit, 4.

Mr. SAWTELLE.

80. **I. SEMINAR.** — For seniors and graduate students. Research in agricultural economics and history; problems of New England agriculture. Library work and reports. If desirable some other topic may be substituted. Hours to be arranged.

1 2-hour conference period, credit, 1 or 2.

The DEPARTMENT.

81. **II. SEMINAR.** — For seniors and graduate students. As stated in Course 80.

1 2-hour conference period, credit, 1 or 2.

The DEPARTMENT.

82. **III. SEMINAR.** — For seniors and graduate students. As stated in Course 80.

1 2-hour conference period, credit, 1 or 2.
The DEPARTMENT.

Agricultural Education.

Professor HART, Professor WELLES, Assistant Professor BARNES, and Mr. HEALD.¹

The plan of the teacher-training courses is as follows: —

(a) A TWO-YEAR TEACHER-TRAINING COURSE. — Designed for mature persons of approved farm experience and educational advancement, who declare an intention to prepare for teaching in vocational agricultural schools or departments in Massachusetts. This course leads to a certificate of credit from the Massachusetts Department of Education. This certificate places the holder on the preferred list of candidates for teaching in vocational agricultural schools and departments. The course is under the joint guidance of the agent of the Massachusetts Department of Education and the Department of Agricultural Education. Each student's work is so planned that he may pursue with thoroughness the subjects in which his previous preparation may have been deficient. His program is planned with reference to his main objective, whether it is teaching agriculture or an allied subject.

(b) A FOUR-YEAR COLLEGE COURSE. — Entered under the usual entrance conditions. This leads to the degree of bachelor of science and to a teacher's certificate from the Massachusetts Department of Education. This certificate authorizes the holder to teach in a State-aided high school. The program for obtaining a teacher's certificate is planned under the supervision of the Department of Agricultural Education. The course also leads to a certificate of credit from the Massachusetts Department of Education, which places the holder on the preferred list of candidates for teaching in vocational agricultural schools and departments. Students are guided in the choice of courses for the certificate of credit by the Department's agent at the college. The program is carried out in accordance with a co-operative agreement between the Massachusetts Department of Education and the Massachusetts Agricultural College.

(c) PROFESSIONAL IMPROVEMENT COURSE. — Designed for teachers in service who seek improvement. Programs are planned strictly on the basis of individual needs, under the guidance of the agent of the Massachusetts Department of Education at the Massachusetts Agricultural College. In the prosecution of this program a student may enter courses given in the Summer School, in the Winter School, and in the four-year curriculum under the limitations of the schedule and his own qualifications to do the work. When the call seems to justify it, and subject to administrative and equipment limitations, special classes will be organized for carrying out this program. In the case of qualified persons, some of this work may be done in the Graduate School.

(d) COURSES FOR PARTLY PREPARED CANDIDATES. — Designed for supplementing the training of candidates whose qualifications are deficient in one or more particulars for teaching in vocational agricultural schools or departments. These programs may coincide in some cases with those in (a)

¹ Representing the Massachusetts Department of Education in the administration of vocational education acts.

or (c). They are planned under the guidance of the agent of the Massachusetts Department of Education in accordance with a co-operative agreement between the Department and the Massachusetts Agricultural College.

(e) **PRESCRIBED COURSES.**—Some study in the Department of Agricultural Education is required in all the foregoing programs. A minimum of 16 credit hours out of a total of 243 is required in those programs leading to a bachelor of science degree, to a teacher's certificate, or to a certificate of credit.

The equipment includes a combination classroom and laboratory for use in teaching agriculture in secondary schools. It is equipped with filing cases for records; cases for books and apparatus; a display-board for pictures, maps, charts, etc.; individual study desks; tables for supervised study; demonstration table supplied with sink, hot and cold water and gas, etc. The department office is equipped with books and pamphlets on agricultural education, properly catalogued.

Elective Courses.

50. **I. EDUCATIONAL PSYCHOLOGY.**—For juniors; sophomores and seniors may elect. Work planned primarily for candidates for teaching. Consists of a study of the mental growth and development, and some correlations of the mind and nervous system.

5 periods, credit, 5.
Professor HART.

51. **II. PRINCIPLES AND METHODS OF TEACHING.**—For juniors and seniors. A study of the laws of learning, exhaustive inquiry into the meaning of interest, apperception, memory-images, judging and reasoning, and their applications in teaching processes, class management and organization of lesson plans.

5 periods, credit, 5.
Professor HART.

52. **III. HISTORY AND PHILOSOPHY OF EDUCATION.**—For juniors and seniors. A study of educational history in modern times, educational movements in the United States and their bearing on national aims and ideals, with special emphasis on education for a democracy.

5 periods, credit, 5.
Professor HART.

75. **I. ORGANIZATION AND SUPERVISION OF SECONDARY EDUCATION.**—For seniors; juniors may elect. School systems, courses of study, training of teachers, financial support, recent tendencies and policies in secondary schools.

3 periods, credit, 3.
Professor WELLES.

76. **I., II. and III. SPECIAL METHODS IN VOCATIONAL AGRICULTURE.**—For juniors, seniors and others qualified. Consists of the outlining of lessons, outlining of projects for agricultural teaching, and applications of the prin-

ciples of vocational education as embodied in the Smith-Hughes Act, and other legislation relative to agricultural education.

3 periods, credit, 3.
Professor WELLES.

77. **III. COUNTY AGENT WORK.** — For seniors. Work on special agricultural problems by individual students; preparation and presentation of a number of theses, using charts and other apparatus. Major advisers will be responsible for accuracy of subject-matter; the Department of Agricultural Education will be responsible for preparation and presentation.

5 periods, credit, 5.
Assistant Professor BARNES.

80. **I., II., III. and IV. TEACHER-TRAINING COURSE.** — For seniors and graduate students. Work will consist of supervised apprentice teaching accompanied by the arranging of subject-matter for lessons, the outlining of projects, and professional study. The number of credits will depend upon the number, character and length of teaching exercises and conferences. The work will be carried on in co-operation with the Massachusetts Department of Education.

Credits, 1 to 5.
Professor WELLES.

Rural Sociology.

Professor PHELAN, President BUTTERFIELD, Professor HART, Mr. —.

The courses in rural sociology are designed for two purposes: first, to give students an appreciation of the general problems of country life; second, to afford a definite training for students who wish to take up some specific form of social service. In the last ten years rural sociology has been introduced as a subject into more than 50 per cent of the agricultural schools and colleges. There is a good demand for teachers, and an increasing opportunity in other directions in this subject. The courses afford the student an opportunity to pursue graduate as well as undergraduate work. The library of the college is unusually well equipped with rural sociological material.

Required Course.

27. **III. ELEMENTS OF RURAL SOCIOLOGY.** — Sophomores. A broad survey of the field of rural sociology, including such topics as the origin of rural sociology, its methods and problems; relation of sociological to the scientific and technical aspects of agricultural problems; the development of the rural community in New England and the west, religious, educational and social ideals of rural people; characteristics and influence of the rural environment, the movement of the rural population, the effects of immigration; rural institutions, the school, the church, local government, effects of modern conditions of life on rural institutions; rural organization; problems of progress, an analysis of the needs of rural life in its further development. Lectures, readings and essays on assigned topics.

3 class hours.

Credit, 3.
Professor PHELAN and Mr. —.

Elective Courses.

50. **I. SOCIAL CONDITION OF RURAL PEOPLE.** — For juniors; seniors may elect. A. The rural status: composition of the rural population, nature, extent and causes of diseases and accidents, health agencies of control; extent and causes of rural delinquency and dependency, conditions of temperance, of sexual morality and family integrity; child labor, women's work and position; standard of living, size of family; cultural ideals; community consciousness and activity; standards of business conduct and of political ethics.

B. Rural social psychology: characteristics of the rural mind, character of hereditary and environmental influence; nature and effect of face-to-face groups; fashion, conventionality, custom, character of discussion and of public opinion.

3 class hours.

Credit, 3.

Professor PHELAN.

51. **II. RURAL GOVERNMENT.** — For juniors; seniors may elect. A general survey of the development of rural government in the United States, origin of the New England town, its influence upon the west, advantages, development of efficiency, county government, the influence of the farmer in legislation, good roads movement, credit facilities, taxation, boards of agriculture, agricultural colleges and experiment stations in relation to rural welfare; national government; a general survey of political organizations and movements among farmers in the United States and foreign countries and their influence in shaping legislation; relation of the Department of Agriculture, postal system, the various national commissions and agencies to rural welfare. Lectures, readings, written exercises on assigned topics.

3 class hours.

Credit, 3.

Professor PHELAN and Mr. —.

52. **III. RURAL ORGANIZATION.** — For juniors; seniors may elect. A study of the organized agencies by which rural communities carry on their various forms of associated life, particularly a study of the ways by which the domestic, economic, cultural, religious and political institutions contribute to rural betterment; principles underlying leadership, qualifications of the paid leader and the lay leader; the field of rural social service, national, State and local, preparation and opportunity for service; rural community building, a study of organized ways and means by which aid is given local communities.

3 class hours.

Credit, 3.

President BUTTERFIELD.

75. **I. FARMERS' ORGANIZATIONS.** — For seniors; juniors may elect. The history, purposes and achievements of the grange, the Farmers' Union, farmers' clubs, village improvement associations, boys' clubs, etc.; the method, scope and history of local, State and national associations formed about some farm product, their influence in forming class consciousness and in shaping agrarian legislation; need of federation. Lectures, readings and essays on assigned topics.

3 class hours.

Credit, 3.

Professor PHELAN.

76. **I. FIELD WORK IN RURAL SOCIOLOGY.** — For seniors; juniors may elect. This course is designed to meet the needs of students who wish to do some constructive work in rural social service while still in college. The work will be carried on in co-operation with the various college agencies engaged in rural service. Any project for which credit in this course is to be asked must first have the approval of the head of the department.

From 2 to 6 laboratory hours, credits, 1 to 3.

Professor PHELAN.

Prerequisites, Rural Sociology 27 and 52.

77. **II. RURAL SOCIAL SURVEYS.** — For seniors; juniors may elect. A careful study of the theory and function of statistics, the limitations and difficulties in the use of statistics, the interpretation of statistical data, various methods of graphic representation; a study of surveys, kinds and use, method of gaining information, the basis for conclusions, value of information gained. Text and lectures.

3 class hours.

Credit, 3.

Professor PHELAN.

78. **II. RURAL AND BUSINESS LAW.** — For seniors; juniors may elect. The work of this course will cover such points as land, titles, public roads, rights incident to ownership of live stock, contracts, commercial paper and distinctions between personal and real property. Text, written exercises, lectures and class discussions.

5 class hours.

Credit, 5.

Professor HART.

79. **I. SEMINAR.** — Credits, 1 to 3.

Professor PHELAN.

80. **II. SEMINAR.** — Credits, 1 to 3.

Professor PHELAN.

81. **III. SEMINAR.** — Credits, 1 to 3.

Professor PHELAN.

Rural Home Life.

Miss SKINNER.

The Department of Rural Home Life offers elective courses for students majoring in other departments of the college. Fundamentally this training is such as will help young women to be better prepared to adjust themselves readily to their environment in the home and in the community, and to help them realize their responsibility as good homemakers and as good citizens. In addition to the elective courses indicated, courses in foods, clothing, business of the household and home care of the sick are offered to students in the two-year course in practical agriculture, and to students in the Ten Weeks' Winter School; and courses for teachers are offered in connection with the work of the Summer School.

The food laboratory, located in the entomology building, is fitted with individual desks (cabinet form) to hold utensils and materials for each student. Each table is equipped with gas stoves. A storage cabinet is provided with bins for supplies and cupboard space for large utensils and illustrative material. This room is well lighted and pleasant. The clothing laboratory is

attractively located in French Hall. The equipment consists of sewing machines, cabinets, work tables, cutting tables, electric irons, dress forms and a collection of materials illustrating the production of textiles for clothing and household use.

Elective Courses.

25. **I.** 26. **II.** 27. **III.** **TEXTILES AND CLOTHING.** — Sophomores. The selection and purchase of suitable materials, their character, cost and durability. Appropriateness and simplicity in dress. There will be practical work in hand and machine sewing, drafting and designing of patterns, the care and repair of clothing.

1 lecture.

2-2-hour laboratory periods, credit, 3.

50. **I.** 51. **II.** 52. **III.** **FOODS AND COOKERY.** — Juniors. A course to establish a fundamental knowledge of foods. The lectures deal with a discussion of the comparative composition, cost and economic value of food-stuffs; their sources, production and manufacture. Laboratory practice in applying scientific principles to the selection and preparation of typical foods. 1 class hour.

2 2-hour laboratory periods, credit, 3.

Miss SKINNER.

75. **I.** 76. **II.** **HOUSEHOLD MANAGEMENT.** — Seniors. This course deals with the application of the principles of scientific management to the household, and the elements of successful home making. It includes a study of the family income, cost of living, household accounts, the budget and its apportionment. Consideration will also be given to the responsibility of the woman to her family and the community in establishing right standard of living.

2 class hours.

Credit, 2.

Miss SKINNER.

78. **III.** **HOME NURSING.** — Seniors. This course includes a study of the care of the family health; simple diseases and their prevention; the care of young children and invalids; first aid to the injured.

2 class hours.

Credit, 2.

Miss SKINNER.

GENERAL DEPARTMENTS.

[Heavy-faced type indicates the term in which the course is given. Numbering of courses: 1 to 24, inclusive, freshmen; 25 to 49, inclusive, sophomores; 50 to 74, inclusive, juniors; 75 to 99, inclusive, seniors.]

Military Science and Tactics.

Lieut.-Col. R. W. WALKER, U. S. A.; Ordnance Sergeant JOHN J. LEE, U. S. A., retired.

Under act of Congress (July 2, 1862) military instruction under a regular army officer was required in this college of all able-bodied male students. Under act of Congress June 3, 1916, as amended by act of Congress Sept. 8, 1916, there was established at this college in April, 1917, an infantry unit of the Reserve Officers Training Corps. Following the World War and an act of Congress (July 9, 1918) the Reserve Officers Training Corps is in operation under the regulations of the War Department, administered by the president of the college and the professor of military science and tactics.

The primary object of the R. O. T. C. is to provide systematic military training at civil educational institutions, for the purpose of qualifying selected students of such institutions as reserve officers in the military forces of the United States. It is intended to attain this object during the time the students are pursuing their general or professional studies, with the least practical interference with their civil careers by employing methods designed to fit men physically, mentally and morally for pursuits of peace as well as war.

All candidates for a degree in a four-year course must take for two years three hours a week of military training.

Students in their junior and senior years, who are approved by the president and the professor of military science and tactics, may take the advanced course, if they so elect. The advanced course consists of five hours per week and a summer camp of about six weeks during the summer vacation, between the junior and senior years. Students taking this course are paid by the Federal government at a rate to be fixed by the Secretary of War, not to exceed the value of the army ration. The rate now fixed is 40 cents per day, which amounts to about \$140 per year. Students graduating in the advanced course are eligible for commissions in the Reserve Officers Corps, *but are not required to accept such commission if offered.*

The required uniform is of olive drab woolen cloth, and is furnished for the use of the students by the Federal government without cost. It is worn by all cadets when on military duty, and may be worn at other times. New uniforms are furnished each year.

The establishment in the near future of a cavalry unit of the R. O. T. C. is contemplated. This work should fit in well with the Departments of Animal Husbandry and Veterinary Science, besides affording students a recreational and physical exercise not usually found at educational institutions.

Required Courses.

1. **I. TACTICS.** — Freshmen. Theoretical instruction through the school of the soldier and squad. Lectures on military subjects.

1 class hour.

Credit, 1.

Lieutenant-Colonel WALKER.

2. **II. TACTICS.** — Freshmen. Theory of small-arms firing, minor tactics, guard duty, personal hygiene and first-aid.

1 class hour.

Credit, 1.

Lieutenant-Colonel WALKER.

3. **III. TACTICS.** — Freshmen. Theoretical instruction in Infantry Drill Regulations. Lectures on military subjects.

1 class hour.

Credit, 1.

Lieutenant-Colonel WALKER.

4. **I. DRILL.** — Freshmen. Practical instruction in Infantry Drill Regulations, schools of the soldier, squad and company, close and extended order.

2 laboratory hours.

Credit, 1.

Lieutenant-Colonel WALKER and Sergeant LEE.

5. **II. DRILL.** — Freshmen. Physical drill, position and aiming drills, gallery practice.

2 laboratory hours.

Credit, 1.

Lieutenant-Colonel WALKER and Sergeant LEE.

6. **III. DRILL.** — Freshmen. Practical instruction in infantry drill, marching, ceremonies, guard.

2 laboratory hours.

Credit, 1.

Lieutenant-Colonel WALKER and Sergeant LEE.

25. **I. TACTICS.** — Sophomores. Infantry Drill Regulations, elementary topography and map reading. Lectures on military subjects.

1 class hour.

Credit, 1.

Lieutenant-Colonel WALKER.

26. **II. TACTICS.** — Sophomores. Theory of small-arms firing and musketry, minor tactics, signalling.

1 class hour.

Credit, 1.

Lieutenant-Colonel WALKER.

27. **III. TACTICS.** — Sophomores. Theoretical instruction in Infantry Drill Regulations, field engineering. Lectures on military subjects.

1 class hour.

Credit, 1.

Lieutenant-Colonel WALKER.

28. **I. DRILL.** — Sophomores. Practical instruction in Infantry Drill Regulations, schools of the soldier, squad and company, close and extended order, bayonet, hand grenade (dummy).

2 laboratory hours.

Credit, 1.

Lieutenant-Colonel WALKER and Sergeant LEE.

29. **II. DRILL.** — Sophomores. Physical drill, position and aiming drills, gallery practice.

2 laboratory hours.

Credit, 1.

Lieutenant-Colonel WALKER and Sergeant LEE.

30. **III. DRILL.** — Sophomores. Practical instruction in infantry drill, marching ceremonies, guard, range practice.
2 laboratory hours.

Credit, 1.

Lieutenant-Colonel WALKER and Sergeant LEE.

Elective Courses.

50. **I. MILITARY SCIENCE.** — Juniors. Topography, minor tactics, lectures, Infantry Drill Regulations.
3 class hours.

Credit, 3.

Lieutenant-Colonel WALKER.

51. **II. MILITARY SCIENCE.** — Juniors. Law, common and military, minor tactics. Lectures on military subjects.
3 class hours.

Credit, 3.

Lieutenant-Colonel WALKER.

52. **III. MILITARY SCIENCE.** — Juniors. Minor tactics, field engineering.
3 class hours.

Credit, 3.

Lieutenant-Colonel WALKER.

53. **I. DRILL.** — Juniors. Duties consistent with rank as cadet officers or noncommissioned officers in connection with practical work laid down for the unit.

2 laboratory hours.

Credit, 1.

Lieutenant-Colonel WALKER and Sergeant LEE.

54. **II. DRILL.** — Juniors. As stated under Course 53.

2 laboratory hours.

Credit, 1.

Lieutenant-Colonel WALKER and Sergeant LEE.

55. **III. DRILL.** — Juniors. As stated under Course 53.

2 laboratory hours.

Credit, 1.

Lieutenant-Colonel WALKER and Sergeant LEE.

75. **I. MILITARY SCIENCE.** — Seniors. Advanced topography and the solution of map problems. Minor tactics, company administration, hippology, Infantry Drill Regulations.

3 class hours.

Credit, 3.

Lieutenant-Colonel WALKER.

76. **II. MILITARY SCIENCE.** — Seniors. Military law, military policy of the United States, minor tactics. Lectures on military subjects.

3 class hours.

Credit, 3.

Lieutenant-Colonel WALKER.

77. **III. MILITARY SCIENCE.** — Seniors. Tactical walks, military history of the United States, field engineering.

3 class hours.

Credit, 3.

Lieutenant-Colonel WALKER.

78. **I. DRILL.** — Seniors. As stated under Course 53.
 2 laboratory hours. Credit, 1.
 Lieutenant-Colonel WALKER and Sergeant LEE.

79. **II. DRILL.** — Seniors. As stated under Course 53.
 2 laboratory hours. Credit, 1.
 Lieutenant-Colonel WALKER and Sergeant LEE.

80. **III. DRILL.** — Seniors. As stated under Course 53.
 2 laboratory hours. Credit, 1.
 Lieutenant-Colonel WALKER and Sergeant LEE.

Physical Education and Hygiene.

Professor HICKS, Assistant Professor GORE, Mrs. HICKS, Mr. GRAYSON, Mr. McCARTHY,
 Mr. DERBY.

The purpose of the courses offered by this department is to provide active exercise and to instruct every student how to care for his health and maintain his physical condition while carrying on his college course.

The equipment consists of the Alumni Athletic Field, which has room for two football fields, a quarter-mile cinder track with a 220 straightaway, and the baseball diamond; and also the old field for class football and baseball, two tennis courts, and the drill hall floor for basket-ball. For several years the drill hall floor was used for class work in gymnastics, but its condition has become so bad that this has been discontinued. During the winter months a hockey rink is provided on the college pond.

[All classified undergraduate male students are given a physical examination upon entering.]

MEN.

Required Courses.

1. **I. HYGIENE.** — Freshmen. Lectures on personal hygiene.
 1 class hour. Credit, 1.
 Professor HICKS.

2. **I. RECREATION.** — Freshmen. Outdoor games.
 1 laboratory hour. Credit, third term.
 Mr. DERBY.

3. **III. RECREATION.** — Freshmen. Outdoor games.
 1 laboratory hour. Credit for Nos. 2 and 3, 1.
 Mr. DERBY.

25. **I. RECREATION.** — Sophomores. Outdoor games.
 1 laboratory hour. Credit, third term.
 Mr. DERBY.

26. **III. RECREATION.** — Sophomores. Outdoor games.
 1 laboratory hour. Credit for Nos. 25 and 26, 1.
 Mr. DERBY.

Elective Course.

77. **III. TRAINING COURSE.** — Seniors. Election by permission only.
History of physical education and supervision of athletics.

1 class hour.

Credit, 1.
Professor HICKS.

WOMEN.

Required Courses.

4. **I. RECREATION.** — Freshmen. Outdoor games.

3 laboratory hours.

Credit, 1.
Mrs. HICKS.

5. **II. GYMNASTICS.** — Freshmen. Dancing, Swedish games, etc.

3 laboratory hours.

Credit, 1.
Mrs. HICKS.

6. **III. RECREATION.** — Freshmen. Outdoor games.

3 laboratory hours.

Credit, 1.
Mrs. HICKS.

27. **I. RECREATION.** — Sophomores. Outdoor games.

3 laboratory hours.

Credit, 1.
Mrs. HICKS.

28. **II. GYMNASTICS.** — Sophomores. Dancing, Swedish games, etc.

3 laboratory hours.

Credit, 1.
Mrs. HICKS.

29. **III. RECREATION.** — Sophomores. Outdoor games.

3 laboratory hours.

Credit, 1.
Mrs. HICKS.

Elective Courses.

50. **II. GYMNASTICS.** — Juniors. Dancing, Swedish games, etc.

3 laboratory hours.

Credit, 1.
Mrs. HICKS.

76. **II. GYMNASTICS.** — Seniors. Dancing, Swedish games, etc.

3 laboratory hours.

Credit, 1.
Mrs. HICKS.

THE LIBRARY.

The library — stack room, reading room and office — occupies the entire lower floor of the Chapel-library building. It contains about 63,000 volumes and a large number of bulletins, farm papers and other material, which is being put into good working order as fast as possible. Works on agriculture, horticulture, botany, entomology and the various sciences predominate, but literature, history and sociology are well represented and receive due attention. The reading room provides a good variety of popular and technical periodical literature, encyclopedias and general reference books.

The library is being reclassified and recatalogued in order to make the splendid material accessible and of the greatest working value. Every effort is being made toward developing the college library into a vital intellectual center, of equal value to every student, teacher and teaching department on the college campus. Consequently only the most cordial relations are cherished, and the fewest and most imperative rules concerning the circulation of books and deportment are enforced. An agricultural reference library is maintained in Stockbridge Hall, and department libraries are also maintained in some of the other buildings on the campus.

Occasional lectures are given to regular and short-course students in order to make the best use of the library equipment. Emphasis is laid upon the card catalogue, periodical indexes, bibliographies and guides, and the large collections of United States Department of Agriculture and experiment station literature.

Library hours are from 8 A.M. to 9.30 P.M. every week day, and from 9 A.M. to 1.30 P.M. on Sundays in term time. Shorter hours prevail during vacation.

THE GRADUATE SCHOOL

THE GRADUATE SCHOOL.

KENYON L. BUTTERFIELD, A.M., LL.D., President of the College.

CHARLES H. FERNALD, Ph.D., Honorary Director of the Graduate School.

CHARLES E. MARSHALL, Ph.D., Director of the Graduate School and Professor of Microbiology.

GRADUATE STAFF, 1918-19.

Professor BEAUMONT, Professor CANCE, Professor CHAMBERLAIN, Assistant Professor O. L. CLARK, Professor CRAMPTON, Professor FERNALD, Professor FOORD, Professor GRAHAM, Associate Professor ITANO, Professor LINDSEY, Professor McNUTT, Professor OSMUN, Professor PETERS, Professor PHELAN, Professor SEARS, Professor WAUGH, Director MARSHALL, President BUTTERFIELD; Mr. WATTS, Secretary.

Graduate courses leading to the degrees of master of science and doctor of philosophy have been given for a number of years; the degrees of master of agriculture and doctor of agriculture are now granted to meet strictly professional needs. The number of requests for each of these courses is apparently increasing. In recognition of the benefits to be derived from a separate organization, a distinct graduate school has been established for the purpose of fitting graduates of this and other institutions for teaching in colleges, high schools and other public schools; for positions as government, State and experiment-station specialists in farm management, dairying, live-stock husbandry, poultry science, agronomy, landscape gardening, pomology, vegetable gardening and floriculture; for positions as bacteriologists, botanists, chemists, entomologists; and for numerous other positions requiring a great amount of scientific and professional knowledge, training and experience.

ORGANIZATION.

The school is based upon the department as the unit, and the apprenticeship system as the most effective means of instruction. This gives to the student individuality in treatment and an intimacy with actual conditions of work and operations. Besides, each student is assigned to an advisory committee, composed of the instructor in charge of his major subject as chairman, and instructors in charge of his minor subjects as members, which directs his graduate studies. The chairmen of all these committees together constitute the graduate staff, which controls the policy of the graduate school.

ADMISSION.

Admission to the graduate school will be granted:—

1. To graduates of the Massachusetts Agricultural College.
2. To graduates of other institutions of good standing who have received a bachelor's degree substantially equivalent to that conferred by this college.

In case an applicant presents his diploma from an institution of good standing, but has not, as an undergraduate, taken as much of the subject he selects

for his major as is required of undergraduates at the Massachusetts Agricultural College, he will be required to make up such parts of the undergraduate work in that subject as the instructor in charge may consider necessary. He shall do this without credit toward his advanced degree.

Admission to the graduate school does not necessarily admit to candidacy for an advanced degree,—students holding a bachelor's degree being in some cases permitted to take graduate work without becoming candidates for higher degrees.

Applications for membership in the graduate school should be presented to the director of the school. Full statements of the applicant's previous training, of the graduate work desired, and of the amount and kind of work already done by him as an undergraduate should be submitted, together with a statement whether the applicant desires to work for a degree.

Registration is required of all students taking graduate courses, the first registration being permitted only after the student has received an authorization card from the director.

NATURE, METHODS AND REQUIREMENTS OF GRADUATE WORK.

Graduate work differs from undergraduate work in its purposes and methods. The primary aims of the instructor are emphasized in an attempt to have the student adjust himself and place himself in his environment; develop the rule of self-direction and self-instruction; acquire the power of accurate reasoning; gain proficiency and skill in his selected field of study or practice; and obtain an appreciative and discriminative insight into experimentation and original research. Methods are not devised, therefore, for attractiveness, entertainment and superficial reviews, but for the creation of initiative and profound thought, thorough acquaintance with detail, independent advance and industrious habits. Careful readings, lectures, conferences, surveys, laboratory exercises and field work are some of the agencies utilized.

All members of the graduate school are required to attend the course of lectures designed to supplement the technical work of all graduate studies. These lectures will be given once each week, and the students will be held responsible for the work. [Suspended during continuance of the war.]

Candidates for the degree of master of science are required to prosecute two subjects, one of which shall be designated as a major and the other as a minor. These subjects may not be selected in the same department. An original thesis is considered a part of the major subject.

Candidates for the degree of doctor of philosophy are required to prosecute three subjects, one of which shall be designated as the major and the others as minors. No two of these subjects may be taken in the same department. An original thesis shall be considered a part of the major subject.

Candidates for the degree of master of agriculture are allowed greater privileges in the selection of subjects, but will be required to select a major and such other supporting lines of study as will be necessary properly to equip the individual professionally.

Candidates for the degree of doctor of agriculture are required to select a major and such other subjects as will develop the major in its greatest intensity and comprehensiveness. Successful experience is also requisite, together with a thesis which represents a masterly survey or intimate study through accurate application of some phase of the major subject.

Candidates for the degree of master of landscape architecture will be expected to conform to the established courses of the department, and to the requirements of the department in the preparation of a thesis, as well as in actual experience outside the college.

Candidates for membership in the graduate school who do not desire to work for a degree may, with the approval of the director of the school, take more than one subject in the same department, or pursue work in several departments, if their preparation will permit. A statement of the subjects chosen must in each case be submitted to the director of the graduate school for approval by the student's advisory committee. The chosen subjects must bear an appropriate relation to each other.

A working knowledge of French and German is essential to successful graduate work, and students not having this will find it necessary to acquire it as soon as possible after entering.

The graduate staff reserves the privilege of recommending and allowing courses in other institutions as a part of residence instruction. Such supervision will be exercised and credit granted as are essential to the highest standards of efficiency.

THESES.

A thesis is required of each candidate for an advanced degree. It must be on a topic belonging to the candidate's major subject; must show that its writer possesses the ability to carry on original study; and must be an actual contribution to knowledge.

The thesis in its final form, must be submitted to the director by May 15 of the year in which the student is to present himself for the advanced degree, and before he may take the required examination. Three complete copies are required. One of the said copies is to be retained as an official copy by the said director, one is to be deposited in the college library, and the third is to be retained by the department in which the thesis was prepared. The candidate for the doctor's degree must be prepared to defend at the oral examination the views presented in his thesis.

FINAL EXAMINATIONS.

For the degree of master of science, master of agriculture, or master of landscape architecture, final examination, which may be either written or oral, or both, is given upon the completion of each subject.

For the degrees of doctor of philosophy and doctor of agriculture, final examinations on the minors taken are given upon the completion of the subjects. In the major subject, a written examination, if successfully passed, is followed by an oral examination in the presence of the faculty of the school.

DEGREES CONFERRED.

The degrees of master of science, master of agriculture and master of landscape architecture are conferred upon graduate students who have met the following requirements:—

1. The devotion of at least one year and a half¹ to the prosecution of study in two subjects of study and research, not less than one full college year of which must be in residence. In the case of a master of landscape architecture the student must follow the prescribed course of study.

¹ All time statements refer to minimum time.

2. The earning of not less than fifty credits in the chief or major subject, and of not less than twenty-five credits in the minor subject. Students pursuing the course in landscape architecture will devote all of their time to the established course, and meet the conditions of one year of experience outside the college.

3. The preparation of a thesis in the major subject, constituting an actual contribution to knowledge, and accompanied by drawings if necessary. The thesis may be waived for the degree of master of agriculture.

4. The passing of final examinations, in both major and minor subjects, to the satisfaction of the professors in charge.

5. The payment of all fees and college expenses required.

The degrees of doctor of philosophy and doctor of agriculture are conferred upon graduate students who have met the following requirements:—

1. The devotion of at least three years to the prosecution of three subjects of study and research in residence at the college.

2. The earning of not less than one hundred credits in the chief or major subject, and of not less than twenty-five credits in each of two minor subjects.

3. The preparation of a thesis, in the major subject, constituting an actual contribution to knowledge and accompanied by drawings if necessary. For the degree of doctor of agriculture the thesis may be modified to meet professional requirements.

4. The passing of final examinations, in both the major and minor subjects, to the satisfaction of the instructors in charge.

5. The payment of all fees and college expenses required.

The fee for the degree of master of science, master of agriculture, or master of landscape architecture is \$10, and for the degree of doctor of philosophy or doctor of agriculture, \$25.

COURSES OFFERED.

Courses available as major subjects for the degree of doctor of philosophy:—

Agricultural economics.
Botany.
Chemistry.
Entomology.

Horticulture.
Microbiology.
Rural sociology.

Courses available as major subjects for the degree of master of science:—

Agricultural economics.
Agricultural education.
Agriculture.
Agronomy.
Animal husbandry.
Botany.
Chemistry.

Entomology.
Horticulture.
Mathematics and physics.
Microbiology.
Poultry science.
Rural sociology.
Veterinary science.

Courses available as major subjects for the degree of master of agriculture:—

Agronomy.

Animal husbandry.

Poultry science.

The course in landscape architecture leads to the degree of master of landscape architecture.

Courses available as minor subjects for the degree of doctor of philosophy: —

Agricultural economics.	Entomology.
Agricultural education.	Horticulture.
Agriculture.	Landscape architecture.
Agronomy.	Mathematics and physics.
Animal husbandry.	Microbiology.
Animal pathology.	Poultry science.
Botany.	Rural sociology.
Chemistry.	Zoölogy.

Courses available as minor subjects for the degree of master of science: —

Agricultural economics.	Horticulture.
Agricultural education.	Landscape architecture.
Agriculture.	Mathematics and physics.
Agronomy.	Microbiology.
Animal husbandry.	Poultry science.
Animal pathology.	Rural sociology.
Botany.	Veterinary science.
Chemistry.	Zoölogy.
Entomology.	

GENERAL OUTLINE OF COURSES FOR ADVANCED DEGREES.

Agricultural Economics (Major Course). — 1. Graduate research work in agricultural economics will be developed by four principal methods, namely, historical, statistical, accounting and general field investigation. In all instances the method includes facility in investigation, tabulation and interpretation of results.

2. Candidates for the doctorate, the master's degree, or candidates offering a minor in agricultural economics, will be required to pass an examination covering the undergraduate work now offered in agricultural economics, including Course 50, the elements of economics, Course 75, the agricultural market and Course 52, co-operation in agriculture; and in addition such definite research work as may be outlined by the department, to consist of original investigations in some particular divisions of the subject of agricultural economics. Courses 52, 53, 76, 77, 78 and 79 are for graduates and undergraduates. Special investigations may be made by electing seminars 80-82 in agricultural economics.

3. Candidates for the doctor's degree will be required to write a thesis, and candidates for the master's degree a thesis or a report, covering results of a specific line of personal investigation in one or more fields of the subject. Each candidate will also be required to have a working knowledge of the general field of economics, the theory of agricultural economics, the problems of agricultural production, land tenure, land problems, agricultural commerce, agricultural co-operation, agricultural credit, statistics of agriculture and prices, and markets and marketing.

Agricultural Education. — Work offered in this department may be taken as a major or minor for the degree of master of science or as a minor for the degree of doctor of philosophy or master of science. Three lines of study are open to students who are properly qualified, — agricultural education, public school supervision, and the philosophy of education. In order to enter upon any one of these for credit towards an advanced degree the candidate must present evidence of proficiency in at least five courses in

agricultural education as outlined for undergraduates, or their equivalent. Open to persons holding a bachelor of science degree from this college or its equivalent; also to school superintendents, principals and to teachers of successful experience and of mature years who wish to avail themselves of this opportunity for advanced study even though not candidates for a degree.

Agronomy (Master of Science).— Graduate students desirous of taking major work in agronomy should have had a good training in the fundamentals of the natural sciences, since agronomical problems involve the application of the natural sciences especially. They should have taken Agronomy 27 and 50, or their equivalents, and other courses given by this department along the line of the problem on which they will work, and should have a command of the laboratory technique required for their problems. Problems may be chosen in which particular attention is devoted to soils, fertilizers or field crops. The specific problem is selected in conference with the major adviser, consideration being given to the student's desires and abilities.

Although this department does not attempt to limit the field of research in agronomy, the following phases are suggested to the prospective graduate student:—

I. SOILS AND FERTILIZERS.— (a) Soil physics: Textural relationships of soil classes; adsorption phenomena; physical properties in relation to mineralogical and chemical properties; soil structure; moisture relationships; the colloidal conditions of soils, etc.

(b) Soil chemistry: Nitrogen fertilization, including commercial supply and gain or loss under different systems of soil management; absorption of potash and phosphoric acid; sulfur fertilization; soil acidity, etc.

(c) Soil biology: Fixation of nitrogen by symbiotic and nonsymbiotic organisms; changes of green and animal manures in the soil, — ammonification and nitrification; care and preservation of manures; humus in relation to soil fertility, etc.

II. FIELD CROPS.— (a) Varieties: Classification; adaptation to climatic and soil conditions, etc.

(b) Distribution as affected by natural and economic conditions.

(c) Cultural methods: Early and late planting of the potato seed crop, of silage corn; spacing of plants; keeping qualities as affected by time and methods of harvesting; tillage and moisture control, etc.

(d) Storage of cereals, roots and tubers as affected by aeration, temperature, humidity, previous treatment, etc.

(e) Crop improvement, involving the application of the principles of plant-breeding to special crops.

After the selection of a topic for investigation the student is required to formulate the problem in detail, develop a line of attack, carry on the work and present the results in a thesis acceptable to the staff of the Graduate School. The student is required to familiarize himself with the literature bearing on the subject.

A graduate student taking a minor in this department will be required first to take certain of the regular courses offered by the department, unless he has already had them or their equivalents. The work assigned will then depend somewhat on the time required to complete these courses.

It is the aim of the department to supply laboratory, greenhouse and field facilities for attacking agronomical problems through most of the known means. These facilities are intended primarily for the use of graduate stu-

dents doing major work in agronomy, but others will be allowed to use them when circumstances permit.

Animal Husbandry (Master of Science). — **COURSE A. ANIMAL BREEDING.** — 1. Reading: Thorough survey of the scientific works dealing with plant and animal breeding and improvement.

2. Project: Each student must outline and pursue some Mendelian problem.

3. Thesis: This is to be a complete treatise of the problem which the student undertakes; it should be a valuable contribution to the present knowledge of the question of animal breeding.

COURSE B. ANIMAL NUTRITION. — This course is in outline similar to A. It is designed to cover the field of nutrition, feeding and management of live stock.

Seminar: Regular periods will be devoted to a discussion of the projects undertaken, together with criticisms of the available material on the question pursued.

Object. — To give the student a comprehensive knowledge of feeding, breeding and management of live stock. This may be divided into a major and a minor, in order to give the student the opportunity of devoting a proportionate share of his time to the class of live stock in which he is particularly interested.

Reading. — The student is to make a very complete survey of experimental and periodical literature dealing with the various phases of the subject.

Practice. — Before the completion of the work for the degree, the student must have the equivalent of at least one year's continuous work on an approved live-stock farm.

Seminar: Regular periods to discuss progress of the work.

Animal Pathology (Minor Course only). — 1. Reviews in anatomy.

2. Reviews in organography and histology.

3. Special lectures and readings in general and special pathology.

4. Laboratory studies in general and special pathology.

5. Pathological technique.

6. Conferences.

Botany (Major Courses). — The equivalent of certain undergraduate courses, determined in the case of each student by the department, is prerequisite. Candidates for the degree of master of science are required to pass a final examination in writing. A final examination in writing before the department and an oral examination before the graduate staff must be passed by candidates for the degree of doctor of philosophy. Candidates for the latter degree are required to attend all graduate lectures given by the department. Candidates for the degree of master of science will take those lectures given during their period of study in the department. All lecture courses will be given in rotation, except Courses 1 and 2, which will come every year. There will be three lectures a week throughout the fall, winter and spring terms. These lecture courses, outlined below, are designed to cover a period of three years.

1. **PLANT PHYSIOLOGY.** — The lectures will consider, under the nutrition of the plant: its chemical structure, absorption of various nutrient substances and their changes in the plant, assimilation and dissimilation of carbon and nitrogen by autotrophic and heterotrophic plants; under changes in the form of plants: growth and form under constant external factors, the influence of variable external and inner factors on growth, form and development; and under plant movements: the various tropisms, nutations, etc. Supplemental

demonstrations, laboratory work and readings in the standard texts and journals. One lecture a week for 36 weeks.

2. **PLANT PATHOLOGY.** — A general consideration of the history, nature and causes of plant disease; parasitism, predisposition, immunity, degeneration, natural and artificial infection, dissemination, epidemics, biologic strains, monstrosities and malformations, proliferation, prevention and control, economics of plant diseases. One lecture a week for 36 weeks.

3. **NORMAL AND PATHOGENIC METABOLISM.** — The lectures in this subject embrace, in more or less detail, comparative consideration of the metabolism of the host in health and disease; the metabolism of the parasite under varying conditions; enzyme activities in host and parasite; methods of preparation and determination of enzyme activities; chemical and physical changes induced in plant tissue by parasites; immunity, etc. Current investigations and new phases of the subjects under discussion will also receive attention as they appear. One hour a week for 24 weeks.

4. **THE COMPARATIVE ANATOMY OF GREEN PLANTS.** — In these lectures an intensive study is directed to the comparative anatomy of green plants from the evolutionary standpoint. Particular emphasis is laid upon the woody forms both living and extinct. Of the latter the department is fortunate in possessing excellent sets of micro-preparations and lantern slides.

5. **BIOLOGIC RELATIONS.** — Consideration of certain phases of the morphological and physiological adaptations of plants with regard to insect visit; the rôle of thorns, hairs, tendrils, glands, etc. Various experiments will be made to test out experimentally some of the existing theories concerning biologic adaptations. One lecture a week for 12 weeks.

6. **THE ECOLOGY OF PLANTS.** — This course deals with the water, light and temperature relations of plants, and the various adaptations in response to these factors; the various types of plant formation; the migration of plants; the competition of plants; invasion and successions of plants under varied conditions; and the various types of alternations and zonations. One lecture a week for 12 weeks.

7. **PHYSIOLOGICAL PLANT PATHOLOGY.** — This course considers those plant diseases not due to bacterial or fungous parasites, but resulting from unfavorable physical or chemical conditions of the soil; from harmful atmospheric influences, such as too dry air, too much moisture, hail, wind, lightning, frost; from injurious gases and liquids; from lack of or too much light; from wounds. A knowledge of the normal physiology of the plant is required. Demonstrations and laboratory work will be given, together with assigned readings. One lecture a week for 12 weeks.

8. **HISTORY OF BOTANY.** — A historical survey of the science; lives of noted botanists; history of certain culture plants, such as wheat, corn, coffee, potato, rice, and their influence on civilization; reading. One lecture a week for 18 weeks.

Seminar: A weekly seminar for members of the department staff, graduate students and major senior students is held, at which important current botanical papers are discussed. Attendance and participation are required.

Collateral Reading: Extensive reading of botanical literature in English, German and French, designed to give the student a broad knowledge of the science, is required of all major students. Final examinations are based in part upon this reading course.

Thesis: Each major student is required to select a problem in plant pa-

thology or physiology (in other branches at the discretion of the department) for original investigation, and the thesis must embody a distinct contribution to knowledge. An effort will be made to assign problems having some bearing on scientific and economic agriculture.

Minor Course. — For a minor a student may take such of the work offered by the department as seems best suited to his major course. In most cases no problem will be assigned.

Professor OSMUN, Dr. CHAPMAN, Associate Professor ANDERSON, Assistant Professor CLARK and Dr. TORREY.

Chemistry. — I. Major courses for the degree of master of science. Students will be required to take Courses 101, 108 to 114. In addition to this the requirements in the various thesis subjects are: —

ORGANIC AND BIO-CHEMISTRY. — Courses 115 and either 105, 106 or 107, and 6 hours for one term selected from Courses 103 (b) and (f), and 104.

ANALYTICAL AND INDUSTRIAL AGRICULTURAL CHEMISTRY. — Courses 116, 103 (6 hours), and 6 hours for one term selected from Courses 102, 104 to 107.

PHYSICAL CHEMISTRY. — Courses 104, 117, and 6 hours for one term selected from Courses 102, 103, 105 to 107.

AGRICULTURAL CHEMISTRY. — Courses 103 (6 hours), 118, and 6 hours for one term selected from Courses 102, 104 to 107.

The candidate must pass a final written and oral examination before the Department of Chemistry upon undergraduate Courses 1 to 80, inclusive, and upon all graduate work taken in chemistry by him.

II. Major course for the degree of doctor of philosophy. Students will be required to take Courses 101 to 114, and one course selected from 115 to 118. In addition, the student may be required to spend at least two terms or one semester at some other recognized institution pursuing graduate work in chemistry. The candidate must pass a final written examination before the Department of Chemistry, and an oral examination before the graduate staff, upon the whole field of chemistry, and must be especially well prepared in the lines of work covered by his research.

III. Minor course for the degrees of master of science and doctor of philosophy. Students will be required to take work totaling at least 25 credits. This may be selected from any of the undergraduate Courses 27 and 51 to 80, or any of the graduate courses for which the student is prepared. In addition, the candidate must pass a final written and oral examination before the Department of Chemistry upon the courses taken and upon undergraduate Courses 27 and 51 to 80.

The following is a list of the courses: —

101. INORGANIC PREPARATIONS. — Laboratory. The preparation of chemical products from raw materials. The manufacture and testing of pure chemicals. The laboratory work is essentially synthetic in nature, and is designed to aid in acquiring a more adequate knowledge of inorganic chemistry than is to be obtained by chemical analysis alone. Ten to fifteen of the preparations given in Biltz's "Laboratory Methods of Inorganic Preparations" will be made by each student. Any term, 6 hours.

Mr. SEREX.

102. ADVANCED INORGANIC PREPARATIONS. — Laboratory. Continuation of Course 101. Any term, 6 hours.

Mr. SEREX.

103. ADVANCED ANALYTICAL CHEMISTRY. — Laboratory. This course may be taken in part as follows: (a) electrolytic analysis, 6 hours; (b) ultimate analysis, 6 hours; (c) special analytical work to meet the needs of the individual student, 6 hours. In addition, parts of undergraduate Courses 61, 62, 76 and 77 may be taken, as follows: (d) fertilizers, 6 hours; (e) insecticides, 6 hours; (f) milk and butter, 6 hours. (a), (b), (c) may be taken any time; (d), (e), (f) must be taken at the time the undergraduate course is given.

Professor WELLINGTON and Professor PETERS.

104. ADVANCED PHYSICAL CHEMISTRY. — Laboratory. Measurement of the electrical conductivity of solutions; degree of ionization; ionization constants; per cent hydrolysis of aniline hydrochloride from conductivity measurements; solubility product by the conductivity method; velocity of saponification by conductivity; neutralization point by conductivity; vapor pressure determinations; critical temperature of carbon dioxide or sulphur dioxide; transport numbers; preparation and properties of colloidal solutions; transition points by dilatometric method; heat of solution of ammonium chloride and potassium nitrate; adsorption of iodine by charcoal; splitting of racemic glyceric or racemic tartaric acids into their optical components. To each student separate work will be assigned. Any term, 6 hours.

Mr. SEREX.

105. ADVANCED ORGANIC PREPARATIONS. — Laboratory. The preparation of compounds not included in Courses 51 and 52, such as the Kolbe synthesis of salicylic acid; benzophenone and Beckmann's rearrangement; rosaniline, malachite green, congo red, indigo and other dyes; synthesis of fructose; Grignard reaction. Barnett, Cain and Thorpe, Gatterman, Noyes, Fischer and other laboratory guides are used. To each student separate work will be assigned. Any term, 6 hours.

Professor CHAMBERLAIN.

106. ADVANCED BIO-CHEMISTRY. — Laboratory. The hydrolysis of proteins and isolation of the amino acids; the study of milk, blood and urine; dietary and digestion studies. References: Abderhalden, Plimmer, Salkowski, Hawk, etc. To each student separate work will be assigned. Any term, 6 hours.

Professor CHAMBERLAIN.

107. INDUSTRIAL ORGANIC CHEMISTRY. — Laboratory. The preparation, on a large scale, of wood alcohol, acetic acid, ethyl alcohol, benzene and cellulose products, such as mercerized cotton and artificial silk. References: Molinari, Rodgers and Aubert, Thorpe, Enzyklopädie der tech. Chemie, etc. To each student separate work will be assigned. Any term, 6 hours.

Professor CHAMBERLAIN.

108. THEORETICAL CHEMISTRY. — Lectures. The following topics are considered: the compressibility of the atoms; the structure of atoms; the electron conception of valence. First term, 1 hour. Given in 1917-18. Alternates with Course 109.

Professor PETERS.

109. ANALYTICAL CHEMISTRY. — A general survey of methods and technique covering processes commonly carried out in the laboratory. Gooch's Quantitative Analysis is used as a text. First term, 1 hour. Given in 1916-17. Alternates with Course 108.

Professor PETERS.

110. ORGANIC CHEMISTRY. — Lectures. Some of the following topics will be considered both theoretically and industrially: alkaloids, synthetic dyes, essential oils, terpenes, rubber, etc.; the study of methods for carrying out general reactions; isomerism, tautomerism, condensation, etc. References, Cain & Thorpe, Cohen, chemical monographs, Lassar-Cohn, Heinrichs, Molinari. Second term, 1 hour. Given in 1916-17. Alternates with Course 111.
Professor CHAMBERLAIN.

111. BIO-CHEMISTRY. — Lectures. Some of the following topics will be considered both chemically and physiologically: fats, cholesterol, lecithin, carbohydrates, amino acids, proteins, urea, uric acid, purine bases, enzymes, fermentation, animal food and nutrition, photosynthesis. References, Monographs on Bio-Chemistry, Abderhalden, Plimmer, Haas & Hill, Lewkowitzsch, Fischer, Euler, Mathews, Czapek. Second term, 1 hour. Given in 1917-18. Alternates with Course 110.
Professor CHAMBERLAIN.

112. THEORETICAL AND PHYSICAL CHEMISTRY. — Lectures. The relation between the constitution and properties of compounds; mutarotation; steric hindrances; stereoisomerism of other elements than carbon; molecular association; similarity between the compounds of silicon and carbon. Third term, 1 hour. Given in 1917-18. Alternates with Course 113.
Mr. SEREX.

113. THEORETICAL AND PHYSICAL CHEMISTRY. — Lectures. Radioactivity; the application of physical chemistry to industrial chemistry. Third term, 1 hour. Given in 1916-17. Alternates with 112.
Mr. SEREX.

114. SEMINAR. — Conferences, reports or lectures. Three terms, twice a month, 1½ hours.
Professor LINDSEY.

115. RESEARCH IN ORGANIC AND BIO-CHEMISTRY. — Three terms. A minimum of 20 hours' laboratory work per week. Credit determined by amount of work done.
Professor CHAMBERLAIN.

116. RESEARCH IN ANALYTICAL OR AGRICULTURAL INDUSTRIAL CHEMISTRY. — Three terms. A minimum of 20 hours' laboratory work per week. Credit determined by the amount of work done.
Professor WELLINGTON and Professor PETERS.

117. RESEARCH IN PHYSICAL CHEMISTRY. — Three terms. A minimum of 20 hours' laboratory work per week. Credit determined by amount of work done.
Mr. SEREX.

118. RESEARCH IN AGRICULTURAL CHEMISTRY. — Three terms. A minimum of 20 hours' laboratory work per week. Credit determined by amount of work done. Professor LINDSEY and EXPERIMENT STATION ASSOCIATES.

Entomology (Major Courses, Ph.D. Degree). — 1. MORPHOLOGY. — Lectures on all, and laboratory work on a portion of the following subjects: embryology and polyembryony; transformations; external morphology; his-

tology; phylogeny; hermaphroditism; hybrids; parthenogenesis; pedogenesis; heterogeny; chemistry of colors; coloration; luminosity; deformities; variation.

2. **ECOLOGY.** — Lectures and laboratory work as above on the following subjects: dimorphism; polymorphism; protective devices; mimicry; insect architecture; plant fertilization; insect products; geographical distribution; methods of distribution; migration; geological history; insects and disease; enemies of insects, vegetable and animal; duration of life; experimental entomology and insect behavior.

3. **ECONOMIC.** — Lectures and laboratory work as above on the following subjects: special methods of control; insecticides; special research; insect photography; methods of preparing illustrations; field work and life-history investigations; insect legislation; methods of record keeping.

4. **SYSTEMATIC.** — Lectures and laboratory work as above on the following subjects: history of entomology; classifications and principles of classification; nomenclature and its rules; how to find and use literature; preparing indices; number of insects known and in existence; lives of prominent entomologists; methods of collecting, preparing, preserving and shipping insects; important collections; location of types.

5. **SEMINAR.** Required readings; thesis.

All of these five courses are required of students taking a Ph.D. in entomology.

Minor Courses. — Such portions of the major courses as are most closely correlated with the other lines of work taken by the student and which can be completed in the time available.

Professor FERNALD, Professor CRAMPTON and Associate Professor REGAN.

Horticulture. — Graduate work is offered in various lines of horticulture. For the most part this is divided into the different departments which now constitute the college Division of Horticulture, as follows: pomology, floriculture, landscape gardening, forestry and market gardening. For work in these lines application should be made direct to the heads of the several departments.

Besides this work, however, opportunity is offered for graduate study in general horticulture, including topics from the several organized departments mentioned, and also questions relating to plant breeding, general evolution, propagation, manufacture of horticultural products, etc. This general work is under the direction of Prof. F. A. Waugh, head of the Division of Horticulture.

Landscape Architecture (Major Course). — Every student before receiving his master's degree in landscape gardening must have given some thorough and fruitful study to each of the following five departments. As far as possible these studies must be of a practical nature, *i.e.*, they must be made upon actual projects in progress of development.

1. **THEORY.** — The principles of esthetics as applied to landscape gardening.

2. **DESIGN.** — The principles of pure design and their application in landscape and garden planning.

3. **CONSTRUCTION.** — The practical methods of carrying out landscape plans, laying out, equipment, organization of working force, time and cost keeping, etc.

4. MAINTENANCE. — Methods, organization, cost.

5. PRACTICE. — Office work, drafting, estimating, reporting, charges, accounting.

Qualifications. — Each student before he may receive the master's degree with a major in this department must convince his instructors that he has a genuine aptitude for some branch of landscape gardening, either in design, construction or management.

The minimum period of graduate study will be one and one-half years. At least one year of this time must be spent in residence at the college, and also one year must be spent in practice outside the college. The work done outside the college may be prescribed by the department, and must be fully reported to the department in writing. It is essential, further, that the candidate secure the written approval of his employers outside the college. The department may, at its discretion, require a longer period of study at the college or a longer apprenticeship outside the college.

Thesis or Project. — Each student before receiving the master's degree with a major in landscape gardening must present a satisfactory thesis or complete project. A thesis will consist of a careful original study of some problem in landscape architecture, presented in typewritten form with any necessary illustrations, such as photographs, diagrams, drawings, etc. A project will consist of a completed set of studies of some suitable landscape-gardening problem, such as the design of a park, a real estate subdivision, an extensive playground. Such a project will usually consist of —

- (a) Original surveys, including topography.
- (b) Block plans, showing original design.
- (c) A rendered plan or plans of the main features.
- (d) Detailed working drawings.
- (e) Estimates of cost.
- (f) Complete report and letter of transmittal.

Minor Course. — Any student electing a minor in landscape gardening will be directed to take such courses from the regular catalogue list as may seem most suitable for him. Under ordinary circumstances no other work will be given to students electing minors. In special cases, however, individual problems will be assigned and individual instruction given. These exceptions will be made in cases where, by so doing, it is possible to give the student material assistance in the plan of his major work.

Prerequisite Work. — The undergraduate courses in the college known as Landscape Gardening 50, 51, 52 and 53, Drawing 25, 26, 27, Horticulture 27, 50, 51, and Mathematics 26 and 27 will be considered prerequisite to graduate work, and any student not having passed these courses or their equivalent will be required to make up such work without graduate credit. Courses known as Landscape Gardening 75, 76, 77, 78 and 79 are required and may or may not be accepted for graduate credit, at the discretion of the department.

Microbiology. — I. COURSES LEADING TO THE DEGREE OF DOCTOR OF PHILOSOPHY. — 1. The candidate must present twenty-five credits from the undergraduate study as furnished in undergraduate Courses 50, 51, 52, 80, 81 or an equivalent before he can enter upon graduate study.

Note. — Twenty-five credits are required of undergraduates majoring in microbiology.

2. The candidate must pursue successfully the following special courses or

their equivalent. These courses are designed to give a comprehensive survey of the fields indicated, and are arranged especially for graduate students.

175. Agricultural microbiology,	5 credits.
176. Agricultural microbiology,	5 credits.
182. Dairy microbiology,	5 credits.
183. Food microbiology,	5 credits.

Note. — Courses 175, 176, 180, 181, 182, 183 correspond in subject-matter with Courses 75, 76, 80, 81, 82, 83 of undergraduate study; the latter courses are elementary in nature, while the former are arranged for intensive advanced study of graduate character. Candidates will be required not only to perform the exercises of the above courses, but will be expected to assist in teaching the elementary classes covering the same theme as a part of graduate requirements.

3. It will be necessary to complete additionally the following courses or their equivalent, open only to graduate students:—

190. I. 1917. Studies in technique, as photomicrography, laboratory equipment and manipulation. ¹	5 to 10 credits.	Associate Professor ITANO.
151. II. 1918. Cytological and morphological studies and technique. ¹	5 to 10 credits.	Professor MARSHALL and Mr. HOOD.
152. III. 1919. Physiological studies. ¹	5 to 10 credits.	Associate Professor ITANO.
177. II. 1919. Microbial studies in agriculture. Specific subjects. ¹	5 to 10 credits.	Professor MARSHALL, Associate Professor ITANO and Mr. HOOD.
181. II. 1920. Advanced sanitary or hygienic studies. ¹	5 to 10 credits.	Professor MARSHALL and Associate Professor ITANO.
150. I., II., III. Lectures and study of literature. ²	10 credits.	Professor MARSHALL, Associate Professor ITANO and Mr. HOOD.
200. I., II., III. Research. ³ (Some microbiological problem related to agriculture.)	40 to 50 credits.	Professor MARSHALL, Associate Professor ITANO and Mr. HOOD.

The thesis prepared must be satisfactory to the department and the graduate staff, and the candidate must be ready to defend it at his public examination. Further, following the presentation of the thesis, the candidate must submit to a written examination covering the entire subject by the department and a public oral examination under the auspices of the graduate staff.

II. COURSES LEADING TO THE DEGREE OF MASTER OF SCIENCE. — 1. Prerequisite studies, as in the case of the degree of doctor of philosophy (I., 1).

2. Special studies as represented by courses —

175. Agricultural microbiology,	5 or 10 credits.
176. Agricultural microbiology,	5 or 10 credits.
182. Dairy microbiology,	5 or 10 credits.
183. Food microbiology,	5 or 10 credits.

3. Courses designed for graduate students only.

150. I., II., III. Lectures and study of literature.	5 credits.	Professor MARSHALL, Associate Professor ITANO and Mr. HOOD.
200. I., II., III. Research. ³ (Some microbiological problem related to agriculture.)	15 to 25 credits.	Professor MARSHALL, Associate Professor ITANO and Mr. HOOD.

¹ Repeated every three years.

² Continues over three years, once each week.

³ Distributed as may be most beneficial for research work. Time and credit by arrangement.

The thesis submitted must be satisfactory to the department and to the graduate staff.

The candidate will be required to take a written examination and an oral examination by the department.

III. **MINOR WORK IN MICROBIOLOGY.** — May consist of Undergraduate Courses 50, 51, 52, and one other course, designed to support his major work, from among Courses 175, 180, 181, 182, 183. He will also be required to pursue Graduate Course 150 through four terms (see II., 3, 150). In case the candidate has had some of these courses he will be required to take more advanced substitute courses. A written examination over the subject-matter covered will be given at the close of the work.

Poultry Science (Major Course for the Degrees of M.S. and M.Agr.). —

1. **READING.** — A review of the entire field of poultry literature, covering books, bulletins and special articles, is made, and a written report on one or more subjects required.

2. **SEMINAR.** — A critical review and a criticism of the more important experiments carried on at the various stations in this and other countries; also a study of poultry conditions in foreign countries, methods of management, etc., besides a detailed study of some of the largest poultry projects in this country.

3. **ANATOMY (GROSS AND HISTOLOGICAL), PHYSIOLOGY AND SURGERY.** — This course requires a careful study of the anatomy and physiology of the fowl. Special attention is given to a study of those structures concerned with practical poultry problems. Instruction in surgical technique, adapted to fowls, may also be given.

4. **BREEDING.** — The student will carry on such breeding experiments as time and facilities permit. He may also do work in connection with our regular experimental projects. A detailed study of the pertinent literature will be required. Animal Husbandry 5, or its equivalent, is a prerequisite.

5. **FEEDING.** — A study of the relation of various foods and other substances to the morphology and physiology of the bird, with special reference to such subjects as egg production, feather form and structure, condition of flesh, bone, etc.

6. **BROODING.** — Studies will be made upon the relation between viability and rate of growth and the following topics: type of brooder, number of chicks in brood, ventilation, humidity, sanitation, exercise and weather conditions; also a comparison of natural methods with artificial methods of rearing chicks.

7. **INCUBATION AND EMBRYOLOGY.** — A number of problems of a practical, scientific and mechanical nature relating to incubation are considered. The work in embryology is of an advanced nature dealing with its relation to morphogenesis and heredity, and presupposes an elementary knowledge of the embryology of the chick.

8. **POULTRY DISEASES AND SANITATION.** — In this course a study is made of various problems in poultry sanitation, with particular reference to methods relating to the control and eradication of disease.

9. **THESIS.** — A thesis based on first-hand work on some problem in poultry biology or husbandry is required of all students working for the M.S. degree, and may be required of those working for the M.Agr. degree.

Note 1. — The postgraduate course presupposes all undergraduate work or its equivalent, together with practical experience. Without the latter, students will be unable to handle Courses 5, 6 and 7. At the discretion of the instructor

in charge, graduate students may be required to pursue undergraduate courses in other departments without credit.

Note 2. — Practical poultry work may be required, but no credit will be given for such work.

Note 3. — Courses 1 and 2 are designed particularly for minors.

Rural Sociology. — Courses are offered in Rural Sociology as major or minor subjects for the degree of doctor of philosophy.

Candidates for the master's degree will be required to pass an examination in all courses offered by this department primarily for undergraduates, as shown in the departmental classification. In addition they will be required to select one or more of the divisions of the subject for intensive study and research, as indicated below.

A thesis showing the results of personal investigation on some particular topic or topics must be presented. The thesis must show familiarity with the material bearing on the subject, ability in discovering and utilizing original sources, judgment in evaluating facts, evidences and authorities, originality and independence of thought. It must be a contribution in a very definite way to rural sociological thought.

TOPICS FOR STUDY AND RESEARCH.

1. The rural community: —
 - (a) Historical development.
 - (b) Influence of modern conditions on family and community life.
 - (c) Problems and methods in community organization.
 - (d) Community planning in Massachusetts.
2. Origin and development of rural institutions: —
 - (a) Scope, function and influence of educational institutions on rural social progress. Plans for betterment.
 - (b) History of the development of the rural church, its problems and program for improvement.
 - (c) The farm family, in its relation to religious, cultural, educational and social agencies. The relation of the standard of living to rural social progress.
3. Rural organization: —
 - (a) The scope and function of rural organization in development of rural life.
 - (b) Work of the national government in rural organization.
 - (c) County and institutional work in rural organization.
 - (d) Leadership in its relation to organization.
4. Rural government and rural law: —
 - (a) Development of rural local government in New England and the west. Progress in efficient local self-government.
 - (b) Relation of the State to the farmer, influence of the farmer in legislation, the organized ways and means by which the State aids the farmer directly.
 - (c) Work of the national government in its relation to the social welfare of the farming people.
 - (d) Agrarian legislation in the United States and Europe affecting rural social welfare.
5. Farmers' organizations: —
 - (a) Social problems underlying farmers' organizations in reference to service and permanency.
 - (b) Principles of organization.
 - (c) History of farmers' organizations in the United States.
6. Rural social and sociological surveys: —
 - (a) An intensive study of the place and function of statistical data in the sociological field, its evaluation and interpretation.
 - (b) A critical study of social surveys of rural life and methods of survey, with a view to discovering the strength and weakness of each.
7. Social condition of the rural people: —
 - (a) Origin and development of rural ideals.
 - (b) The status of the rural people in relation to health, morality, crime, etc.
 - (c) Problems of social psychology arising in rural life.

The course required for candidates offering a minor will be arranged after a conference with the director of the department, and will take into consideration the needs of the student in view of his previous preparation. The amount of time required of the student for his minor work will correspond with the requirements of the graduate school.

Veterinary Science. — Work is available in anatomy, hygiene, veterinary pathology, medicine, surgery, parasitology and other special lines or divisions of the subject.

Zoölogy. — Courses in zoölogy may be available as a minor for the degree of master of science and as a minor for the degree of doctor of philosophy. The nature of the work will necessarily vary according to circumstances, and may be intensive in a special field and correlated closely with the major work of the student, or it may be of a more general character, depending on the student's needs or previous acquaintance with general zoölogical science. The time devoted to zoölogy as a minor for either of the above-named degrees may vary from 12 to 16 hours per week, pursued for a year and a half.

LIST OF STUDENTS.

A list of the degrees conferred in the Graduate School, and of the students enrolled, is given in the general lists at the end of the volume.

THE SHORT COURSES

THE SHORT COURSES.

The short courses offered by the Massachusetts Agricultural College are designed to meet the needs of those, both young and old, who cannot come to the college for the regular agricultural courses. They furnish the student with instruction in modern accepted methods and are planned to help the farmer and the housewife.

The short courses include:—

- A. The Two-year Course in Practical Agriculture.
- B. The Ten Weeks' Winter School.
- C. The Summer School.
- D. The Vocational Poultry Course.
- E. The One-year Rural Engineering Course.
- F. The Regional School.

REQUIREMENTS FOR ADMISSION TO SHORT COURSES.— Students must be at least seventeen years of age and must furnish satisfactory evidence of good moral character. References are required. There are no entrance examinations. The sole test is ability to do the prescribed work. Students enrolling for the Two-year Course in Practical Agriculture must have at least a common school education.

EXPENSES OF SHORT COURSES.— The expense of attending any of the short courses is approximately as follows:—

Furnished rooms in private houses (per week),	\$2 to \$4
Board at college dining hall (per week),	\$6.50
Board with private families (per week),	\$6.50 to \$9
Registration fee (Ten Weeks' Winter School),	\$5

Tuition in all the short courses is free to residents of the Commonwealth. Small laboratory fees are charged in some of the courses.

A. TWO-YEAR COURSE IN PRACTICAL AGRICULTURE.

The Two-year Course in Practical Agriculture is offered to meet the needs of students who for one reason or another cannot take the four-year college course. It is designed to provide the largest amount of practical information and training in agriculture and horticulture in the shortest possible time consistent with thoroughgoing work. This course is open to men and women seventeen years of age or over who have at least a common school education. The Two-year Course in Practical Agriculture was organized in 1918, the first term beginning December 2 and continuing for a period of four months. Owing to the fact that young men of eighteen were subject to military service, students of sixteen years of age were admitted during this year. It was deemed inadvisable while war conditions prevailed to offer more than a four

months' term, in order that students might return to the farm in time for the spring work. All subjects offered during this four months' term were made elective. Thirty-seven students were enrolled during the first year. The value of such a course to the State is shown by the fact that 210 students enrolled in 1919.

The course as now organized makes available to the student three courses in agronomy, five courses in animal husbandry, five courses in fruit growing, six courses in rural engineering, five courses in dairying, four courses in poultry, four courses in rural home life, one course in farm manufacturing, three courses in forestry, four courses in farm business, one course in hygiene and sanitation, one course in English, three courses in vegetable gardening, three courses in floriculture, one course in insect pests and two courses in botany. The advantages of the college staff of specialists and the college plant with all its resources are thus made available to young men and young women who may not have had the opportunity of securing a high school education.

This course will appeal not only to young men and women, but also to men and women of mature years and practical experience who wish to know more about the business of farming. Although the course is planned to meet the needs of those who are not graduates of high schools, the instruction is not preparatory or elementary in its nature, but is so arranged that it will be of value to all. The greater amount of academic training that some of the students may possess will in a measure be offset by the fund of practical knowledge possessed by many who have completed only the elementary schools.

The Two-year Course in Practical Agriculture is so arranged that the student receives instruction in fundamental subjects and is given an opportunity to select the lines of work during the second year in which he is particularly interested.

The first year consists of six months of study at the college. The term begins with the college fall term and closes with the winter term of the regular session. The same vacation periods are observed as in the regular four-year course. The student pursues during the first year two courses in soil fertility, two courses in animal husbandry, two courses in fruit growing, one course in farm machinery, one in shop mechanics, one in dairying, one in poultry, one in farm structure, one in hygiene and one in farm law.

At the close of six months of study, students are required to gain six months of farm experience. The college will assist students in finding positions and in placing them on farms where the experience gained will be of great advantage. Thus, an effort will be made to place on a dairy farm the man expecting to take up dairying as his chief line of work, and a student of pomology on a fruit farm.

During the second year the student spends nine months in resident study. Courses in plant diseases, crops, insect pests, feeding, farm management, marketing and farm problems are required of all students.

In addition, the student selects from the following list of subjects three which he will carry throughout the year: fruit growing, dairying, poultry husbandry, vegetable gardening, floriculture and rural home life.

During the winter and spring terms of the second year there are elective subjects from which the student may complete his program. These courses include: breeding, animal diseases, gas engines, dairying, carpentry, drainage and irrigation, agricultural credit, farm manufacturing and dairy bacteriology.

The course is not intended for students enrolled in high schools. Such students should finish the high school course. Students enrolled in high schools who wish to take the course should bring a statement either from the principal of the high school or from parent or guardian asking permission to be enrolled.

There are no entrance examinations or entrance conditions other than that students must be seventeen years of age or over and have completed the elementary or common schools. They must have had six months' practical farm experience before they will be permitted to enroll for the work of the second year. This experience may be gained after the first year of study at the college.

Each student is required to file with the treasurer of the college a statement, signed by the town (or city) clerk of the town (or city) from which he enrolls, stating that the parent or guardian of the student is a resident of that town.

POSITIONS. — While the college does not guarantee positions it frequently has calls for capable, energetic men and women with farm experience. The demand for students to fill positions has been greater than the supply. The opportunity for farm positions is exceptionally good.

CERTIFICATE. — All students will receive a certificate showing their standings in courses in which they were registered. Credits earned in the Two-year Course in Practical Agriculture or in any other of the short courses do not lead to the college degree. Students who possess college entrance requirements and who wish to take the regular college work should address the registrar of the college.

SCHOLARSHIPS. — In connection with the Two-year Course in Practical Agriculture the New England Branch of the Woman's National Farm and Garden Association offered five scholarships of \$100 each, available to women electing agricultural courses.

TUITION AND FEES. — Tuition is free to residents of the Commonwealth. Students who are not residents of Massachusetts pay a fee of \$20 a term.

B. THE WINTER SCHOOL.

The Winter School, beginning usually about January 1 and continuing for ten weeks, was started several years ago and has always been very popular, not only with more mature farmers and their wives, but with young men and women who control or manage farms. The courses, though short, are very practical in their nature, and are so arranged that a student may choose such subjects as will enable him to specialize along the line of work in which he is most interested. There is a wide range in the choice of subjects, making it possible for the student to take work for several winters in succession. Many college graduates enroll for the Winter School.

SCHOLARSHIPS. — The Jewish Agricultural and Industrial Aid Society of New York has instituted a system of free scholarships to enable the children of Jewish farmers to attend the short winter course in the States in which they reside. The stipend is sufficient to pay all the expenses of the holder for the course; such expenses usually amount to from \$100 to \$150. The following courses are offered: —

OUTLINE OF THE TEN WEEKS' WINTER SCHOOL, DECEMBER 30 TO MARCH 5.

- Soil Fertility. Professor BEAUMONT. Three lectures a week.
 Field Crops. Assistant Professor COOPER. Two lectures and one two-hour laboratory period per week.
 Types and Breeds of Livestock. Professor McNUTT. Three lectures and two two-hour laboratory periods a week.
 Livestock Feeding. Professor McNUTT. Three lectures per week.
 Animal Breeding. Professor McNUTT. One lecture and one two-hour laboratory period per week.
 Dairying. Professor LOCKWOOD and assistants. Five lectures and five laboratory periods per week.
 Dairy Bacteriology. Professor MARSHALL. Two lectures and one two-hour laboratory period per week.
 Animal Diseases and Stable Sanitation. Professor PAIGE. Two lectures per week.
 Poultry Husbandry. Mr. DEAN. Five lectures and one two-hour laboratory period per week.
 Fruit Growing. Professor SEARS. Three lectures and one two-hour laboratory period per week.
 Market Gardening. Associate Professor DACY. Three lectures and two two-hour laboratory periods per week.
 Floriculture. Associate Professor THAYER and Mr. WHITING. Five lectures per week.
 Horticultural Manufacture. Professor CHENOWETH. Two lectures and two laboratory periods per week.
 Farm Management. Assistant Professor ABELL. Two lectures a week.
 Farm Accounts. Assistant Professor ABELL. Two two-hour laboratory periods per week.
 Marketing. Professor CANCE and assistants. Two lectures a week.
 Agricultural Credit. Professor CANCE and assistants. Two lectures a week.
 Botany. Assistant Professor McLAUGHLIN. Two lectures a week.
 Entomology. Associate Professor REGAN. Three lectures per week.
 Farm Structures. Assistant Professor STRAHAN. Two lectures and one two-hour laboratory period per week.
 Farm Machinery. Professor GUNNESS. Two lectures and three two-hour laboratory periods a week.
 Rural Sanitary Science and Hygiene. Professor MARSHALL. Two lectures per week.
 Vocational Guidance. Miss HAMLIN. One lecture per week.
 Foods. Miss SKINNER. One lecture and two two-hour laboratory periods per week.
 Clothing. DEPARTMENT OF HOME ECONOMICS. One lecture and two two-hour laboratory periods per week.
 The Business of the Household. Miss SKINNER. Three class hours per week.
 Home Care of the Sick. Miss SKINNER. Three class hours per week.
 Principles and Methods of Vocational Agricultural Teaching. Professor HART. Five exercises per week.
 Special Methods in Vocational Agricultural Teaching. Professor WELLES. Five exercises a week.
 Professional Improvement Problems. Mr. HEALD. Five periods per week.

C. THE SUMMER SCHOOL.

The 1919 Summer School was under the joint direction of the Massachusetts Agricultural College and the Massachusetts Board of Education. Twenty-five courses were offered in agriculture and horticulture, and nineteen courses in education. The enrollment was the largest in the history of the college.

The plan of co-operation of the Massachusetts Agricultural College and the Massachusetts Board of Education will be followed during the 1920 Summer School. More courses in agriculture, horticulture and education will be offered, in order that teachers who attended the 1919 Summer School may take advantage of another summer's work.

D. ONE-YEAR VOCATIONAL COURSE IN POULTRY HUSBANDRY.

PURPOSE.—This course is designed for graduates of the agricultural vocational schools and others who wish to prepare themselves for practical poultry keeping, and can spend only one year at college.

SCOPE.—The work covers seven detailed courses in poultry husbandry, as well as short-course work in fruit growing, market gardening, animal husbandry, or other subjects that will be helpful to poultry raisers. In addition to classroom and laboratory exercises each student is required to put in from twenty-five to thirty hours per week at the plant in the care and management of poultry, for the purpose of becoming proficient in the various branches of the work.

ENTRANCE REQUIREMENTS.—Applicants must be at least eighteen years of age and have a good elementary education.

FEES.—There is no tuition for residents of Massachusetts, but a laboratory fee of \$5 is required for both the fall and spring terms.

NOTE.—The course is limited to 16 students. Plans are now being made to begin the one-year poultry course next year in December, to continue until the following December.

E. THE ONE-YEAR RURAL ENGINEERING COURSE.

The One-year Course in Rural Engineering was organized at the college in 1919. This course offers instruction in drawing, English, farm machinery, forge shop, gas engines, mathematics and physics. The course is designed for men who wish to specialize in the study of farm machinery. It is open to every one eighteen years of age or over who has completed a common school education.

The subjects are arranged as follows:—

<i>First Term</i>	<i>Second Term</i>	<i>Third Term</i>
Gas Engines, . . . 5	Gas Tractors, . . . 5	Gas Tractors, . . . 5
Farm Machinery, . . . 3	Forge Shop, . . . 2	Forge Shop, . . . 2
Mechanical Drawing, . . 3	Farm Accounts, . . . 2	Farm Management, . . 3
Vocational Mathematics, 2	Vocational Mathematics, 2	Vocational Mathematics, 2
Elective.	Elective.	Drainage and Irrigation, 3
		Elective.

F. THE REGIONAL SCHOOL.

There has been a constant demand for a school of from four to six weeks in connection with some other educational institution located in the eastern part of the State, in or near Boston, by means of which short practical courses in agriculture might be presented.

THE EXTENSION SERVICE

THE EXTENSION SERVICE.

The Extension Service of the Massachusetts Agricultural College is an organized effort to carry systematic and practical instruction to the thousands of people throughout the State who are unable, owing to various reasons, to take advantage of the regular courses offered at the college. It is in reality the "carrying of the college to the people of the State." Every department of the institution, in so far as the regular teaching and research work will permit, contributes what it can to this work. There is also a regular staff of extension workers whose business it is to present the instruction of the college to individuals and various educational organizations, such as extension schools, granges, Y. M. C. A.'s, churches, boards of trade, etc., throughout the State, in addition to giving county farm bureaus assistance in their project work. Extension work includes the following: extension courses at the college; home study courses; itinerant instruction, including lectures and lecture courses, exhibits, demonstrations and extension schools; extension work through the various departments of the college, in which the extension specialist is responsible to the head of the department for the technique of the work and to the director of the Extension Service for its accomplishment; co-operative work of various kinds with the United States Department of Agriculture; and extension work through county, district and local agents. Some of the ways in which this is being done are briefly described below.

COURSES AT THE COLLEGE.

Courses of the duration of one week or under are managed by the Extension Service, and include, in the winter, programs for special agricultural interests or organizations, and, in the summer, the big summer Farmers' Week.

THE WINTER COURSES. — These courses are arranged to meet the demand for a short course of instruction on agricultural subjects, requested by such interests as the State institutional managers and various live-stock, crops, tobacco, fruit and market-gardeners' associations. A sheep-shearing contest is also arranged for the sheep breeders' association. Instruction is presented by lectures, demonstrations and conferences. The college equipment is available for use, and the subject-matter may be selected or suggested by those expecting to attend. The work of the college faculty may be supplemented by lectures and demonstrations by eminent men and women from our own and other States. No fee is charged.

SUMMER FARMERS' WEEK. — The first summer Farmers' Week was held at the college July 28 to Aug. 2, 1919, and was instituted to meet the demand for an opportunity to see the actual outdoor work of the college farm and experiment station, and to see the college teaching put into practice in the field. As the winter meetings of necessity are confined to indoor lectures and demonstrations, the summer Farmers' Week places the emphasis on out-

door work, and limits the program to one or two lectures a day. The greater part of the time is devoted to personally conducted field trips to all parts of the college property. Various agricultural organizations have field days at the college during the week, and every available facility for their entertainment is placed at their disposal. Farm bureaus, agricultural organizations and individual farmers co-operate in supplying requested information as to the probable subject-matter which visitors desire on the program. With the program for the week is furnished a detailed map of the college property, and, with the signs and guideposts which are numerous displayed to explain various features, the services of a guide are not required to see what is desired.

The 1919 summer Farmers' Week attracted an exceptionally large crowd to the college from every county in the State and many from out of the State, and with the new features anticipated for the 1920 event, even greater interest is expected.

ANNUAL CONFERENCE OF COUNTY AGENTS AND VOCATIONAL AGRICULTURAL INSTRUCTORS. — In December of each year a one-week conference of county agents and vocational agricultural instructors is held at the college. This is for the purpose of correlating the extension work throughout the State, and to enable the field workers to keep in up-to-the-minute touch with agricultural problems, methods and research as conducted in Massachusetts as well as other States in this particular section of the country. The next annual conference will probably be held during the third full week in December, 1920.

POULTRY CONVENTION. — The annual poultry convention, now included as one of the main events on the program of summer Farmers' Week, is the most important meeting in the State for the poultry public. Men of national reputation are secured for this occasion. In preparing the program, the wishes and needs of the poultry men and women are given first consideration, and topics of the most timely interest are listed for discussion by the best-informed authorities.

HOME STUDY COURSES. — The purpose of the home study courses is to furnish systematic instruction in those lines which will most benefit the general farmer, the dairyman, the fruit grower, the market-gardener, the poultryman, the teacher, the home maker, and all others who are interested in agricultural and country-life matters. It is the purpose to present up-to-date, accurate and concise information in such a manner and in such language that all who pursue the study may readily understand the work.

Courses offered. — A number of courses are in process of revision and several are being rewritten. During 1920 courses will be available as follows: —

1. Soils and Soil Fertility. Professor BEAUMONT.
2. Manures, Fertilizers and Soil Amendments. Professor BEAUMONT.
3. Field Crops. Assistant Professor JONES.
4. Farm Dairying. Professor LOCKWOOD.
5. Fruit Growing. Professor SEARS, Associate Professor CHENOWETH.
6. Vegetable Gardening: Part I., Market Gardening, Part II., Home Gardening. Prof. H. F. TOMPSON and Prof. GILBERT S. WATTS.
7. Farm Accounts. Professor FOORD.
8. Entomology. Dr. REGAN.
9. Forestry. Professor CLARK.
10. Shade Tree Management. Professor OSMUN.
11. Plant Diseases. Professor OSMUN.
12. Poultry Husbandry. Professor GRAHAM and Professor PAYNE.
13. Home Economics.

Methods of conducting the Work. — The best known methods of conducting correspondence course teaching are employed. Certain courses are based entirely upon text-books, others consist wholly of typewritten lectures, while others combine the two. If books are not required they are usually recommended.

The courses are designed primarily for the individual student, although experience has shown the advantages of the group method of home instruction. Prospective students should endeavor to find four or more others who will enroll in the same or other courses, so that a study class may be formed. Such a method has the advantage of instruction under the guidance of a leader, who is a member of the class. Furthermore, it is usually possible for the Extension Service to send a speaker to the class two or three times during the term to help the members of the group with their individual problems. The college library will also arrange for the loan of books to be used as text and reference reading.

Enrollment of Home Study Courses. — Students may enroll in the courses at any time between October 1 and June 1, and one year from the date of registration is allowed for the completion of each course.

Expenses of the Courses. — In order that none shall enroll except those who are interested and desire to pursue earnest study, a small fee is charged. This has been fixed at \$2 for each course except where the courses are divided, and it has been found advisable to charge \$2 for each of the parts in these instances. The fee is payable strictly in advance, at the time the enrollment card is sent. When text-books are required the student purchases these.

LECTURES AND DEMONSTRATIONS. — The members of the faculty of the college are, when other duties will permit, available for lectures and demonstrations before granges, men's clubs, women's clubs, Y. M. C. A.'s, farmers' clubs, boards of trade and other organizations. Organizations arranging the lectures are asked to pay the traveling expenses of the lecturer, provided no admission fee is charged. When admission is charged the lecturer is entitled to a fee in addition to traveling expenses.

EXTENSION SCHOOLS. — Agricultural extension schools dealing with the production side of farming and with the problems of the farm home are offered to communities where there is the desire to have the college brought to the community. The college sends a corps of instructors and the necessary equipment to put on a program of instructional work in live-stock, crops, soils, fruits, market-gardening, poultry or farm management and home makers' courses for women. Communities desiring an extension school make a written request, agreeing to defray all local expenses, such as the rent, heating and lighting of a suitable hall, and the board of the instructors during the school. Information can be obtained by writing to the Extension Service of the Massachusetts Agricultural College.

EDUCATIONAL EXHIBITS AT FAIRS AND OTHER SHOWS. — The college cooperates with the managers of fairs, industrial expositions, corn shows, poultry shows, fruit shows and other exhibitions by making educational exhibits. Where practicable the exhibit is accompanied by lecturers and demonstrators.

EXTENSION WORK IN SPECIAL FIELDS.

EXTENSION WORK IN FRUIT GROWING. — This work includes lectures and demonstrations on laying out and planting orchards, pruning, spraying, thinning, grading, packing and marketing fruits. Demonstration orchards,

new and renovations plots, are established in different sections of the State, under a co-operative agreement between the college and the owners of land. Extension schools in fruit growing and fruit grading and packing are arranged on request. Visits to farms for advisory work are made, and correspondence on orcharding subjects is invited.

EXTENSION WORK IN ANIMAL HUSBANDRY. — The purpose of this work is primarily to acquaint the farmers of the State with improved methods of developing the live-stock industry of the State. This is done by assistance rendered communities of farmers who wish to organize live-stock centers, and also by co-operating with other active educational organizations already established.

Upon request, and where conditions favor the organization of county live-stock clubs, cow testing associations and bull associations, assistance is provided.

Live-stock feeding, breeding and management demonstrations are established in different sections of the State under co-operative agreement between the college and the owners of live stock. Extension schools, involving the selection, housing, general management and marketing of live stock, are arranged on request. Advisory trips to farms are made, and correspondence on subjects relating to live stock is invited.

EXTENSION WORK IN DAIRYING. — This includes lectures and demonstrations on the handling and care of milk, cream, butter and cheese; Babcock testing, dairy utensils and dairy manufactures. Educational campaigns may be arranged in different communities, seeking to educate producers, dealers and consumers as to the production and distribution of clean, safe milk. Through correspondence and personal visits advice is given —

1. To help the improvement of the quality of dairy products.
2. To help in the problem of more economical handling and manufacturing.
3. To help stimulate a larger and continued use of dairy products.

EXTENSION WORK IN POULTRY HUSBANDRY. — In addition to such general activities as lectures, demonstrations, extension schools, exhibits, conferences, farm visits, bulletins and plans for developing poultry plants, the poultry extension practice is to emphasize, each year, two or three urgent needs of the industry in State-wide campaigns aiming to reach all poultrymen of the State.

In co-operation with the several county farm bureaus definite county projects and community programs are arranged; and co-operative work is undertaken with many local poultry associations. Service is also rendered in the diagnosis and control of poultry diseases.

The annual poultry convention on the campus is attended by hundreds of poultrymen.

EXTENSION WORK IN SHEEP HUSBANDRY. — The extension work in sheep husbandry has been conducted along the following project lines: —

- I. Service project carried on by —
 - A. Lectures on —
 1. Breeds.
 2. Feeding.
 3. Care and management.
 4. Parasites.

B. Demonstrations of methods of castration, docking, shearing both by shears and machine, preparing the fleece for marketing, dipping and treatment for intestinal parasites, including *post mortem*.

C. Selecting breeding stock for beginners and others.

II. A project having for its object the finding of the cost of carrying on a profitable sheep business.

III. Organizing county sheep breeders' co-operative associations.

IV. Forming boys' and girls' sheep and lamb clubs.

The above lines of work have been carried on during the year. At this writing project II. has not been completed. New calls may open up new projects along the same lines as those now complete. This work is conducted in co-operation with the United States Department of Agriculture.

EXTENSION WORK IN FARM MANAGEMENT, FIELD STUDIES AND DEMONSTRATIONS. — This is carried on co-operatively between the college and the office of farm management of the United States Department of Agriculture at Washington. The work consists of a study of farm conditions, followed by suggestions for handling farm management problems, often involving an adjustment of the different enterprises, such as dairy, orchard or field crops, so as to give economical use of labor and material, and make a profitable business. Specific advice is given upon the planning of farms and farm buildings, the proper farm equipment and the keeping of farm accounts.

EXTENSION WORK IN SOILS AND CROPS. — The subject-matter of this work considers the economical production of crops and the economical maintenance of soil productivity in Massachusetts. The crops adapted to Massachusetts conditions, their relative place in agriculture, their culture, fertilization, etc., are considered.

The work done can be grouped under the following main headings: —

1. Project work, county farm bureaus: —

(a) Assistance in soil and crop problems and in demonstration work.

(b) Assistance at meetings and in work with individual farmers and organizations.

2. Correspondence. Conducting correspondence courses and answering inquiries sent to the college.

3. Lectures and demonstrations at meetings and extension schools.

4. Preparation of exhibit material.

5. Preparation of short articles dealing with timely soil and crop problems.

EXTENSION WORK IN HOME ECONOMICS. — This work includes lectures and demonstrations on subjects pertaining to homemaking. This year special emphasis will be placed on clothing, household management and right food for the family. Instruction is carried on by means of a series of lessons given to groups who are housekeepers and leaders as well. All work is done in co-operation with the county home demonstration agents.

JUNIOR EXTENSION WORK. — This is an organized effort to promote among young people between the ages of ten and nineteen years the study of agriculture and home economics in the home. The work organized by the United States Department of Agriculture is carried on by the college in co-operation with county farm bureaus or improvement leagues. As far as possible the young people are organized into groups or clubs; where this is impossible the work is done with the individual. An endeavor is made to obtain some one in each community to act as a local leader of the club. Many school superintendents find it one means of stimulating enthusiasm

for outdoor life among their pupils. Throughout the State teachers of rural schools use it to tie up the school and home life. City school teachers have found it helpful in finding the rural-minded pupils living under urban conditions. Exhibits held locally or at county and State fairs do much to arouse a wholesome spirit of competition among the members. The State Department of Agriculture and several private organizations appropriate money to further the work. The work is usually introduced by conferences with individuals interested, and lectures before any organization interested in young people and desiring to see the work carried on in any community.

LIBRARY EXTENSION WORK. — This consists principally of loaning to the libraries of the Commonwealth general collections of the latest and best books and bulletins on agriculture and home economics. Smaller collections or package libraries on special subjects, such as fruit harvesting and marketing, dairying, poultry houses, beekeeping, home economics, country schools and other topics, are also sent out.

This material is loaned for a period of eight weeks, subject to renewal when possible. All transportation charges for shipments to or returned from borrowing libraries are paid by the Extension Service. The college library also supplies lists of books on various subjects, and also information about books on agriculture, home economics and related subjects.

LOCAL COMMUNITY ORGANIZATION. — Work under this project is temporarily suspended, leave of absence having been granted to the project leader to do some special work with the National Red Cross.

EXTENSION WORK IN AGRICULTURAL ECONOMICS. — Work in this field has been developing along six lines all connected with commercial agriculture, emphasizing the production of value or money returns rather than volume of agricultural products. Much of this work is conducted in direct co-operation with the United States Department of Agriculture.

(a) *Rural Credit.* — Sources and means of providing credit for buying or financing farms, purchasing supplies or storing and distributing farm crops.

(b) Better methods of marketing, grading and distributing farm crops.

(c) Assistance in organizing co-operative buying and selling associations. Helping to establish producers' city and country milk plants and co-operative tobacco packing plants.

(d) Assistance in establishing farmers' markets, both wholesale and retail, in cities, to furnish an outlet for perishable local produce and to provide a better market for consumers.

(e) *Direct Marketing.* — The college was the first agency to bring about direct connection between farmers and industrial plants for trading in potatoes, onions, etc., from farm to consumer.

(f) *Market News Survey.* — In co-operation with the farm bureaus and United States Bureau of Markets, a plan has been perfected whereby a daily market report of wholesale and retail prices of local produce is being furnished by the farm bureaus to a number of daily papers. These reports, made in retail units, have been very helpful both to producers and to city consumers.

FOOD PRESERVATION. — On account of the demands for instruction in food preservation, particularly preservation of fruits and vegetables, much attention was given to this work during the year, the work being carried on chiefly through training local leaders how to handle the work. Special attention is given to the manufacture of fruit by-products, to home and farm storage and to the operation of preservation kitchens. The project is carried

out through demonstrations, extension schools, farm visits and correspondence.

FARM BUREAU WORK. — Co-operative extension work is carried on in counties by means of farm bureaus. Agents in agriculture, homemaking and junior work are co-operatively employed by the Massachusetts Agricultural College, the United States Department of Agriculture and the county. The residents of the county are consulted in community groups as to the work which is to be done, and then all assistance which is possible to be secured from the United States Department of Agriculture, the college and the county brought in to successfully complete the work planned. The work receives its financial support from public funds which are secured from the above co-operating parties and the county commissioners. Private funds which are in the form of memberships and contributions are also received. The administration of the work in each county is vested in a board of ten trustees who are appointed by the county commissioners, co-operating with representatives of the Extension Service at the College.

ADVISORY WORK WITH INSTITUTIONS AND INDIVIDUALS. — Special effort is made to comply with as many of the requests of the State institutions and individuals who ask for advice on farm problems as possible. The force of instructors available for this work is at present insufficient to take care of all the demands. Special trips, including visits to a number of the various State institutions, are occasionally made by a group of specialists.

PUBLICATIONS OF THE EXTENSION SERVICE. — In addition to the regular circulars and bulletins which announce the various short courses and lines of work mentioned, publications giving timely information on agricultural subjects are issued. Large numbers of helpful circulars and bulletins are annually distributed. A series of bulletins especially for the farm woman is one feature of this work. Reports of the work of the Extension Service, farm account blanks, boys' and girls' club circulars, lists of books, and so forth, may be had upon request.

CO-OPERATION WITH OTHER ORGANIZATIONS. — The aim of the Extension Service is to co-operate with existing organizations so far as possible. It is therefore glad to work with local organizations, and welcomes suggestions from town officers, local granges, farmers' clubs, women's clubs, Y. M. C. A.'s, Y. W. C. A.'s, boards of trade, village improvement societies, teachers, clergymen, librarians and others interested in agriculture and country life, as to the needs and methods best adapted to the meeting of these needs.

INFORMATION BY CORRESPONDENCE. — Besides the activities mentioned, hundreds are helped through personal visits to farms, and still larger numbers through letters of inquiry, which always receive the most careful attention from every department of the institution.

Pamphlets and bulletins are sent free to all who apply for them, and any who desire such help as has been mentioned should address the Director of the Extension Service, Massachusetts Agricultural College, Amherst, Mass.

GENERAL INFORMATION

GENERAL INFORMATION.

A. FINANCIAL AND ADMINISTRATIVE.

Student Expenses.

TUITION.¹— Tuition is free to residents of Massachusetts. Students who are not residents of Massachusetts are charged a tuition fee of \$60 a year. The tuition charged persons not citizens of the United States is \$120 a year. Students entering from Massachusetts are required to file with the president a statement signed by either town or city clerk stating that the applicant's father is a legal resident of Massachusetts; a similar statement is required of those entering from other States.

All students entering the college for the first time as undergraduates or unclassified students are charged a matriculation fee of \$5, which in event of a student leaving the institution shall, if all bills due the college are paid, be remitted, or which shall upon graduation be considered as payment for the diploma.

DORMITORIES AND BOARD.— The college has dormitory accommodations for about 62 students. The rooms in the dormitories are occupied by the upper classmen, hence new students find it necessary to room in private houses. The rooms in the college dormitories are unfurnished; for the most part they are arranged in suites of three, — one study room and two bedrooms. These rooms are heated by steam and lighted by electricity; they are cared for by students occupying them. The dormitory rent for each person varies from \$39 to \$66 a year. The rent for furnished rooms in private houses ranges from \$1 to \$3 a week for each occupant. Correspondence in regard to rooms should be addressed to the dean of the college.

Board may be obtained at the college dining hall. At present, the price of board there is about \$6.50 a week.

Expenses.

The necessary college expenses are estimated as follows:—

Tuition: citizens of Massachusetts, free; other citizens of the United States, \$60 a year; foreigners, \$120 a year.

	Low.	High.
Matriculation fee, first year,	\$5 00	\$5 00
Room in college dormitories or in private houses,	39 00	110 00
Board, \$6.50 per week,	234 00	234 00
Laundry, 50 to 85 cents a week,	18 00	30 00
Laboratory fees,	5 00	20 00
Books, stationery and miscellaneous items,	24 00	51 00
	<hr/>	<hr/>
	\$325 00	\$450 00

¹ This statement applies to those registering as regular, two-year or unclassified students.

OTHER EXPENSES.—Prospective students should understand that the above estimates cover expenses which may be called strictly college expenses, and that there are other financial obligations voluntarily placed upon students which they should expect to meet. Chief among these are class assessments and taxes levied for maintenance of various organizations, such as the Social Union, Athletic Association, weekly publications, etc. Such expenses vary from \$15 to \$30 a year. Additional financial responsibility is also assumed by students joining a fraternity or entering into other social activities of the college. Students rooming in college dormitories are obliged to equip their own rooms with furniture. The college assumes no responsibility in regard to the safe keeping of student property either during the college term or vacations, except under such special arrangement as may be made with the treasurer. Besides the amount necessary for clothes and traveling, the economical student will probably spend between \$325 and \$450 per year.

INITIAL CHARGES.

At the opening of the college year, before students are registered in their classes, the following charges are payable at the treasurer's office:—

	Freshmen.	Sophomores.	Juniors and Seniors.
Matriculation fee,	\$5 00	-	-
Board (if at college dining hall) four weeks in advance,	26 00	\$26 00	\$26 00
Assessment for support of Social Union,	1 50	1 50	1 50
Laboratory fees,	5 00	5 00	2 00-10 00
Room rent (if in college dormitory),	-	-	12 00-20 00
Student tax for support of athletics, ¹	10 00	10 00	10 00
Student tax for support of nonathletic activities, ¹ .	2 50	2 50	2 50

¹ While this is not essentially a college charge, the treasurer of the college acts as collector for the student activity, and all students are expected to make the payment as indicated. The subscription price of the "Collegian" is fixed by the managers; the amount of athletic tax by vote of the student body.

LABORATORY FEES.

The principles observed in establishing laboratory fees are the requirement that students pay for those materials actually used which cannot be supplied by the individual, and that the laboratory fees include a charge sufficient to guard against wanton waste and breakage. Fees may be established for any course without previous announcement. At present, the fees charged are as follows:—

Agronomy:—	Per Term.
Course 27, 3,	\$1 50
Course 50, 1,	2 00
Course 51, 3,	2 00
Course 75, 1,	1 50
Course 76, 3,	1 50
Course 77, 2,	2 00
Course 78, 3,	2 00

	Per Term.
Animal husbandry: —	
Course 1, 1 and 2,	\$1 00
Course 25, 1,	1 50
Course 26, 2,	1 50
Course 50, 2,	1 50
Course 78, 2,	1 00
Dairying: —	
Course 50, 1,	2 50
Course 51, 3,	2 50
Course 75, 2,	2 00
Course 76, 3,	3 00
Course 77, 1,	2 50
Farm administration: —	
Course 75, 2,	1 50
Course 76, 3,	1 50
Poultry husbandry: —	
Course 51, 1,	2 50
Course 53, 3,	3 00
Course 55, 3,	2 50
Course 76, 1,	2 00
Course 77, 1,	2 00
Rural engineering: —	
Course 25, 1,	1 50
Course 26, 2,	1 50
Course 76, 1,	1 50
Course 77, 2,	1 50
Course 78, 3,	1 50
Floriculture: —	
Course 50, 1,	2 50
Course 51, 2,	2 50
Course 52, 3,	2 50
Course 53, 1,	2 50
Course 75, 1,	2 00
Course 76, 3,	2 00
Course 77, 2,	2 50
Course 78, 3,	2 50
Forestry: —	
Course 50, 1,	2 00
Course 51, 2,	3 00
Course 75, 1,	4 00
Landscape gardening: —	
Course 50, 1,	3 00
Course 51, 2,	3 00
Course 52, 3,	4 00
Course 76, 2,	4 00
Course 77, 3,	4 00
Course 79, 3,	2 00
Vegetable gardening: —	
Course 50, 3,	2 00
Course 75, 1,	3 00
Course 76, 2,	3 00
Pomology: —	
Course 75, 1,	3 00
Course 76, 2,	3 00

Drawing: —		Per Term.
Course 25, 1,	.	\$3 00
Course 26, 2,	.	3 00
Botany: —		
Course 3, 3,	.	3 00
Course 25, 1,	.	3 00
Course 26, 2,	.	3 00
Course 50, 1,	.	3 00
Course 51, 2,	.	5 00
Course 52, 1,	.	4 00
Course 53, 2,	.	4 00
Course 54, 3,	.	4 00
Course 55, 1,	.	5 00
Course 56, 2,	.	5 00
Course 75, 1,	.	5 00
Course 76, 2,	.	5 00
Course 77, 3,	.	5 00
Course 78, 1,	.	5 00
Course 79, 3,	.	5 00
Course 80, 3,	.	5 00
Course 82, 2,	.	5 00
Course 83, 3,	.	5 00
Course 84, 2,	.	5 00
Course 85, 3,	.	5 00
Entomology: —		
Course 50, 1,	.	1 00
Course 51, 2,	.	1 00
Course 53, 1,	.	1 00
Course 54, 2,	.	1 00
Course 55, 3,	.	1 00
Course 75, 3,	.	2 00
Course 76, 1,	.	3 00
Course 77, 2,	.	3 00
Course 78, 3,	.	3 00
Chemistry: ¹ —		
Course 1, 1,	.	3 00
Course 2, 2,	.	3 00
Course 3, 3,	.	3 00
Course 4, 1,	.	3 00
Course 5, 2,	.	3 00
Course 6, 3,	.	3 00
Course 25, 1,	.	4 00
Course 26, 2,	.	4 00
Course 27, 3,	.	5 00
Course 30, 3,	.	4 00
Course 51, 1,	.	5 00
Course 52, 2,	.	5 00
Course 62, 3,	.	5 00
Course 65, 3,	.	4 00
Course 76, 1,	.	5 00
Course 77, 2,	.	5 00
Course 80, 1,	.	4 00
Course 90, 2,	.	5 00
Course 91, 3,	.	5 00
Course 92, 2,	.	5 00
Course 93, 3,	.	5 00
Course 94, 2,	.	5 00
Course 95, 3,	.	5 00

¹ An additional deposit of \$1 for Courses 1 to 6, inclusive, and \$2 for Courses 25 to 95, will be required to cover individual breakage. In case the laboratory breakage does not equal the deposit, the balance will be refunded.

	Per Term.
Mathematics and engineering:—	
Course 27, 3,	\$2 00
Course 78, 3,	2 00
Microbiology:—	
Course 50, 1, 2 and 3,	5 00
Course 51, 2 and 3,	5 00
Course 52, 3,	5 00
Course 75, 2,	5 00
Course 76, 3,	5 00
Course 80, 2,	5 00
Course 81, 1,	5 00
Course 82, 1,	5 00
Course 83, 1,	5 00
Physics:—	
Course 27, 3,	3 00
Course 50, 1,	3 00
Course 51, 2,	3 00
Course 52, 3,	3 00
Veterinary science:—	
Course 78, 1,	2 00
Course 79, 1,	2 00
Course 80, 3,	2 00
Course 85, 1,	2 00
Course 86, 2,	2 00
Course 87, 3,	2 00
Zoölogy and geology:—	
Course 25, 1,	3 00
Course Zoölogy 27, 3,	3 00
Course 50, 1,	3 00
Course 51, 2,	4 00
Course 52, 3,	4 00
Course 53, 1,	4 00
Course 54, 2,	3 00
Course 55, 3,	3 00
Course 58,	2 00
Course 75, 1,	3 00
Course 76, 2,	3 00
Course 77, 3,	3 00
Course 78,	2 00
Course 79,	2 00
Rural journalism:—	
Course 53, 1,	2 00
Course 54, 2,	2 00
Course 55, 3,	2 00
Course 77, 1,	2 00
Course 78, 2,	2 00
Course 79, 3,	2 00
Course 80, 1,	2 00
Course 81, 2,	2 00
Course 82, 3,	2 00
Music (each course),	3 00

Rooms.

Students are expected, as far as possible, to occupy rooms in the college dormitories. Students who do not live in the college dormitories must secure rooms approved by the college. The assignment of rooms, and the general supervision of the housing of students, is in charge of the dean. The in-

spection of student quarters is in charge of the commandant. At the end of each college year all unoccupied rooms will be thrown open for selection, and will be assigned to students according to classes. Freshmen will be assigned rooms according to the date of application.

Women students are expected to occupy rooms in the college dormitory and such houses or apartments as the college may provide. No woman student will be allowed to room in a private house without a special written permission from the dean.

Student Aid.

SELF HELP. — Many students are obliged to find work of some sort to earn their way through college. A few men have met their entire expenses in this manner, many more have paid a large part of their expenses, and many have earned a small proportion of the cost of their college education; but the college recommends that no new student enter without having at least \$150 and preferably \$250 with which to pay his way until he can establish himself in some regular work. The college does not encourage students to enter without money in the expectation of earning their way entirely. The ordinary student will find it better either to work and accumulate money before coming to college, or to take more than four years in completing his college course, or, instead, to borrow money sufficient to carry him through. No student should undertake work that interferes with his studies, and students should understand that, owing to the large number of applications for employment, no one man can receive a large amount of work at the college. A number of students find opportunities for earning money without depending upon the college to furnish them with work.

So far as possible needy students will be employed in some department of the college. The divisions of agriculture and horticulture usually afford the most work, although there are several permanent janitorships available for students, and twenty or more students are employed at the dining hall.

Application for student labor should be made directly to Kenyon L. Butterfield, president of the college. Applicants are required to present statements from parent or guardian and from a public official or other responsible person of the town or city in which they reside, explaining the necessity of the applicant's need of assistance. Students whose department or class work is not satisfactory are not likely to be continued in student labor. The most desirable and responsible positions are naturally assigned to those needy students who have been in the institution longest and who have demonstrated their need and ability. Students, therefore, may find it rather difficult to obtain all the work they desire during their freshman year; as a matter of fact, however, any student who is capable of doing a variety of things, and who is a competent workman, usually finds little difficulty in obtaining all the work that he can do from the outset.

SPECIAL NOTICE TO NEEDEY STUDENTS. — In the last few years the demand for paid labor on the part of new students has far exceeded the amount of employment that the college can offer. The college cannot promise work to any student, particularly to freshmen; it accordingly urges prospective students who are dependent entirely upon their own efforts not to undertake the course before they have earned enough money to carry them through, or nearly through, the first year.

Student Accounts.

The following rules are enforced concerning student accounts:—

No student will be allowed to graduate until all bills due the institution from him are paid.

College charges, such as room rent, laboratory fees and tuition, must be paid in advance, at the beginning of each term. This rule is strictly adhered to, and no student will be allowed to complete his registration until such payments are made.

Every student boarding at Draper Hall is required to pay at the beginning of each term at least one month's board in advance; and no student will be allowed to continue to board at Draper Hall if at any time during the term he is more than one week in arrears in his payment for board.

All money due for student labor shall at the discretion of the treasurer of the college be applied on account toward any bills that a student may owe to the institution.

Student Relations.

The customary high standard of college men in honor, manliness, self-respect and consideration for the rights of others constitutes the standards of student deportment.

Any student known to be guilty of dishonest conduct or practice must be reported by the instructor to the president for discipline.

The privileges of the college may be withdrawn from any student at any time, if such action is deemed advisable.

It should be understood that the college, acting through its president or any administrative officer designated by him, distinctly reserves the right not only to suspend or dismiss students, but also to name conditions under which students may remain in the institution. For example, if a student is not doing creditable work he may not only be disciplined but he may also be required to meet certain prescribed conditions in respect to his studies, even though under the foregoing rules his status as a student be not affected. The same provision applies equally to the matter of absences ("cuts"). According to the rules a student is allowed a certain percentage of absences from class and other exercises. This permission, which implies a privilege and not a right, may be withdrawn at any time for any cause.

Similarly, also, it applies to participation in student activities. Though this will ordinarily be governed by the rules as already laid down, yet, if in the judgment of the college authorities a student is neglecting his work on account of these activities, the privilege of participating in them may be withdrawn for such time as is considered necessary. Moreover, it may be withdrawn as a punishment for misconduct. Prospective students or their parents may, upon application, obtain a copy of the faculty rules governing student relations to the college.

Infirmary.

The college maintains an infirmary for the care of sick or injured students. The buildings now available for this purpose are quite inadequate for the needs of the institution, and it is hoped that in the near future other buildings of this kind may be erected and the general equipment somewhat amplified. At

present two small buildings, built especially for hospital purposes, are used for the infirmary.

The following statement outlines the plan followed in the management of the infirmary with respect to students:—

MANAGEMENT OF THE INFIRMARY.

Supervision.

1. The infirmary is under the *general supervision* of Prof. Charles E. Marshall who is designated as Supervisor of the Infirmary. Miss Elizabeth Olmsted, the resident nurse, is in *immediate* charge of the infirmary.

Use of Infirmary.

2. Students are urged to go to the infirmary at any time that they are in need of the services rendered by the resident nurse or by a town physician. Inasmuch as the physical director gives special attention to all student diseases, it is to be expected that the majority of the students will go to the infirmary at his suggestion. This understanding, however, should in no way deter students from going to the infirmary voluntarily at any time.

General Health.

3. Students are urged to consult the physical director or the resident nurse immediately when signs of physical disorder appear. Severe attacks of cold or other forms of illness can usually be avoided if treatment is administered in the incipient stage. The purpose of the infirmary is to help maintain the general good health of the students, as well as to furnish a suitable place for professional attention in cases of severe illness or accident.

General Fee.

4. The infirmary fee will be at the rate of \$1.50 a day, and will be charged when one or more meals are obtained at the infirmary, or when the student remains at the infirmary for one or more nights. A nominal charge will be made to out patients for miscellaneous treatment of a minor character.

Additional Expenses.

5. In addition to the fee charged, as specified in paragraph 4, the following additional expenses will be charged to the patient:—

(a) *Nurses.*— In case a special nurse is required for the proper care of an individual, the services and board of this nurse will be paid by the patient. Such a nurse will be under the general supervision of the resident nurse.

(b) *Professional Service.*— If a student requires medical attention by a physician, he will be required to select his physician and become responsible for fees charged by the physician.

(c) *Supplies.*— Special medical supplies prescribed by a physician or nurse will be charged to the patient.

(d) *Laundry.*— Expense for personal laundry incurred by students while in the infirmary will be charged to the individual student.

B. COLLEGE ACTIVITIES.

General Exercises.

Chapel exercises are held two mornings each week. On Wednesday an afternoon assembly is held, to which some prominent layman or professional man is invited to speak. The object of these assemblies is to bring to the students discussions of topics of present-day interest. A special chapel service on Sunday is usually held during the winter months. Students are required to attend these general exercises, although the president is authorized to excuse from chapel any student who may object to attendance thereon because of his religious scruples, provided his request for excuse therefrom is endorsed by his parent or guardian.

Student Activities.

A large number of student organizations furnish opportunity to students for work and leadership.

The Massachusetts Agricultural College Social Union was established about ten years ago. All students become members of the union by paying a small fee. The union is designed to become the center of student interests. In North College it has a trophy room and a large lounging room for music, reading and study; in the basement of this building there is also a game room for pool and billiards. In the fall and winter months the union gives a series of entertainments, free to students and faculty.

The College Senate is composed of representatives of the junior and senior classes. This body serves as a general director of undergraduate conduct, and represents before the faculty the interests of the student body.

The Young Men's Christian Association is active both socially and religiously. A Catholic club has also been organized.

The musical organizations include an orchestra, a mandolin club and a glee club. These furnish music for college meetings, and occasionally give concerts at the college and at other places. A military band is maintained as part of the cadet corps.

A dramatic club has been organized, and each year presents a play.

The Public Speaking Council represents the students' interest in debate and oratory.

The Athletic Association represents in the college the interests of football, baseball, track, hockey and basket ball.

A rifle club has been organized for a few years. Teams representing this club have repeatedly won the intercollegiate championship of the country, both in indoor and outdoor contests.

The college publications are the "Massachusetts Collegian" published weekly by the student body, and the "Index," published annually by the members of the junior class.

The Stockbridge Club is an organization of students especially interested in practical agriculture and horticulture. Regular meetings are addressed by outside speakers, and members present papers and engage in discussions.

Clubs also exist in the Departments of French, Entomology, Floriculture, Landscape Gardening, Zoölogy and Agricultural Economics.

There has recently been organized a Collegiate Country Life Club, the membership of which is composed of faculty and students who are particularly interested in the study of country life problems.

A nonathletics student activities board, composed of alumni, faculty and students, has charge of the finances, schedules, etc., of the musical clubs, dramatic club and student publications.

C. ACADEMIC AND DEPARTMENTAL.

Degrees.

Those who complete a four-year course receive the degree of bachelor of science. The fee for graduation from the college is \$5.

Graduate students who complete the assigned courses will receive the degree of master of science upon the payment of a fee of \$10. Credit may sometimes be allowed towards this degree for teaching or other advanced work done in some department of the college.

Graduate students who complete the required three-year course of study, and present a satisfactory thesis, will be granted the degree of doctor of philosophy.

Those to whom degrees are awarded must present themselves in person at commencement to receive them. No honorary degrees are conferred.

The honorary fraternity of Phi Kappa Phi has a chapter at the agricultural college. Students are elected to membership to this fraternity on the basis of scholarship. Elections are made from the highest tenth of the senior class who have attained an average grade of at least 85 per cent during their college course.

Prizes.

Prizes are given annually in several departments for excellence in study or for other special achievement. Prizes offered in 1914 were:—

AGRICULTURE.—The Grinnell prizes, given by Hon. William Claffin of Boston in honor of George B. Grinnell, Esq., of New York, for excellence in theoretical and practical agriculture. Three prizes, \$25, \$15, \$10. The contest is open to those senior students whose record on the registrar's books shows an average standing of 80 or above for the technical work taken in the Divisions of Agriculture and Horticulture during the junior and senior years. Applicants should register with the head of the Division of Agriculture before noon, June 2, 1918.

BOTANY.—The Hills prizes, given by Henry F. Hills of Amherst, amount to \$35 annually. Competition is open to members of the senior, junior and sophomore classes as follows: for the best herbarium, \$20; for the second best herbarium, \$15. No collection deemed unworthy of a prize will be considered.

PUBLIC SPEAKING.—The Burnham prizes are awarded as follows: to the students delivering the best and second best declamations in the Burnham contest, \$15 and \$10, respectively. The preliminary contests in declamation are open, under certain restrictions, to freshmen and sophomores.

The Flint prizes are awarded as follows: to the students delivering the best and second best orations in the Flint contest, a gold medal and \$20 and \$15, respectively. The preliminary contests in oratory are open, under certain restrictions, to all regular students.

The prizes in debate are awarded as follows: to each of the three students ranking highest in the annual debating contest, a gold medal and \$15. The preliminary contests in debate are open, under certain restrictions, to all regular students.

Awards and Prizes.

GRINNELL PRIZES. — The Grinnell prizes, given by the Hon. William Claflin of Boston in honor of George B. Grinnell, Esq., of New York, to those members of the senior class who pass the best, second best and third best examinations, oral and written, in theoretical and practical agriculture, were awarded as follows: —

First prize, \$25, awarded to Mr. George Edwin Erickson.

Second prize, \$15, awarded to Mr. Raymond Thurston Parkhurst.

Third prize, \$10, awarded to Mr. Arthur Lincoln Chandler.

PUBLIC SPEAKING. — The Burnham prizes were awarded to the students delivering the best and second best declamations, as follows: —

First prize, \$15, awarded to Mr. Willis Tanner, 1922.

Second prize, \$10, awarded to Mr. Francis Fletcher, 1921.

The Flint prizes were awarded to the students delivering the best and second best orations, as follows: —

First prize, medal and \$20, awarded to Mr. Henry J. Burt, 1919.

Second prize, \$15, awarded to Mr. John A. Crawford, 1920.

HILLS PRIZE. — A second prize of \$15 for the best herbarium was awarded to Mr. Emil F. Guba, 1919.

MILITARY HONORS. — The following-named Cadet officers have been granted the military diploma and have been reported to the Adjutant-General of the United States Army and to the Adjutant-General of the Commonwealth of Massachusetts as being efficient in military science and tactics and graduating with highest honors: —

Cadet Maj. Harold Edwin Spaulding.

Cadet Capt. Vincent DePaul Callanan.

Cadet Capt. Verne Allen Fogg.

Cadet Capt. William Joseph Sweeney.

Cadet 1st Lieut. Paul Faxon.

Cadet 2d Lieut. Victor Abel Dickinson.

STATE TEACHER'S CERTIFICATE. — The following persons, having fulfilled the requirements for a Massachusetts State teacher's certificate, have been recommended for the same to the State Department of Education by the acting dean and the Department of Agricultural Education: Miss Olive E. Carroll, Benjamin E. Hodgson and Raymond R. Willoughby.

DEGREES CONFERRED AND
ROLL OF STUDENTS

DEGREES CONFERRED — 1919.

MASTER OF SCIENCE (M.Sc.).

Jones, Linus Hale, Milford, Mass., Massachusetts Agricultural College, B.Sc.

BACHELOR OF SCIENCE (B.Sc.).

Bagg, Quincy Austin,	South Hadley.
Blanchard, Carlton Douglas,	Uxbridge.
Bond, Herbert Richard,	Needham.
Bowen, Arthur Newton,	Providence, R. I.
Brigham, Sylvia Bowen,	Newtonville.
Burt, Henry John,	Arlington.
Callanan, Vincent DePaul,	Malden.
Carpenter, Hall Bryant,	Somerville.
Carroll, Olive Evangeline,	Dorchester.
Chandler, Arthur Lincoln,	Leominster.
Chisholm, Robert Dudley,	Melrose Highlands.
Collins, Robert Burleigh,	Rockland.
Cosby, Alfred Francis,	Westfield.
Davis, Albert Noah,	Somers, Conn.
Dickinson, Victor Abel,	Amherst.
Erhard, Bena Gertrude,	East Milton.
Erickson, George Edwin,	Brockton.
Erickson, Gunnar Emmanuel,	West Lynn.
Evans, Myrton Files,	West Somerville.
Faber, Edward Stuart,	Plainfield, N. J.
Faneuf, Ambrose Clement,	West Warren.
Faxon, Paul,	Wellesley Hills.
Ferriss, Samuel Boynton,	New Milford, Conn.
Field, Wilbert Daniel,	Winter Hill.
Fogg, Verne Allen,	Danvers.
French, Willard Kyte,	Worcester.
Garde, Earl Augustus,	Lynn.
Garvey, Mary Ellen Monica,	Amherst.
Gasser, Thomas Jefferson,	Uxbridge.
Guba, Emil Frederick,	New Bedford.
Hance, Forrest Sansbury,	Paterson, N. J.
Harris, Ethel Lovett,	Beverly.
Hartwell, Richard Raymond,	Springfield.
Hastings, Louis Pease,	Springfield.
Hodgson, Benjamin Earl,	Methuen.
Howe, Ralph Thomas,	Melrose.
Huntoon, Douglas Henderson,	Norwood.
Jewell, Charles Henry,	Merrimac.
Johnson, Sidney Clarence,	Gloucester.
Knowlton, Priscilla,	Roxbury.
Liebman, Anna,	Dorchester.
Mather, William,	Amherst.
Mattoon, Charles Gordon,	Pittsfield.
McCarthy, Arthur Martin,	Munson.
McKee, William Henry,	Pittsfield.
Parke, Robert Warren,	Winchendon.

Parkhurst, Raymond Thurston,	Fitchburg.
Patch, Lawrence Henry,	Wenham.
Peck, George Newbery,	Granville.
Peirson, Henry Byron,	New Bedford.
Phipps, Clarence Ritchie,	Dorchester.
Pulley, Marion Gertrude,	Melrose.
Rea, Julian Stuart,	East Weymouth.
Roberts, Oliver Cousins,	Arlington.
Sibley, Helen Aramintha,	Wollaston.
Smith, Wendell Frederick,	Pittsfield.
Stafford, Irving Boynton,	Fall River.
Stevens, Chester Dillingham,	Reading.
Stockwell, Ervin Sidney, Jr.,	Sharon.
Strack, Edward,	Framingham.
Sutherland, Ralph,	Cambridge.
Sweeney, William Joseph,	Dorchester.
Thomas, Frank DesAutel,	Milford.
Thompson, Wells Nash,	Adams.
Vickers, John,	Amherst.
Wells, Marion Nichols,	Springfield.
White, Edward Asa,	Providence, R. I.
Willoughby, Raymond Royce,	New Britain, Conn.
Wood, Oliver Wiswall,	Arlington.
Woodard, Chester Smith,	Leverett.
Yesair, John,	Newburyport.

BACHELOR OF SCIENCE, HONORIS CAUSA.

- Hamburger, Amos Francis, Class of 1908, died of disease at Camp Meade, Oct. 6, 1918.
- Wood, Lieut. Alton Palmer, Class of 1911, died of wounds in France, May 4, 1918.
- Hutchison, Robert Baker, Class of 1913, killed in action in France, Sept. 7, 1918.
- Chapon, Robert Henri, Class of 1914, killed in action in France, Dec. 30, 1914.
- Koplovitz, Samuel, Class of 1915, killed in action at Verdun, Oct. 24, 1918.
- Chamberlin, Raymond, Class of 1916, killed in action in France, Sept. 26, 1918.
- Farwell, Lieut. Alfred Austin, Class of 1917, died of disease at Camp Merritt, Dec. 29, 1918.
- Harris, Warren Timothy, Class of 1917, died of disease at Fort Slocum, Oct. 9, 1918.
- Foster, Capt. Hamilton Knight, Class of 1918, killed in action in the Argonne, France, Oct. 4, 1918.
- Irvine, Robert Patterson, Class of 1918, died of disease at Camp Logan, Jan. 16, 1919.
- Jones, Forrest Dean, Class of 1918, killed in airplane accident at Kelley Field, April 16, 1918.
- Petit, Arthur Victor, Class of 1918, died of disease in France, Jan. 9, 1919.
- Woodworth, Lieut. Brooks, Class of 1918, died of disease at Camp Lee, Oct. 20, 1918.
- Callanan, Lieut. John Edward, Class of 1919, died of disease at Dorchester, Dec. 24, 1918.
- Cooley, Edwin Prince, Class of 1919, killed in action at Bazoches, France, Aug. 26, 1918.
- Day, Elston Almond, Class of 1919, died of disease at Camp Devens, Sept. 26, 1918.
- Desmond, Lieut. Thomas Whitty, Class of 1919, killed in action in France, May 27, 1918.
- Moore, John Raymond, Class of 1919, died of wounds in France, Oct. 16, 1918.
- Sexton, Lieut. Ernest Francis, Class of 1919, killed in action at Premont, France, June 4, 1918.
- Woodside, Wilfred Livingstone, Class of 1919, killed in airplane accident at Caruthers Field, Oct. 14, 1918.
- Gay, Lawrence Washburn, Class of 1920, died of wounds in France, Oct. 30, 1918.
- Roberts, Lieut. Ivan Andrew, Class of 1920, died from wounds in German hospital, Oct. 1, 1918.
- Hathaway, Lieut. Warren Sidney, Class of 1921, died of wounds in France in November, 1918.
- MacCormack, Lieut. Ralph Roby, Class of 1921, killed in airplane accident at Pensacola, Fla., Feb. 7, 1919.
- Kile, Trueman Eugene, Class of 1921, died of disease at Providence, R. I., Dec. 6, 1918.

REGISTRATION, 1919-20.

GRADUATE STUDENTS.

Albrecht, Daniel A.,	Champaign, Ill.
A.B., University of Illinois.	
B.Sc., University of Illinois.	
Avery, Roy Crowdy,	New York City.
B.Sc., Connecticut Agricultural College.	
Bourne, Arthur I.,	Amherst.
A.B., Dartmouth College.	
Fagan, Frank Nelson,	State College, Pa.
B.Sc., Ohio State University.	
Faneuf, Ambrose C.,	West Warren.
B.Sc., Massachusetts Agricultural College.	
Folsom, Josiah C.,	South Hadley.
B.Sc., Massachusetts Agricultural College.	
Gagnon, Aimé,	Laprairie, P. Q., Can.
B.A., Laval University.	
Garvey, Mary E.,	Amherst.
B.Sc., Massachusetts Agricultural College.	
Godbout, Adelard,	Ste. Anne de la Pocatière, P. Q., Can.
B.A., B.S.A., École d'Agriculture de Ste. Anne de la Pocatière.	
Gordon, Thomas B.,	Lexington, Ky.
B.S.Agr., University of Kentucky.	
Greenwood, Arthur M.,	Ashburnham.
A.B., Brown University.	
M.D., Harvard Medical School.	
Harrington, William Chauncey,	Amherst.
A.B., Harvard College.	
Harris, Roy Dudley,	Middlebury, Vt.
B.Sc., Middlebury College.	
Helder, Arthur H.,	Kansas City, Mo.
B.Sc., Kansas State Agricultural College.	
M.Sc., Kansas State Agricultural College.	
Hood, Egerton G.,	Amherst.
B.S.A., University of Toronto.	
Jennings, Marjorie Squire (Mrs. John F.),	Longmeadow.
A.B., Smith College.	
Jewell, Charles Henry,	Merrimac.
B.Sc., Massachusetts Agricultural College.	
Julian, Arthur N.,	Amherst.
A.B., Northwestern University.	
Lieber, Conrad H.,	Jamaica Plain.
B.Sc., Massachusetts Agricultural College.	
Mallorey, Alfred S.,	Lynn.
B.Sc., Massachusetts Agricultural College.	
Middleton, Joseph Altman,	Clemson College, S. C.
B.Sc., Clemson College.	
Morgan, Ezra Leon,	Amherst.
A.B., McKendree College.	
M.A., University of Wisconsin.	
Morse, Fred W., Jr.,	Amherst.
B.Sc., Dartmouth College.	

Mutkekar, Satwaji G.,	Belgaum, India.
B.Agr., Poona Agricultural College.	
M.Sc., Massachusetts Agricultural College.	
Pauley, William C.,	Lafayette, Ind.
B.S. in Agr., Purdue University.	
Perrins, William Arthur, Jr.,	Jamaica Plain.
A.B., Harvard College.	
Prince, Arthur Leslie,	Webster.
A.B., Clark College.	
Purinton, James A.,	Hopkinton, N. H.
B.Sc., New Hampshire State College.	
Serex, Paul, Jr.,	Amherst.
B.Sc., Massachusetts Agricultural College.	
M.Sc., Massachusetts Agricultural College.	
Spencer, Leland,	Elmira, N. Y.
B.Sc., Cornell University.	
Sturgis, Russell D.,	Wilmington, Del.
B.Sc., Delaware College.	
Whitaker, Leslie Clinton,	Sacramento, Cal.
B.Sc., Oregon Agricultural College.	
Wood, Oliver W.,	Arlington.
B.Sc., Massachusetts Agricultural College.	

CLASS OF 1920 (SENIORS).

Apsey, George Wills, Jr.,	Winchester,	Alpha Sigma Phi.
Babbitt, George King, ¹	Bridgewater, Conn.,	Alpha Sigma Phi.
Bacon, Milo Roderick,	Leominster,	Sigma Phi Epsilon.
Baker, Henry Raymond, ¹	Amherst,	West Street.
Baker, William Alphonso, ¹	Melrose,	Lambda Chi Alpha.
Ball, Harry Abraham, ¹	Bridgewater,	Commons Club.
Batchelder, Stewart Putnam,	North Reading,	Q. T. V.
Beauregard, Winfield Scott,	Framingham,	Sigma Phi Epsilon.
Belcher, Daniel Webster,	North Easton,	Stockbridge Hall.
Berman, Harry,	Holyoke,	7 South College.
Binks, Frank Joseph,	Maynard,	Alpha Gamma Rho.
Boardman, Charles Meade,	Amherst,	Q. T. V.
Boyce, Alan Freeman,	Melrose,	83 Pleasant Street.
Brown, Roy Robertson,	Allston,	Theta Chi.
Burns, Allan Melville, Jr.,	Taunton,	Theta Chi.
Burton, Lee Williams,	Plainville,	South College.
Campbell, George Murray, ¹	Baltimore, Md.,	Phi Sigma Kappa.
Card, Ralph Hunter,	Somerville,	Commons Club.
Carleton, John Foxcroft,	East Sandwich,	Sigma Phi Epsilon.
Chase, Malcolm Willis, ¹	Amesbury,	Draper Hall.
Clapp, Augustus Warren,	East Braintree,	Lambda Chi Alpha.
Clarridge, Fred William,	Milford,	Theta Chi.
Clough, Alfred Arnold,	Wollaston,	Theta Chi.
Cole, Frederick Eugene, Jr.,	South Portland, Me.,	15 South College.
Crafts, Gordon Burnham,	Manchester,	Q. T. V.
Crawford, John Alexander,	Allston,	Alpha Gamma Rho.
Crowe, Charles, ¹	Norwich, Conn.,	Kappa Sigma.
Daggett, Clinton Jones,	Albany, N. Y.,	Kappa Sigma.
Delahunt, John Kersey,	Boston,	Kappa Gamma Phi.
Deriek, Glendon Robert,	Clinton,	North College.
Dewing, Warren Montague,	Kingston,	Kappa Sigma.
Doucette, Charles Felix,	Melrose,	Commons Club.
Dowd, William Lawrence, ¹	North Amherst,	North Amherst.
Dunn, Arthur Paul,	Malden,	Alpha Gamma Rho.
Earley, Marion Edith,	Redlands, Calif.,	Draper Hall.
Emery, Herbert Martin,	Newburyport,	3 North College.
Fanucf, Leo Joseph, ¹	West Warren,	6 Nutting Avenue.

¹ Work incomplete.

Fellows, Harold Carter, . . .	Peabody, . . .	North College.
Frellick, Arthur Lester, ¹ . . .	Everett, . . .	13 Phillips Street.
Fuller, Camille Baldwin, ¹ . . .	Quincy, . . .	North College.
Gifford, Flavel Mayhew, . . .	West Tisbury, . . .	North College.
Glavin, William Francis, . . .	Wenham, . . .	Sigma Phi Epsilon.
Goodridge, George Lucien, ¹ . . .	Melrose, . . .	Lambda Chi Alpha.
Goodwin, William Irving, ¹ . . .	Bradford, . . .	13 South College.
Gordon, Frederick George, . . .	Plymouth, . . .	7 Phillips Street.
Graff, Leland Sprague, ¹ . . .	Newton Center, . . .	Q. T. V.
Graves, Carlisle Ferrin, . . .	Stamford, Conn., . . .	Alpha Sigma Phi.
Gray, Milton Berford, . . .	Woods Hole, . . .	Alpha Gamma Rho.
Grayson, Forrest, . . .	Milford, . . .	Alpha Sigma Phi.
Green, Lynn, . . .	Schenevus, N. Y., . . .	53 Lincoln Avenue.
Hamlin, Hazen Wolcott, . . .	North Amherst, . . .	North Amherst.
Harrington, Harold Leon, . . .	Lunenburg, . . .	Kappa Gamma Phi.
Harvey, Ebenezer Erskine, . . .	Washington, D. C., . . .	15 South College.
Hawley, Robert Dorman, . . .	Springfield, . . .	Phi Sigma Kappa.
Hill, John Farren, . . .	Egypt, . . .	Kappa Gamma Phi.
Holloway, Joan William, . . .	Taunton, . . .	Theta Chi.
Holmes, Robert Palmer, . . .	Agawam, . . .	Aggie Inn.
Horne, Robert Sanderson, . . .	Derry Village, N. H., . . .	Q. T. V.
Howard, Arthur Merchant, . . .	Pittsfield, . . .	84 Pleasant Street.
Howe, Albert Edward, ¹ . . .	Needham, . . .	8 South College.
Hurlburt, Ralph Walter, . . .	Ashley Falls, . . .	Sigma Phi Epsilon.
Jakeman, Brooks Franklin, . . .	Winchester, . . .	Lambda Chi Alpha.
Johnson, Lawrence Wilhelm, ¹ . . .	Avon, . . .	Alpha Sigma Phi.
Littlefield, John Edwin, . . .	West Lynn, . . .	11 North College.
Lothrop, Earle Daniel, . . .	West Bridgewater, . . .	Alpha Gamma Rho.
Luce, William Alan, . . .	West Boylston, . . .	Lambda Chi Alpha.
Lyons, Henry Egmont, . . .	Cambridge, . . .	East Experiment Station.
MacLeod, Guy Franklin, . . .	Lowell, . . .	Alpha Sigma Phi.
Maginnis, John Joseph, ¹ . . .	Lawrence, . . .	Alpha Sigma Phi.
Maples, James Comly, . . .	Port Chester, N. Y., . . .	Kappa Sigma.
Marshall, Max Skidmore, . . .	Amherst, . . .	44 Sunset Avenue.
Mather, Fred, . . .	Amherst, . . .	Veterinary Laboratory.
Meserve, Albert Wadsworth, . . .	Framingham, . . .	Kappa Gamma Phi.
Millard, Helen Stanley, ¹ . . .	Great Barrington, . . .	Draper Hall.
Mitchell, Theodore Bertis, . . .	Needham, . . .	13 South College.
Morse, Maurice, . . .	Dorchester, . . .	14 South College.
Moynihan, Patrick Joseph, . . .	Holyoke, . . .	Alpha Sigma Phi.
Oertel, August Leonard, . . .	South Hadley Falls, . . .	4 Chestnut Street.
Peckham, William Harold, . . .	Newport, R. I., . . .	Alpha Sigma Phi.
Perry, Errol Clinton, . . .	Acushnet, . . .	11 North College.
Pike, Chester Arthur, . . .	Springfield, . . .	Mathematics Building.
Pond, Allan Leon, . . .	Holliston, . . .	Kappa Sigma.
Prée, Karl Julius, . . .	Brookline, . . .	Theta Chi.
Quadland, Howard Preston, ¹ . . .	North Adams, . . .	Sigma Phi Epsilon.
Radio, Philip Adna, . . .	Florence, . . .	Alpha Gamma Rho.
Redding, George Kenneth, . . .	Melrose, . . .	Commons Club.
Roberts, Mark Anthony, . . .	Dorchester, . . .	25 Lincoln Avenue.
Robertson, William Fenton, ¹ . . .	Framingham, . . .	Kappa Gamma Phi.
Sampson, Fred Buckman, . . .	Fall River, . . .	18 Nutting Avenue.
Sanborn, Joseph Raymond, ¹ . . .	North Amherst, . . .	North Amherst.
Sanderson, Ralph Hemenway, . . .	Waltham, . . .	Kappa Gamma Phi.
Sargent, Walter Harriman, ² . . .	Malden, . . .	
Sawyer, Wesley Stevens, . . .	Boston, . . .	Alpha Gamma Rho.
Scott, Clifton William, . . .	Buckland, . . .	Alpha Gamma Rho.
Simmons, Lester Winslow, . . .	Dighton, . . .	Theta Chi.
Skinner, Everett Hamilton, ¹ . . .	West Upton, . . .	Kappa Sigma.
Smith, George Alfred, ¹ . . .	Whitinsville, . . .	Q. T. V.
Smith, Raymond Newton, ¹ . . .	Plainville, . . .	15 South College.

¹ Work incomplete.² Registered Feb. 27, 1919; left May 8, 1919.

Smith, Susan Almira,	Great Barrington,	Draper Hall.
Spaulding, Harold Edwin, ¹	Milford,	Kappa Sigma.
Stedman, Ralph Shaw,	Springfield,	Phi Sigma Kappa.
Stowe, Raymond Timothy,	Scitico, Conn.,	51 Amity Street.
Sullivan, Walter Mitchell, ¹	Lawrence,	Alpha Sigma Phi.
Swift, Raymond Walter, ¹	North Amherst,	North Amherst.
Taylor, Elliot Hubbard,	Shelburne,	Q. T. V.
Thayer, Weston Cushing,	Hingham,	Kappa Gamma Phi.
Urquhart, John Wardrop,	East Walpole,	Kappa Gamma Phi.
Williams, Allan Carruth, ¹	Rockland,	11 North College.
Window, James Joseph,	Springfield,	17 Fearing Street.
Woodbury, Ray Willard, ¹	Newburyport,	Cottage Street.
Wooding, Paul Bennett, ¹	Yalesville, Conn.,	French Hall.
Woodward, George Blossom, ¹	Albany, N. Y.,	Kappa Sigma.
Worthley, Harlan Noyes,	Amherst,	7 Phillips Street.
Wright, Stuart Eldridge,	Raynham Center,	Kappa Sigma.

CLASS OF 1921 (JUNIORS).

Alger, James Warren, ¹	Reading,	Kappa Sigma.
Allen, Harold Kenneth,	Belchertown,	Belchertown.
Allen, Henry Vaughn,	Arlington,	Phi Sigma Kappa.
Andersen, Charles Henry, ¹	Medford,	Theta Chi.
Armstrong, Philip Brownell,	Rutherford, N. J.,	Phi Sigma Kappa.
Bailey, William, Jr., ¹	Williamstown,	Commons Club.
Baker, Louis Eliot,	Salem,	16 South College.
Baker, Russell Dexter, ¹	Oxford, Me.,	17 Fearing Street.
Bögholt, Carl Miller, ¹	Newport, R. I.,	53 Lincoln Avenue.
Boynton, Raymond Woods, ¹	Framingham,	53 Lincoln Avenue.
Brigham, John Dexter, ¹	Sutton,	Lambda Chi Alpha.
Brown, Paul Wilfred,	Fiskdale,	Lambda Chi Alpha.
Bunker, Carroll Wooster,	West Somerville,	Q. T. V.
Calhoun, Saltean Frederick,	Brookline,	Kappa Gamma Phi.
Cameron, Viola Mary, ¹	Amherst,	Draper Hall.
Cascio, Peter Joseph, ¹	Willimantic, Conn.,	Draper Hall.
Coombs, Roger Conklin,	Peabody,	Sigma Phi Epsilon.
Cooper, Lawrence Melville, ¹	Charlemont,	Alpha Gamma Rho.
Davenport, Frank Semore,	Dorchester,	Alpha Sigma Phi.
Davidson, Donald Gordon,	Amherst,	10 Maple Avenue.
Davis, Orrin Chester, ¹	Belchertown,	Alpha Gamma Rho.
Dean, Herman Nelson, ¹	Oakham,	Q. T. V.
Douglass, Donald Churchill, ¹	Cambridge,	Phi Sigma Kappa.
Dunbar, Charles Oliver, ¹	Westfield,	84 Pleasant Street.
Edman, George William, ¹	Orange,	Q. T. V.
Evers, Joseph Daniel,	Malden,	Draper Hall.
Fletcher, Francis Summers, ¹	East Lynn,	Alpha Gamma Rho.
Fuller, Lorenzo,	Lowell,	Mathematics Building.
Gaskill, Harland Everett, ¹	Hopedale,	Alpha Sigma Phi.
Geer, Herbert Leroy,	Three Rivers,	Q. T. V.
Goff, Howard Mason,	Cambridge,	Phi Sigma Kappa.
Gould, Robert Meredith,	Shelburne,	Q. T. V.
Gray, Irving Emery, ¹	Woods Hole,	Alpha Gamma Rho.
Haag, Joseph Archibald, ¹	Newtonville,	Kappa Sigma.
Haskins, Harold Arthur,	North Amherst,	North Amherst.
Haslam, Emerson Francis, ¹	Westwood,	Theta Chi.
Haynes, Charles Francis, ¹	Canton,	North College.
Howard, Frederic,	Mansfield,	Lambda Chi Alpha.
Howe, George Cole,	Worcester,	81 Pleasant Street.
Hunter, Harold Clayton, ¹	South Hadley Falls,	6 Nutting Avenue.
Hurd, Davis Alden, ¹	Wellesley Hills,	Alpha Gamma Rho.
Hurd, Gordon Killam, ¹	Millbury,	Physics Laboratory.
Iorio, Carlo Antonio,	Hartford, Conn.,	East Experiment Station.

¹ Work incomplete.

Jones, Robert Lambert, ¹	Attleboro,	Q. T. V.
Kendall, Charles Donald, ¹	Worcester,	Q. T. V.
Kimball, William Lincoln, ¹	Orange,	Phi Sigma Kappa.
King, Starr Margetts,	Pittsfield,	Kappa Sigma.
Kirkland, Lyle Lord,	Chester,	Kappa Gamma Phi.
Knight, Frank Edward, ¹	Brimfield,	South College.
Labrovitz, Edward Browdy, ¹	Amherst,	11 Amity Street.
Lambert, Richard Bowles,	Gleasondale,	Lambda Chi Alpha.
Leavitt, Ralph Goodwin, ¹	Melrose Highlands,	Theta Chi.
Leighton, Arthur Whiting,	Abington,	9 Fearing Street.
Lent, Donald Ashford,	Maynard,	Alpha Gamma Rho.
Lincoln, Newton Ewell,	Dorchester,	13½ Amity Street.
Lockwood, George Russell,	Waban,	Theta Chi.
Long, Albert Douglas, ¹	Amherst,	Sigma Phi Epsilon.
Mackintosh, Charles Gideon,	Peabody,	Phi Sigma Kappa.
Mallon, Charles Hugh,	East Braintree,	Phi Sigma Kappa.
Mansell, Elton Jessup, ²	Cambridge,	Phi Sigma Kappa.
Martin, Laurence Paul, ¹	Malden,	Alpha Sigma Phi.
McCarthy, Justin Jeremiah, ¹	Arlington,	Phi Sigma Kappa.
McNulty, Raymond Henry, ¹	Amherst,	6 South East Street.
Mellen, Richard Adams, ¹	Cambridge,	Sigma Phi Epsilon.
Miller, William Henry,	Springfield,	Commons Club.
Newell, Philip Sanger,	West Newton,	Phi Sigma Kappa.
Newton, Edward Buckland, ¹	Holyoke,	Commons Club.
O'Hara, Joseph Ernest, ¹	Worcester,	8 Kellogg Avenue.
Palmer, Walter Isaiah, ¹	Amherst,	13 South Prospect Street.
Peck, Richard Charles, ¹	Shelburne,	West Experiment Station.
Poole, Harold Walter, ¹	Hudson,	Alpha Gamma Rho.
Pratt, Laurence Francis,	North Weymouth,	Q. T. V.
Preston, Everett Carroll, ¹	Dorchester,	Kappa Gamma Phi.
Quint, Isador Gabriel, ¹	Roxbury,	16 South College.
Radio, Roger Frank,	Florence,	Alpha Gamma Rho.
Reed, Morris,	Worcester,	56 Pleasant Street.
Rice, Henry Lawrence,	Somerville,	Kappa Sigma.
Richards, George Henry,	Springfield,	Phi Sigma Kappa.
Robinson, Philip Luther, ¹	New Bedford,	Alpha Gamma Rho.
Rosoff, Samuel Nathaniel, ¹	Springfield,	16 South College.
Russert, Marion Ruth, ¹	Roxbury,	Draper Hall.
Sampson, Howard Jenney, ¹	Fall River,	Theta Chi.
Sanford, Richard Herbert, ¹	Westfield,	Sigma Phi Epsilon.
Shaughnessy, Howard John,	Springfield,	17 Phillips Street.
Slate, George Lewis, ¹	Bernardston,	Alpha Gamma Rho.
Sloan, Kenneth Wilson, ¹	Amherst,	29 North Prospect Street.
Smith, Jonathan Harold,	Roslindale,	83 Pleasant Street.
Smith, Richard Watson, Jr., ¹	Sylacauga, Ala.,	116 Pleasant Street.
Snow, John Dow,	Arlington,	Phi Sigma Kappa.
Spencer, Orville Holland, ¹	West Haven, Conn.,	Phi Sigma Kappa.
Starkey, Robert Lyman, ¹	Fitchburg,	Phi Sigma Kappa.
Stevens, Ralph Shattuck, ¹	Arlington,	Theta Chi.
Stiles, Harry Stephen, ¹	Lynn,	Kappa Gamma Phi.
Tietz, Harrison Morton,	Richmond Hill, N. Y.,	37 Cottage Street.
Tillson, Reginald Drury,	Whitman,	21 Fearing Street.
Van Lennep, Emily Bird,	Great Barrington,	Draper Hall.
Waite, Richard Austin, ¹	Middlefield,	Alpha Gamma Rho.
Watkins, Tscharn Degraffenreidt, ¹	Midlothian, Va.,	41 Lincoln Avenue.
Webster, Milton Fuller, ¹	Malden,	Kappa Gamma Phi.
West, Guy Clifford,	Amesbury,	Kappa Gamma Phi.
Whittle, Clarence Parker, Jr., ¹	Weymouth,	Phi Sigma Kappa.
Wood, Clarence Milton,	West Somerville,	Lambda Chi Alpha.
Zercher, Frederick Kaupp, ¹	Huntington, W. Va.,	Q. T. V.

¹ Work incomplete.

CLASS OF 1922 (SOPHOMORES).

Acheson, Roger Melvin, . . .	New Bedford, . . .	Alpha Gamma Rho.
Andrews, John Hollis, ¹ . . .	Vineyard Haven, . . .	Commons Club.
Bainton, Hubert Judson, ¹ . . .	Hyde Park, . . .	Commons Club.
Baker, George Louis, . . .	Amherst, . . .	West Street.
Barnard, Kenneth Allen, . . .	Shelburne, . . .	Q. T. V.
Beckwith, Robert Henry, . . .	Wellesley Hills, . . .	Entomology Building.
Bent, Leslie Dana, . . .	Medfield, . . .	Lambda Chi Alpha.
Bigelow, George Samuel, ¹ . . .	Millville, N. J., . . .	116 Pleasant Street.
Blakely, Roger Wolcott, . . .	Medford, . . .	46 Pleasant Street.
Blanchard, Raymond Stanwood, ¹ . . .	Wollaston, . . .	7 Nutting Avenue.
Bowen, Willard Lee, Jr., ¹ . . .	Natick, . . .	Phi Sigma Kappa.
Bromley, Stanley Willard, . . .	Southbridge, . . .	75 Pleasant Street.
Buck, Charles Alfred, . . .	Mansfield, . . .	Alpha Gamma Rho.
Burnett, Paul Lapham, ¹ . . .	Leicester, . . .	Theta Chi.
Burnham, Edwin Graham, . . .	Springfield, . . .	Lambda Chi Alpha.
Carey, Edmund Thomas, . . .	Springfield, . . .	Kappa Gamma Phi.
Chapin, Ellis Warren, Jr., ¹ . . .	Chicopee Falls, . . .	Plant House.
Chase, Eleanor Frances, . . .	Amesbury, . . .	Draper Hall.
Clark, Clarence Frederick, . . .	Sunderland, . . .	Q. T. V.
Collins, Donald Keith, ¹ . . .	Rockland, . . .	Theta Chi.
Collins, Herbert Laurence, ¹ . . .	Arlington, . . .	Sigma Phi Epsilon.
Cook, Frederick Belcher, . . .	Niantic, Conn., . . .	Commons Club.
Cotton, George Asa, . . .	Woburn, . . .	84 Pleasant Street.
Crawford, Alexander George, . . .	Waverley, . . .	14 South College.
Crichton, Peter Andrew, ¹ . . .	Greenwich, Conn., . . .	Kappa Sigma.
Davis, Harold Sanborn, ¹ . . .	Belchertown, . . .	Belchertown.
Degener, Otto, ¹ . . .	New York, N. Y., . . .	The Davenport.
DuBois, Howard Grace, . . .	Springfield, . . .	Kappa Sigma.
Erysian, Harry Adrian, ¹ . . .	Chelsea, . . .	North College.
Farwell, Charles Austin, ¹ . . .	Turners Falls, . . .	10 South College.
Field, Richard Edmund, . . .	Shelburne Falls, . . .	Q. T. V.
Freeman, Stanley Leonard, . . .	Needham, . . .	Lambda Chi Alpha.
Frilen, Karl Arvid, ¹ . . .	West Springfield, . . .	Alpha Gamma Rho.
Gilbert, Frank Albert, Jr., . . .	Brandon, Vt., . . .	Lambda Chi Alpha.
Giles, Clifton Forrest, . . .	Newtonville, . . .	18 Nutting Avenue.
Gowdy, Carlyle Hale, . . .	Westfield, . . .	Sigma Phi Epsilon.
Haskins, Philip Hall, ¹ . . .	North Amherst, . . .	North Amherst.
Higgin, Albert Snyder, ¹ . . .	Passaic, N. J., . . .	12 South College.
Hodgson, Robert Moore, ¹ . . .	Boston, . . .	The Davenport.
Holman, Reginald Newton, . . .	Somerville, . . .	Q. T. V.
Hooper, Francis Edwards, . . .	Revere, . . .	Sigma Phi Epsilon.
Hurder, Ruth Wasson, ¹ . . .	Mattapan, . . .	Draper Hall.
Hussey, Francis William, ¹ . . .	Whitinsville, . . .	7 Nutting Avenue.
Jackson, Belding Francis, . . .	Belchertown, . . .	Belchertown.
Johnson, Conrad John, . . .	Poplar, Wis., . . .	Lambda Chi Alpha.
Kemp, George Austin, . . .	North Andover, . . .	Lambda Chi Alpha.
Knapp, Irving Robinson, ¹ . . .	Seekonk, . . .	116 Pleasant Street.
Kokoski, Frank Joseph, ¹ . . .	Hadley, . . .	Amherst, R. F. D. No. 3.
Kroock, Julius, Jr., ¹ . . .	Huntington, N. Y., . . .	Phi Sigma Kappa.
Lacroix, Donald Sewall, ¹ . . .	Rowley, . . .	Alpha Gamma Rho.
Lawrence, Robert Parker, . . .	East Greenwich, R. I., . . .	12 North College.
Leland, James Freeman, Jr., ¹ . . .	Sherborn, . . .	10 South College.
Leonard, Earle Stanley, ¹ . . .	Hyde Park, . . .	Lambda Chi Alpha.
Lewandowski, John Neptumcen, ¹ . . .	Easthampton, . . .	Alpha Sigma Phi.
Lindquist, Harry Goffred, ¹ . . .	Holden, . . .	3 North College.
Lingham, Robert Marston, . . .	Newton Highlands, . . .	Q. T. V.
Lockhart, John Harold, ¹ . . .	Tarrytown, N. Y., . . .	Stockbridge Hall.
Lovering, Everett Waldron, . . .	Northampton, . . .	Northampton.
Lowery, John Gordon, ¹ . . .	Malden, . . .	Kappa Sigma.
Lyons, Edgar Albion, . . .	Methuen, . . .	8 Kellogg Avenue.

¹ Work incomplete.

Lyons, John Joseph, Jr., ¹	Arlington,	Sigma Phi Epsilon.
MacArdle, Herbert Aloysius, ¹	Worcester,	Kappa Gamma Phi.
Main, Stuart DeGroff,	Maplewood, N. J.,	101 Butterfield Avenue.
Martin, Edward William, ¹	Amherst,	5 Phillips Street.
McGuinn, Albert Francis,	Worcester,	83 Pleasant Street.
Messenger, Herbert Dickinson, ¹	Cambridge,	8 North College.
Moody, Kenneth Watts,	Brookline,	Lambda Chi Alpha.
Moseley, Henry Samson, ¹	Glastonbury, Conn.,	Alpha Sigma Phi.
Murdoek, Matthew John, ¹	Medford,	Q. T. V.
Murray, Harry Athol, Jr.,	Arlington,	West Experiment Station.
Murray, Myron George,	Bradford,	Lambda Chi Alpha.
Nigro, Henry, ¹	Revere,	1 North College.
Packer, George Blanchard, ¹	Waterbury, Conn.,	Sigma Phi Epsilon.
Peck, William Henry,	Stow,	12 North College.
Pickup, Ezra Alden,	Holyoke,	4 North College.
Pollard, Jane Isabel, ¹	North Adams,	Draper Hall.
Reed, Paul Malcolm, ¹	Baldwinsville,	Phi Sigma Kappa.
Richardson, Marjory,	Millis,	Draper Hall.
Rollins, Walter Jessie,	Leominster,	North College.
Roser, Conrad Herman, ¹	Glastonbury, Conn.,	Phi Sigma Kappa.
Russell, Ralph, ¹	Worcester,	Commons Club.
Sherman, Kenneth David, ¹	Orange,	North College.
Smith, Maxfield Merriam, ¹	Pittsfield,	23 East Pleasant Street.
Smith, Rowland Piper,	North Amherst,	46 Pleasant Street.
Smith, Stuart Van Alstyne, ¹	Springfield,	Kappa Sigma.
Spring, Hobart Wadsworth, ¹	Braintree,	Q. T. V.
Stephan, Henry Wesley, ¹	Brooklyn, N. Y.,	1 North College.
Stevens, Seth Edward,	Reading,	Kappa Sigma.
Sullivan, Joseph Timothy,	Lawrence,	Alpha Gamma Rho.
Swift, Arthur Lawrence,	North Amherst,	North Amherst.
Talmage, Harry John,	Great Barrington,	120 Pleasant Street.
Tanner, Willis,	Worcester,	Plant House.
Thompson, George Henry, Jr.,	Lenox,	84 Pleasant Street.
Tucker, Francis Sample, ¹	Arlington,	4 Nutting Avenue.
Vinten, Charles Raymond, ¹	Roxbury,	8 South College.
Walker, Philip Duane,	Hardwick,	10 South College.
Walsh, John Leonard, ¹	Amherst,	35 East Pleasant Street.
Warren, Edwin Herbert,	Chelmsford,	Lambda Chi Alpha.
Waugh, Frederick Vail,	Amherst,	Kappa Sigma.
Wentsch, Harold Earle, ¹	Southbury, Conn.,	Kappa Gamma Phi.
Whitaker, Carl Fales, ¹	Hadley,	Kappa Sigma.
White, George Edwin, ¹	Worcester,	Kappa Gamma Phi.
Whittemore, Alfred Lincoln, ¹	South Hadley Falls,	Lambda Chi Alpha.
Wildner, Edwin Lincoln, ¹	Holyoke,	Kappa Sigma.

PROVISIONAL SOPHOMORES.²

Arms, Richard Woodworth,	Hopkinton,	Kappa Gamma Phi.
Conant, Luman Binney,	Waltham,	4 Nutting Avenue.
Eastwood, John Edgar,	Plymouth,	5 Fearing Street.
Krasker, Abraham,	Boston,	7 South College.
Law, Hervey Fuller,	Longmeadow,	care of C. W. Everson.
Randall, Kenneth Charles,	Springfield,	care of C. W. Everson.
Smith, Albert William,	Easthampton,	Alpha Sigma Phi.
Taylor, Clarence Leo,	Jamaica Plain,	116 Pleasant Street.

CLASS OF 1923 (FRESHMEN).

Abele, Trescott Tupper,	Quincy,	16 North College.
Alexander, Donald Briggs,	Roxbury,	29 North Prospect Street.
Alger, Mason Williams,	West Bridgewater,	15 North College.

¹ Work incomplete.² Admitted from Special S. A. T. C. or from service of army or navy. Entrance record not yet complete.

Ames, Nathaniel Jackson, ¹	Peabody,	Kappa Sigma.
Arrington, Luther Bailey, ¹	Florence,	6 Nutting Avenue.
Baker, George Eugene,	Pleasantville, N. Y.,	70 Lincoln Avenue.
Baker, Howard, ¹	Marshfield,	7 North College.
Bartlett, Warren Leslie, ¹	Roslindale,	3 Nutting Avenue.
Bateman, Eleanor Willard,	Arlington Heights,	Draper Hall.
Bates, Howard, ¹	Cohasset,	101 Pleasant Street.
Bates, Robert Brooks, ¹	West Springfield,	30 North Prospect Street.
Beal, James Allen,	Abington,	101 Pleasant Street.
Blanchard, Edward Rollin,	Uxbridge,	7 Phillips Street.
Bock, Erwin Jardine, ¹	Springfield,	30 North Prospect Street.
Boles, Inza Almema, ¹	Dorchester,	Draper Hall.
Borgeson, Melvin Benjamin, ¹	Worcester,	21 Fearing Street.
Brewer, Gardner Hunter,	Upton,	10 North College.
Broderick, Lawrence Francis,	Hyde Park,	19 South Prospect Street.
Buckley, Francis Edward, ¹	Natick,	35 North Prospect Street.
Burke, Edmund William,	Watertown,	9 North College.
Cohen, Solomon, ¹	Dorchester,	6 North College.
Corash, Paul,	Worcester,	56 Pleasant Street.
Davis, Frank Langdon, ¹	Lexington,	M. A. C. Farmhouse.
Davis, William, ¹	North Adams,	3 East Pleasant Street.
Dickinson, Lewis Everett, Jr.,	Holyoke,	4 North College.
Dimock, Walter Lewis,	Oxford,	17 Fearing Street.
Dowden, Philip Berry, ¹	Sandwich,	16 North College.
Faneuf, John Benedict,	West Warren,	Chemistry Laboratory.
Fetter, George Andrew,	Watertown,	35 North Prospect Street.
FitzGerald, David Francis,	Holyoke,	4 Chestnut Street.
Fitzpatrick, Leo Joseph,	Brockton,	Mount Pleasant.
Folsom, Owen Eugene, ¹	Roslindale,	3 Nutting Avenue.
Friend, Roger Boynton,	Dorchester,	15 Hallock Street.
Fuller, Robert Donald,	Woburn,	7 North College.
Gamzue, Benjamin, ¹	Holyoke,	56 Pleasant Street.
Gaskill, Millard Thayer,	Hopedale,	Alpha Sigma Phi.
Gay, Alfred Fullick,	Groton,	83 Pleasant Street.
Gildemeister, Mary Katherine, ¹	West Springfield,	Draper Hall.
Gordon, Howard Reynolds,	Ipswich,	101 Pleasant Street.
Grayson, Raymond Henry, ¹	Milford,	120 Pleasant Street.
Groves, Alan Marston,	Newton Center,	13 North College.
Hale, John Stancliff,	South Glastonbury, Conn.,	66 Pleasant Street.
Hardy, Sherman Keeler,	Littleton,	9 Fearing Street.
Harrington, Robert John,	Holyoke,	83 Pleasant Street.
Heath, Allan Jay,	Newfane, Vt.,	5 North College.
Hilyard, Norman Douglas,	Beverly,	120 Pleasant Street.
Hobart, Charles Harrison,	Boston,	73 Pleasant Street.
Hodsdon, Marshall Sinclair,	Melrose Highlands,	66 Pleasant Street.
Hubbard, James Sumner,	Sunderland,	17 Phillips Street.
Hunter, Henry Leander, Jr.,	Mount Kisco, N. Y.,	31 Lincoln Avenue.
Irish, Gilbert Henry,	Turner, Me.,	North Amherst.
Isaac, Carl Frederick, ¹	Brighton,	35 North Prospect Street.
Johnson, Cleon Bancroft,	Ipswich,	101 Pleasant Street.
Johnson, Eyrle Gray, ¹	Dorchester,	45 East Pleasant Street.
Jones, Alan, ¹	Boston,	35 North Prospect Street.
Labrovitz, Rose Florence,	Amherst,	11 Amity Street.
Latour, Oliver Page,	Spencer,	6 Nutting Avenue.
Lewis, Molly LeBaron,	Jamaica Plain,	Draper Hall.
Lindskog, Gustaf Elmer Richard,	Roxbury,	6 North College.
Luddington, Frank Dennison, ¹	Hamden, Conn.,	125 South Pleasant Street.
MacCready, Donald Eugene, ¹	Elizabeth, N. J.,	4 Chestnut Street.
Malley, Joseph Anthony, ¹	Watertown,	35 North Prospect Street.
Marshman, Wilbur Horace, ¹	Springfield,	23 East Pleasant Street.
Martin, Frances Barbara,	Amherst,	5 Phillips Street.
Martin, Robert Fitz-Randolph,	Springfield,	53 Lincoln Avenue.

¹ Work incomplete.

Mather, Edna,	Amherst,	5 Allen Street.
McCabe, Raymond Salter,	Holyoke,	83 Pleasant Street.
McKenzie, David Hamilton, ¹	Thorndike,	McClure Street.
Midgley, William Bancroft, ¹	Worcester,	30 North Prospect Street.
Mitsui, Takasada,	New York, N. Y.,	34 North Prospect Street.
Mohor, Robert deSales, ¹	Newton Center,	13 North College.
Morris, Walter Markley, ¹	Amherst,	66 Pleasant Street.
Mudgett, Vernon Downer,	Sterling Junction,	8 North College.
Newell, Richard Carll,	West Springfield,	Cottage Street.
Newton, Payson Taft,	Holyoke,	21 Fearing Street.
Nicholson, Donald Albert,	Lynn,	17 Fearing Street.
Paddock, Wallace Earl,	Worcester,	M. A. C. Farmhouse.
Perry, Chauncy Valentine,	Waltham,	17 Kellogg Avenue.
Phelps, Harley Procter,	South Williamstown,	120 Pleasant Street.
Picard, Charles Francis, ¹	Plymouth,	15 Fearing Street.
Ribero, Edwin Francis,	Franklin,	9 South College.
Roberts, Arthur William, ¹	Hyde Park,	9 North College.
Sargent, Richmond Holmes,	Buxton, Me.,	101 Pleasant Street.
Searles, Gilbert Brundage,	Lake Mohegan, N. Y.,	66 Pleasant Street.
Sears, Fred Grant, Jr.,	Dalton,	23 East Pleasant Street.
Shea, Thomas Francis,	Holyoke,	36 North Prospect Street.
Sherman, Bradford Pierce,	New Bedford,	13 Fearing Street.
Slade, Irving Woodman,	Chelsea,	53 Lincoln Avenue.
Smith, Jeffrey Poole,	West Roxbury,	14 North College.
Smith, Richard Burr, ¹	Greenfield,	15 Fearing Street.
Snow, Thomas Lathrop,	Greenfield,	15 North College.
Sullivan, Catherine Elisabeth,	Amherst,	25 Gray Street.
Tanner, Edwin,	Worcester,	Plant House.
Tarplin, Allan Sebastian,	Brookline,	56 Pleasant Street.
Tarr, James Gordon,	Everett,	29 North Prospect Street.
Task, Mortimer,	West Stoughton,	North College.
Tileston, Roger Gordon,	Sharon,	18 Nutting Avenue.
Tisdale, Edward Norman,	Medfield,	13 Fearing Street.
Towne, Carroll Alden,	Auburndale,	83 Pleasant Street.
Towne, Warren Hannaford,	Cambridge,	5 North College.
Tumey, Malcomb Edward,	Deerfield,	120 Pleasant Street.
Turner, Dorothy Van Hoven,	Amherst,	Draper Hall.
Wendell, Richard Goodwin,	Belmont,	15 North College.
Whitaker, Holden,	Newton Highlands,	83 Pleasant Street.
Whittier, John McKey,	Everett,	15 Fearing Street.
Williams, Forrest Earl,	Sunderland,	17 Phillips Street.
Wilson, Albert Arthur,	Boston,	18 Nutting Avenue.
Wilson, John Jacob,	Boston,	18 Nutting Avenue.
Wirth, Conrad Louis, ¹	Minneapolis, Minn.,	9 Nutting Avenue.
Woodworth, Leverett Stearns,	Newton,	North Amherst.

PROVISIONAL FRESHMEN.²

Arnold, Isaac,	Boston,	56 Pleasant Street.
Atkins, Cecil Everett,	Beverly,	35 North Prospect Street.
Bastille, Joseph Thomas,	Amherst,	120 Pleasant Street.
Burbeck, Joseph Howard,	Peabody,	15 Phillips Street.
Cady, Howard Meader,	South Shaftsbury, Vt.,	13 South Prospect Street.
Dowd, Henry Clement,	Holyoke,	36 North Prospect Street.
Gerry, Bertram Irving,	Peabody,	18 Nutting Avenue.
Goldstein, Joseph,	Lynn,	56 Pleasant Street.
Holley, George Gilbert,	Fiskdale,	13 Fearing Street.
Hollis, Frederick Allen, ³	Charlton,	35 North Prospect Street.
Lewis, Bert Morton,	Northampton,	Northampton.
Nowers, Donald Gilford,	Danvers,	45 East Pleasant Street.

¹ Work incomplete.² Admitted on service record in either army or navy. Entrance record not complete.³ Admitted on scholarship probation. Entrance record not yet complete.

Putnam, Ernest Taylor,	Greenfield,	care of L. H. Taylor.
Sandow, Alexander, ¹	Pittsfield,	23 East Pleasant Street.
White, Ralph Harold,	Barnard, Vt.,	101 Pleasant Street.

UNCLASSIFIED STUDENTS.

Browning, Joan Ruth,	Springfield,	Draper Hall.
Burgess, Almore Watson,	Plymouth,	15 Fearing Street.
Coles, Howard Finlay,	Tarrytown, N. Y.,	Theta Chi.
Crocker, Mrs. Elsie Venner,	North Amherst,	North Amherst.
Cummings, Leslie Samuel,	Webster,	120 Pleasant Street.
Dalrymple, George Benjamin,	Plainfield,	M. A. C. Farmhouse.
Farnham, George Ellison,	Peabody,	3 Nutting Avenue.
Gilbert, Marion,	Great Barrington,	29 Lincoln Avenue.
Glatzerman, Benjamin,	Lebanon, Conn.,	56 Pleasant Street.
Goodale, Geoffrey Dearborn,	Ipswich,	The Davenport.
Green, Howard Emery,	Westfield,	McClure Street.
Gustin, Francis Borden,	North Amherst,	North Amherst.
Hansen, Ernest,	Worcester,	18 Nutting Avenue.
Hart, Owen Stephen,	Meriden, Conn.,	6 Nutting Avenue.
Hemenway, Rachel Viola,	Williamsburg,	Draper Hall.
Hooper, Oliver Furbish,	East Lynn,	Kappa Gamma Phi.
Itano, Mrs. Arao,	Amherst,	7 East Pleasant Street.
Johnson, Francis Wesley,	Springfield,	53 Lincoln Avenue.
Knapp, Fanny Carter,	Lowell,	Draper Hall.
McCarthy, Jeremiah Joseph, Jr.,	Newton,	15 Hallock Street.
McNamara, James Joseph,	South Boston,	3 Nutting Avenue.
Morse, Mrs. Betty Strome,	Amherst,	18 Nutting Avenue.
Novitski, Joseph Francis,	Amherst,	6 Phillips Street.
Perry, John Tuttle,	Waltham,	17 Kellogg Avenue.
Richardson, Lester Thornley,	Waltham,	7 Nutting Avenue.
Smith, Sydney Alexander,	Worcester,	25 Lincoln Avenue.
Stevens, Richard Clinton,	Winchester,	17 Fearing Street.
Stockbridge, John Sylvester,	Atlanta, Ga.,	Kappa Sigma.
Tattan, Francis David,	Cambridge,	4 Chestnut Street.
Tierney, Grace Elizabeth,	Holyoke,	Draper Hall.
Tracy, Ralph Prior,	Winchendon,	Poultry Plant.
Wendler, Henry George,	Clinton,	Stockbridge Hall.
Whitney, Clara Frances,	Boston,	Draper Hall.

GEOGRAPHICAL SUMMARY.

Massachusetts,	446
Connecticut,	18
New York,	16
Vermont,	5
New Jersey,	5
Maine,	4
Rhode Island,	3
New Hampshire,	2
California,	2
Canada,	2
Alabama,	1
Delaware,	1
District of Columbia,	1
Georgia,	1
Illinois,	1
Indiana,	1
Kentucky,	1
Maryland,	1
Minnesota,	1
Missouri,	1

¹ Admitted on scholarship probation. Entrance record not yet complete.

Pennsylvania,	1
South Carolina,	1
Virginia,	1
West Virginia,	1
Wisconsin,	1
India,	1
Total,	519

SUMMARY BY CLASSES.

CLASS.	Men.	Women.	Total.
Graduate students,	31	2	33
Senior class, 1920,	110	3	113
Junior class, 1921,	100	3	103
Sophomore class, 1922,	100	4	104
Provisional sophomores,	8	-	8
Freshman class, 1923,	101	9	110
Provisional freshmen,	15	-	15
Unclassified students,	24	9	33
Total,	489	30	519

SHORT COURSE ENROLLMENT.

TWO-YEAR COURSE, 1919-20.

Adams, George William,	Pittsfield,	5 Kendrick Place.
Allen, Chester Carolton,	West Rutland,	120 Pleasant Street.
Almy, Roger Warren,	New Bedford,	10 North College.
Amsden, Maude Ella,	Petersham,	Mount Pleasant.
Anderson, Walter Raldolph,	East Pepperell,	34 North Prospect Street.
Andrews, Harold Leslie,	Stafford, Conn.,	15 Amity Street.
Arel, Theophile,	Holyoke,	15 Phillips Street.
Arp, Dietrich,	Milwaukee, Wis.,	36 North Prospect Street.
Arruda, Anthony Peter,	New Bedford,	36 North Prospect Street.
Ashforth, Arthur Clifton,	Brockton,	70 Lincoln Avenue.
Baird, Francis William,	Waltham,	7 Nutting Avenue.
Barrows, Edward Fletcher,	Brattleboro, Vt.,	75 Pleasant Street.
Barrows, Harold Clayton,	Mendon,	20 Lessey Street.
Baxter, Samuel Ballantine,	Tenafly, N. J.,	5 Kendrick Place.
Bemis, Raymond Battles,	Spencer,	15 Phillips Street.
Bennett, William Whytal,	Arlington,	101 Pleasant Street.
Blumen, David,	Smolensk, Russia,	101 Pleasant Street.
Bobb, Linn,	Philadelphia, Pa.,	Mount Pleasant.
Bronsdon, William Abbott,	Baldwinsville,	75 Pleasant Street.
Brooker, John Patrick,	Roxbury,	34 Pleasant Street.
Bruce, Mary Elizabeth,	Dorchester,	79 Pleasant Street.
Bryant, Frank Kenneth,	Lowell,	8 Kellogg Avenue.
Burke, Leslie Joseph,	Medford,	12 Cottage Street.
Burnett, Marston,	Cambridge,	14 Nutting Avenue.
Burnham, Theodore Shelley,	Essex,	53 Lincoln Avenue.
Burrington, Raymond Wells,	North Amherst,	North Amherst.
Burrington, Reginald Clifton,	North Amherst,	North Amherst.
Butler, James Stoddard,	Keene, N. H.,	- -
Carpenter, Ruth,	Hudson,	Draper Hall.
Carroll, Margaret Adelaide,	Dorchester,	Draper Hall.
Chace, Chester William,	Springfield,	20 Nutting Avenue.
Chadwick, Walter,	Lawrence,	32 Lessey Street.
Chandler, Donald Carlyle,	New Gloucester, Me.,	15 Hallock Street.
Chapel, Walter,	Bolton,	36 North Prospect Street.
Chrisfield, Edward Richardson,	Needham,	101 Pleasant Street.
Christensen, Frank William,	North Easton,	13 Phillips Street.
Clapp, Horace Damon,	Easthampton,	8 Kellogg Avenue.
Clark, Chester Frederic,	Fitchburg,	North Amherst.
Clark, Elbridge Theodore,	Millis,	45 East Pleasant Street.
Clark, William Guster,	Amherst,	11 Amity Street.
Colton, Hartman Dudley,	Springfield,	45 Pleasant Street.
Connor, Raymond James,	Worcester,	52 Lincoln Avenue.
Conroy, Maurice,	New Bedford,	West Experiment Station.
Converse, John Kendrick,	Andover,	79 Pleasant Street.
Corey, Raymond Stanley,	Amherst,	35 East Pleasant Street.
Cornell, Ivan Manley,	Brookline,	36 North Prospect Street.
Crocker, Fred Carlton,	North Adams,	35 East Pleasant Street.
Crosby, Leon Rolland,	Tyngsborough,	34 Pleasant Street.
Crowell, Homer Merrill,	New York, N. Y.,	35 East Pleasant Street.
Currier, Napoleon,	Lawrence,	108 Pleasant Street.
Danske, Frank,	Holyoke,	35 East Pleasant Street.

Davis, Frederick Oscar,	Windsor, Vt.,	21 Amity Street.
Day, Roland Wight,	Medfield,	83 Pleasant Street.
Dill, Clarence Elmer,	Raynham Center,	North Amherst.
Doane, Robert Allen,	North Brookfield,	70 Lincoln Avenue.
Dole, Stevens Field,	Greenfield,	45 Pleasant Street.
Douglas, Harry Lawton,	Lowell,	M. A. C. Farmhouse.
DuFresne, Francis Armand,	Lenox,	North Amherst.
Dunbar, Charles Basil,	Taunton,	Ye Aggie Inn.
Eastman, Roger Austin,	Amherst,	North Amherst.
Estey, Roger Bradshaw,	Somerville,	6 Kellogg Avenue.
Faufaw, R. W.,	Derby Line, Vt.,	36 North Pleasant Street.
Finn, William Francis,	Chelsea,	North Amherst.
Firth, Frank Lemuel,	Worcester,	81 Pleasant Street.
Flanders, John Leonard, Jr.,	Southville,	20 Lessey Street.
Ford, Clarence Eugene,	St. Louis, Mo.,	Eames Street.
Frary, Frank Taylor,	Southampton,	8 Kellogg Avenue.
Gibbons, William Frank,	Fitchburg,	120 Pleasant Street.
Gifford, Franklin Maynard, Jr.,	Middleborough,	34 North Prospect Street.
Girard, Albert John,	East Brimfield,	29 East Pleasant Street.
Graeff, Charles Albert,	New York, N. Y.,	Sunderland.
Greenfield, Abraham,	Springfield,	4 Chestnut Street.
Grieve, Alexander Watson,	Dorchester,	7 Nutting Avenue.
Gruver, Raymond Charles,	Lowell,	35 Northampton Road.
Gustafson, Gustaf Albert,	Wilmington,	North Pleasant Street.
Hall, Robert Hancock,	Waverley,	35 East Pleasant Street.
Hamilton, Grant Ethan,	Cyrus,	20 Lessey Street.
Hamilton, Weston Alexander,	Salem,	13 Phillips Street.
Hancock, Russell Hagen,	Vineyard Haven,	18 Nutting Avenue.
Hanifin, Robert Emmett,	Belchertown,	10 Maple Avenue.
Hare, Ambrose Henry,	Leominster,	71 South Pleasant Street.
Hartwell, Nathan Haywood,	Rockland,	4 Nutting Avenue.
Hartwell, Robert Mantor,	Buckland,	M. A. C. Farmhouse.
Haskell, Wilder Alexander,	Holyoke,	North Amherst.
Hawes, Leon Roy,	Sudbury,	33 East Pleasant Street.
Hayden, Arthur Leo,	Natick,	35 North Prospect Street.
Hayes, William Bointon,	South Deerfield,	120 Pleasant Street.
Heffernan, Cyril James,	Dorchester,	12 McClure Street.
Heinlein, Edward Bancroft,	South Natick,	17 Pleasant Street.
Hoyt, Perley Luther,	Perkinsville, Vt.,	20 Lessey Street.
Hubbell, James Platt,	Boston,	36 North Prospect Street.
Huckins, Norman Charles,	Dorchester,	9 Fearing Street.
Huntley, Robert Ernest,	Somerville,	73 Pleasant Street.
Igo, Bernard James,	West Somerville,	101 Pleasant Street.
Jaeques, John William,	Malden,	60 Pleasant Street.
Jauncey, Oakleigh Wells,	Williamstown,	36 North Prospect Street.
Jewett, Joseph Winthrop,	Arlington,	23 East Pleasant Street.
Johnson, William James,	Medford,	7 Nutting Avenue.
Jordan, Emmett Philmore,	Smithfield, Va.,	101 Pleasant Street.
Kallio, Toivo Matthew,	Middlefield,	8 North Prospect Street.
Keller, Earle Franklin,	Augusta, Me.,	4 Chestnut Street.
Kelley, John Joseph,	Amherst,	71 South Pleasant Street.
Kilton, Donald Gilbert,	Worcester,	79 Pleasant Street.
Kimball, Elforest Franklin,	Danvers,	34 Pleasant Street.
Kimball, Howard Augustus,	Littleton,	9 Fearing Street.
Kirchner, Robert Walter,	Pittsfield,	40 Mount Pleasant.
Knight, Henry Elbridge,	Easton, Me.,	20 Lessey Street.
Knight, Herbert Allen,	Ludlow,	45 Pleasant Street.
Komta, Stanley,	Cambridge,	101 Pleasant Street.
Krikorian, Krikor Hovaness,	Bridgeport, Conn.,	12 Cottage Street.
Landstrom, Oscar Nathaniel,	Heath,	5 Nutting Avenue.
Langelier, Edgar Joseph,	Lynn,	18 Nutting Avenue.
Lawrenee, Harold Tildon,	Rhodesia, South Africa,	29 Northampton Road.
Lawson, John Thomas,	New Bedford,	60 Pleasant Street.
Leone, Anthony,	Boston,	North Amherst.

Libby, Ben Frank,	Springfield,	Experiment Station.
Libby, Carl Estes,	Springfield,	East Experiment Station.
Loomer, Gordon Powell,	Waverley,	4 Chestnut Street.
Lord, George Walker,	Framingham,	70 Lincoln Avenue.
Lounsbury, Francis Edward,	Cambridge,	101 Pleasant Street.
MacLeod, Norman Frederick,	Lynn,	35 North Prospect Street.
MacMillan, Murray,	Medford,	36 North Prospect Street.
Mahakian, John,	Boston,	4 Chestnut Street.
Malhoit, Alfred William,	Worcester,	R. F. D. No. 3, Amherst.
Mason, Gerald Joe,	Barre, Vt.,	North Pleasant Street.
Maxson, John Warren,	Philadelphia, Pa.,	21 Fearing Street.
McCluskey, Joseph James,	Bangor, Me.,	101 Pleasant Street.
McFarlan, John Wesley,	Cincinnati, O.,	75 Pleasant Street.
McGilvery, Peter Joseph,	Cambridge,	3 Pleasant Street.
Miller, Fred Reuben,	Bernardston,	20 Lessey Street.
Moczarski, Joseph,	Holyoke,	Triangle Street.
Morse, Harold Sterling,	Arlington,	23 East Pleasant Street.
Morse, Herbert Edgar,	Foxborough,	18 Nutting Avenue.
Mullen, Frank Myles,	Fayville,	44 Triangle Street.
Mumford, William Henry,	Springfield,	36 North Prospect Street.
Narkin, Isadore,	Philadelphia, Pa.,	75 Pleasant Street.
Newell, Joseph Delaplane,	Brooklyn, N. Y.,	Inwood.
Newhall, Gordon William,	Brookline,	45 Pleasant Street.
Norris, Frank White,	Dorchester,	12 Cottage Street.
Nowers, Rodman Clark,	Danvers,	45 East Pleasant Street.
Oakes, John Joseph,	Wellesley,	17 Pleasant Street.
O'Brien, Katherine Frances,	Lawrence,	29 Lincoln Avenue.
O'Shan, David,	New York, N. Y.,	47 Pleasant Street.
Owens, Zorayda Kathleen,	Haverhill,	29 Lincoln Avenue.
Parkes, Charles Ransom,	New York, N. Y.,	120 Pleasant Street.
Parsons, Phillips Henry,	Southampton,	79 Pleasant Street.
Peirce, Albert Kimball,	Arlington,	101 Pleasant Street.
Pellis, Abraham,	Chelsea,	41 Pleasant Street.
Percy, Minot Simons,	Arlington,	101 Pleasant Street.
Perkins, Georǵe Burton,	Woburn,	21 Fearing Street.
Phipps, Carleton Lawrence,	Holliston,	60 Pleasant Street.
Pickard, Herbert Peirce,	Concord Junction,	17 Kellogg Avenue.
Porrovecchio, Carl James,	Charlemont,	5 Nutting Avenue.
Potwin, Bert Louis,	Woodstock, Conn.,	35 East Pleasant Street.
Purdy, Donald Ring,	Waverley,	4 Chestnut Street.
Quinn, William Robert,	Natick,	34 Pleasant Street.
Raymond, Matthew George,	Boston,	108 Pleasant Street.
Reid, Howard Stanton,	Franklin,	9 South College.
Richards, Osgood Samuel,	Jamaica Plain,	32 North Prospect Street.
Rideout, Lawrence Walter,	Amherst,	17 Kellogg Avenue.
Ripley, Lucien Lawrence,	Montague,	17 Cottage Street.
Robinson, Frederick Charles,	Westford,	54 Pleasant Street.
Rollins, Guy Emery,	Selden, Me.,	3 Nutting Avenue.
Root, Howard Chapin,	Colrain,	20 Lessey Street.
Rossier, Hardy Samuel,	Newport, Vt.,	17 Kellogg Avenue.
Rowe, Everett Elliot,	Bolton,	53 Lincoln Avenue.
Rowe, George Joseph,	Greenfield,	66 Pleasant Street.
Rowe, Herbert Malcolm,	Beverly,	116 Pleasant Street.
Ruggieri, Salver,	Summit, R. I.,	12 Cottage Street.
Russell, Paul Belford,	West Medway,	6 Nutting Avenue.
Sadowski, Stephen Anthony,	South Boston,	35 East Pleasant Street.
Savage, John Francis,	Dorchester,	71 South Pleasant Street
Sawyer, John Henry,	North Brookfield,	70 Lincoln Avenue.
Seigelman, Max,	Chelsea,	9 Fearing Street.
Shaw, Charles Dudley,	Westfield,	13½ Amity Street.
Shaw, Walter Bruce,	Sutton,	8 Kellogg Avenue.
Shevlin, Frank James,	Woonsocket, R. I.,	101 Pleasant Street.
Smith, Raymond Leslie,	East Hartford, Conn.,	11 Triangle Street.
Smith, Royce Walter,	Boston,	4 Chestnut Street.

Snelling, Samuel William, . . .	Lincoln,	4 Chestnut Street.
Spinney, Joseph Warren, . . .	Allston,	25 Lincoln Avenue.
Spooner, Roy Adelbert,	Dorchester,	34 Pleasant Street.
Spooner, William Danforth, . .	Brimfield,	Waid Farm.
Spring, Earle Nelson,	Millers Falls,	M. A. C. Farmhouse.
Steele, Gordon Ells,	Waverley,	4 Chestnut Street.
Stiles, Allan Langille,	Littleton,	6 Nutting Avenue.
Sutherland, John Francis, . . .	South Boston,	Mount Pleasant.
Talbot, William Joseph,	Quincy,	8 Hallock Street.
Taylor, Arthur Raymond,	Framingham,	13 Phillips Street.
Thorn, Henry Holton,	Deerfield,	120 Pleasant Street.
Trafton, Walter Richard,	Swampscott,	12 Cottage Street.
Van Derpoel, Ernest Collins, . .	Chicopee Falls,	33 East Pleasant Street.
Vartanian, Neshan,	Indian Orchard,	41 Pleasant Street.
Veselak, Helen Clara,	Westfield,	Draper Hall.
Wackerbarth, William Rudolph, .	Morenci, Ariz.,	13 Phillips Street.
Walsh, John, Jr.,	Bedford,	North Pleasant Street.
Ward, William David,	Newton,	44 Triangle Street.
Warner, Harry Freeman,	Wollaston,	7 Phillips Street.
Watson, Alan Wendell,	Providence, R. I.,	17 Kellogg Avenue.
Whitcomb, Harold Adams,	Concord Junction,	6 Nutting Avenue.
White, Alice Louise,	Bristol, Conn.,	Mount Pleasant.
Whitmore, Raymond Swett, . . .	Arlington Heights,	4 Chestnut Street.
Wickwire, Harry Wyndom,	Worcester,	35 East Pleasant Street.
Wiggin, Theron Herman,	Norwood,	83 Pleasant Street.
Willson, Stewart Hemingway, . . .	Thompsonville, Conn.,	53 Lincoln Avenue.
Wilson, Harvey William,	Boston,	101 Pleasant Street.
Wolf, Henry,	Amherst,	4 Chestnut Street.
Wood, Matthew Arnold,	South Portland, Me.,	6 Nutting Avenue.
Young, George Thomas,	Wilkinsonville,	8 Kellogg Avenue.

VOCATIONAL POULTRY COURSE.

Abair, Peter Dorcey,	Worcester,	41 Pleasant Street.
Abercrombie, Edward Marion, . .	Greenfield,	120 Pleasant Street.
Donovan, Albert Peter,	New Brunswick, Can.,	70 Lincoln Avenue.
Follansbee, Harry Mayoh,	Enfield, N. H.,	North Amherst.
Goodnow, Lewis Weston,	Greenfield,	15 Phillips Street.
Hatch, Henry Donald,	Auburn, Me.,	29 North Prospect Street.
Jorgensen, George Arthur,	Floral Park, N. Y.,	13½ Amity Street.
McFague, Maurice Graeme,	Wollaston,	70 Lincoln Avenue.
Mosher, Roy Wilson,	East Bridgewater,	36 North Prospect Street.
Nestle, Harold George,	Amherst,	Leverett Street.
Torrey, Hamilton,	Springfield,	118 Pleasant Street.
Von Bisberstein, Herbert,	Boston,	81 Pleasant Street.
Wenz, Philip Henry,	East Dedham,	North Amherst.

RURAL ENGINEERING COURSE.

Ash, Walter George,	Anthony, R. I.,	75 Pleasant Street.
Burt, John Holton,	Hyde Park,	7 Phillips Street.
Clarke, William John,	Ipswich,	101 Pleasant Street.
Flanagan, Matthew Joseph,	Roxbury,	101 Pleasant Street.
French, Percy Jackson,	Rockland,	4 Chestnut Street.
Jarvis, Albert Arthur,	East Boston,	Sigma Phi Epsilon.
Landry, Theodore Joseph,	New Brunswick, Can.,	101 Pleasant Street.
Logan, Michael John,	Atlantic,	37 Cottage Street.
MacDonnell, Charles Angus,	Cambridge,	3 Pleasant Street.
Mirault, Joseph Dustin,	Holyoke,	15 Phillips Street.
Nelson, Guy Leslie,	Milford, N. H.,	71 South Pleasant Street.
Salo, Charles Raymond,	Pittsfield,	37 Cottage Street.
Sharp, James Milne,	Dorchester,	101 Pleasant Street.
Syrett, Clifford Franklin,	Springfield,	17 Kellogg Avenue.
Thoubboron, Frank William,	Brooklyn, N. Y.,	39 Main Street.
Whitbeck, Henry,	Alandar,	5 McClellan Street.

SECOND SIX WEEKS' COURSE, 1919.

Ainsworth, Dean F.,	Springfield.
Carlson, Ralph,	East Longmeadow.
Daley, Edwin W., Jr.,	Boston.
Gould, Irvin T.,	Waverley.
Groeinger, Christian,	Amherst.
Hartung, Robert R.,	Boston.
Parker, Reginald S.,	Cambridge.
Patch, Helen M.,	Beverly.
Williams, Fred B.,	Interlaken.

VOCATIONAL POULTRY COURSE, MARCH TO JUNE, 1919.

Etheridge, William H.,	Salem.
Goodnow, Lewis W.,	Greenfield.
Graves, Reginald S.,	Bridgeport, Conn.
Malhoit, Alfred W.,	Worcester.
McFague, Maurice G.,	Wollaston.
Vondell, John H.,	Windsor, Vt.

SUMMER COURSE FOR FEDERAL MEN, 1919.

Adams, Glenn W.,	Eden, Vt.
Ash, Walter G.,	Anthony, R. I.
Ashforth, Arthur C.,	Brockton.
Chace, Chester W.,	Springfield.
Christensen, Frank W.,	North Easton.
Corey, Raymond S.,	Raynham Center.
Crocker, Fred C.,	North Adams.
Currier, Napoleon,	Lawrence.
Donovon, Albert P.,	New Brunswick, Can.
Flanagan, Matthew J.,	Roxbury.
Gibbons, William F.,	Fitchburg.
Hamilton, Weston A.,	Salem.
Igo, Bernard J.,	West Somerville.
Komla, Stanley,	Cambridge.
Lounsbury, Francis E.,	Cambridge.
Malhoit, Alfred W.,	Worcester.
McFarlan, John W.,	Cincinnati, O.
McGrath, Edward J.,	New Bedford.
Mirault, Joseph D.,	Holyoke.
Narkin, Isadore,	Boston.
Potwin, Bert L.,	Woodstock, Conn.
Ralls, Myles F.,	Lowell.
Raymond, Matthew G.,	Boston.
Rollins, Guy E.,	Selden, Me.
Rowe, George J.,	Greenfield.
Shevlin, Frank J.,	Woonsocket, R. I.
Talbot, William J.,	Quincy.
Vayo, William B.,	Worcester.
Wackerbarth, William B.,	Morenci, Ariz.
Whitbeck, Henry,	Alandar.
Wilson, Harvey W.,	Boston.

SUMMER SCHOOL, 1919.

Allen, Roland H.,	Auburndale.
Allen, Wendell P.,	Auburndale.
Alley, Evelyn L.,	Hyde Park.
Anderson, Paul J.,	Amherst.
Archibald, Edith M.,	Waltham.
Armor, Mira L.,	Marshallton, Del.
Bader, Annetta M.,	Shelburne Falls.
Baker, Florenz M.,	Amherst.

Baker, L. Ada,	Amherst.
Bates, Ethel W.,	Webster.
Beals, Mrs. J. I.,	Sunderland.
Blakeman, Florence L.,	Brockton.
Blodgett, Emma M.,	Springfield.
Boland, Albert M.,	Worcester.
Bond, Lawrence A.,	North Adams.
Bowers, Frank H., Jr.,	Mansfield.
Bowles, Mary N.,	Middlebury, Vt.
Braley, Laura E.,	Putney, Vt.
Buckler, Gertrude M.,	Springfield.
Burt, Dorothy L.,	Easthampton.
Cady, Howard M.,	South Shaftsbury, Vt.
Camp, Emily B.,	Norwich, Conn.
Campagna, S. Louise,	Randolph.
Carlson, C. J. Allan,	Cambridge.
Carpenter, Alta J.,	Orange.
Carpenter, Ruth T.,	North Adams.
Caruthers, John T.,	Nashville, Tenn.
Cavanaugh, Mrs. Agnes H.,	Springfield.
Chapin, Frederick C.,	Greenfield.
Chapin, Marion,	Sheffield.
Chenoweth, Mrs. W. W.,	North Amherst.
Colburn, Minnie A.,	Hollis, N. H.
Cole, Rosalie M.,	Waltham.
Collins, Anna L.,	Hudson.
Collis, Ada E.,	Enfield.
Corey, Mrs. Eva M.,	Raynham Center.
Coyle, Agnes,	Pittsfield.
Crawford, Marion H. C.,	Waverley.
Cristman, Clyde E.,	Florence.
Crossley, Mrs. Jessie P.,	Holyoke.
Crowell, Homer M.,	Nutley, N. J.
Crozier, Ruth C.,	Lyonsville.
Dana, Minnie L.,	Amherst.
Darling, Eleanor,	Sunderland.
Derrah, Mrs. Cecilia A.,	Andover.
Dickson, Christine,	Wellesley.
Dutton, Alice L.,	Glover, Vt.
Elder, Mrs. E. A.,	Amherst.
Emerson, Dorothy,	Lynn.
Esty, Pearl,	Richford, Vt.
Fairchild, Katharine H.,	Sunderland.
Fairman, Louise,	Amherst.
Fallis, E. Hazel,	West Somerville.
Farley, Alice J.,	East Boston.
Farnham, Dorothy W.,	Needham.
Fearing, Mrs. Henry D.,	Amherst.
Fentem, Mrs. Alice E.,	Montague.
Fentem, Beth,	Montague.
Fish, Mrs. Charles,	Amherst.
Foley, Dora C.,	Enfield.
Follette, Miriam A.,	Great Barrington.
Foord, Mrs. James A.,	Amherst.
Ford, Harold L.,	Greenfield.
Fowler, Maude A.,	Henniker, N. H.
French, Fannie F.,	Quincy.
Fusfeld, Irving S.,	Washington, D. C.
Garlick, Lillian,	South Ashburnham.
Gaylord, Mrs. E. W.,	Lititz, Pa.
Glazier, Leta,	Amherst.
Gleason, Gertrude E.,	Newton Highlands.
Glowinski, Mrs. Helen,	Holyoke.
Gould, Warren H.,	Buckland.

Goward, Carlotta,	Framingham.
Graves, Mrs. Lillian,	Sunderland.
Greene, Jessie M.,	Marlborough.
Greenwood, Helen E.,	Worcester.
Groezinger, Christian,	Amherst.
Hale, C. Ethel,	Lowell.
Hamblett, Florence,	Attleboro.
Hamblett, Marion S.,	Attleboro.
Hamlin, Margaret,	Amherst.
Hammond, Lucy M.,	Northfield.
Hannaford, F. L.,	Hathorne.
Harrington, Mary L. V.,	Fall River.
Harris, Esther L.,	Dedham.
Haskins, Mora P.,	North Adams.
Hathaway, Wilfred A.,	Saugus.
Hennessey, Laura,	Fall River.
Hersey, Albert D.,	Cambridge.
Heyne, Frank A.,	South Hadley Falls.
Higgins, Mary E.,	Northampton.
Hildick, Dorothy E.,	Leominster.
Hill, Miriam,	Methuen.
Hinkley, Elsie M.,	Whitman.
Hirshberg, Elliott W.,	Allston.
Hodge, Josephine C.,	Amesbury.
Hollis, Mildred H.,	Amherst.
Holmes, May A.,	Sheffield.
Howe, Mrs. Jenabelle D.,	Amherst.
Howes, Flora E.,	Shelburne Falls.
Hubbard, Mrs. Orpha E.,	Sunderland.
Hull, Marguerite S.,	Sunderland.
Humeston, Mrs. L. R.,	Holyoke.
Irwin, Carolyn A.,	Brookfield.
Jensen, Anna C.,	Granby.
Johnson, Edith H.,	Andover.
Johnson, Mrs. Myrtle I.,	Amherst.
Joyce, Helen M.,	Framingham.
Keane, Mary E. A.,	Boston.
Kelley, Mrs. J. E.,	Amherst.
Kendrick, Grace S.,	Shelburne Falls.
Kendrick, Ruth W.,	Brockton.
Kingsbury, May O.,	Bardwells Ferry.
Kingsley, Evelyn,	North Amherst.
Krout, Mrs. Webster,	Amherst.
Lamson, May J.,	Rochdale.
Lang, Ella F.,	Bradford.
Lang, Florence A.,	Bradford.
Larsen, Anna M.,	Orange.
Latehford, Mary E.,	Worcester.
Leban, Cecile,	Pleasantville, N. Y.
Lee, Edith M.,	Amherst.
Liden, John,	Brookline.
Lindsey, Mrs. J. B.,	Amherst.
Little, Florence L.,	Cliftondale.
Livermore, Mrs. Olive D.,	Amherst.
Loomis, Charles W.,	North Dana.
Martin, Margaret A.,	Amherst.
Mathews, Etta M.,	Worcester.
McBride, James J.,	Waverley.
McBride, John P.,	Waverley.
McLean, William A.,	Medford.
McManus, Jeannette M.,	Lynn.
McNulty, Mrs. Nellie A.,	Boston.
Meacham, Caroline E.,	Holyoke.
Miller, Helen M.,	Hadley.

Mills, Mrs. J. K.,	Amherst.
Mitchell, Edward A.,	Cappahosic, Va.
Mollan, Isabella M.,	Brookline.
Monahan, May C.,	Shelburne Falls.
Montague, Mrs. E. J.,	Amherst.
Monteith, Agnes M.,	Natick.
Morse, Fred W., Jr.,	Amherst.
Moynihan, Anna M.,	Holliston.
Mulligan, Louise E.,	Salem.
Newlon, Mrs. J. B.,	Amherst.
Nielsen, Charlotte M.,	East Boston.
Nowlan, Elizabeth T.,	Amherst.
Nugent, Gertrude V.,	East Boston.
Nutting, Rena L.,	Three Rivers.
Oberholtzer, Mrs. Rosa A.,	Sioux City, Ia.
Ogden, Lillian,	Williamsburg.
O'Neil, Patrick J.,	Roslindale.
Paige, Mrs. Ada M.,	Amherst.
Parker, Ruby,	Northampton.
Parke, Charles R.,	New York, N. Y.
Penney, Elsie L.,	Northampton.
Perey, Myrtle L.,	Ashfield.
Perrins, William A., Jr.,	Brookline.
Perrins, Mrs. William A., Jr.,	Brookline.
Phelan, Mrs. John,	Amherst.
Prince, Walter E.,	Amherst.
Putney, Lucretia,	Brockton.
Quimby, Cora M.,	Amherst.
Rabbette, Eliza M.,	Hudson.
Ransom, Clara,	Winchester.
Rhoades, Dorothy F.,	Williamsburg.
Richards, Mrs. Viola F.,	South Deerfield.
Richmond, Sarah B.,	Buckland.
Ricks, Mrs. L. E.,	Amherst.
Ricks, W. Edward,	Amherst.
Robinson, Edith C.,	East Taunton.
Roe, Charlotte E.,	Fall River.
Rogers, Mrs. G. Edwin,	Amherst.
Root, Chester A.,	West Roxbury.
Root, George W.,	West Roxbury.
Roraback, Evelyn A.,	Sheffield.
Rorstrom, Hans A.,	Framingham Center.
Rose, Elizabeth J.,	Chicopee.
Sander, Margaret F. J.,	Cambridge.
Schedin, Mrs. Elsie,	Philadelphia, Pa.
Schoenfield, Roslyn L.,	Newton Center.
Sears, Mabel H.,	Worcester.
Sears, Mrs. Ruth S.,	Amherst.
Shears, Dorothy,	Sheffield.
Sheehan, Helen,	Northampton.
Sisson, Rachel N.,	Mil River.
Smith, Mrs. Abby H.,	Sunderland.
Smith, Ann,	Amherst.
Smith, Daisy B.,	Amherst.
Smith, Emily D.,	Amherst.
Smith, Jane,	Amherst.
Smith, Olive E.,	Norwich, Conn.
Smith, Raymond L.,	East Hartford, Conn.
Snow, Mrs. Sarah,	Cochituate.
Sparrow, Marion C.,	East Orleans.
Sprague, Eleanor,	Amherst.
Sprague, Mrs. R. J.,	Amherst.
Stephenson, Charles L.,	Windham.
Stiles, Robert M.,	Danvers.

Stowell, Harold T.,	Amherst.
Stratton, Alice I.,	Framingham.
Stratton, Ever L.,	Springfield.
Sullivan, Mrs. Annie N.,	Holyoke.
Sullivan, Mary D.,	Fall River.
Sullivan, Mrs. P. C.,	Indian Orchard.
Sullivan, Phyllis,	Indian Orchard.
Swanston, Ernest E.,	Amherst.
Swanston, Mrs. Marie,	Amherst.
Tabor, Flora A.,	Hampstead, N. H.
Taylor, Mrs. Katherine G.,	Amherst.
Thomas, Genevieve M.,	Wellesley.
Thomas, Stafford F.,	Amherst.
Thomas, Mrs. Stafford F.,	Amherst.
Thomson, Mrs. A. S.,	South Deerfield.
Thomson, Gilbert B.,	Amherst.
Tierney, Mary G.,	Holyoke.
Turner, Mary W.,	Foxborough.
Tuxbury, Grace M.,	Brockton.
Walker, Mrs. Alta M.,	Lexington.
Walsh, Mrs. Bertha H.,	Amherst.
Ward, Sarah N.,	Amherst.
Warner, Mrs. A. C.,	Sunderland.
Warren, Helen,	Grafton.
Waugh, Mrs. Frank A.,	Amherst.
Wells, Sarah A.,	Shelburne Falls.
Wheaton, Harvey H.,	Springfield.
White, Helena,	Amherst.
White, Mildred W.,	Amherst.
Whitney, Mrs. Harrie L.,	Somerville.
Williams, Dorothy B.,	Sunderland.
Williams, Mildred B.,	Harwich.
Wilson, Gustavus O.,	Cambridge.
Wood, Marion O.,	Cambridge.
Worthen, Doris M.,	Concord, N. H.
Worthley, Mrs. Ruth S.,	Amherst.
Wright, Dorothy H.,	Manteno, Ill.
Wyman, Francis,	Winchester.

SUMMARY OF SHORT COURSES.

	Men.	Women.	Total.
Two-year Course, 1919, winter term, ¹	31	6	37
Ten Weeks' Course, 1919, ¹	43	20	63
First Six Weeks' Course, 1919, ¹	13	-	13
Second Six Weeks' Course, 1919,	9	1	10
Vocational Poultry Course, March to June, 1919,	6	-	6
Summer School, 1919,	46	192	238
Summer Course for Federal Men, 1919,	31	-	31
Two-year Course, 1919-20,	201	8	209
Vocational Poultry Course, 1919-20,	13	-	13
Rural Engineering Course, 1919-20,	16	-	16
Total,	409	227	636
Counted twice,	46	-	46
	363	227	590

¹ Names published in catalogue for May, 1919.

INDEX.

INDEX.

	PAGE
Calendar,	9
Historical statement,	11
Members of the corporation,	14
Faculty, officers,	16-25
Experiment station staff,	19
Extension service staff,	21
Library staff,	24
Committees,	26
Admission,	29-39
Courses of instruction: —	
General requirements, including majors,	40-44
Outline of majors: —	
In Division of Agriculture: —	
Agriculture,	45
Agronomy,	46
Animal Husbandry,	47
Dairying,	48
Poultry Husbandry,	49
In Division of Horticulture: —	
Floriculture,	50
Forestry,	51
Landscape Gardening,	52
Pomology,	53
Vegetable Gardening,	54
In Division of Science: —	
Botany,	55
Chemistry,	56
Entomology,	57
Microbiology,	58
In Division of the Humanities: —	
Rural Journalism,	59
In Division of Rural Social Science: —	
Agricultural Economics,	60
Agricultural Education,	61
Rural Sociology,	62

Courses of instruction — <i>Concluded.</i>	PAGE
Undergraduate courses: —	
In Division of Agriculture,	65-75
In Division of Horticulture,	76-88
In Division of Science,	89-112
In Division of the Humanities,	113-125
In Division of Rural Social Science,	126-134
In General Departments,	135-139
Graduate School,	141-159
Short courses,	161-167
Extension service,	169-177
General information: —	
Financial and administrative,	181-188
College activities,	189, 190
Academic and departmental,	190, 191
Degrees conferred,	192-196
Roll of students: —	
Graduate,	197
College,	198-206
Summary,	206, 207
Short course,	208-216
Summary of short-course enrolment,	216

Concerning the
MASSACHUSETTS
AGRICULTURAL
COLLEGE

FOUNDED AT AMHERST
IN THE CONNECTICUT
VALLEY ❁ ❁ ❁ ❁
EIGHTEEN SIXTY-THREE

THE M. A. C. BULLETIN
VOL. XII. No. 2. FEBRUARY, 1920

PUBLISHED EIGHT TIMES A YEAR BY THE COLLEGE

Jan., Feb., March, May, June, Sept., Oct., Nov.

Entered at the Post Office
Amherst, Mass.
As second class matter.



THE OLD CHAPEL

The College Purpose

“To be at home in all lands and all ages; to count nature a familiar acquaintance; and art an intimate friend; to gain a standard for the appreciation of other men’s work and the criticism of one’s own; to carry the keys of the world’s library in one’s pocket, and feel its resources behind one in whatever task he undertakes; to make hosts of friends among the men of one’s own age who are to be leaders in all walks of life; to lose oneself in generous enthusiasms, and co-operate with others for common ends; to learn manners from students who are gentlemen, and form character under professors who are Christians;—these are the returns of a college for the best four years of one’s life.”

Former President Hyde, of Bowdoin College.

M. A. C.

In the town of Amherst in the Connecticut Valley is a College that is at your service.

The Massachusetts Agricultural College, maintained for you by the people of the State, is able to offer Massachusetts men, *tuition free*, an effective training in vocations which are not yet overcrowded and at the same time provide a general education.

Tuition charged men from other states is the nominal sum of \$60 a year.

M. A. C. is located in the town of Amherst. It is not a "city college" nor is it far from centers of population. Northampton, or "Hamp" as it is known in Amherst, is eight miles from the College. The cities of Holyoke and Springfield are respectively fifteen and twenty-five miles distant, and are connected with Amherst by train and trolley.

Amherst College is situated in the same town and a friendly but keen athletic rivalry is maintained between the two institutions.

Smith and Mount Holyoke, two of the best known women's colleges in the country, are located nearby, — the former in Northampton and the latter in South Hadley.



THE POND



"NORTH" AND "SOUTH" DORMITORIES

"Massachusetts Aggie" has the advantage of being a relatively small college and competing with any institution in New England in intercollegiate activities. The total enrollment at the present time is seven hundred forty-one. "Aggie Democracy" is the spirit that is traditional at the college. It is the "every-man-for-the-other-fellow" idea that has built up an Alumni body that is solidly behind the institution, and maintains on the campus a student body that keeps in existence a fighting spirit of loyalty.

M. A. C. has a war record that she is proud of, — she feels that she has a right to be.

1,355 men in the service

433 commissioned officers

50 men dead in the service of their country.

In memory of those boys who gave their lives the Alumni and undergraduates of the College are now erecting a Memorial Building, — that is to be a student activity center, — to cost \$150,000. This fund has been raised as a result of contributions from approximately seventy per cent of the men who ever attended the College, — an unusual record.

A BRIEF HISTORY

BY L. B. CASWELL OF THE CLASS OF 1871

(Extracts from a book of the above title)

IN 1858 Hon. Justin S. Morrill, representative from Vermont, submitted a bill to Congress donating a portion of the public lands for the endowment of a college in each state, to teach such branches of learning as are related to agriculture and mechanic arts. This bill, after prolonged discussion for two sessions, passed both houses of Congress but was vetoed by President James Buchanan. The measure was finally enacted July 2, 1862, and was approved by President Abraham Lincoln.

As Massachusetts had twelve members in Congress at this time, her allotment was 360,000 acres of land. The Legislature of Massachusetts accepted this generous gift April 18, 1863, and after much discussion resolved to found one independent college for the special education of young men in scientific agriculture and horticulture.

The general verdict today is that the trustees acted wisely in the location they selected for the college, — situated in the most picturesque portion of the renowned Connecticut Valley, the garden spot of New England, with scenery unsurpassed in beauty and cultivation in this or any other country. Stand upon the elevation above the plant houses, and as your eye takes in the scene unfolded before you on every side, the Holyoke Mountain range and Mt. Tom, Mt. Warner in the west, and Toby and Sugar Loaf to the north, with the beautiful Connecticut flowing through the wide expanse of fertile meadows, the most fertile lands of New England, you will exclaim, as has many another, who has traveled in this and other lands, "There is nothing equal to it."

It was voted to open the college for those who might wish to enter the freshman class, October 2, 1867, and it was only by the greatest effort that the buildings were completed so that the term commenced on that date.

Probably the most exciting event in the early history of the college was the intercollegiate regatta of American colleges held on the Connecticut River at Ingleside, between Holyoke and Springfield, July 21, 1871. The race was rowed over a three mile course, and was participated in by Harvard University, Brown University, and the Massachusetts Agricultural College. The smooth surface of the river was scarcely broken by a ripple, when a few minutes past seven P.M. the word was given. The M. A. C. crew, with the outside position, had the poorest start of all, but

quickly settled down to work, and in two minutes had gained perceptibly and continued to do so, although the other crews rowed as if for dear life. On they went, the Aggie boys every minute leaving their city rivals farther and farther behind. People on the shore fairly shrieked with excitement to see this extraordinary turn in affairs. Down by the Chicopee bridge great crowds were anxiously waiting for the arrival of the crews. As they came in sight, it was seen that the Agricultural College crew was in the lead and was easily keeping its rivals at a good distance. It won by a goodly margin — a dozen lengths at least — and the enthusiasm which greeted its entirely unlooked for success was intense. The time was remarkably good, sixteen minutes and forty-six and one-half seconds, — then the fastest time on record, — while Harvard came in second, in eighteen minutes and thirty seconds. * * * * *

With the beginning of the European War, the work of the College assumed a new importance not only in relation to furnishing men trained in military science, but also in crop production. This function was at once recognized by the College which early in April pledged its fullest support to the Nation in the crisis. This was followed by increasing the amount of military training given at the College, and by action excusing from further attendance during the year any students who desired to enlist for any form of mobilization work either military or agricultural, and granting them credit for this work under suitable restrictions. The students quickly availed themselves of this opportunity and the exodus began about the last of April. A month later *ninety-seven per cent* had entered upon some form of mobilization work.



DRAPER HALL

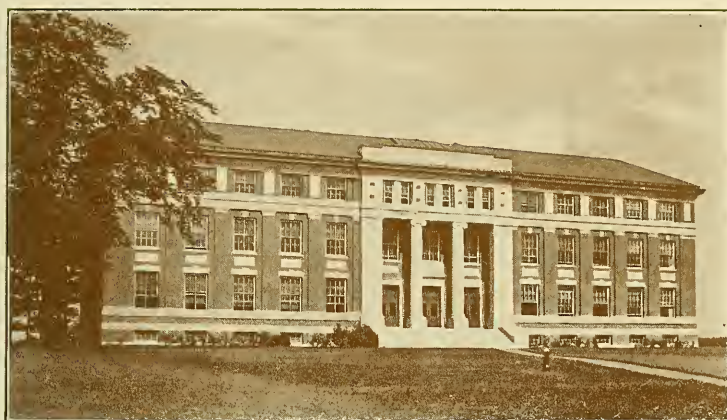
THE COURSES

A College offers an opportunity. What a man makes of it is gauged by individual initiative, ability and ambition.

M. A. C. prepares a man for agricultural vocations but, believing that no college training would be worth while unless it is also a training for life, courses are required which include humanities and sciences that are indispensable for the man who would live a life as well as make a living.

Undoubtedly the best way to show exactly what a college offers as a preparation for specific lines of work is to show what its Alumni are actually doing. The following table summarizes the present occupations of M. A. C. graduates.

Farming	306
Floriculture	17
Market Gardening	4
Agricultural College Administrators	3
Agricultural College Teachers: Agriculture and Horticulture	36
Agricultural College Teachers: Sciences	23
Agricultural School Teachers: Agriculture and Horticulture	37
Agricultural School Teachers: Sciences	8
Experiment Station Administrators	3
Experiment Station Agriculturists	4
Experiment Station Horticulturists	4
Experiment Station Chemists	13
Experiment Station Botanists	4
Experiment Station Entomologists	3
Extension Service Administrators	5
Extension Service: County Advisers	30
Extension Service: Other Experts	5
State Experts: Entomologists	17
United States Department of Agriculture: Agriculturists	3
United States Department of Agriculture: Entomologists	30
United States Department of Agriculture: Market Experts	5
Landscape Gardeners	48
Foresters	35
Agricultural Journalists	5
Agricultural Business	32



STOCKBRIDGE HALL

Veterinarians	6
Other Commercial Agricultural Experts	46
Other Miscellaneous Agriculture	24
Business	125
Engineers	63
Physicians	38
Teachers	46
Miscellaneous	107

The following are the divisions of the college and under them the various departments. Under each department are various courses which cover special phases of the work and give the student the necessary information for a complete understanding of the subject. Detailed descriptions of each one of these courses may be found in the Catalogue of the College.

DIVISION OF AGRICULTURE:

- Departments:
- Agromony.
 - Animal Husbandry.
 - Dairying.
 - Farm Management.
 - Poultry Husbandry.
 - Rural Engineering.

DIVISION OF HORTICULTURE:

- Departments:
- Horticulture.
 - Floriculture.
 - Forestry.
 - Horticultural Manufactures.
 - Landscape Gardening.
 - Pomology.
 - Vegetable Gardening.

DIVISION OF SCIENCE:

Departments:
Botany.
General and Agricultural
Chemistry.
Entomology.
Mathematics and Civil En-
gineering.
Microbiology.
Physics.
Veterinary Science.
Zoology and Geology.

DIVISION OF THE HUMANITIES:

Departments:
Economics and Sociology.
History and Government.
Languages and Literature.
French.
Spanish.
German.

DIVISION OF RURAL SOCIAL
SCIENCE:

Departments:
Agricultural Economics.
Agricultural Education.
Rural Sociology.
Rural Home Life.

GENERAL DEPARTMENTS:

Military Science and Tactics.
Physical Education and Hy-
giene.



A CAMPUS ROAD

ENTRANCE REQUIREMENTS

All correspondence concerning admission should be addressed to the Registrar. Below is given abstract of entrance requirements to the college but, for specific information, the candidate is referred to the regular college catalogue.

The requirements for admission to the four years' course leading to the degree of Bachelor of Science are based upon the satisfactory completion of a four years' high school course or its equivalent. The requirements may be met by examination, by Regents credentials of the State of New York, or by certificate presented from a preparatory school approved by the College Entrance Board. The entrance requirements as given below are stated in terms of units. To satisfy unit entrance credit in any subject, the subject must be pursued one school year with at least four or five recitations per week. Fourteen units are required for admission of which eight and one-half are prescribed and five and one-half are elective.

<i>Group A (prescribed)</i>		Units
Algebra		1½
Plane Geometry		1
History (to be offered from the following group): Ancient, Mediæval and Modern, English, General, United States and Civics		1
English (1)		1½
English (2)		1½
Modern Language (Elementary French or Elementary German)		2
Total		8½
<i>Group B (elective)</i>		Units
Agriculture		1 to 4
Botany		½ or 1
Chemistry		1
Solid Geometry		½
Trigonometry		½
Physics		1
Geology		½
Physiography		½
Physiology		½
Zoology		½
History *		½
Elementary French (if not offered in Group A)		2
Elementary German (if not offered in Group A)		2
Intermediate French		1
Advanced French		1
Intermediate German		1
Advanced German		1
Greek A		2
Greek B		1
Latin A		2
Latin B		1
Commercial Geography		½
Drawing		½
Manual Training		½ or 1

*Exclusive of the prescribed unit offered in Group A, three additional elective units may be offered from the following group: Ancient, Mediæval and Modern, English, General, United States and Civics.



THE ENTOMOLOGICAL BUILDING is unusually well-equipped and contains laboratories for the study of Geology, Zoology and Entomology as well as an Experiment Station room and a well-equipped library and lecture rooms.



FLINT LABORATORY includes a complete outfit for handling market milk including clarifying and pasteurizing equipments; complete equipment for making butter, soft cheeses, ice cream and artificial ice. It is said to be the best building of its kind in the country.



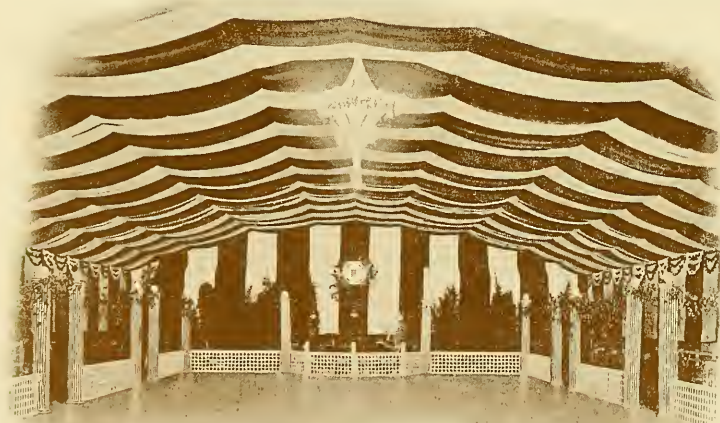
WILDER HALL is noticeable as one of the best designed and best built buildings on the campus. It is the headquarters of the Division of Horticulture, the work here being almost exclusively in Pomology and Landscape Gardening.



FRENCH HALL houses the first separate Department of Floriculture established in this country. In addition the building contains the Departments of Forestry and Market Gardening.



CLASS DAY — One of THE days of the four years.



Ready for
THE SOPH-SENIOR HOP
A scene that is an invitation



THE ROPE PULL



ATHLETICS



ATHLETICS at M. A. C. are under the direction of a General Manager who is also Professor of Physical Education and a member of the college faculty. Intercollegiate athletics are in the hands of a joint committee which represents faculty, Alumni and students.

Aggie teams are representative of the institution in every respect. Only regular students in good scholastic standing are permitted to play on varsity teams and an "M" represents a well-earned honor.

Intercollegiate schedules are arranged for the following sports:—

FOOTBALL

HOCKEY

BASEBALL

BASKETBALL

TRACK

CROSS-COUNTRY

Basketball Schedule, 1920

- | | | | |
|----------|--------------------------|---------|-------------------------|
| Feb. 12. | Conn. Aggie at Storrs. | Jan. 2. | Conn. Aggie at Amherst. |
| 13. | Pratt Inst. at Amherst. | 10. | R. I. State at Amherst. |
| 19. | Dartmouth at Amherst. | 17. | W. P. I. at Worcester. |
| 20. | Pratt Inst. at Brooklyn. | 21. | Amherst at M. A. C. |
| 21. | Stevens at Hoboken. | 24. | Tufts at Amherst. |
| 28. | Springfield at Amherst. | 29. | Stevens at Amherst. |
| Mar. 3. | Dartmouth at Hanover. | 31. | R. P. I. at Troy. |
| | | Feb. 7. | N. H. State at Durham |
| | | Mar. 6. | N. H. State at Amherst. |



FOOTBALL

THE 1919 SCHEDULE

		SCORE
Massachusetts vs.: —		Mass. Opp's
Oct.	4. Conn. Agr'l College at Amherst	15 7
	11. Dartmouth at Hanover	7 27
	18. W. P. I. at Amherst	27 0
	25. Vermont University at Amherst	25 0
Nov.	1. New Hampshire State at Durham	7 9
	8. Rhode Island State at Kingston	19 11
	15. Springfield Y. M. C. A. College at Springfield	0 0
	22. Tufts at Amherst	14 0
		114 54

THE FRESHMAN SCHEDULE

Oct.	11. Monson Academy at Monson	57 0
	25. Brattleboro High at Brattleboro	26 14
Nov.	1. Arms Academy at Amherst	34 0
	8. Williston at Amherst	14 18
		131 32

NON-ATHLETIC ACTIVITIES

The Musical Clubs

The musical clubs consist of the Glee Club, the Mandolin Club and the College Orchestra. These organizations take part in various college social functions and make several trips during the college year giving concerts in different parts of Massachusetts and the neighboring states.

Dramatics.

The "Roister Doisters" produce a play at the time of the Junior Prom in the winter and again in June as a part of the commencement programme.



Publications

THE COLLEGIAN is the college weekly. It is primarily a news sheet and is the popular medium for expressing student opinion.

THE INDEX is the Junior Annual, and is a permanent record of the year's work of the student body.

THE SQUIB is the outlet for campus humor and appears six times a year.

The Senate

The Senate is the student governing body and is composed of six members of the senior class and four from the junior class. All matters of student relations and campus activities are under the authority of these representatives.





Social Life

Informal dances are held in the Drill Hall at frequent intervals during the year. Special cars are run from Smith and Mount Holyoke at these times.

The Junior Prom is a February event and is under the direction of the junior class.

The Senior-Sophomore Hop is a part of the commencement programme.

Fraternities

There are ten fraternities at M. A. C., seven of them being National. The following is a list in order of establishment: Q. T. V., local; Phi Sigma Kappa, national; Kappa Sigma, national; Kappa Gamma Phi, local; Theta Chi, national; Sigma Phi Epsilon, national; Lambda Chi Alpha, national; Alpha Sigma Phi, national; Alpha Gamma Rho, national; Delta Phi Gamma — for women, local.



THE MASSACHUSETTS COLLEGIAN



MASSACHUSETTS AGRICULTURAL COLLEGE

Vol. XXX.

Amherst, Mass., Wednesday, October 29, 1919.

No. 5

SIX FROSH TAKE BAPTISM FOR NEGLIGENCE OF DUTY

Large Crowd Sees Execution of Sentences by the Senate.

With a delegation of six men from the entering class inspecting the M. A. C. water supply, the first pond party of the season was declared a success by all who witnessed it.

The event took place Friday afternoon, Oct. 24, at 12-45. A large crowd of spectators lined the sides of the pond to laugh and cheer.

The six delegates were marched from Social Union rooms, accompanied by a large portion of the Sophomore "Aggie's owl" two-piece band.

The parade ended at a large feet above the northern side of the pond.

WORLD AGGIE DAY HUGE SUCCESS

WITH FOUR ATHLETIC VICTORIES

FUND UP TO \$126,000

Meetings All Over World Bring M. A. C. Men Together with Alma Mater on Their Lips.

M. A. C. SURPRISES VERMONT TO TUNE OF 25-0

Whirlwind Backfield Scatters Visitors' Efforts to Futility.

The Maroon and White eleven, playing against a team that outweighed them 15 pounds to a man in the line, turned in its second consecutive victory, and its third of the season, against Union Vermont Saturday afternoon.

ALUMNI AGGIE NIGHTS GIVE FUND BIG BOOST

Discuss Everything from Policies to Politics, with Memorial as Leading Topic.

"And everybody had a good time." This is the report from every one of Aggie's 24 Alumni meetings held last Saturday night.

HOSTON.

The Boston meeting was equally successful with something over 100 men present, most of whom had pledged previously. Approximately \$8000.00 was added to the former pledges. Politics and national events brought up some serious and interesting talks from alumni and guests who were present.

H. W. Dana '09, the president of Greater Boston Club.

George H. P.

AGGIES TEAM POWER AND SPEED TROUNCES SHIFTY TUFTS' TRIBE

ALL SCORING OF GAME DONE IN FIRST HALF

Turn Two Forward Into Touchdowns
Period; Score 0

M.A.C.	TUFTS
Wright, 10	DiMarzio
King, 10	Berchard
Gree, 10	Barrett
McDermott, 10	Pror
Holmes, 10	Riordan
Morris, 10	McGowan
Ford, 10	Keefe
McCarthy, 10	Smith
Wright, 10	Thurston
Wright, 10	Hub. Connell
People, 10	McDonnell
Smith, D. A. U. T. Tufts & School	
Law, M. A. C. - DeWalt for Good	
Lin, Lou for Whittie, Lealand	
ski for Jakeman, Glavin for Gray	
Spracht for McElroy, Tuffe for	
for Pror, Sanford for Smith, Mc	
for ... Lindell for Conn.	
"1 touch"	

M. A. C. Chapel Bells Sound Tufts' Defeat

Aggies Careen to Brilliant 14 to 0 Victory Over Medford Collegians Through Superior Playing

AMHERST, Nov. 22—Chapel bells at Massachusetts Agricultural College rang loud and long as wild students snaked around bonfire. Never before in the history of the college was there such an occasion as the great throng of alumni, friends and undergraduates enjoyed yesterday, when the Aggies defeated Tufts, 14 to 0. A hard battle had been anticipated, but hopes were more than fulfilled. It was more than a contest of physical strength and strategy; it was a test of condition, endurance and morale. Tufts had promised a variety of trick plays, and those who stands were well satisfied they witnessed them. But at the 15 quarter Tufts ... had to resort to straight football.

Vermont Easy For Aggie Eleven

M. A. C. Has Soft Time in Rolling Up 25-to-0 Score.

AMHERST, Oct. 11—The Aggies easily won from University of Vermont, 25 to 0, here today. The Aggies scored in every quarter. Poole, Fullback. M. A. C. scored in the first quarter and had made a 20-yard ...

MASSACHUSETTS
AGRICULTURAL COLLEGE

REPORT OF THE PRESIDENT
AND OTHER OFFICERS OF
ADMINISTRATION



1919

THE M. A. C. BULLETIN
AMHERST, MASSACHUSETTS

VOLUME XII MARCH, 1920 NUMBER 3

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THE FIFTY-SEVENTH ANNUAL REPORT OF THE
MASSACHUSETTS AGRICULTURAL COLLEGE

PART I.—THE REPORT OF THE PRESIDENT
AND OTHER OFFICERS OF ADMINISTRATION
FOR THE FISCAL YEAR ENDED NOV. 30, 1919



PUBLICATION OF THIS DOCUMENT
APPROVED BY THE
SUPERVISOR OF ADMINISTRATION.

CONTENTS.

	PAGE
Report of the President of the College:—	
Review of the Year,	7
Legislative Budget for 1920,	22
Report of the Dean,	30
Report of the Director of the Experiment Station,	33
Report of the Director of the Extension Service,	36
Report of the Director of the Graduate School,	39
Report of the Director of Short Courses,	43
Tables and Statistics,	48
Financial Report of the Treasurer,	59



The Commonwealth of Massachusetts

MASSACHUSETTS AGRICULTURAL COLLEGE,
AMHERST, Nov. 29, 1919.

To His Excellency CALVIN COOLIDGE.

SIR: — On behalf of the trustees of the Massachusetts Agricultural College I have the honor to transmit herewith, to Your Excellency and the Honorable Council, Part I of the fifty-seventh annual report of the trustees, for the fiscal year ended Nov. 30, 1919, this being the report of the president of the college and other officers of administration to the corporation.

I am, very respectfully, your obedient servant,

KENYON L. BUTTERFIELD,
President.

Enrollment in the Two-year Course.

The work of our two-year course has met with an enthusiastic response from the people of the State. It will be recalled that the first year of the two-year course started about the first of December, 1918, and continued until the last of March, 1919. At the close of the first year's work in this course, those who had enrolled were placed on farms for six months' practical work. The enrollment in the two-year course this autumn is even larger than was anticipated, the total being 209, of whom 8 are women. Twenty-nine men have registered in special one-year courses in poultry husbandry and in rural engineering.

Summer School and Other Short Courses.

The summer school of 1919 had the largest enrollment in its history, the total being 238. The work of this course was developed in co-operation with the State Department of Education, and served as a training school for teachers of western Massachusetts and for others desiring special work in agriculture.

In the winter of 1919, when it was learned that the army in the American camps would be speedily demobilized, a series of six weeks' courses in agriculture was arranged to meet the need of those soldiers who should care to come to the college for a brief period and more adequately prepare themselves for farm work. These courses started February 10, April 14 and June 30, respectively. A special course in poultry husbandry was offered from March to June, 1919. The ten weeks' course of 1919 was quite well attended, the total enrollment being 63.

The development of our short course work has, under Prof. John Phelan's direction, been most gratifying, and the demand for the various courses already organized has been quite unexpected. I wish to submit in full Director Phelan's report covering this work. (See pages 43-47.)

Federal Board for Vocational Education.

The Federal Board for Vocational Education was, at the close of war hostilities, delegated to assume the responsibility for providing adequate training for those soldiers and sailors

who had been disabled during the war. The officers of this Board, who have charge of the New England district, chose the Massachusetts Agricultural College to which should be sent those disabled soldiers and sailors desiring to pursue an agricultural course in order to adequately fit themselves for a vocation which will render them self-supporting. A few of these returned soldiers and sailors were enrolled in the college in the spring of 1919, and this autumn some 75 are here. A few of these are enrolled in our four-year course, three or four being former students of this institution; but nearly all of the Federal Board men are enrolled in the two-year course.

Total Enrollment at the Present Time.

In addition to the 519 students enrolled in the work of college grade, we have on the campus at the end of November, 209 in the two-year course, and 29 in the one-year courses in poultry husbandry and rural engineering, making a total of 238 in our short courses, and a total student population of 757.

Student Activities.

All varsity athletic teams have now resumed intercollegiate relations on much the same basis as that prevailing before the war. The baseball team of 1919 played its first full schedule since 1916. A football schedule was carried out this autumn after an interruption of three years. It has been gratifying to note the rapidity with which the normal student life has been resumed.

Absence in France.

It was my privilege to serve as one of three members of the Overseas Educational Commission, which directed the educational program developed among the soldiers in the American Expeditionary Forces. I sailed for France on Nov. 30, 1918, and on arrival proceeded to organize the vocational work, particularly that in agriculture. While the commission went over under the auspices of the Y. M. C. A., the army subsequently assumed full responsibility for its work, and all those serving in connection with the project became civilian employees of the army, and were designated as the Educational Corps; the commission became the Educational Corps Commission.

The early demobilization of the American army in France resulted in our being obliged to curtail our program and to bring our educational work to an abrupt conclusion. Early in June I was able to practically close the work of which I had charge, and reached home June 23, in time for commencement.

Other members of our staff who rendered efficient service in connection with the educational work in France were Professors A. E. Cance, J. C. McNutt and R. J. Sprague. A goodly number of our alumni served as teachers and educational advisers at various points in France. The task of directing the work of the college during my absence was performed most successfully by the acting president, Edward M. Lewis. I cannot too strongly express my personal appreciation of the rare skill and complete loyalty with which he carried on the work during my absence, and I know I speak for both trustees and faculty, as well as students, when I say that in the difficult rôle of acting president, Dean Lewis gave abundant satisfaction, and his leadership brought enthusiastic support.

Resignations.

In the spring of 1919 Prof. W. D. Hurd, who had for nearly ten years been director of our Extension Service, resigned to accept an attractive position with the National Fertilizer Association. Professor Hurd came to the institution when Extension Service was a new enterprise, not only in this State but throughout the country. He did truly pioneer work in developing our State system of Extension Service, and evolved an organization and system of administration which was one of the most comprehensive and effective to be found in the country. Indeed, as the extension work became nationalized through Federal legislation and executive oversight, the general plan of administrative organization which Director Hurd developed here was regarded as in many ways a model. During the last five years of Director Hurd's administration the State had appropriated annually \$50,000 for extension work, and this amount was in 1919 increased to \$78,000. The Smith Lever and other Federal funds brought the total amount available for extension work up to nearly \$100,000 annually. During the war the United States Department of Agriculture made fur-

ther emergency grants of money to the administration of our Extension Service for the support of projects in home economics, agricultural production and in boys' and girls' club work. For something over half a year during the war Professor Hurd was assistant to the Secretary of Agriculture of the United States. He was an active member, and at one time chairman, of the committee on extension service of the Association of American Agricultural Colleges and Experiment Stations. Professor Hurd was skillful in selecting members of his staff, and their loyalty to him was most marked. His service was a notable piece of constructive educational work for Massachusetts, pursued with great energy and keen foresight.

Prof. A. G. Hecht, head of our Department of Floriculture, who had for some months served in the army, resigned, shortly after his return, to take up business activities in St. Louis. Professor Hecht was an able administrator and teacher, and a man well trained in his subject. It was with regret that we accepted his resignation, because we had been confident that under his guidance our Department of Floriculture would develop until it should take its rightful place of leadership, not only among the colleges of the country, but also among the commercial florists of the State.

New Appointments.

Mr. John D. Willard has been elected director of Extension Service to succeed Professor Hurd, and it is expected that he will assume the responsibilities of this office Jan. 1, 1920. Mr. Willard in 1916 was eminently successful as secretary of the Franklin County Farm Bureau. Early in 1917 he became executive secretary of the food committee of the Massachusetts Public Safety Committee, and later served as assistant to Henry D. Endicott, Food Administrator of Massachusetts. Early in 1919 Mr. Willard came on to the college staff in charge of the extension work in marketing. In July Governor Coolidge appointed him to the Commission on the Necessaries of Life, and for the past four months Mr. Willard has been devoting practically all of his time to this work.

Mr. Clark L. Thayer has been chosen to succeed Prof. A. G. Hecht as head of the Department of Floriculture. Mr. Thayer

is a graduate of this college in the class of 1913, and since graduation has taught in the department of floriculture at Cornell University under the direction of Prof. E. A. White, formerly of this institution. Mr. Thayer enters upon his task here with an excellent academic training and a rich practical experience.

War Record of the College.

I cannot too frequently call attention to the splendid war record of the college, not only as reflected by the number of students, alumni and faculty participating in the war, but also as indicated by the service which the institution rendered by its large force of scientific experts who contributed their time throughout the war period. The following table has been compiled from the latest records of those serving in the army and navy:—

War Record of the College.

	Total in Service (Army, Navy, Marine Corps).	Commis- sioned Officers.	Overseas.	Deaths.	Addi- tional in State Guard.	Addi- tional in Y.M.C.A., Red Cross, etc.
Faculty,	20	14	8	1	-	2
Class:—						
1873,	-	-	-	-	1	-
1876,	-	-	-	-	1	-
1878,	1	1	-	-	1	-
1882,	2	2	-	-	2	-
1885,	2	2	1	-	-	-
1886,	-	-	-	-	2	-
1890,	1	1	-	-	-	1
1891,	-	-	-	-	2	1
1892,	-	-	-	-	1	-
1893,	-	-	-	-	1	-
1894,	1	1	-	-	-	-
1895,	2	2	2	-	1	1
1896,	-	-	-	-	3	-
1897,	2	2	-	-	1	-
1898,	-	-	-	-	1	-
1899,	1	1	1	-	2	-
1900,	1	1	-	-	-	1

War Record of the College—Concluded.

	Total in Service (Army, Navy, Marine Corps).	Commissioned Officers.	Overseas.	Deaths.	Additional in State Guard.	Additional in Y.M.C.A., Red Cross, etc.
1901,	1	-	-	-	1	-
1902,	1	-	-	-	-	-
1903,	3	3	1	-	1	-
1904,	1	1	-	-	1	-
1905,	-	-	-	-	1	1
1906,	4	4	3	-	2	1
1907,	6	4	3	-	-	1
1908,	9	6	4	1	1	-
1909,	7	2	2	-	2	-
1910,	13	5	6	2	3	-
1911,	19	7	10	2	-	-
1912,	36	18	17	1	4	3
1913,	48	24	26	6	-	1
1914,	73	33	29	2	-	-
1915,	78	31	37	1	-	1
1916,	107	47	50	2	-	1
1917,	129	55	56	7	1	-
1918,	137	66	71	7	-	2
1919,	158	52	57	6	-	1
1920,	130	26	25	3	3	-
1921,	92	11	4	2	-	-
1922,	108	-	1	-	-	-
Graduate students, . . .	39	4	11	2	-	-
Unclassified,	62	12	16	5	1	1
Total,	1,318	437	441	50	33	19

The secretary of the college is still working on this record in order that it may be as complete as possible, and it is proposed to publish in the near future a rather comprehensive report on the full participation of the college in the war.

Alumni Memorial Building.

In the spring of 1919, Acting President Lewis invited a group of some twenty-five representative alumni residing in the vicinity of Boston to meet him there and discuss various

problems confronting the institution; among other things which were considered at that time was the question of erecting a suitable memorial to commemorate the splendid war record of our alumni and students, but more especially to serve as a memorial to the fifty M. A. C. boys who gave their lives in the great war. As a result of this conference the Alumni Association held a banquet in Boston on May 23. It has been said by many to have been the most significant alumni meeting in the history of the college; 288 were present. Tentative plans for erecting a student memorial building which would cost \$150,000 were presented at that time; the alumni unanimously endorsed the project, and that evening subscribed approximately \$20,000 toward it. Subsequently the campaign for raising the balance of the fund was organized under the direction of an alumni committee, with Mr. Almon W. Spaulding of the class of 1917 as manager. The campaign was launched the 1st of October, and as a result \$143,000 has to date been subscribed. The response of the students to the appeal for support was remarkable; \$26,000, subscribed by them during the campus campaign, was pledged practically in twenty-four hours. The memorial building will be located in the area south of the stone chapel, and will serve as headquarters for various student activities and will be the center of the social life of the college.

I cannot commend too highly the spirit which inspired this project, nor the splendid success which has thus far been attained in the campaign for funds. It is the first time that our alumni have been asked to make any large contribution for the benefit of the institution. The purpose of the building is, in my judgment, ideal, and the whole effort will certainly result in bringing the body of loyal alumni into still closer touch with the institution. It is indeed a courageous undertaking for a small college without wealthy alumni to assume so large a responsibility. Its immediate success and the enthusiasm and energy with which it was carried out are simply indicative of what one may well, without any attempt at rhetoric, characterize as the traditional "Aggie spirit."

Memorial Service.

On June 11 there was held in Stockbridge Hall a memorial service in memory of our men who gave their lives in the war. The relatives and friends of the men were invited, and 17 out of the 50 families were represented. Luncheon was served at 1 o'clock, and at 3 P.M. the following program was carried out:—

Organ prelude.

Invocation.

Rev. JOHN A. HAWLEY

Organ solo, prelude in C Minor, *Chopin*

Mrs. EDNA K. WATTS

Remarks in behalf of the trustees.

Mr. CHARLES A. GLEASON

Vocal solo, "Lest We Forget," *DeKoven*

Mr. HARLAN N. WORTHLEY, 1918

Remarks in behalf of the alumni.

Dr. JOSEPH B. LINDSEY

Organ solo, Prelude and Fugue in G, *Bach*

Mrs. EDNA K. WATTS

Remarks in behalf of the faculty.

Dean EDWARD M. LEWIS

Vocal solo, "The Americans Come," *Fay Foster*

Mr. HARLAN N. WORTHLEY, 1918

Benediction.

Rev. JOHN HAWLEY

Organ postlude.

Practically all the students were present, as well as a large number of faculty and towns people.

Commencement.

The annual commencement was held Tuesday, June 24. Albert R. Mann, Dean of the College of Agriculture of Cornell University, delivered the commencement address, his subject being, "The Place of the Trained Man in Agriculture." Degrees were awarded to 61 men and 10 women. The degree of bachelor of science honoris causa was also conferred upon 25

former members of the college who died in military service and who did not remain in college long enough to complete their work.

The degree of master of science was conferred upon one candidate.

Legislative Appropriations.

The Legislature in 1919 was requested to appropriate \$150,000 for the construction and equipment of a women's building; \$45,000 for miscellaneous improvements and equipment; and \$15,000 for the market-garden field station. The appropriations granted were as follows: women's building and equipment, \$127,400; miscellaneous improvements and new equipment, \$20,000; market-garden field station, \$15,000; for a special study of the grounds, \$2,000, making a total of \$164,400.

Improvements and New Construction.

The improvements completed during the present fiscal year include the turbine building provided in 1918. This is a brick building in which is stored all of the electrical equipment of the power plant. The building was completed late in the spring. Numerous improvements have been made in the building and grounds to make them more suitable for the needs of the institution. The construction of the women's building was begun early in November, and it is hoped that sufficient progress may be made before winter closes in to permit the contractors to continue work during the winter with little interruption.

Consolidation Law.

Following the mandate of the voters of the Commonwealth as expressed by their approval of an amendment to the Constitution referred to them by the Constitutional Convention, the Legislature of 1919 was obligated to pass a law consolidating all the State boards, departments and commissions into not more than twenty groups. The Massachusetts Agricultural College was logically placed in the group of other educational institutions, all of which are included in the Department of Education. (General Acts of 1919, chapter 350, Part III, Division 9.)

The College as a State Institution.

The college has now for a full fiscal year been operated as a "State institution." We have been obliged to make numerous adjustments in our methods of accounting, payment of bills and other details of administration. The college has made every effort to comply in all respects with the laws and new administrative rules governing the work of the college, and has found the various State departments and officials responsible for the administration of these laws most patient and indeed generous in helping us to make the various adjustments. It is quite possible that some rather important and even serious problems of institutional efficiency may arise out of the new requirements. A State budget system is unquestionably necessary and desirable. It is highly appropriate that the Commissioner of Education should head the educational forces of the State. The only question is, how can the greatest efficiency of the college itself be sustained, with such initiative and final authority as are necessary to that efficiency still residing in the trustees and faculty, and at the same time conform loyally, thoroughly and fully to the new centralizing plan that has undoubtedly come to stay. I feel very sure that these matters can be worked out. Certainly, we must show the same spirit of courtesy and good will that has been shown us by the officials from the State House.

Standardization of Salaries.

Pursuant to the State law, the Supervisor of Administration has, in consultation with the president of the college, been studying the problem of standardizing the salaries, duties, qualifications and titles of the officers of the institution. The college has welcomed the initiative of the Supervisor in this effort, and I hope that out of it may come many advantages to the institution, such as the specification of titles, the more definite establishment of grades with respect to salary, a substantial increase in actual and prospective salaries, an adjustment in discrepancies of titles and salaries, and, above all, a greater certainty to the members of our staff of reasonable and adequate salary advances, combined with a fuller knowledge of what a staff member may reasonably expect ultimately to receive.

The Departments of Undergraduate Instruction.

As has already been indicated, the work of the past year has been largely that of readjustment. The departments, especially those in agriculture and horticulture and the sciences, have all been confronted with numerous problems of relationship between the two-year course and the four-year course. Thus far the adjustments at this point have been happily made. A number of instructors who have served in the war have returned during the year to resume their work, although a number of other instructors have resigned. Heads of divisions are unanimous in expressing the opinion that something must be done in the way of larger salaries if we are to maintain our present staff or our present quality of instructors. Quite a few of our best men have left during the year to accept more attractive positions in educational work or in commercial activities.

The effectiveness of the work in the Department of Agricultural Education has been greatly increased by the appointment of an additional professor who, in co-operation with the Department of Education, is giving special attention to the training of teachers for agricultural work.

We still feel very keenly the handicap of inadequate facilities in certain directions. The need of the library is more pressing than ever, chiefly in view of the fact that we have more students on the campus than ever before. The chemistry laboratory is becoming more and more inadequate, and certainly the instruction given there is performed under conditions which lessen its effectiveness and economy in operation.

Women's Work.

Miss Edna L. Skinner was appointed professor of home economics at the beginning of the second term of the current calendar year. She is also serving for the present as adviser of women students. With no adequate facilities for teaching home economics, she has had to overcome a good many handicaps; the work, however, is being enthusiastically received by the women students who desire to supplement their training in agriculture with a limited number of courses in home economics and allied subjects. One of our problems is to develop

the general field of homemaking, especially in respect to preparation for the rural home. We need ampler facilities than we can possibly provide at present, with a reasonable amount of equipment and some additions to the teaching force. During the year Miss Margaret Hamlin has been designated definitely as vocational counselor for women, with particular reference to helping women who desire to enter agriculture. She has succeeded in placing quite a number of our graduates in permanent positions, and has a record of applications much greater than we have thus far been able to fill. There is no doubt whatever but women are coming to the college in increasing numbers, both for agriculture and for homemaking, and it is only fair to them and to the people of the State that we should as rapidly as possible make fully adequate provision for housing and for teaching.

One of the problems confronting the management of women's work has been that of making adjustments for an increasing number of women students in a college where all the policies, equipment and methods have been intended to meet the requirements of men students. For example, there are no traditions of social life. Much improvement has been made, particularly in the creation of the *esprit de corps*; social regulations have been revised, and the Student Government Association organized. The interest of women in all phases of agriculture has been markedly increased during the past year. An endeavor has been made to enforce the idea that the farm and the farm home are a unit. Women studying agriculture, therefore, are offered courses in homemaking. A clothing laboratory and a food laboratory have been equipped for this purpose and are now in use. The completion of the dormitory for women will not only afford adequate accommodations for the rooming of a hundred students, but it will meet some of the difficulties that have been mentioned.

The Infirmary.

A special need growing out of the increase of women students is in the procurement of satisfactory infirmary facilities. Inasmuch as these facilities are already rather crowded for men students, it will probably be necessary within a few years to

construct a fairly large infirmary building, and, indeed, it may be wise to provide two buildings, one for men and one for women. All this confirms the judgment of Dr. Marshall, the supervisor of the infirmary, that we must have first-class hospital facilities and a hospital force to meet exigencies as well as the ordinary needs.

Market-Garden Field Station.

During the past two years two greenhouses, a boiler house and a farmer's cottage have been constructed. On account of the increased cost of building some changes had to be made in the plans, but the appropriations were not exceeded. The station is now on a permanent and substantial basis and fully meeting the work expected of it.

The Library.

The attendance records for the library show a marked increase in library use. Careful records kept during October, for example, show that 3,277 visited the library in October a year ago, and 6,010 in October of this year. The branch library in Stockbridge Hall had 430 visitors the same month a year ago, and 1,132 this year. The book accessions for the year have been creditable. There are now 62,000 volumes on hand, about double the number ten years ago. It is hardly necessary to repeat the plea that has been made over and over again for the last sixteen or eighteen years as to the need of a new building to house this equipment. The library extension work continues to grow. Collections of the latest books on agriculture and home economics are loaned to the libraries of the Commonwealth, and package libraries on special subjects in these fields are sent out. All this material is loaned for a period of eight weeks, subject to a renewal when possible.

Department of Physical Education.

During the year Professor Hicks, Professor Gore and Mr. Derby all returned from war service duties to the regular work here. Physical drill is now a requirement in the training of the Reserve Officers Training Corps, so that it is now carried

on under the joint supervision of the professor of military science and tactics and the physical director. Active interest has been maintained in interclass athletics, and, as already indicated in this report, intercollegiate athletics have been resumed. It seems to be a fact that service men returning to college have an unusual interest in athletic work. The department has also had to meet the problem of providing exercises for nearly two hundred men in the two-year course. During the past fall the attendance of the men in the work of this department is at least 50 per cent greater than at any previous time in the history of the institution. The perennial need of the department is a new gymnasium. The present drill hall cannot be used for gymnastics, and repeated attempts to do this have finally been abandoned. In other words, the department has to confine its work almost wholly to athletics. Athletic field facilities are somewhat less pressing, but still should be provided, particularly so long as we have no gymnasium.

Department of Military Science and Tactics.

The work with the Reserve Officers Training Corps, under the supervision of the War Department, has been resumed. We believe that this plan, carrying as it does a progressive scheme of instruction, will develop great interest among the student body as well as harmonize with the general governmental policy. The head of the department finds the drill hall completely inadequate, and states that the failure of the State to provide armory facilities is so serious a handicap that it defeats to a very large extent the real purpose of the military drill.

During the year Col. R. H. Wilson, who had been in charge of the department for two years, retired from service here and his place was taken by Col. R. H. Walker. Colonel Wilson was especially effective with the Student Army Training Corps unit. The results obtained with the unit during the autumn term were really remarkable. The showing of the men as they paraded on Armistice Day was a revelation. Colonel Walker comes to us out of the abundant experience in the army, and full of enthusiasm for the possibilities of the Reserve Officers Training Corps.

LEGISLATIVE BUDGET, 1920.

The legislative budget, as adopted by the Board of Trustees last October, calls for considerable increases, both in funds for current expenses and in special appropriations for permanent improvement. There are four main groups of needs which the Legislature is asked to meet through increases in the appropriations for current expenses, as follows:—

1. Increase of salaries for the members of the staff. This is, by all odds, the most important single need of the institution. So much has been said publicly concerning the humiliating position in which the teachers, both in public schools and in colleges, find themselves in this era of high prices that I do not care to repeat the argument for illustration here. I can only enforce with all the power at my command the pleas that have been made repeatedly by presidents of many of our leading universities and colleges, both endowed and state supported, on behalf of higher salaries for members of the staff. The matter has become more than serious; it has become critical. Men are leaving us for other lines of work. The morale is being broken down, and discouragement and disheartenment will soon result unless the remedy is immediately applied. The increases we ask are modest, undoubtedly less than are deserved, but we hope that these increases, taken in connection with adjustments of salary grades which members of our staff may reasonably expect to achieve within a few years, will at least do reasonable justice to the situation.

2. A number of new positions are asked for on the teaching force, in the Experiment Station and in the Extension Service. We have not asked for the establishment of any new position that we did not think was absolutely necessary in order to make it possible for the institution to render the service that is being demanded of it by the people of the State. We must remember that the college, in all lines of its work, is an investment. If the college does its work well, for every dollar that the State puts in to the support of the college many dollars are returned to the productivity and welfare of the Commonwealth.

3. In the Extension Service an unusually large increase is required, not only because of new demands, but because the

withdrawal of United States funds, both emergency war funds and other funds which had been available, make it necessary for the State to make good the loss, or else we shall have to entirely drop many important lines of extension activity which have, without any doubt whatever, found a place in the agricultural educational system of the State. There is also included in the Extension Service budget an item for the appropriation of State funds to aid directly the county farm bureaus. It is a matter of very great gratification to us all that the farm bureaus are asking for this through the college in order that not only they may have the larger support to which they feel they are entitled, but in order that there may be the closest possible co-operation between them and the Extension Service of the college.

4. The nominal increase in our request for current expenses is much larger than the actual increase in former years, because under State law we are obliged to return to the State treasury all income, no matter how earned. For example, all of the receipts from the farm, the dairy, the poultry plant, the horticultural department go directly to the State treasury. The so-called producing departments, therefore, are charged with all the expenses of growing crops, producing milk, etc., but without any opportunity to receive credit in money for the sale resulting from their productivity. This is unfortunate in many ways. Under a system by which departments do get credit for what they sell, it often happens that the larger the gross expenditures the less the net cost to the college because the larger expenditure has resulted in increased production. On the other hand, under the present plan, every expenditure for producing or harvesting simply adds to the cost of the department. It is universally agreed upon the campus that this system does not work well from the college point of view. Whether it can be changed is another question.

Requests for Special Appropriations for Permanent Improvements.

It has been difficult for the trustees to reach a conclusion as to the wisest and fairest policy to follow with respect to special appropriations from the incoming Legislature. The building

program of the college, already far behind the needs of the institution, was practically laid aside during the war. It is recognized that other State institutions pursued a similar policy, and that the total requests from these institutions will be very large indeed. It is also recognized that we are in an era of high costs for buildings. Our best advice is, however, that we can hardly look for any sharp decrease in building costs for some time to come. The attendance at the college is larger than ever before, and need for room and equipment will increase rather than diminish. It has seemed, therefore, as if the trustees were best meeting their duty by presenting a budget which represented the present needs of the institution, leaving it to the responsible State authorities to indicate what the State can afford to spend upon the institution another year.

The specific items in the special legislative budget are as follows:—

Library Building and Equipment.

In the report of the trustees for the fiscal year 1915 the library building was requested and the needs for it outlined. Attention is called to the fact that late President Goodell, who himself acted as college librarian for many years, as far back as 1902 emphasized the need for a new library building. This need, of course, has strengthened with the years. The report of the Commission on Investigation of Agricultural Education, made in January, 1918, said that "An adequate library building is at present one of the greatest material needs of the college."

The original estimate for this building has, of course, to be increased. It is believed that to carry out the plans adopted by the trustees it will be necessary to call for an appropriation of \$425,000. Probably about one-third of this amount will be required during the fiscal year in which the building is begun.

Chemistry Laboratory and Equipment.

While this is the first time that this structure has been asked for, it has been under discussion for many years. The Commission on Investigation of Agricultural Education said that "An adequate chemistry laboratory is equally needed. The present chemistry building is one of the oldest, most dilapi-

dated and most unsuitable buildings on the campus." Chemistry is a subject required of every student because it is fundamental in all agricultural work. For the same reason the research work in chemistry demands more space than does any other single branch of investigation. It is estimated that it will require an appropriation of \$600,000 to build and equip a building that will be at all adequate to meet the situation. As in the case of the library, however, not more than one-third of this amount will be needed during the fiscal year.

Miscellaneous Improvements and Equipment.

The time has come when the college should be liberally treated with reference to the making of a large number of miscellaneous improvements and the purchase of many items of equipment for the different departments. For many years past our requests for these things have been seriously cut by the Legislature. The result is that some departments are almost scandalously short of equipment. This item is in turn composed of a large number of separate items which are indicated in the list submitted to the Supervisor of Administration, together with definite projects covering each detail. The aggregate in figures is \$120,000.

A Dwelling for Farm Help.

There can be no question but far more efficient farm help can be kept at the college if provision is made for residence near the college buildings. This is especially desirable, as the barn and piggery are south of the college farm. It is believed that this house can be built at a very reasonable figure by using timber belonging to the college. The estimate is \$5,000.

The Extension of the Rural Engineering Shops.

These shops, erected nearly four years ago, are totally inadequate to accommodate the large number of students taking the work. As was expected when the department was organized, it has developed into one of the most useful and popular of the practical departments, and there is clearly no limit to the service that it can render to the students and the farmers of the State. Farm machinery is becoming more and more an im-

portant factor in agriculture. Simply to meet the existing demand requires that the present space be doubled; this will cost \$25,000.

Improvements at Power and Heating Plant.

The request for an appropriation aggregating \$80,000 for the power plant is made necessary when we consider the needs of the institution from an economic point of view. Two of the old boilers should have their foundations replaced the coming year, the cost of which is approximately \$5,000. They are seventeen years old, and when they are twenty years old it will be necessary to replace them, as their pressure will undoubtedly be cut down. It seems, therefore, that the economic thing to do is to put in two boilers next year. With the new building being erected, we should have a spare boiler so that it will not be necessary to run the entire battery during the peak load without having any boiler for emergency service. We recommend that two Heine water tube boilers, 400 horse power, be installed with stokers. At this time the Dillon boiler, which was purchased in 1915, should be connected with a stoker also. The feed water heater is in very poor condition. It is of too small a capacity, and was secondhand when purchased. We recommend the purchase of a heater.

With the increased lighting requirement there continues to be wasted every year a considerable amount of exhaust steam. We recommend that a tunnel be constructed from the power plant north to Flint Laboratory and Stockbridge Hall, through which all steam mains may be carried. This would allow us to install a heating main carrying exhaust steam to these buildings, which would take care of the loss of steam.

Stable for Cavalry Unit.

The United States War Department has notified the college that it will send to this institution and maintain a unit of at least thirty horses, the maintenance to include feed, care, veterinary service and blacksmithing. This will permit cavalry drill to be added to infantry drill as a part of the military education carried on at all of the institutions which receive Federal aid as does ours. The only requirement placed upon the college

is to build a stable that will accommodate the horses. It is estimated that this will cost \$15,000; in this case it is believed that substantial savings can be made by the use of lumber cut from the college forests.

The Celebration of the Fiftieth Anniversary of the College.

It will be recalled that rather elaborate preparations had been made for the celebration of the fiftieth anniversary of the opening of the college to students, through a program which was to have taken place in October, 1917. Because of the entrance of the country into the war it was thought that it would be impossible to carry out the program with satisfaction, and it was therefore entirely canceled. It is now proposed to resume the project for a celebration, and you will have laid before you plans originating with a committee of the faculty, looking toward a celebration going over a period of about a year, beginning with the laying of the cornerstone of the new Memorial Hall next spring and ending in June, 1921, at Commencement time, with a dedication of the Memorial Hall, a presentation of the pageant which had been prepared for 1917, a celebration of the fiftieth anniversary of the graduation of the first class of the college in 1871, and other appropriate exercises. Between these dates it is proposed to hold a series of conferences, the college either acting as host or co-operating with other organizations and places, these conferences to bear upon some phase of the development of agriculture and country life. The Association of Land Grant Colleges has again voted to meet in Springfield some time next autumn, and the delegates will arrange to spend a day at the college. I will not go into further detail at the present time. I do want to call attention to the fact that to carry out this plan we need a special appropriation from the Legislature.

Some Problems.

In closing, I desire in a very brief way merely to call your attention to some very important questions that must be answered in the near future.

1. *Salaries.*—I have already referred to this matter in another part of this report, but it is of such vital consequence

to the continuing effectiveness of the college that I desire to reiterate the statement that it is the most important single question before us. The increase of salaries is not only a matter of justice to the individuals on the staff, but it is absolutely necessary in order to retain men upon the staff who are effective, and who, to maintain their effectiveness, must be relieved from serious worry in regard to financial matters. College teachers for years have been underpaid.

2. *The building program* of the college is still years behind. I am beginning to wonder if the State of Massachusetts really intends to provide on this campus the buildings and equipment that are absolutely necessary in order to maintain a first-class agricultural college. I ask this question in all seriousness. I am quite aware of the fact that building costs are, at present, extremely high; that several good buildings have been granted by the Legislature during the past few years; and that the buildings we have had are first class and in every way most satisfactory. But there still remains the demand for certain facilities that the college has never been able to get and for the needs of a growing institution. We are ten years behind a normal building program.

3. *Housing of Students.* — A special feature of the building need is that of accommodations for students. At present, the village of Amherst is unable to accommodate the student body in a manner that is satisfactory. Men are living a mile or a mile and a half, some even a greater distance, from the college. The dormitory problem, therefore, is becoming a crucial question. I wish to recommend a very careful consideration of the proposition that will come to you in at least outline form, that we move at once to secure the erection of plain dormitories in the nature of first-class barracks, comfortable and convenient in every way, with the hope that we can at least temporarily relieve the situation in this way, particularly by providing accommodations for the short-course students, and perhaps eventually for freshmen students. But this does not dispose of the problem. The college, at its inception, adopted as a part of its policy the dormitory system for its students. It does not, however, house in its dormitories as many students as it did thirty years ago at a time when the college was generally

looking more and more toward the dormitory system as an integral part of its policy. Our college is obliged to state the fact that it has practically no accommodations whatever for its student body.

4. *Policy and Organization.* — Several years ago, in a report to your Board, I took considerable time to develop what I believed to be the needs of the institution with respect to a study of general policy and organization. For various reasons those studies have materialized only in part, but I feel that the time has fully come when we should put on paper very distinctly a statement of our aims, purposes and methods. I should like to see these made a part of the anniversary celebration.

5. *The Scope of the College.* — In connection with this general need for defining policies, there is a specific feature. I have been conscious, particularly since getting back from Europe, of an increasing call for courses to be given at this institution other than those connected with the vocation of agriculture. The fact that the Massachusetts Agricultural College is the only one of the land grant colleges which confines itself to the agricultural field, while a matter of pride in the past and undoubtedly a matter of advantage at many points, raises the question as to whether, in a great urban State like Massachusetts, the one State educational institution should not serve a wider constituency. I am not at this time expressing any opinion in this matter, but I think it my duty to call your attention to the fact, or at least what seems to me to be a fact, that to an increasing degree the question is being asked of us, and we must, I think, in the near future, give either a negative or an affirmative answer.

In Conclusion.

In conclusion I wish to express to your Board my hearty appreciation for your continued support, for your unwearied devotion in committee work and other trustee obligations, and for your intelligent consideration of the projects that come to you from time to time from the staff of the institution.

KENYON L. BUTTERFIELD,

President.

REPORTS OF OTHER ADMINISTRATIVE OFFICERS.

The Report of the Dean.

Undoubtedly the great problems of the dean's office are those of the scholarship and the life of the students, especially of the freshmen and sophomores. The fact that a large number of freshmen fall below a satisfactory record in scholarship, while very few juniors and seniors fail, is due not merely to the break between the secondary school and the college, but also to the differences in characters of the studies of the first two years and of the last two years. The problem of overcoming the interruption occasioned by the change of school and of methods of instruction has in the last few years been met with increasing sympathy, clearer understanding and a larger degree of success by the method of special advisors working in co-operation with the dean. I believe that tutors may well be employed for a time for freshmen, and that sympathy and study of the needs of all students should continue indefinitely. It is clear to me, also, that actual assistance by tutoring should continue only during one term or, at most, two terms, of the freshman year. The English university seeks to educate only safe practitioners and leaders; the American college seeks to give higher education to as many as can possibly pass. But in neither ideal is there any desire to foist upon the community unsafe men who are to pose as experts or superficial leaders, or, in short, to fill the professional classes with "lame ducks." The man should be strictly on his own feet, on both of them, by the end of the first, or at most, the second, term of his freshman year. After that, sympathy, understanding, encouragement, intimacy, but not tutoring.

In this connection there arises the great problem of student life as it concerns the freshmen and sophomores. This problem is as important in this office as the problem of scholarship. Some method that would bring students and instructors to-

gether socially, but not in mere so-called receptions, in normal, natural fellowship, very commonly should be found. Specifically, freshmen and sophomore instructors should, if necessary, be assisted financially so as to meet the freshmen and sophomores very often in small groups.

The much greater cause, however, of the apparent inability of freshmen and sophomores as compared with juniors and seniors is not in the men but in our college courses. The courses of the freshmen and sophomore years, almost without exception, are more condensed and more difficult than a very large number of those of the two upper years. This difference is due to two fundamental difficulties:—

1. A fundamental difference exists, of course, in the fact that the studies of the first two years are not technical, while those of the last two years are technical. In my opinion the mere liking that a student has for subjects in his major is not an explanation for his better scholarship in those subjects than in the subjects of the first two years. It is evident that many of them are not in his major and are not preferred by him. Nor is his mere acquaintance with the school an explanation. These subjects should really be more difficult because they are technical. Again it seems evident that there is something wrong. As a matter of fact, I wonder whether we can expect real college work if the student is required to carry so many hours a week. Textbook work is possible, but not much beyond. If the work of the latter two years through compulsion of time is forced into laboratory and textbook work only, it will, of course, be easier than the work of the first two years. I believe that in every year of the college course we require too many hours a week.

2. A number of courses in the upper two years are taught, not as education proper, but, in a way, as manual training. It raises, of course, the fundamental question whether this is a college or a training school, and whether the aim of a college is to teach the *science* or the *art*, or *both*. The question is too long for discussion here, but it is an axiom that the college must teach the science, and only illustratively the art. Nearly all subjects taught in this institution merely as arts evidently cannot be made as difficult as courses taught as science in the

freshman and sophomore years. In my opinion they do not belong in the course for a degree; they belong in the short courses. If they must exist in the degree course, which I doubt, they should be greatly condensed. The work should be intensive, if an art can be. There is small question that in some cases the work drawn out into courses covering two years or more might be and ought to be condensed — in a college — into two or three terms. I wonder whether any committee could be appointed that could and would effectively supervise and co-ordinate and evaluate all courses.

If something is not done to remedy this fundamental fallacy, then the passing grade should be higher in the junior and senior years than in the freshman and sophomore years.

During the year an obstacle in the way of assigning courses for students in the irregular conditions in which they found themselves loomed rather large. This obstacle was the large number of prerequisites to various courses. It has led me to question seriously whether a large number of these prerequisites could not be dropped. It seems to me desirable that there should be as much freedom as there possibly can be for students to take individual courses.

Another obstacle in the way of scholarship, particularly for the freshmen, is in the length of the "rushing" season for the fraternities. This year, as well as last, this has been a serious interruption. I suggest that the rushing season should be confined to two weeks, preferably one week before college opens and the first week of college, or the Christmas vacation and the first week after college opens for the winter term.

The war necessarily placed upon the dean's office an endless succession of special cases in regard to credits, requirements for graduation, maximum hours, etc., as well as more difficult questions of advice to our men who were returning from service. During the S. A. T. C. period, when the problems of co-ordination with military training were to be solved, and at the same time the needs of a body of regular students were to be supervised, the office was a very busy place. The acting dean has acted also as counsellor for disabled soldiers sent to this college by the Federal Board.

The unfailing sympathy and counsel of the Acting President and the wise rulings of the committee on scholarship, whose members were most faithful and painstaking, enabled the office to pass through a difficult period.

C. H. PATTERSON,
Acting Dean.

Report of the Director of the Experiment Station.

In spite of after-war conditions, which retained in military service for much of the year several of its staff, the Experiment Station has made positive progress in each of its departments, of which brief mention will be made in detail.

Agriculture. — A series of field experiments, supplemented by pot experiments, was begun with bacterized pest and with barium phosphate. While these experiments were projected partially to satisfy influential parties, they have shown the need for careful research into efficient use of natural materials and natural agencies for crop production in comparison with the customary employment of fertilizers prepared by artificial means. At present, extravagant claims are made for materials used as fertilizers which are based on results obtained under special and even unknown conditions, while strongly condemnatory statements are made with similar unstable foundations.

Agricultural Economics. — The work of this department was almost completely broken up for a time by war service. Nevertheless, a study of Holyoke's food markets was made, and a promising survey of farm ownership in the State has been begun.

Botany. — Positive ground has been gained in the control of lettuce drop and onion smut. These diseases can be effectively prevented by proper use of formaldehyde in the soil.

Chemistry. — The effect of temperature on the rate of chemical change in cranberries in storage has been definitely established. Variations in the character of the fats of milk during the progress of lactation have been determined. A study of the effect of low protein rations on growing calves has been completed. An investigation of jelly-making in co-operation with the Department of Pomology was begun, and a study of the effect of lactic acid in a ration for swine was also started.

Entomology. — The life history of the European corn borer was completed early in the year. The vacancy caused by Mr. Vinal's untimely death has remained unfilled, and the time of the department has been occupied in the necessary investigations of outbreaks of insect pests in various parts of the State.

Horticulture. — The projects of this department are of continuous, long-term character. Their progress has been uninterrupted by any unseasonal conditions. A graduate assistant was added during the year to the staff. The resignation of Dr. Shaw from the research work will cause considerable difficulty in insuring in the future satisfactory progress in some of the work of this department.

Microbiology. — The needs of the medical and sanitary corps of the army made it exceedingly difficult to secure assistants for the prosecution of the investigations in this department. This fall sees the staff nearly complete again, and work being vigorously prosecuted. The De Laval investigations of clarification of milk have been completed and partially published.

Poultry. — The breeding projects are necessarily continuous over a term of years, and their progress has been uninterrupted. As generations increase in numbers, the problem of land and housing becomes serious.

Veterinary Science. — This department also lacked strong members of its staff until the hospital service was demobilized. Shortly after September 1 its work was again organized, and the investigation of poultry diseases is being pushed. Under an act of the last Legislature, the department has renewed the effort to control the spread of bacillary white diarrhoea in poultry by means of blood tests performed on the fowls. Applications are on file for over 12,000 birds to be tested, and additions are made daily.

Changes in staff have not been numerous during the year, and with one exception have occurred in the minor positions. But these changes have occurred because higher salaries could be secured elsewhere, and it has been impossible to fill the vacancies with equally experienced parties. It is obvious that our scale of compensation is too low at present for the needs of our institution.

By the middle of the year lack of money for printing our bulletins became acute, and several manuscripts had to be withheld from the printer until recently, when it became safe to use the contingent reserve for a part of the work, and to carry the completion of other matter into next year. A considerable list of prepared and proposed bulletins has already been submitted to you in connection with the budget for the ensuing year, in which an increase for publications was requested.

The principal and almost the only line of contact of the research departments with the public is through our publications. There is positive need of greater development of this contact by more reports on investigations, either on completed studies or on progress, and also by short, readable statements of methods and results of our investigations which will interest all our constituents when the full report may appeal only to the people engaged in the special fields in which the problems arise. Such brief popular leaflets would be both an advertisement of the station's power for service and a defence against ignorant critics.

As new buildings are projected for the institution, it becomes apparent that some of our station field experiments occupy unusually fine and dominating building sites. Therefore it is clearly evident that it will be a wise forethought to provide as soon as possible some easily accessible fields with suitable soils for field experiments that will be adjacent to our station buildings, if the work of the station in the study of crops and fertilizers is not to be restricted and is to be permitted to grow as it should. Tillson farm is not, as a whole, suited to the station's needs, and is too remote to permit efficient work without the duplication of some of the present buildings and equipment.

The varied interests of our rural population and the highly capitalized lines of intensive crop production in our suburban localities offer numerous opportunities for fruitful investigations, and frequently call for quick solutions of pressing problems. This year four new projects were selected from several propositions and made a part of the estimated budget for next year. They included an investigation of feeding swine with household

garbage; studies in the economical preparation of jellies and other products from surplus fruits; the climatic effects on orchard spraying in eastern Massachusetts; and the beginning of an investigation of rural social conditions; with particular reference to the changes in our farm ownership.

There are so many opportunities for service that it is a serious problem how to complete the projects now under way while undertaking new ones that are asked for by different interests. A specialist in one line cannot, as a rule, be transferred to some other line, and, on the other hand, one cannot be employed satisfactorily for a temporary period. Possibly the solution of the problem may be reached through the use of graduate students, to whom may be assigned a single problem, as their thesis subject.

FRED W. MORSE,
Acting Director.

The Report of the Director of the Extension Service.

Activities of the Extension Service have been directed along lines similar to those in previous years. The emergency program conducted on account of the war has been dropped, and in some respects this has meant a reorganization of effort. Unfortunately it has been necessary to reduce the amount of work along many lines which the State has needed, but which the war only accentuated. This is particularly true of home demonstration and home gardening, entomology and plant pathology. The results of effort along those lines have shown conclusively that for the most part they should be continued in peace times. The same is true of other phases of the work which should have support, but for which no funds are available.

The purpose of the appropriation of public funds, by Congress through its Smith-Lever law and by the State Legislature, for Extension Service in agriculture and home economics was for disseminating agricultural information and giving practical instruction by designated agencies. This necessarily presupposed a close association of those agencies. Progress worthy of note has been made in that direction during the past year. Closer co-operation between the Extension Service of the college and

the farm bureaus has been established, and closer relationships and fairly frequent conference with farm bureau managers have done much to unify, co-ordinate and strengthen all the lines of extension work. In conjunction with farm bureau managers definite outlines of work have been planned for the coming year, and such new phases as they consider urgent have been asked from the Supervisor of Administration and the Legislature. As the result of co-ordinated effort the use of projects has increased, and this in turn has increased the efficiency of the work and enabled the specialists to be of more service to the county agents, and, through them, to the farmers themselves. They have co-operated to assist farmers to raise better roughage for their live stock; to improve their live stock by better breeding; to increase the demand for their milk by advertising; to increase the income from their poultry by early hatching of chicks, better feeding and careful culling; to improve the yield and quality of their potatoes by better selection of seed; to improve their methods of feeding and management of swine; to bring up to date their methods of orchard management and orchard practice; to keep books in order to study more intelligently the question of management and the proper relation of enterprises on the farm; to sell co-operatively those products which are produced individually in such small quantities as to work to the disadvantage of the grower; to develop among people interested in agriculture a farm bureau organization which will choose a definite and profitable program, and to assist in carrying it out in order that agriculture may be more profitable and country life more enjoyable.

In home demonstration work a distinct need has been met by the introduction of nutrition courses for mothers. This is especially true among foreigners, and over 15,000 people of 14 different nationalities have been reached by this work. Closely linked to this was the assistance given to the campaign for advertising the use of milk as food, a movement which has resulted in better nourishment of infants, children and adults, and which has improved the outlook for dairy farming in the State. Equally important is the continuation of the campaign for the preservation of food, which was emphasized as a war measure. This campaign is of vital importance in the solution

of some of the present-day economic problems. In this work over 10,000 housewives were reached. Increased interest has been shown in clothing efficiency, textiles, remodeling of clothes and in millinery. In this work leaders are taught and in turn teach groups of individuals. By this far-reaching method of clothing efficiency over 4,000 garments and 10,000 patterns were made. This service has issued a household account book which enables the family to keep a more businesslike record of the family budget. Extensive instruction has been given in keeping this account, and over 1,000 copies of the book have been distributed, while many others are to be distributed as soon as issued.

The year has seen a return of boys' and girls' club work to a peace basis. The appeal to patriotism due to war conditions gave way to an appeal of the work for the work's sake. The enrollment, not so great as last year, is, however, large enough to show that the work has a strong appeal to hundreds of young people. Although more effort has been concentrated upon having club members complete the work they set out to do, rather than enrolling large initial numbers, there has been a membership from all counties in the State of over 43,000 boys and girls. Emphasis has been placed upon the organization of clubs which hold regular meetings throughout the year, and whose program extends over a period of two, three or four years. This plan retains interest and enthusiasm, — necessary attributes which are not possible with the one-year program of work. The training of demonstration and judging teams has given the young people an opportunity to demonstrate their knowledge of the work they are doing, and their ability to judge the progress of their handiwork at community, county and State fairs. The results of this line of activity of the Extension Service have clearly indicated that it is developing future leaders for the Commonwealth, and that it is advancing the cause of agriculture in the most fertile field, — that of the farm boys and girls.

The principal difficulties which the service has met during the year have been due to the resignation of the director, and to the lack of funds. In the spring Director W. D. Hurd, who has been in the service ten years, left to accept commercial

work which would give him a larger territory for action. In addition to this loss there have been many changes in the staff due to resignations. In most cases the resignations occurred because it was impossible to pay higher salaries. In Massachusetts, extension needs were recognized by the Federal government, and a considerable amount of Federal money was available for extension work in the State during the war. Beginning July 1 there was some reduction in the total amount of Federal funds for extension work available for the entire country, but the change of distribution from the basis of needs to the basis of rural population severely discriminated against some of the States, particularly Massachusetts. As a result twenty-nine co-operative home demonstration agents were dropped, and also specialists in entomology, plant pathology and junior poultry clubs. Some losses have also resulted from our inability to increase the salary of men paid entirely from State funds. Apparently other State colleges are able to pay from \$500 to \$1,500 more for the same grade of work, — a condition which results in numerous resignations from our staff.

The spirit of the whole college — Experiment Station, resident teaching and extension — has been most satisfactory, and with the closer understanding existing between the farm bureaus extension work appears to be making healthy progress.

RALPH W. REDMAN,
Acting Director.

Report of the Director of the Graduate School.

Our graduate school suffered severely from the effects of the war. Accordingly, what we have to report upon are the mere fragments left behind.

The most important problems which confront the graduate school may be discussed briefly in the following manner: —

I. It becomes more and more evident that most of the students seeking entrance to the graduate school are very deficient in fundamental training and knowledge essential to the pursuit of graduate specialization and intensive study. Too often it is necessary to place these students back in undergraduate courses even as far as the freshman year. This, of

course, interferes very seriously with graduate work, and is discouraging to the student involved.

There is a common desire on the part of leaders in agriculture to place agriculture on the same plane as other leading professions. Wonder is often expressed why this cannot be done. Professions are not manufactured or made, they result from growth and development. Medicine, for instance, has moved ahead very rapidly and satisfactorily to a high plane of development, largely because university schools of medicine have forged ahead in the face of their clientele or practitioners, and because they have appreciated the bearing of the deepest, most intense, and most comprehensive study of all problems related. Consequently, they have fostered such study. This was done even when practitioners were antagonistic and could not see the force of such study or research, and looked upon the work as impracticable.

In agriculture the trained leaders of agriculture, who are most sympathetic and concerned, find the drags or influence which weigh them down so heavy as to nullify to a large extent the efforts made to rise out of stagnation. Progress is very, very slow. There is such a strong pull from constituents that instead of rising to new levels, a tendency exists to drop into the empiricism of agriculture as now largely practiced and recognized.

It is only possible for agriculture to grow through men who are as well trained as the university leaders in medicine, whose attitude is that of seeking new developments, whose training is commensurate with their difficult undertakings and the advancement of wisdom, and whose contributions, although perhaps not immediately interpretable in practice, will eventually enrich agriculture. Such spirit is not one of humiliating descendancy or stagnation, but is leadership which lifts. Agriculture needs the best and severest training possible to produce real leaders for the purpose of forging ahead. Basic or fundamental training and learning means grounding in subjects which will enable the student to grow, to rise without restriction or curbing, as against subjects which consist only of present and perhaps temporary methods or procedures. These are valuable

and necessary in their place, but are of very limited range outside of their own boundaries as subjects.

Graduate students should possess the most rigid training in fundamental subjects as undergraduates and as preparatory for specialized graduate study. This the agricultural college fails to furnish, although it is the only center on account of the environment where it can be done sympathetically.

II. As would be naturally anticipated under the stress of demands upon the instructor in an agricultural college, little energy remains to direct graduate study after other duties, which seemingly are more pressing, are accomplished. This doubtless leads to a condition of graduate study in some departments which is not satisfactory. The writer sometimes feels, too, that there is a want of appreciation and knowledge of graduate work in some departments which works mischief or depreciates standards and quality of work. If in a department a differentiation between "short-course" instruction, "undergraduate" instruction and "graduate" instruction cannot be made, then graduate instruction should not be undertaken. If, however, it is a lack of time or energy only, then much can be accomplished by organization within the scope of our "apprenticeship" system. Graduate study is and should be distinctive from all prior methods and study, for it is not only extended knowledge, but is peculiarly another attitude and atmosphere.

III. Graduate assistantships should be greatly encouraged. They have proven highly meritorious. The ambition to complete graduate study for an advanced degree makes these assistantships unusually valuable, and especially is this so when the graduate assistant majors in the department in which he serves. The graduate assistant is so intimately bound up with the department's activities that the experiences thus gained redound greatly to his education. When properly organized, they return to the department not only what is expected in actual service, but in addition an amount which is expended in energy and expense in their special instruction.

Nearly all the leading universities have fellowships or scholarships which enable graduate students to live fairly well. With

this institution their remuneration for half time is not at present sufficient to cover living expenses.

The time should approach in the near future when it will be possible to exercise to a much greater degree than in the past a discriminating power of selection among candidates for vacancies.

IV. An intangible subject, yet real, an institutional "atmosphere" is of great import in graduate study. A large part of the institutional life flows out into the field as "extension service," leaving an anæmic condition behind. There is scarcely enough "real red blood" left to revitalize the actual work of the organism, the college. This "letting of blood" for the "life" of the field is commendable and generous, but the time arrives when the organism which furnishes the "blood" succumbs, and in most cases the "patient" in the field will succumb, too. In order to maintain a constant flow fieldward, the vitality in the institution should be superabundant or large enough to maintain the "standard of vitality" within, and the "patients" in the field must assume the rôle of strong men who will join in helpfulness as a part of the organic whole in advancing agriculture.

With the flow out there has developed within the institution a spirit which lacks creative purpose and which has been substituted by a missionary purpose. The latter is a most commendable ideal, but when it dominates, agriculture remains unprogressive — it distributes what is and seeks no more: but *when properly combined* with the former, new developments are inevitable.

So little emphasis and energy have been given to the constructive processes within the institution that its functioning powers are lowering. So weak are they becoming that the spirit which is an expression of vigorous life fails in large degree. The intangible "atmosphere" which makes the institution a center of agricultural learning, research and instruction is somewhat deoxygenated.

The treatment of the problems above is designed to point out our institutional drift in the light of graduate study, and not with any desire to criticize.

It is assumed that a large number of the most highly trained

men as specialists will be needed year by year, as has become more clearly evident with the passing years. These men should be trained and educated in an agricultural environment. Anything short of the most rigorous training fundamentally and comprehensively invites a degradative movement in agricultural education and research. Accordingly, undergraduate education for graduate study demands high standards, well-chosen, basic subjects both for intensity and comprehensiveness, exacting requirements and scholarly attainments.

Strictly professional courses, limited courses and special courses have their place in the institution and have definite purposes, but at this time do not call for an interpretation in terms of graduate study.

CHARLES E. MARSHALL,
Director.

The Report of the Director of Short Courses.

PURPOSE.

Short courses in the Massachusetts Agricultural College are organized to provide instruction in agriculture, horticulture and related subjects for men and women who either do not possess college entrance requirements or who, for one reason or another, are unable to take the regular four-year college course. The resources of the college are thus made available to a large number of men and women in the State who otherwise would be unable to profit by them. The experience of the past year indicates a very general demand for such courses.

In my report for 1918 the statement was made that through short-course work the college would serve from 600 to 800 students each year. The total enrollment in all short courses from December, 1918, to November, 1919, was 636. Excluding students counted twice in continuing courses, 590 different persons have been served by the short course during the first fiscal year. The past year has not been a normal one. The Winter School and the first term of the two-year course offered during 1918-19 were seriously affected by the military situation.

If financial support may be had for instruction and maintenance of the courses already existing, and development of

such other courses as may be demanded, I am quite confident that we shall serve, through short-course administration, from 1,000 to 1,500 students a year. These students will not all be here at one time, but will come in groups for special lines of work at different periods of the year.

It is not the purpose of the short courses to enter the field of secondary agricultural education, but to provide practical courses for those men and women who feel that they are too old to enter the secondary school, and for men and women of more mature years and practical experience who wish to take advantage of the opportunities offered by the college. That there is such a mature group in the State is shown by the following age classification of the 238 students now enrolled in short courses: —

AGE.	Number of Students.	Per cent.
17-18,	10	4
18-19,	18	7
19-20,	31	13
20-21,	25	11
21-22,	29	12
22-23,	18	7
23-24,	11	5
24-25,	19	8
Over 25,	77	33
	238	100

Classification of Short Courses.

The Two-Year Course in Practical Agriculture.

The Ten Weeks' Winter School.

The Summer School.

The One-Year Vocational Poultry Course.

The One-Year Course in Rural Engineering.

The Regional School.

The Special Six Weeks' Courses in Agriculture for Returned Soldiers and Sailors.¹

¹ These were emergency courses organized during demobilization, to serve men who wished instruction in agriculture as a preparation for farming.

A committee of the faculty, composed of Professors Foord, Sears, Fernald, Cance, McNutt and Phelan, was appointed by the president to prepare the course of study of the two-year course and to make plans for its permanent organization.

The course as now organized makes available to the student three courses in agronomy, five courses in animal husbandry, five courses in fruit growing, six courses in rural engineering, five courses in dairying, four courses in poultry, four courses in rural home life, three courses in vegetable gardening, three courses in floriculture, two courses in botany, three courses in forestry, four courses in farm business, and one course in each of the following: farm manufacturing, hygiene and sanitation, English, and insect pests.

At the close of six months of study students are required to gain six months of farm experience. The college will assist students in finding positions and in placing them on farms where the experience gained will be of great advantage. Thus an effort will be made to place on a dairy farm the man expecting to take up dairying as his chief line of work, and a student of pomology on a fruit farm.

Two hundred and thirty-eight students have enrolled this fall for the short courses. Of these, 70 are men who have been disabled in military or naval service of the United States and sent here by the Federal Board for Vocational Education. These men vary in academic preparation from college graduates to men who have not completed the common schools. They range in age from eighteen to fifty. The need of these men for education is very great, since the adjustment from war to peace is hard for them to make, particularly in view of the fact that they have suffered disability.

NEEDS OF THE SHORT COURSES.

In considering the needs of the short courses, the most important fact is not that during the first year we enrolled more than 600 men, but the fact that we added to the work of this college the equivalent of fifteen months of instruction for 200 men. The two-year course has created suddenly a small college in itself.

We need more teaching assistance. Several instructors are

now paid out of the short-course funds, but no attempt has been made this year to arrange a short-course staff. Each department is managing the short-course work on exactly the same basis as for any other group of students. This arrangement has been fortunate this year, for it would have been utterly impossible to provide instruction for the men enrolled in the two-year course if the subjects had been taught by members of a small special staff. I am inclined to think, however, that we shall have to create, very rapidly, a special short-course staff. There are some disadvantages to this plan, but there are many advantages. This special staff should have the same relation to the department that members of the Extension Service staff now have.

Assistance for instruction is our first and greatest need. Short-course classes should be small, twenty-five or thirty men, if we are to achieve the best results. We should begin to add as rapidly as possible, if funds will permit, special short-course instructors. These instructors should be mature men of teaching ability and broad human sympathies.

The second need is for a supervisor of farm practice who could assist in the administration of short-course work. The course of study calls for six months of farm experience. This should be under competent supervision in order that the boys may realize the greatest benefit from the course. The supervisor of farm practice might well take charge of the winter school and teach certain courses during the six months that he would be on the campus.

Summer School. — The summer school for 1919 was under the joint direction of the Massachusetts Agricultural College and the Massachusetts State Board of Education. The college offered instruction in agriculture, horticulture and related subjects. The Board of Education offered courses in elementary education. The arrangement was very satisfactory in every respect; students expressed their appreciation of the plan, and there were many inquiries asking if the plan would be continued another year. The enrollment was 238, the largest in the history of the college. I wish to suggest that for the ensuing year the summer school be lengthened to six weeks; that courses be offered that will carry college credit; and that, if agreeable to the State Board of

Education, the arrangement for a joint management be continued.

More courses in agricultural education and rural social science should be offered in the summer school. All of these courses should carry credit and be so organized that they may be taken up by graduate or undergraduate students.

Winter School. — The winter school for 1919 enrolled 63 students. It has always appealed to a more mature class of students, and the work of the school should be further extended so that young men who can attend only during the winter school might come for two or three years in succession in order to take a series of related courses.

One-Year Vocational Poultry Course. — The one-year vocational poultry course is designed to prepare practical poultrymen. The number of students who enroll in this course is limited by the fact that laboratory provision can be made only for a small group, twelve or fifteen men.

One-Year Course in Rural Engineering. — This course was organized in the fall of 1919, and was designed especially for men sent here by the Federal Board for Vocational Education, who wish instruction in farm machinery.

The Federal Board placed at the college an instructor to give courses in mechanical drawing and physics.

A Regional School. — I wish to urge the advisability of the organization of a regional school of from four to six weeks in connection with some other educational institution located in the eastern part of the State, in or near Boston, by means of which we may offer short courses in practical agriculture to those who cannot come to Amherst for instruction.

The organization of such a school would meet a very definite need. The cost would be small in view of the fact that most of the work would be done by the regular staff of the college.

Special Six Weeks' Course in Practical Agriculture. — Three special six weeks' courses in practical agriculture were offered during the winter of 1919. These courses were designed to offer an opportunity to demobilized men to prepare them for farm work. These courses were organized during the period of demobilization.

JOHN PHELAN,
Director.

TABLES AND STATISTICS.

TABLE I. — *Resignations.*

POSITION.	Name.
Assistant chemist, Experiment Station,	Windom A. Allen, ¹
Professor of general and physical chemistry,	Ernest Anderson.
Assistant State leader of home economics,	Stella A. Belcher.
Extension professor of farm management demonstrations,	Wesley H. Bronson.
Clerk, Extension Service,	Cassie L. Clark.
Clerk, library,	Lois Clark.
Clerk, president's office,	Ruth Clow.
Clerk, Extension Service,	Elsie H. Cooley.
Instructor in dairying,	Harry D. Drain.
Garden supervisor,	Henry R. Francis.
Clerk, president's office,	Lillian M. Gelinas.
Clerk, poultry husbandry,	Nettie A. Gilmore.
Clerk, Division of Agriculture,	Mary G. Hanifin.
Instructor in mathematics,	Burt A. Hazeltine.
Assistant professor of floriculture,	August G. Hecht.
First clerk, Experiment Station,	Alice M. Howard.
Director of the Extension Service,	William D. Hurd.
Associate professor of dairying,	Orville A. Jamison.
Clerk, Extension Service,	Ethel L. Kennedy.
Extension assistant professor of pomology,	Austin D. Kilham.
Assistant in veterinary science, Experiment Station,	John B. Lentz.
Assistant to the director of Extension Service,	Daniel J. Lewis.
Chief clerk, Extension Service,	Carleton D. Livermore.
Stenographer, treasurer's office,	Irene A. Martin.
Assistant chemist, Experiment Station,	Esther S. Mixer.
Clerk, treasurer's office,	Hazel Parker.
Instructor in farm management	Walter M. Peacock.
Assistant chemist, Experiment Station,	Harold B. Pierce.
Associate professor of animal husbandry,	Byron E. Pontius.
Associate professor of physics,	Harold E. Robbins. ²
Assistant chemist, Experiment Station,	Robert S. Scull.
Research pomologist, Experiment Station,	Jacob K. Shaw.

¹ Died in service.² Effective Dec. 31, 1919.

TABLE I. *Resignations* — Concluded.

POSITION.	Name.
Extension assistant professor of landscape gardening,	Frank A. C. Smith.
Assistant chemist, Experiment Station,	John B. Smith.
Extension professor of farm management demonstrations,	Benjamin G. Southwick.
Instructor in poultry husbandry,	Lloyd L. Stewart.
Extension assistant professor of animal husbandry,	William F. Turner.
Chief clerk, Extension Service,	Lawrence A. Wheaton.
Curator, Department of Botany,	Mae H. Wheeler.

TABLE II. — *New Appointments.*A. *In the Academic Departments.*

POSITION.	Name.	Institution from which graduated, and Degrees.
Instructor in zoölogy,	Charles H. Abbott,	Ph.D., ¹ Brown University, 1918.
Assistant professor of farm management, Department of Botany,	Max F. Abell, ¹	B.Sc., Cornell University, 1914.
Assistant in physics,	Alyn S. Ball, ²	- - -
Assistant professor of pomology,	Henry J. Burt, ³	B.Sc., Massachusetts Agricultural College, 1919.
Instructor in pomology,	Brooks D. Drain,	B.Sc., Ohio State University, 1917.
Instructor in physical education,	Charles H. Gould,	B.Sc., Massachusetts Agricultural College, 1916.
Assistant in physical education,	Emory E. Grayson,	B.Sc., Massachusetts Agricultural College, 1917.
Instructor in animal husbandry,	Mrs. C. S. Hicks, ³	Michigan State Normal College, 1909.
Associate professor of dairying,	Richard L. Holden,	B.Sc., Massachusetts Agricultural College, 1917.
Assistant in physical education,	Henry F. Judkins,	B.Sc., New Hampshire State College, 1911.
Instructor in rural engineering,	Arthur M. McCarthy,	B.Sc., Massachusetts Agricultural College, 1919.
Instructor in mathematics,	John B. Newlon,	- - -
Instructor in farm management,	Laurence H. Parker,	A.B., Tufts College, 1902.
Assistant professor of rural engineering,	Leland Spencer, ⁴	B.Sc., Cornell University, 1918.
Instructor in agronomy,	James L. Strahan,	M.Sc., Cornell University, 1913.
Associate professor of floriculture and head of department,	Charles H. Thayer,	Short Course, Massachusetts Agricultural College.
Instructor in botany,	Clark L. Thayer,	B.Sc., Massachusetts Agricultural College, 1913.
Instructor and foreman, vegetable gardening,	Ray L. Torrey,	B.Sc., Massachusetts Agricultural College, 1912; Ph.D., Harvard University, 1918.
Professor of agricultural education,	Gilbert S. Watts,	B.Sc., Pennsylvania State College, 1918.
Instructor in dairying,	Winthrop S. Welles,	B.Sc., University of Illinois, 1901.
	Fred E. Wheeler,	B.Sc., Cornell University, 1919.

¹ To take effect Jan. 1, 1920.² Transferred from labor account.³ Part time.⁴ Temporary.

TABLE II. *New Appointments* — Continued.*B. In the Experiment Station.*

POSITION.	Name.	Institution from which graduated, and Degrees.
Assistant chemist,	Ethel Bradley,	B.Sc., Connecticut College, 1919.
Assistant chemist,	Arthur M. Clarke,	A.B., Amherst College, 1917.
Assistant in veterinary science,	Thomas G. Hull, ¹	Ph.D., Yale University.
Curator, Department of Botany,	Marguerite G. Iekis,	B.Sc., Ohio University, 1918; M.A., Columbia, 1919.
Assistant chemist,	Anne C. Messer,	A.B., Mount Holyoke College, 1916.

C. In the Extension Service.

Assistant professor of agricultural education.	Lincoln W. Barnes, ¹	B.Sc., Colorado Agricultural College, 1918.
Assistant state leader of home economics.	Stella A. Belcher,	- - -
Instructor in horticultural manufactures.	William R. Cole,	Massachusetts Agricultural College, 1898-1900.
Assistant professor of animal husbandry.	Roy B. Cooley,	B.Sc., Ontario Agricultural College, 1910.
Assistant state leader of home economics.	Laura Gifford,	Two years at Teachers College.
Specialist in dairying,	Delos L. James,	University of Illinois.
Instructor in charge of poultry club work.	Earl H. Nodine, ¹	Connecticut Agricultural College.
Professor of agricultural economics,	John D. Willard,	A.B., Amherst College, 1907.
Assistant to the director,	John D. Zink,	B.Sc., Pennsylvania State College 1916.

D. Miscellaneous.

Farm superintendent,	Enos J. Montague,	B.Sc., Massachusetts Agricultural College, 1915.
Field agent,	Almon W. Spaulding,	B.Sc., Massachusetts Agricultural College, 1917.

E. In the Clerical Staff.

POSITION.	Name.
Clerk, president's office,	Nellie V. Barkhouse.
Clerk, treasurer's office,	Mary Broadfoot.
Secretary, president's office,	Evelyn Brewster.
Stenographer, Extension Service,	Susan L. Clark.
Clerk, treasurer's office,	Grace Colburn.
Stenographer, Extension Service,	Elsie H. Cooley.

¹ Temporary.

TABLE II. *New Appointments — Concluded.**E. In the Clerical Staff — Concluded.*

POSITION.	Name.
Clerk, Division of Agriculture,	Irene Crutch.
Mailing clerk, Extension Service,	Margaret G. Davidson.
Clerk, dean's office,	Charlotte E. Erickson.
Library assistant,	Lottie M. Fosdick.
Stenographer, Extension Service,	Catherine A. Harrington.
Stenographer, Extension Service,	Marion E. Hawthorne.
Stenographer, Extension Service,	Margaret C. Leduc.
Clerk, Division of Horticulture,	Honorina A. Lee.
Stenographer, short courses,	Marie Mercier.
Clerk, president's office,	Rachel C. Packard.
Clerk, short courses,	Mildred Pierpont.
Clerk, Extension Service,	Jessie M. Prince.
Stenographer, Department of Poultry Husbandry,	Laura Sabin.
Clerk, president's office,	Marjorie Silcox.
Chief clerk, Extension Service,	Lawrence A. Wheaton.

TABLE III. — *Changes in Title and Transfers.**Changes in Title of Officers of the Institution.*

NAME.	Former Title.	Present Title.
Nellie V. Barkhouse,	Clerk, president's office,	Clerk, home economics office.
Arthur B. Beaumont,	Associate professor of agronomy,	Professor.
Abram L. Dean,	Extension instructor in charge of poultry club work,	Instructor in poultry husbandry.
Charlotte E. Erickson,	Clerk, dean's office,	Clerk, treasurer's office.
Cora B. Grover,	Clerk, Extension Service,	Clerk, Experiment Station.
Arao Itano,	Assistant professor of microbiology,	Associate professor.
Arthur N. Julian,	Instructor in German,	Assistant professor.
Anderson A. Mackimmie,	Assistant professor of French,	Professor.
Frederick A. McLaughlin,	Instructor in botany,	Assistant professor.
Rebecca L. Mellor,	Clerk, Experiment Station,	First clerk, Experiment Station.
Charles H. Patterson,	Assistant professor of English,	Professor.
Victor A. Rice,	Extension instructor in charge of pig club work,	Assistant professor of animal husbandry.
Doris Tower,	Stenographer, Department Poultry Husbandry,	Clerk, Department of Poultry Husbandry.
John D. Willard,	Extension professor of agricultural economics,	Director of the Extension Service.

TABLE IV. — *Leaves of Absence.*

POSITION.	Name.	Cause of Leave.
Foreman of grounds,	Lawrence S. Dickinson, .	Service with Walter Reed Hospital, Washington, D. C.
Professor of poultry husbandry, .	John C. Graham,	Charge of educational work for the blind, Baltimore, Md.
Extension professor of community planning.	Ezra L. Morgan,	Service with the Red Cross.
Extension professor of agricultural economics.	John D. Willard,	Service with Commission on Necessaries of Life.

TABLE V. — *Speakers for the Year.*A. *Speakers at Wednesday Assembly for Year ending Nov. 30, 1919.***1918.**

- Dec. 4. — Mr. Herbert A. Parsons, Boston.
 Dec. 18. — Col. Clarence Ousley, Washington, D. C.

1919.

- Jan. 8. — Mr. Ralph S. Rounds, New York City.
 Jan. 15. — Lieutenant V. de Wierzbici, Paris.
 Jan. 22. — Dr. Horace M. Kallen, Boston.
 Jan. 29. — Pres. William A. Neilson, Northampton.
 Feb. 5. — Rev. Charles T. Riggs, Northampton.
 Feb. 12. — Dr. J. N. Mills, Washington, D. C.
 Feb. 19. — Student forum.
 Feb. 26. — Lieut. Harry G. Milsom, Canada.
 Mar. 5. — Rev. Gerald C. Treacy, Boston.
 Mar. 12. — Student forum.
 Apr. 2. — Dr. J. J. Walsh, New York City.
 Apr. 9. — Prof. Albert H. Gilmer, Tufts College.
 Apr. 16. — Dr. Arthur W. Gilbert, Boston.
 Apr. 23. — Prof. W. L. Stoddard, Boston.
 Apr. 30. — Capt. Thomas G. Chamberlain, New York City.
 May 7. — Student forum.
 May 21. — Mr. Bertram Tupper, Newton.
 June 4. — Prof. Charles H. Patterson, M. A. C.
 Oct. 1. — Mr. Howard L. Russell, Worcester.
 Oct. 8. — Dr. W. I. Chamberlin, Hudson, Ohio.
 Oct. 15. — Pres. Kenyon L. Butterfield, M. A. C.
 Oct. 22. — Student forum.
 Oct. 29. — Prof. Robert J. Sprague, M. A. C.
 Nov. 5. — Prof. Fred S. Cooley, Bozeman, Mont.
 Nov. 12. — Hon. Joseph Walker, Boston.
 Nov. 19. — Mr. Alva Agee, Trenton, N. J.

B. *Speakers at Sunday Chapel, for Year ending Nov. 30, 1919.***1918.**

- Dec. 1. — Rev. Henry A. Atkinson, New York City.
 Dec. 8. — Dr. Anson Phelps Stokes, New Haven, Conn.
 Dec. 15. — Rev. John A. Hawley, Amherst.

1919.

- Jan. 5. — Prof. Harry F. Ward, New York City.
 Jan. 12. — Dean Lee McColester, Tufts College.
 Jan. 19. — Rev. J. C. Sycamore, Holyoke.
 Jan. 26. — Dean Charles R. Brown, New Haven, Conn.
 Feb. 2. — Dr. Albert P. Fitch, Amherst.
 Feb. 9. — Mr. Albert E. Roberts, New York City.
 Feb. 16. — Rev. Charles F. Carter, Hartford, Conn.
 Feb. 23. — Rev. H. G. Ives, Amherst.

B. Speakers at Sunday Chapel, for Year ending Nov. 30, 1919 — Concluded.

1919.

- Mar. 2. — Rev. John Haynes Holmes, New York City.
 Mar. 9. — Mr. Owen R. Lovejoy, New York City.
 Mar. 16. — Bishop Edwin H. Hughes, Melrose.
 Apr. 6. — Rev. Christian F. Reisner, New York City.
 Apr. 13. — Dr. Joel E. Goldthwait, Boston.
 Apr. 20. — Rev. Joseph C. Robbins, Boston.
 Apr. 27. — Rev. Daniel Evans, Cambridge.
 Sept. 28. — Pres. Kenyon L. Butterfield, M. A. C.
 Nov. 2. — Dr. Albert Parker Fitch, Amherst.
 Nov. 9. — Rev. Herbert J. White, Hartford, Conn.
 Nov. 16. — Rev. Norman MacLeod, Hartford, Conn.
 Nov. 23. — Rabbi Sidney E. Goldstein, New York City.

TABLE VI. — *Attendance.**A. In Work of College Grade.*

CLASS.	REGISTRATION FEB. 17, 1919.			REGISTRATION NOV. 30, 1919.		
	Men.	Women.	Total.	Men.	Women.	Total.
Graduate students, . . .	9	3	12	31	2	33
Senior class,	64	10	74	110	3	113
Junior class,	69	3	72	100	3	103
Sophomore class, . . .	70	5	75	100	4	104
Provisional sophomores, . . .	—	—	—	8	—	8
Freshman class,	93	4	97	101	9	110
Provisional freshmen, . . .	25	—	25	15	—	15
Unclassified students, . . .	26	3	29	24	9	33
	356	28	384	489	30	519

B. Short-course Enrollment.

	Men.	Women.	Total.
Two-year course, 1919, winter term, ¹	31	6	37
Ten weeks' course, 1919, ¹	43	20	63
First six weeks' course, 1919, ¹	13	—	13
Second six weeks' course, 1919,	9	1	10
Vocational poultry course, March to June, 1919, . . .	6	—	6
Summer school, 1919,	46	192	238
Summer course for Federal men, 1919,	31	—	31
Two-year course, 1919-20,	201	8	209
Vocational poultry course, 1919-20,	13	—	13
Rural engineering course, 1919-20,	16	—	16
Total,	409	227	636
Counted twice,	46	—	46
Total,	363	227	590

TABLE VI. — Attendance — Concluded.
C. Convention Registration.

	1918.	1919.
Farmers' week,	632	898
Polish farmers' day,	12	-
County agents' conference,	150	30
Poultry convention,	200	200
Boys' camps,	17	52
Girls' camp,	24	33
	1,035	1,213

TABLE VII. — Legislative Budget, 1919.

ITEMS.	Amount asked.	Amount granted.
Women's building and equipment,	\$150,000	\$127,400
Miscellaneous improvements in buildings and grounds, and teaching, operating and office equipment.	35,000	20,000
Market-garden field station,	15,000	15,000
Study of the grounds,	-	2,000
	\$200,000	\$164,400

Current Appropriations for 1918-19.

Maintenance.

Personal services:—		
Administration,	\$30,000 00	
Instruction,	119,000 00	
General maintenance,	88,000 00	
Experiment station,	38,000 00	
Extension service,	43,000 00	
Market garden, field station,	4,500 00	
Short courses,	10,500 00	
Travel, office and other expenses,	37,000 00	
Teaching laboratory, supplies and equipment,	52,000 00	
Experiment Station:—		
Supplies and equipment,	11,500 00	
Travel and office expenses,	5,000 00	
Extension service, supplies, equipment, travel, etc.,	35,000 00	
Short courses,	6,500 00	
Heat, light and power,	45,000 00	
Farm,	26,600 00	
Repairs, ordinary,	7,000 00	
Replacements,	8,000 00	
Market gardening, field station,	3,500 00	
		\$570,100 00
Trustees' expenses,	\$900 00	
Printing reports,	3,000 00	
Commercial feedstuffs,	6,000 00	
		9,900 00
		\$580,000 00

TABLE VIII. — *Statistics of Freshmen entering Massachusetts Agricultural College, September, 1919.*A. *Home Addresses of Students (classified by Towns and Cities).*

Amherst, 6	Hopedale, 1	Pleasantville, N. Y., . . . 1
Arlington, 2	Ipswich, 2	Plymouth, 1
Barnard, Vt., 1	Lake Mohegan, N. Y.,; . . 1	QUINCY, 1
Belmont, 1	Lexington, 1	Sandwich, 1
BEVERLY, 2	Littleton, 1	Sharon, 1
BOSTON, 18	LYNN, 2	South Shaftsbury, Vt., . . 1
Brighton, 1	Marshfield, 1	South Glastonbury, Conn., 1
BROCKTON, 1	Middlefield, 1	SPRINGFIELD, 2
Brookline, 1	MEDFORD, 1	Sunderland, 2
Buxton, Me., 1	MELROSE, 1	Sterling, 1
CAMBRIDGE, 1	MINNEAPOLIS, MINN., . . 1	Sturbridge, 1
Charlton, 1	Milford, 1	Turner, Me., 1
CHELSEA, 1	Mount Kisco, N. Y., . . 1	Upton, 1
Cohasset, 1	Natick, 1	Uxbridge, 1
Dalton, 1	NEW BEDFORD, 1	WALTHAM, 1
Danvers, 1	Newfane, Vt., 1	Warren, 1
Deerfield, 1	NEWTON, 5	Watertown, 3
Elizabeth, N. J., 1	NEW YORK, N. Y., 1	West Bridgewater, 1
EVERETT, 2	NORTH ADAMS, 1	West Springfield, 4
Franklin, 1	NORTHAMPTON, 2	WOBURN, 1
Greenfield, 3	Oxford, 1	WORCESTER, 6
Groton, 1	Palmer, 1	Williamstown, 1
Hamden, Conn., 1	PEABODY, 3	
HOLYOKE, 8	PITTSFIELD, 1	

B. *Home Addresses (classified by States).*

	Number.	Per Cent.		Number.	Per Cent.
Connecticut,	2	1.6	New Jersey,	1	.8
Maine,	2	1.6	New York,	4	3.2
Massachusetts,	112	89.6	Vermont,	3	2.4
Minnesota,	1	.8		125	100.0

C. *Home Addresses (classified by Counties of Massachusetts).*

	Number.	Per Cent.		Number.	Per Cent.
Barnstable,	1	.89	Middlesex,	22	19.64
Berkshire,	4	3.57	Norfolk,	6	5.36
Bristol,	1	.89	Plymouth,	4	3.57
Essex,	10	8.93	Suffolk,	20	17.86
Franklin,	6	5.36	Worcester,	15	13.39
Hampden,	15	13.40		112	100.00
Hampshire,	8	7.14			

TABLE VIII. — *Statistics of Freshmen entering Massachusetts Agricultural College, September, 1919* — Continued.*D. Nativity of Parents.*

	Number.	Per Cent.
Neither parent foreign born,	85	68.0
Both parents foreign born,	20	16.0
Father (only) foreign born,	7	5.6
Mother (only) foreign born,	10	8.0
No statistics,	3	2.4
	125	100.0

E. Education of Father.

	Number.	Per Cent.
Common school,	52	41.6
High school,	31	24.8
Business school,	10	8.0
College or university,	29	23.2
No statistics,	3	2.4
	125	100.0

F. Religious Census.

	MEMBERSHIP.		PREFERENCE.		TOTALS.	
	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.
Baptist,	13	10.4	2	1.6	15	12.0
Catholic,	17	13.6	1	.8	18	14.4
Congregationalist,	28	22.4	8	6.4	36	28.8
Episcopal,	6	4.8	3	2.4	9	7.2
Hebrew,	6	4.8	2	1.6	8	6.4
Methodist,	3	2.4	5	4.0	8	6.4
Unitarian,	7	5.6	6	4.8	13	10.4
Universalist,	3	2.4	1	.8	4	3.2
Miscellaneous,	8	6.4	3	2.4	11	8.8
No statistics,	-	-	-	-	3	2.4
	91	72.8	31	24.8	125	100.0

TABLE VIII. — *Statistics of Freshmen entering Massachusetts Agricultural College, September, 1919 — Concluded.**G. Occupation of Father.*

	Number.	Per Cent.
Agriculture and horticulture,	29	23.2
Artisans,	30	24.0
Business,	35	28.0
Deceased or no statistics,	6	4.8
Miscellaneous,	16	12.8
Professional,	9	7.2
	125	100.0

H. Intended Vocation of Student.

	Number.	Per Cent.
Agriculture or horticulture (practical),	58	46.4
Agriculture or horticulture (professional),	37	29.6
Professions,	5	4.0
Miscellaneous,	10	8.0
Undecided or no statistics,	15	12.0
	125	100.0

I. Farm Experience.

	Number.	Per Cent.
Brought up on a farm,	32	25.6
Not brought up on a farm and having had no or practically no farm experience.	35	28.0
Not brought up on a farm but having had some farm experience.	58	46.4
	125	100.0

J. Miscellaneous Statistics.

Average age, 19.36 years.

TABLE IX. — *Cases treated at the Infirmary, Dec. 1, 1918, to Nov. 30, 1919.*

	Daily Count.	Individual.
Dec. 1, 1918, to Jan. 1, 1919:—		
House cases,	217	37
Out-patients,	72	59
January 1 to February 1:—		
House cases,	75	13
Out-patients,	25	16
February 1 to March 1:—		
House cases,	42	9
Out-patients,	49	35
March 1 to April 1:—		
House cases,	19	5
Out-patients,	32	20
April 1 to May 1:—		
House cases,	10	1
Out-patients,	25	17
May 1 to June 1:—		
House cases,	22	8
Out-patients,	47	25
June 1 to July 1:—		
House cases,	3	1
Out-patients,	42	18
July 1 to August 1:—		
House cases,	4	1
Out-patients,	11	4
September 1 to October 1:—		
House cases,	7	2
Out-patients,	25	14
October 1 to November 1:—		
House cases,	54	13
Out-patients,	137	54
November 1 to December 1:—		
House cases,	63	12
Out-patients,	107	55
Number of house cases,		516
Number of out-patients,		572
Total,		1,088
Number cared for in the house,		102
Number cared for as out-patients,		317
Total,		419

REPORT OF THE TREASURER

FOR THE FISCAL YEAR ENDING NOV. 30, 1919.

BALANCE SHEET.

	Dr.	Cr.
1918.		
Dec. 1. To balance on hand,	\$22,554 65	
1919.		
Nov. 30. To departmental income,	143,304 99	
Nov. 30. To receipts from State Treasurer,	616,877 25	
Nov. 30. To receipts from United States Treasurer,	99,072 68	
Nov. 30. To November schedule in transit,	66,413 37	
Nov. 30. Expenditures for fiscal year,		\$774,475 74
Nov. 30. Income transferred to State Treasurer,		143,304 99
Nov. 30. Balance on hand,		30,442 21
	\$948,222 94	\$948,222 94

STATEMENT OF LEGISLATIVE APPORTIONMENT AND EXPENDITURES FOR FISCAL YEAR ENDING NOV. 30, 1919, AND APPORTIONMENT RE- QUESTED FOR 1920.

	Apportionment for Last Fiscal Year.	Expenditures.	Apportionment for New Fiscal Year.
College: —			
Personal services,	\$234,000 00	\$245,094 90	\$366,855 00
Maintenance,	178,600 00	182,149 14	205,705 00
	\$412,600 00	\$427,244 04	\$572,560 00
Experiment Station: —			
Personal services,	\$38,000 00	\$38,826 25	\$92,510 00
Maintenance,	16,500 00	9,901 80	20,600 00
	54,500 00	48,728 05	113,110 00
Extension Service: —			
Personal services,	\$43,000 00	\$41,805 77	\$160,260 00
Maintenance,	35,000 00	27,164 70	68,130 00
	78,000 00	68,970 47	228,390 00
Short courses: —			
Personal services,	\$10,500 00	\$12,233 62	\$33,975 00
Maintenance,	6,500 00	5,132 41	10,300 00
	17,000 00	17,366 03	44,275 00
Market-garden and field station: —			
Personal services,	\$4,500 00	\$4,666 08	\$5,400 00
Maintenance,	3,500 00	1,685 87	3,000 00
	8,000 00	6,351 95	8,400 00
Totals,	\$570,100 00	\$568,660 54	\$966,735 00

STATEMENT OF LEGISLATIVE APPORTIONMENT AND EXPENDITURES FOR
FISCAL YEAR ENDING NOV. 30, 1919, AND APPORTIONMENT RE-
QUESTED FOR 1920 — *Concluded.*

	Apportionment for Last Fiscal Year.	Expenditures.	Apportionment for New Fiscal Year.
Trustees, travel, . . .	\$900 00	\$1,027 48	\$1,200 00
Printing reports, . . .	3,000 00	3,000 00	6,000 00
Commercial feedstuffs, . . .	6,000 00	6,000 00	6,000 00
Totals, . . .	\$580,000 00	\$578,688 02	\$979,935 00
Fertilizer law, . . .	10,500 00	11,548 68	12,500 00
Poultry disease law, . . .	2,000 00	813 66	4,000 00
Milk testing law, . . .	500 00	616 69	550 00
Totals, . . .	\$593,000 00	\$591,667 05	\$996,985 00

CASH STATEMENT.

	Other Funds.	State Funds.	Totals.
Balance Dec. 1, 1918,	\$22,554 65	-	\$22,554 65
<i>Receipts.</i>			
College receipts from students and others,	-	-	16,401 48
Tuition,	-	\$2,595 22	
Laboratory fees,	-	6,486 63	
Rents,	-	7,319 63	
Department sales,	-	-	112,271 72
Produce,	-	105,396 25	
Miscellaneous,	-	6,875 47	
Experiment Station,	-	-	8,752 05
Cranberry receipts,	-	4,234 46	
Chemical receipts,	-	1,604 86	
Miscellaneous,	-	2,912 73	
Extension Service,	-	-	1,185 13
Correspondence courses,	-	612 00	
Miscellaneous,	-	573 13	
Short courses,	-	-	1,898 63
Students' fees,	-	1,467 75	
Summer school,	-	35 28	
Winter school,	-	395 60	
Market-garden field station,	-	-	2,795 98
Produce,	-	2,795 98	
Treasurer of the Commonwealth,	-	-	616,877 25
Maintenance,	-	509,084 87	
Special appropriations,	-	104,479 06	
Endowment,	3,313 32	-	
Federal government,	-	-	99,072 68
Land grant of 1862,	7,300 00	-	
Hatch fund of 1887,	15,000 00	-	
Morrill fund of 1890,	16,848 67	-	
Adams fund of 1906,	15,000 00	-	
Nelson fund of 1907,	16,848 66	-	
Smith Lever fund of 1914,	25,392 19	-	
S. A. T. C., plumbing,	2,683 16	-	
November schedule in transit,	-	66,413 37	66,413 37
	\$124,940 65	\$823,282 29	\$948,222 94

CASH STATEMENT — *Concluded.*

	Other Funds.	State Funds.	Totals.
<i>Payments.</i>			
College expenses,			\$463,019 62
Personal services,	\$37,864 69	\$245,094 90	
Maintenance,	2,910 89	182,149 14	
Experiment Station,			78,423 14
Personal services,	28,133 59	38,826 25	
Maintenance,	1,561 50	9,901 80	
Extension Service,			92,357 05
Personal services,	17,734 01	41,805 77	
Maintenance,	5,652 57	27,164 70	
Short courses,			17,366 03
Personal services,	-	12,233 62	
Maintenance,	-	5,132 41	
Market-garden field station,			6,351 95
Personal services,	-	4,666 08	
Maintenance,	-	1,685 87	
Special appropriations,			111,957 95
Feed law,	-	6,000 00	
1914, agricultural building,	-	925 35	
1917, improvements and equipment,	-	2,231 00	
1917, power plant,	-	3,029 22	
1917, printing reports,	-	888 79	
1918, improvements and equipment,	-	11,448 39	
1918, power plant,	-	49,697 74	
1918, market-garden field station,	-	7,235 49	
1918, dining hall,	-	2,173 87	
1918, printing reports,	-	3,000 00	
Printing,	-	158 17	
1919, improvements and equipment,	-	10,443 74	
1919, women's dormitory,	-	6,016 07	
1919, market-garden field station,	-	4,348 73	
1919, engineering survey,	-	832 27	
Trustees, travel,	-	1,027 48	
S. A. T. C., plumbing,	2,501 64	-	
Income,	-	143,304 99	143,304 99
Balance,	30,442 21	-	30,442 21
	\$126,801 10	\$821,421 84	\$948,222 94

CLASSIFICATION OF INCOME FROM STUDENTS AND OTHERS.

	Laboratory Fees.	Department Sales.	Transfers.	Rent.	Miscellaneous.	Tuition.	Totals.
Agricultural economics,	-	-	-	-	\$1 22	-	\$1 22
Agricultural education,	-	-	-	-	10	-	10
Agronomy,	\$252 00	-	-	-	-	-	252 00
Animal husbandry,	293 50	-	-	-	70	-	294 20
Botany,	620 00	-	-	-	7 76	-	627 76
Chemistry,	2,652 88	-	\$16 54	-	-	-	2,669 42
Dairying,	331 50	\$32,970 24	-	-	20	-	33,301 94
Domestic science,	-	-	-	-	68	-	68
Entomology,	82 00	788 32	212 18	-	-	-	1,082 50
Farm,	-	42,166 18	2,072 29	-	-	-	44,238 47
Farm management,	195 50	-	-	-	10	-	195 60
Floriculture,	68 50	4,477 49	-	\$4 00	-	-	4,549 99
Forestry,	9 00	-	-	-	-	-	9 00
Freshman agriculture,	219 00	-	-	-	-	-	219 00
General agriculture,	-	-	-	-	4 15	-	4 15
General horticulture,	-	-	1,849 90	-	398 36	-	2,248 26
Grounds,	-	-	24 50	-	82 63	-	107 13
Horticultural manufactures,	-	641 03	-	-	-	-	641 03

Hospital,	-	-	-	-	792 48	-	792 48	-	792 48
Landscape gardening,	218 00	-	-	30 24	-	-	-	-	248 24
Language and literature,	170 00	-	-	-	-	-	-	-	170 00
Library,	-	59 34	-	-	-	-	-	-	59 34
Market gardening,	76 00	4,728 51	-	-	-	-	-	-	4,804 51
Mathematics,	232 81	-	-	-	-	-	-	-	232 81
Microbiology,	307 00	-	-	-	-	-	397 60	-	704 60
Mount Toby,	-	5,872 15	-	-	-	-	-	-	5,872 15
Physics,	21 00	-	-	-	19 00	-	05	-	40 05
Pomology,	135 00	3,603 61	-	-	-	-	-	-	3,738 61
Poultry husbandry,	114 00	15,719 10	-	-	-	-	62 64	-	15,895 74
Rural engineering,	214 14	-	-	-	-	-	-	-	214 14
Veterinary,	6 00	-	-	-	-	-	-	-	6 00
War emergency,	-	844 62	-	-	-	-	-	-	844 62
Zoology and geology,	511 00	-	-	4 63	-	-	50	-	516 13
Operating and maintenance,	-	-	-	-	30 00	-	3,562 48	\$2,505 22	6,187 70
North dormitory,	-	-	-	-	2,574 42	-	-	-	2,574 42
South dormitory,	-	-	-	-	2,395 04	-	-	-	2,395 04
College residences,	-	-	-	-	745 72	-	-	-	745 72

CLASSIFICATION OF INCOME FROM STUDENTS AND OTHERS — *Concluded.*

	Laboratory Fees.	Department Sales.	Transfers.	Rent.	Miscellaneous.	Tuition.	Totals.
Dean's office,	-	-	-	-	\$0 55	-	\$0 55
President's office,	-	-	-	-	3 50	-	3 50
Registrar's office,	-	-	-	-	25	-	25
Treasurer's office,	-	-	-	-	64 55	-	64 55
Draper Hall,	-	-	-	\$1,624 75	-	-	1,624 75
General expense (cash credits),	-	-	-	-	1,494 97	-	1,494 97
Totals,	\$6,728 83	\$111,870 59	\$4,210 28	\$7,392 93	\$6,875 47	\$2,595 22	\$139,673 32
Less refunds (\$315.50 and journal entries (\$10,684.62),	242 20	10,684 62	-	73 30	-	-	11,000 12
	\$6,486 63	\$101,185 97	\$4,210 28	\$7,319 63	\$6,875 47	\$2,595 22	\$128,673 20

ANALYSIS OF COLLEGE EXPENDITURES.

ADMINISTRATION.		Office Expense.	Salaries and Labor.	Travel.	Minor Equipment.	Building Supplies.	Publicity and Lectures.	Student Activities.	Com-mence-ment.	Miscel-laneous.	Totals.
Dean's office, . . . . .	.	\$334 71	\$134 89	\$2 20	\$50 70	-	-	-	-	-	\$522 50
Executive order, . . . . .	.	-	-	2,663 44	-	-	\$1,454 79	\$87 50	\$754 43	\$2,125 07	7,985 23
President's office, . . . . .	.	1,309 16	248 86	302 53	58 42	\$12 36	-	-	-	40 25	1,971 88
Registrar's office, . . . . .	.	472 50	65 90	61 39	79	-	-	-	-	-	600 88
Treasurer's office, . . . . .	.	864 14	213 49	223 38	161 58	44 81	-	-	-	32 82	1,940 22
Administration (salaries), . . . . .	.	-	31,743 14	-	-	-	-	-	-	-	31,743 14
Totals, . . . . .	.	\$2,980 51	\$32,406 28	\$3,252 94	\$271 49	\$57 17	\$1,454 79	\$87 50	\$754 43	\$2,198 14	\$43,463 25

MAINTENANCE.		Office Expense.	Labor.	Laboratory Supplies.	Returns.	Minor Equip-ment.	Building Supplies.	Travel.	General Expense.	Miscel-laneous.	Salaries.	Totals.
Academic maintenance:—	.											
Agricultural economics, . . . . .	.	\$155 37	\$67 91	\$6 60	-	\$46 84	\$0 28	\$100 98	-	-	-	\$377 98
Agricultural education, . . . . .	.	134 05	-	44 56	-	35 55	-	50 09	-	-	-	264 25
Agronomy, . . . . .	.	199 38	286 36	219 43	\$1 50	139 41	-	101 86	-	-	-	947 94
Animal husbandry, . . . . .	.	211 78	158 50	53 11	6 00	58 76	-	259 60	-	-	-	742 75
Botany, . . . . .	.	261 93	625 96	440 58	3 50	1 03	149 78	-	-	-	-	1,482 78
Chemistry, . . . . .	.	155 37	967 10	3,310 60	83 30	85 26	76 15	8 84	-	-	-	4,636 62

ANALYSIS OF COLLEGE EXPENDITURES — *Concluded.*

MAINTENANCE.	Office Expense.	Labor.	Laboratory Supplies.	Refunds.	Minor Equipment.	Building Supplies.	Travel.	General Expense.	Miscellaneous.	Salaries.	Totals.
Dairying,	\$217 50	\$3,910 05	\$28,953 89	\$14 50	\$317 84	\$131 51	\$5 41	-	-	-	\$33,550 70
Domestic science,	234 39	671 03	200 91	-	1,017 80	119 74	153 40	-	-	-	2,397 27
Economics and sociology,	47 60	8 00	10 18	-	-	-	-	-	-	-	65 78
Entomology,	84 75	510 13	166 23	-	33 36	149 40	-	-	-	-	943 87
Farm management,	153 12	22 64	68 36	1 50	5 97	-	106 73	-	-	-	338 32
Floriculture,	33 94	5,908 32	1,413 26	-	22 80	25 08	-	-	-	-	7,488 40
Forestry,	73 96	95 79	11 55	-	41 08	6 96	108 45	-	-	-	337 79
Freshman agriculture,	20 12	33 81	110 45	-	24 22	-	-	-	-	-	188 60
General agriculture,	-	1,506 86	-	-	176 65	238 44	-	-	\$79 20	-	2,001 15
Horticultural manufactures,	49 67	1,155 21	1,933 53	-	224 15	-	66 57	-	-	-	3,429 13
Hospital,	-	1,225 78	-	-	36 11	-	-	\$950 36	-	-	2,212 25
Landscape gardening,	18 86	-	117 37	3 00	30 21	-	-	-	-	-	169 44
Language and literature,	11 00	24 28	113 73	20 00	41 05	-	-	-	-	-	210 06
Market gardening,	161 42	5,007 94	1,433 86	6 50	117 15	36 19	239 36	-	-	-	7,892 42
Mathematics,	55 24	109 07	12 27	-	25 00	19 28	-	-	-	-	220 86
Microbiology,	99 20	577 08	770 98	81 90	261 41	35 38	-	-	-	-	1,825 90
Military science,	107 71	705 71	3 85	-	225 61	221 09	-	123 80	-	-	1,387 77
Mount Toby,	-	2,970 85	-	-	181 35	-	131 34	-	88 80	-	3,372 34
Physical education,	35 17	281 15	211 90	-	52	-	312 53	-	-	-	841 27
Physics,	37 56	271 22	209 12	-	156 84	47 50	-	-	-	-	722 24
Pomology,	196 22	3,226 08	953 04	5 00	108 05	-	61 79	-	-	-	4,550 18

CURRENT ACCOUNTS.

Disbursements and Receipts.

ACCOUNTS.	Disbursements from Nov. 30, 1918, to Nov. 30, 1919.	Receipts from Nov. 30, 1918, to Nov. 30, 1919.	Apportionment for Year ending Nov. 30, 1919.	Balance to Credit.
Administration:—				
Dean's office,	\$522 50	\$0 55	\$500 00	—\$22 50
Executive order,	7,085 23	—	6,700 00	—385 23
President's office,	1,971 58	3 50	1,500 00	—471 58
Registrar's office,	600 58	25	600 00	—58
Salaries,	31,743 14	—	30,000 00	—1,743 14
Treasurer's office,	1,540 22	64 55	1,200 00	—340 22
Maintenance, academic:—				
Agricultural economics,	377 98	1 22	338 50	—39 48
Agricultural education,	264 25	10	350 00	85 75
Agronomy,	947 94	252 00	975 00	27 06
Animal husbandry,	742 75	294 20	610 00	—132 75
Botany,	1,482 78	627 76	1,600 00	117 22
Chemistry,	4,636 62	2,669 42	4,450 00	—186 62
Dairying,	33,550 70	33,301 94	33,665 00	114 30
Domestic science,	2,397 27	68	500 00	—1,897 27
Economics and sociology,	65 78	—	50 00	—15 78
Entomology,	948 87	1,082 50	1,000 00	56 13
Farm management,	358 32	195 60	400 00	41 68
Floriculture,	7,468 40	4,549 99	6,850 00	—618 40
Forestry,	337 79	9 00	250 00	—87 79
Freshman agriculture,	188 60	219 00	300 00	111 40
General agriculture,	2,001 15	4 15	1,750 00	—251 15
Horticultural manufactures,	3,429 13	641 03	2,665 00	—764 13
Hospital,	2,212 25	792 48	1,800 00	—412 25
Landscape gardening,	169 44	248 24	350 00	180 56
Language and literature,	210 06	170 00	400 00	189 94
Market gardening,	7,892 42	4,804 51	4,700 00	—3,192 42
Mathematics,	220 86	232 81	220 00	—86
Microbiology,	1,825 90	704 60	1,725 00	—100 90
Military science,	1,387 77	—	1,460 00	72 23
Mount Toby,	3,372 34	5,872 15	5,000 00	1,627 66
Physical education,	841 27	—	700 00	—141 27
Physics,	722 24	40 05	600 00	—122 24
Pomology,	4,550 18	3,738 61	3,935 00	—615 18
Poultry husbandry,	16,248 47	15,895 74	16,075 00	—173 47
Rural engineering,	742 47	214 14	575 00	—167 47
Rural sociology,	174 96	—	150 00	—24 96
Veterinary,	895 21	6 00	1,100 00	204 79
War emergency,	102 62	844 62	—	742 00
Zoölogy and geology,	655 34	516 13	575 00	—80 34
Maintenance, general:—				
Farm,	50,997 36	44,238 47	46,600 00	—4,437 72
General horticulture,	9,117 97	2,248 26	8,800 00	—317 97
Graduate school,	60 26	—	100 00	39 74
Grounds,	5,731 00	107 13	5,800 00	69 00
Library,	6,919 64	59 34	6,036 50	—883 14
General expense,	31,350 07	31,350 07	—	—
Operating and maintenance,	98,123 29	13,527 63	90,000 00	—8,082 93
Endowment fund,	7,220 76	10,613 32	10,613 32	3,392 56
Instruction:—				
Salaries,	121,518 21	—	130,000 00	8,481 79
United States Treasurer, Morrill fund (\$16,666.67 and \$182 refund),	16,777 42	16,848 67	16,666 67	9,793 47
United States Treasurer, Nelson fund (\$16,666.67 and \$182 refund),	16,777 40	16,848 66	16,666 66	9,793 48
State Treasurer, account of schedules,	—	427,244 04	—	—
Income to State Treasurer,	128,673 20	—	—	—
	\$638,146 96	\$641,083 11	\$466,901 65	\$9,431 02
Less journal entries (\$40,539.72) and refunds (\$914.42),	41,454 14	—	—	—
Less journal entries (\$40,539.72) and refunds (\$315.50),	—	40,855 22	—	—
	\$596,692 82	\$600,227 89	—	—
Balance beginning fiscal year Dec. 1, 1918,	—	19,444 44	—	—
Balance on hand Nov. 30, 1919,	22,979 51	—	—	—
	\$619,672 33	\$619,672 33	—	—

COLLEGE ACCOUNTS.

Comparative Disbursements and Receipts for 1918-19.

ACCOUNTS.	DISBURSEMENTS.		RECEIPTS.	
	1918.	1919.	1918.	1919.
Agricultural economics,	\$262 55	\$377 98	-	\$1 22
Agricultural education,	323 67	264 25	-	10
Agronomy,	772 83	947 94	\$199 12	252 00
Animal husbandry,	376 50	742 75	139 50	294 20
Beekeeping,	1,025 52	-	588 12	-
Botany,	1,377 19	1,482 78	320 50	627 76
Chemistry,	3,093 18	4,636 62	1,545 92	2,669 42
Dairying,	31,821 36	33,550 70	26,479 19	33,301 94
Dean's office,	388 40	522 50	43 43	55
Domestic science,	-	2,397 27	-	68
Economics and sociology,	74 65	65 78	-	-
Entomology,	393 08	943 87	25 90	1,082 50
Executive order,	5,649 07	7,085 23	14 91	-
Farm management,	349 61	358 32	138 56	195 60
Farm,	47,778 65	50,997 36	41,988 56	44,238 47
Floriculture,	5,873 28	7,468 40	2,407 98	4,549 99
Forestry,	120 81	337 79	7 00	9 00
Freshman agriculture,	88 54	188 60	238 55	219 00
General agriculture,	1,538 01	2,001 15	75	4 15
General horticulture,	8,326 81	9,117 97	2,671 87	2,248 26
Graduate school,	82 57	60 26	-	-
Grounds,	4,780 99	5,731 00	92 24	107 13
Horticultural manufactures,	1,893 63	3,429 13	374 33	641 03
Hospital,	1,565 61	2,212 25	280 32	792 48
Land,	5,000 00	-	5,000 00	-
Landscape gardening,	178 53	169 44	157 71	248 24
Language and literature,	382 73	210 06	112 00	170 00
Library,	6,238 82	6,919 64	480 07	59 34
Market gardening,	5,037 99	7,892 42	3,423 29	4,804 51
Market garden field station,	1,121 94	-	2,317 46	-
Mathematics,	151 21	220 86	60 10	232 81
Military science,	1,003 49	1,387 77	89 41	-
Microbiology,	836 54	1,825 90	434 45	704 60
Mount Toby,	7,139 81	3,372 34	357 00	5,872 15
Physical education,	452 64	841 27	-	-
Physics,	556 60	722 24	76 00	40 05
Pomology,	3,340 64	4,550 18	2,635 05	3,738 61
Poultry husbandry,	16,812 64	16,248 47	16,449 05	15,895 74
President's office,	1,828 64	1,971 58	26 00	3 50
Registrar's office,	592 26	600 58	-	25
Rural engineering,	544 47	742 47	191 00	214 14
Rural sociology,	101 87	174 96	-	-
Salaries,	170,048 15	153,261 35	676 81	-
Treasurer's office,	1,184 60	1,540 22	-	64 55
Veterinary science,	920 54	895 21	20 12	6 00
War emergency,	2,236 28	102 62	2,042 51	844 62
Women's dormitories,	724 71	-	542 00	-
Zoölogy and geology,	243 55	655 34	175 38	516 13
1917 celebration,	1,751 94	-	-	-
General expense,	-	31,350 07	-	31,350 07
Operating and maintenance,	86,129 77	98,123 29	9,628 37	13,327 63
State Treasurer:—				
Endowment fund,	-	7,220 76	10,613 32	10,613 32
Graduate school,	-	-	3,000 00	-
Maintenance,	-	-	110,000 00	-
Instruction,	-	-	115,000 00	-
Administration,	-	-	39,000 00	-
United States Treasurer:—				
Morrill fund (\$16,666.67 and \$182 re- fund),	-	16,777 42	16,666 66	16,848 67
Nelson fund (\$16,666.66 and \$182 re- fund),	-	16,777 40	16,666 67	16,848 66
State Treasurer account of schedules, Income to State Treasurer,	-	128,673 20	-	427,244 04
	\$432,516 87	\$638,146 96	\$433,397 18	\$641,083 11
Less journal entries and refunds,	-	41,454 14	-	40,855 22
	\$432,516 87	\$596,692 82	\$433,397 18	\$600,227 89
Balance beginning of fiscal year, Balance on hand at close of fiscal year,	-	-	18,266 00	19,444 44
	19,146 31	22,979 51	-	-
	\$451,663 18	\$619,672 33	\$451,663 18	\$619,672 33

COLLEGE ACCOUNTS — *Concluded.**Summary.*

	Disbursements.	Receipts.
Cash on hand Dec. 1, 1918,	-	\$19,444 44
Institution receipts Nov. 30, 1919,	-	128,673 20
State Treasurer's receipts Nov. 30, 1919,	-	427,244 04
United States Treasurer's receipts Nov. 30, 1919,	-	33,697 33
State Treasurer, endowment fund,	-	10,613 32
Total disbursements,	\$468,019 62	-
Receipts turned in to State Treasurer,	128,673 20	-
	\$596,692 82	\$619,672 33
Bills receivable Dec. 1, 1918, deducted,	-	5,972 27
Bills payable Dec. 1, 1918, deducted,	7,961 55	-
	\$588,731 27	\$613,700 06
Bills receivable Nov. 30, 1919,	-	8,206 00
Bills payable Nov. 30, 1919,	7,179 90	-
Balance,	25,994 39	-
	\$621,906 06	\$621,906 06

FARM DISBURSEMENTS.

	Labor.	Equip- ment.	Feed.	Supplies.	Sundry.	Bedding.	Fertilizer.	Seeds.	Improve- ments.	Totals.
Dairy cattle,	\$10,067 59	\$562 39	\$2,731 54	\$1,758 45	\$764 14	-	-	-	-	\$15,884 11
Horses,	2,033 75	235 18	193 05	25 45	361 23	-	-	-	-	2,850 66
Sheep,	978 26	50 38	133 34	33 40	126 89	-	-	-	-	1,319 74
Live stock,	314 58	-	11,279 66	-	-	\$1,040 66	-	-	-	12,634 90
Swine,	1,625 89	92 82	1,965 19	-	76 30	-	-	-	-	2,799 90
Field crops,	5,057 13	-	-	77 81	-	-	\$1,042 00	-	-	7,052 36
Tools and machinery,	570 97	1,142 73	-	295 66	-	-	-	-	-	2,009 36
Miscellaneous,	4,129 67	-	-	221 44	-	-	-	-	\$2,095 32	6,446 43
Totals,	\$24,175 54	\$2,034 50	\$15,942 78	\$2,413 21	\$1,328 03	\$1,040 66	\$1,042 00	\$875 32	\$2,095 32	\$50,997 36

FARM CREDITS.

	Milk.	Stock.	Sundry.	Labor.	Live Stock.	Field Crops.	Tools and Machinery.	Improve- ments.	Totals.
Dairy cattle,	\$31,155 08	\$3,264 24	\$361 45	-	-	-	-	-	\$34,780 77
Horses,	-	1,455 00	10 85	\$937 66	-	-	-	-	1,403 51
Sheep,	-	1,092 19	-	-	-	-	-	-	1,092 19
Live stock,	-	-	-	\$150 75	-	-	-	-	150 75
Swine,	-	3,075 27	-	-	-	-	-	-	3,075 27
Field crops,	-	-	-	-	-	\$2,391 88	-	-	2,391 88
Tools and machinery,	-	-	-	-	-	-	\$51 72	-	51 72
Miscellaneous,	-	-	-	1,134 63	-	-	-	\$157 75	1,292 38
Totals,	\$31,155 08	\$7,886 70	\$372 30	\$2,072 29	\$150 75	\$2,391 88	\$51 72	\$157 75	\$44,298 47

AGRICULTURAL DIVISION.
Disbursements and Receipts.

	Disbursements.	Receipts.
Agronomy,	\$947 94	\$252 00
Animal husbandry,	742 75	294 20
Dairying,	33,550 70	33,301 94
Farm,	50,997 36	44,238 47
Farm management,	358 32	195 60
Poultry husbandry,	16,248 47	15,895 74
Rural engineering,	742 47	214 14
Division totals,	\$103,588 01	\$94,392 09

Summary.

	DR.	CR.
By total division receipts,		\$94,392 09
By bills receivable,		5,652 57
By net apportionment,		4,507 91
By total disbursements,	\$103,588 01	
To bills payable,	4,335 74	
Balance,		3,371 18
	\$107,923 75	\$107,923 75

Inventory of Quick Assets.

	Nov. 30, 1918.	Nov. 30, 1919.
Inventory of produce,	\$10,550 24	\$14,967 85
Inventory of cattle,	17,100 00	17,090 00
Inventory of swine,	1,957 00	1,507 00
Inventory of horses,	4,675 00	4,350 00
Inventory of poultry,	2,582 10	2,946 10
Inventory of sheep,	1,655 00	2,010 00
	\$38,619 34	\$42,870 95

HORTICULTURAL DIVISION.
Disbursements and Receipts.

	Disbursements.	Receipts.
Floriculture,	\$7,468 40	\$4,549 99
Forestry,	337 79	9 00
General horticulture,	9,117 97	2,248 26
Grounds,	5,731 00	107 13
Horticultural manufactures,	3,429 13	641 03
Landscape gardening,	169 44	248 24
Market gardening,	7,892 42	4,804 51
Pomology,	4,550 18	3,738 61
Mount Toby,	3,372 34	5,872 15
	\$42,068 67	\$22,218 92

Summary.

	DR.	CR.
By total division receipts,		\$22,218 92
By bills receivable,		2,043 99
By net apportionment,		16,131 08
To total division disbursements,	\$42,068 67	
To bills payable,	551 68	
By balance,		2,226 36
	\$42,620 35	\$42,620 35

Inventory of Quick Assets.

	Nov. 30, 1918.	Nov. 30, 1919.
Floriculture,	\$1,200 00	\$1,200 00
General horticulture (live stock),	1,663 00	1,995 00
Horticultural manufactures,	-	200 00
Market gardening,	805 00	175 50
Mount Toby,	9,260 00	4,790 22
Pomology,	1,181 00	455 00
	\$14,109 00	\$8,815 72

EXPENSE OPERATING AND MAINTENANCE.

	Salaries.	Labor.	Fuel and Water.	Repairs.	Supplies.	Tools.	Architect.	Miscellaneous.	Totals.
General:—									
General superintendent,	\$2,572 18	—	—	—	—	—	—	—	\$2,572 18
Office,	810 00	—	—	—	\$283 36	—	—	—	1,093 36
General expense,	—	—	—	—	40 36	—	—	—	40 36
Power plant:—									
Heat,	—	\$10,757 89	\$46,926 78	\$3,403 67	—	—	—	—	61,087 84
Light,	—	2,136 25	—	899 73	—	—	—	—	3,035 98
Tools,	—	—	—	—	—	\$892 67	—	—	892 67
Amherst Water Company,	—	—	2,307 73	—	—	—	—	—	2,307 73
Night watchman,	—	1,688 49	—	—	—	—	—	—	1,688 49
Mail service,	—	301 96	—	—	—	—	—	—	301 96
Water mains,	—	510 82	—	—	—	—	—	—	510 82
Steam mains,	—	1,935 45	—	—	—	—	—	—	1,935 45
Electric light circuit,	—	1,851 64	—	—	—	—	—	—	1,851 64
Miscellaneous sundry,	—	—	—	—	—	—	—	\$3,934 31	3,934 31
Sewers and cesspools,	—	55 68	—	—	—	—	—	—	55 68
Walks and drives,	—	365 79	—	—	—	—	—	—	365 79
Emergency maintenance,	—	1,135 03	—	—	102 81	—	—	—	2,265 23
Expert service,	—	—	—	—	—	—	\$684 97	—	684 97
Fire department,	—	—	—	—	47 15	—	—	—	47 15
Totals,	\$3,382 18	\$20,738 50	\$49,234 51	\$4,303 40	\$473 68	\$892 67	\$684 97	\$4,901 70	\$84,611 61

EXPERIMENT STATION.
Disbursements and Receipts.

ACCOUNTS.	Disbursements from Dec. 1, 1918, to Nov. 30, 1919.	Receipts from Dec. 1, 1918, to Nov. 30, 1919.	Apportionment for Year ending Nov. 30, 1919.	Balance to Credit.
Administration,	\$835 87	\$1 00	\$1,100 00	\$264 13
Agricultural,	9,205 27	4,908 59	7,000 00	—2,205 27
Agricultural economics,	699 16	—	800 00	100 94
Botanical,	1,967 65	—	2,000 00	32 35
Chemical,	4,991 27	3,820 67	5,000 00	8 73
Cranberry,	3,618 41	4,234 46	4,100 00	481 59
Entomological,	605 48	4 55	650 00	44 52
Freight and express,	353 38	—	400 00	46 62
Horticultural,	1,603 09	100 25	2,000 00	396 91
Library,	742 17	—	600 00	—142 17
Meteorology,	321 96	—	400 00	78 04
Microbiology,	1,258 22	—	1,300 00	41 78
Poultry,	2,355 95	32 70	2,400 00	44 05
Publications,	1,374 62	—	800 00	—574 62
Salaries,	50,753 50	—	49,066 00	—1,687 50
Tillson farm,	2,340 73	1,259 91	2,500 00	159 27
Treasurer's office,	341 37	—	350 00	8 63
Veterinary,	813 66	148 54	500 00	—313 66
Hatch fund,	—	15,000 00	—	—
Adams fund,	—	15,000 00	—	—
State Treasurer, account of schedules,	—	48,728 05	—	—
Income remitted to State Treasurer,	8,752 05	—	—	—
	\$92,933 81	\$93,238 72	\$80,966 00	—\$3,215 66
Less journal entries,	5,758 62	5,758 62	—	—
	\$87,175 19	\$87,480 10	—	—
Balance beginning fiscal year Dec. 1, 1918,	—	2,534 07	—	—
Balance on hand Nov. 30, 1919, . . .	2,838 98	—	—	—
Totals,	\$90,014 17	\$90,014 17	—	—

EXPERIMENT STATION — *Continued.*
Comparative Disbursements and Receipts, 1918-19.

ACCOUNTS.	DISBURSEMENTS.		RECEIPTS.	
	1918.	1919.	1918.	1919.
Administration,	\$888 49	\$835 87	\$40 65	\$1 00
Agriculture,	9,627 26	9,205 27	6,064 36	4,908 59
Agricultural economics,	355 71	699 16	-	-
Botanical,	2,202 50	1,967 65	-	-
Chemical,	14,641 14	4,991 27	13,423 39	3,820 67
Cranberry,	5,705 37	3,618 41	6,220 20	4,234 46
Entomological,	603 71	605 43	-	4 55
Equipment,	11 00	-	-	-
Feed inspection,	6,925 28	-	6,053 00	-
Fertilizer inspection,	9,519 67	-	7,007 50	-
Freight and express,	334 71	353 33	8 65	-
Graves orchard,	126 38	-	1,004 50	-
Horticultural,	2,142 69	1,603 09	61 66	100 25
Library,	218 39	742 17	-	-
Meteorology,	325 82	321 96	-	-
Microbiology,	947 61	1,258 22	-	-
Poultry,	2,316 15	2,355 95	19 63	32 70
Pomology,	-	-	3 40	-
Publications,	247 94	1,374 62	-	-
Salaries,	47,123 30	50,753 50	-	-
Tillson farm,	3,390 51	2,340 73	1,010 94	1,259 91
Treasurer's office,	246 46	341 37	-	-
Veterinary,	270 98	813 66	206 35	148 54
Hatch fund,	-	-	15,000 00	15,000 00
Adams fund,	-	-	15,000 00	15,000 00
State fund,	-	-	40,000 00	-
State Treasurer, account of schedules,	-	-	-	48,728 05
Income remitted to State Treasurer,	-	8,752 05	-	-
	\$108,171 07	\$92,933 81	\$111,124 23	\$93,238 72
Less journal entries,	-	5,758 62	-	5,758 62
	\$108,171 07	\$87,175 19	\$111,124 23	\$87,480 10
Balance beginning of fiscal year, . .	-	-	8,688 34	2,534 07
Balance on hand at close of fiscal year,	11,641 50	2,838 98	-	-
Totals,	\$119,812 57	\$90,014 17	\$119,812 57	\$90,014 17

EXPERIMENT STATION — *Concluded.*
Analysis of Experiment Station Accounts.

	Adams Fund.	Hatch Fund.	State Fund.	Totals.
Salaries,	\$13,290 83	\$14,173 57	\$23,289 10	\$50,753 50
Labor,	504 96	164 23	18,187 82	18,857 01
Publications,	-	-	934 49	934 49
Postage and stationery,	-	80 50	1,324 14	1,404 64
Freight and express,	-	-	418 98	418 93
Heat, light, water and power,	-	-	287 36	287 36
Chemical and laboratory supplies,	193 96	-	1,001 40	1,195 36
Seeds, plants and sundry supplies,	96 14	-	1,788 36	1,884 50
Fertilizers,	115 20	203 65	888 48	1,207 33
Feedstuffs,	201 25	-	1,744 45	1,945 70
Library,	-	20 00	745 07	765 07
Tools, machinery and appliances,	-	-	541 38	541 38
Furniture and fixtures,	-	-	184 01	184 01
Scientific apparatus and specimens,	535 30	115 50	149 85	800 65
Live stock,	-	-	107 00	107 00
Traveling expenses,	-	-	1,785 70	1,785 70
Buildings and land,	-	-	1,109 13	1,109 13
Totals,	\$14,937 64	\$14,757 45	\$54,486 67	\$84,181 76
Less journals,	-	-	5,758 62	5,758 62
	\$14,937 64	\$14,757 45	\$48,728 05	\$78,423 14

Summary.

	Disbursements.	Receipts.
Cash on hand Dec. 1, 1918,	-	\$2,534 07
Receipts from State Treasurer,	-	48,728 05
Receipts from United States Treasurer,	-	30,000 00
Receipts from other sources,	-	8,752 05
Total disbursements,	\$78,423 14	-
Receipts turned into State Treasurer,	8,752 05	-
	\$87,175 19	\$90,014 17
Bills receivable Dec. 1, 1918, deducted,	-	2,599 44
Bills payable Dec. 1, 1918, deducted,	424 64	-
	\$86,750 55	\$87,414 73
Bills receivable Nov. 30, 1919,	-	770 44
Bills payable Nov. 30, 1919,	954 14	-
Balance,	480 48	-
	\$88,185 17	\$88,185 17

EXTENSION SERVICE.¹*Disbursements and Receipts.*

CLASSIFICATION.	Disbursements.	Receipts.	Apportionment.	Balance.
Administration,	\$1,256 95	-	\$2,000 00	\$743 05
Animal husbandry,	837 04	-	1,000 00	162 96
Co-operative marketing,	1,279 44	-	1,200 00	-79 44
Correspondence courses,	773 70	\$612 00	1,600 00	826 30
County agents' work,	957 29	-	200 00	-757 29
Dairying,	1,264 42	-	1,200 00	-64 42
Director's office,	3,739 13	772 97	2,700 00	-1,039 13
Exhibits,	4,028 26	-	2,000 00	-2,028 26
Expenses, urban home demonstration,	580 06	35	1,475 00	894 94
Extension courses at college,	1,758 11	9 52	3,800 00	2,041 89
Extension schools,	62 32	-	-	-62 32
Farm management demonstration,	369 74	111 68	250 00	-119 74
Home economics,	2,081 68	43 20	300 00	-1,781 68
Home gardening,	270 33	-	940 00	669 67
Horticultural manufactures,	1,635 57	2 68	780 00	-855 57
Injurious insects,	38 57	-	200 00	161 43
Junior extension work,	3,640 42	40	3,160 00	-480 42
Lectures,	53 37	-	500 00	446 63
Library extension,	241 01	-	200 00	-41 01
Local community organization,	558 87	14 40	1,000 00	441 13
Methods of extension instruction,	269 33	-	492 00	222 67
Plant diseases,	58 09	-	200 00	141 91
Pomology,	624 86	-	1,100 00	475 14
Poultry husbandry,	646 55	-	500 00	-146 55
Printing,	1,037 40	296 11	3,000 00	1,962 60
Rural civic planning,	14 64	16 90	-	-14 64
Salaries,	40,422 52	-	47,163 67	6,741 15
Sheep husbandry,	360 22	9 67	100 00	-260 22
Soils and crops,	932 44	-	940 00	7 56
State Treasurer, account of schedules,	-	68,970 47	-	-
Income remitted to State Treasurer,	1,185 13	-	-	-
	\$70,977 46	\$70,860 35	\$78,000 67	\$8,208 34
Less journal entries (\$704.75), refund (\$111.11) and \$6.	821 86	704 75	-	-
	\$70,155 60	\$70,155 60	-	-

¹ Includes Federal Smith-Lever Fund.

EXTENSION SERVICE — *Continued.**Summary.*

	Disbursements.	Receipts.
Balance Dec. 1, 1918,	-	\$2,618 11
Receipts Nov. 30, 1919,	-	1,185 13
Received from State Treasurer,	-	68,970 47
Received from United States Treasurer,	-	25,392 19
Disbursements to Nov. 30, 1919,	\$92,357 05	-
Receipts turned into State Treasurer,	1,185 13	-
	\$93,542 18	\$98,165 90
Bills receivable Dec. 1, 1918, deducted,	-	138 03
Bills payable Dec. 1, 1918, deducted,	69 25	-
	\$93,472 93	\$98,027 87
Bills receivable Nov. 30, 1919,	-	88 82
Bills payable Nov. 30, 1919,	708 11	-
Balance,	3,935 65	-
	\$98,116 69	\$98,116 69

SMITH-LEVER FUND (FEDERAL).

	Disbursements.	Receipts.
Administration,	\$5 00	-
Dairying,	161 96	\$250 00
Extension schools,	747 94	-
District and county agents,	38 05	-
Farm management demonstration,	553 02	-
Home economics,	75 46	-
Home gardening,	37 23	-
Horticultural manufactures,	379 81	-
Junior extension,	1,939 90	-
Plant diseases,	239 68	-
Pomology,	17 08	-
Poultry husbandry,	539 30	-
Printing and publications,	515 71	-
Salaries,	17,734 01	-
Sheep husbandry,	402 43	-
State Treasurer,	-	25,142 19
	\$23,386 58	\$25,392 19
Balance beginning of fiscal year Dec. 1, 1918,	-	2,618 11
Balance on hand Nov. 30, 1919,	4,623 72	-
Totals,	\$28,010 30	\$28,010 30

SHORT COURSES.

	Salary.	Office.	Laboratory Supplies.	Labor.	Travel.	Miscellaneous.	Total.
Two-year course,	\$3,614 42	\$253 82	\$446 10	\$249 11	\$104 51	\$564 26	\$5,322 22
Ten weeks' winter course,	150 00	74 44	1,208 67	44 69	154 15	221 72	1,853 67
Summer school,	3,990 00	179 95	577 16	960 40	73 25	850 87	6,631 63
Administration,	3,225 00	3 50	-	-	45 93	312 08	3,586 51
Totals,	\$10,979 42	\$511 71	\$2,231 93	\$1,254 20	\$467 84	\$1,948 93	\$17,394 03
Less cash refunds,	-	-	-	-	-	-	28 00
							\$17,366 03
State appropriation,	-	-	\$17,000 00	-	-	-	-
Amount of receipts,	-	-	1,898 63	-	-	-	-
Amount of receipts transferred to State Treasurer,	-	\$1,898 68	-	-	-	-	-
Department expenditures,	-	17,366 03	-	-	-	-	-
Balance overdrawn,	-	-	366 03	-	-	-	-
		\$19,264 06	\$19,264 66				

MARKET GARDEN FIELD STATION.

	Debit.	Credit.
Labor,	\$4,666 08	
Maintenance,	1,481 12	
Minor equipment,	221 48	
Miscellaneous,	18 07	
Total,	\$6,386 75	
Less journal entries,	34 80	
Net expenditures,	\$6,351 95	
State appropriation,		\$8,000 00
Amount of receipts,		2,795 98
Amount of receipts transferred to State Treasurer,	\$2,795 98	
Department expenditures,	6,351 95	
Balance unexpended,	1,648 05	
	\$10,795 98	\$10,795 98

SPECIAL APPROPRIATIONS.

	Date made.	Appropriation.	Amount expended to Date.	Unexpended Balance.
Agricultural building,	1914	\$210,000 00	\$210,000 00	-
Microbiology building,	1915	67,500 00	65,450 31	\$2,049 69
Agricultural building,	1916	13,732 34	12,243 49	1,488 85
Rural engineering building,	1916	12,000 00	11,997 57	2 43
Improvement and equipment,	1917	33,500 00	33,471 20	28 80
Power plant improvements,	1917	40,000 00	39,955 91	44 09
Printing,	1917	-	888 79	-
Improvement and equipment,	1918	20,000 00	19,496 57	503 43
Power plant improvements,	1918	54,500 00	54,500 00	-
Market garden field station,	1918	16,500 00	13,068 97	3,431 03
Dining hall,	1918	12,000 00	11,676 41	323 59
Printing,	1918	3,000 00	3,000 00	-
Improvement and equipment,	1919	20,000 00	10,443 74	9,556 26
Women's dormitory,	1919	127,400 00	6,016 07	121,383 93
Market garden field station,	1919	15,000 00	4,348 73	10,651 27
Engineering studies,	1919	2,000 00	832 27	1,167 73
Printing,	-	-	158 17	-
Feed law,	1919	6,000 00	6,000 00	-
Trustees' travel,	1919	900 00	1,027 48	-127 48
S. A. T. C., plumbing,	-	-	2,501 64	-
Totals,	-	\$654,032 34	\$507,077 32	\$150,503 62
Amount spent previous to Dec. 1, 1918,	-	-	-	395,119 37
Amount expended during fiscal year,	-	-	-	111,957 95
Unexpended balance Nov. 30, 1919,	-	-	150,503 62	-
	-	\$654,032 34	\$657,580 94	\$657,580 94

INVENTORY — REAL ESTATE.

Land (Estimated Value).

Angus land,	\$800 00
Allen place,	500 00
Baker place,	2,500 00
Bangs place,	2,350 00
Brown land,	500 00
Charnbury place,	450 00
Clark place,	4,500 00
College farm,	37,000 00
Cranberry land,	12,745 00
Geo. Cutler, Jr., trustee,	2,700 00
Dickinson land,	7,850 00
Harlow farm,	1,584 63
Hawley and Brown place,	675 00
Kellogg place,	3,368 45
Loomis place,	415 00
Louisa Baker place,	5,000 00
Market garden field station,	4,800 00
Mount Toby demonstration forest,	30,000 00
Newell farm,	2,800 00
Old creamery place,	1,000 00
Owen farm,	5,000 00
Pelham quarry,	500 00
Tillson farm,	2,950 00
Westcott place,	2,250 00
Total,	<hr/> \$132,238 08

College Buildings (Estimated Value).

	Inventory at Beginning of Year.	Per Cent de- ducted.	Value at Beginning of Year less Per Cent De- terioration.	Repairs and Improve- ments during Year.	Total Value at Close of Fiscal Year.
Apiary,	\$3,043 03	2	\$2,982 17	\$10 85	\$2,993 02
Animal husbandry building,	9,390 57	2	9,202 76	8 60	9,211 36
Cashier's house,	1,660 90	5	1,577 85	25 75	1,603 60
Chemical laboratory,	8,190 95	5	7,781 40	552 44	8,333 84
Clark Hall,	63,995 60	2	62,715 69	353 03	63,068 72
Cold-storage laboratory,	11,190 07	2	10,966 27	7 50	10,973 77
Dairy building,	71,226 86	2	69,802 32	373 47	70,175 79
Dairy barn and storage,	27,599 63	3	26,771 64	146 43	26,918 07
Dining hall,	65,797 49	3	63,823 57	3,643 57	67,467 14
Drill hall and gun shed,	8,891 24	5	8,446 68	317 28	8,763 96
Durfee glass houses, old,	8,582 37	5	8,153 25	3 96	8,157 21
Durfee glass houses, new,	12,497 72	5	11,872 83	176 87	12,049 70
Entomology building,	74,801 30	2	73,305 27	333 83	73,639 10
Farm bungalow,	2,653 85	3	2,574 23	9 78	2,584 01
Farmhouse No. 1,	2,492 24	3	2,417 47	187 33	2,604 80
Farmhouse No. 2,	4,512 52	8	4,151 52	20 86	4,172 38
French Hall,	47,071 45	2	46,130 02	194 39	46,324 41
Grounds' tool shed,	245 00	5	232 75	-	232 75
Harlow house,	1,603 55	5	1,523 37	31 54	1,554 91
Horse barn,	4,649 75	3	4,510 26	24 78	4,535 04
Head of Division of Horticulture,	2,342 52	5	2,225 39	27 64	2,253 03
Horticultural barn,	2,433 67	3	2,360 66	108 66	2,469 32
Horticultural tool shed,	1,770 59	3	1,717 47	-	1,717 47
Hospital,	14,917 49	2	14,519 14	98 32	14,617 46
Kellogg house,	2,369 50	5	2,251 02	317 67	2,568 69
Machinery barn,	3,565 35	3	3,458 39	12 66	3,471 05
Market garden field station barn,	3,395 00	3	3,293 15	-	3,293 15
Mathematical building,	5,185 08	5	4,925 83	7 57	4,933 40
Microbiology building,	59,981 80	2	58,782 16	155 48	58,937 64
Military storage,	250 00	5	237 50	-	237 50
Mount Toby house and barn,	4,007 18	5	3,806 82	2 85	3,809 67
North dormitory,	24,550 64	2	24,059 63	459 97	24,519 60
Physics laboratory,	4,673 48	5	4,439 81	353 59	4,793 40
Piggery,	2,672 97	3	2,592 78	-	2,592 78

College Buildings (Estimated Value) — Concluded.

	Inventory at Beginning of Year.	Per Cent de- duced.	Value at Beginning of Year less Per Cent De- terioration.	Repairs and Improve- ments during Year.	Total Value at Close of Fiscal Year.
Poultry department:—					
No. 1 demonstration building,	\$1,354 12	2	\$1,327 04	\$3 51	\$1,330 55
No. 2 oil house,	71 60	2	70 17	-	70 17
No. 3 brooder, killing and fattening laboratory.	2,389 09	2	2,332 49	-	2,332 49
No. 4 mechanics, storage building and incubator cellar.	3,445 07	2	3,376 17	12 37	3,388 54
No. 5 laying house,	1,663 43	2	1,630 16	10 23	1,640 44
No. 6 manure shed,	94 73	2	92 84	-	92 84
No. 7 small henhouse,	47 67	2	46 72	-	46 72
No. 8 breeding house,	1,504 66	2	1,474 57	5 20	1,479 77
No. 9 experimental breeding house, . .	592 23	2	580 39	-	580 39
No. 10 duck house,	98 01	2	96 05	-	96 05
No. 11 unit house for 200 hens, . . .	495 85	2	485 93	-	485 93
No. 12 unit house for 100 hens, . . .	400 10	2	392 10	-	392 10
Power plant and storage building, in- cluding coal pocket.	47,410 53	2	46,462 32	1,734 38	48,196 70
President's house,	11,958 83	3	11,609 07	1,655 28	13,264 35
Quarantine barn,	486 91	3	472 30	-	472 30
Rural engineering building,	3,585 03	2	3,513 33	2 18	3,515 51
Sheep barn,	1,457 31	3	1,413 59	-	1,413 59
South dormitory,	35,090 90	2	34,389 08	2,917 57	37,306 65
Stockbridge Hall,	175,342 74	2	171,835 89	343 59	172,179 48
Agronomy greenhouse,	2,039 09	2	1,998 31	1 18	1,999 49
Stockbridge house,	1,407 23	5	1,336 87	262 67	1,599 54
Stone chapel,	28,323 67	2	27,757 20	134 76	27,891 96
Turbine house,	-	-	-	-	17,665 00
Vegetable plant house,	4,366 24	5	4,147 93	222 36	4,370 29
Veterinary laboratory and stable, . .	22,519 03	2	22,068 65	14 90	22,083 55
Waiting station,	476 30	2	466 77	-	466 77
Wilder Hall,	34,971 06	2	34,271 64	31 51	34,303 15
Young stock barn,	5,948 16	3	5,769 72	84 72	5,854 44
Totals,	\$949,741 95	--	\$927,028 37	\$15,403 13	\$960,096 50

College Equipment (Estimated Value).

Administrative division:—	
Dean's office,	\$484 90
President's office,	2,188 00
Registrar's office,	1,206 11
Treasurer's office,	3,035 89
Agricultural division:—	
Agronomy,	6,860 06
Animal husbandry,	729 38
Dairy,	20,077 28
Farm,	48,923 66
Farm management,	969 90
General agriculture,	3,879 95
Poultry,	6,441 91
Rural engineering,	3,897 21
Domestic science,	1,906 81
Dining hall,	17,868 48
Extension,	12,407 97
General science:—	
Apiary,	2,218 06
Botanical,	23,023 76
Chemical,	12,853 42
Entomology,	4,612 52
Mathematics,	2,407 25
Microbiology,	7,792 05
Physics,	7,005 15
Veterinary,	10,260 25
Zoological and geological,	17,143 60
Graduate school,	115 80
Horticultural division:—	
Floriculture,	18,897 04
Forestry,	2,180 74
General horticulture,	7,057 51
Grounds,	1,399 63
Horticultural manufactures,	4,117 40
Landscape gardening,	5,049 18
Market-garden field station,	1,711 90
Market gardening,	2,513 62
Mount Toby reservation,	4,905 29
Pomology,	5,929 30
Hospital,	1,104 72
Humanities division:—	
Economics and sociology,	195 00
Language and literature,	626 00
Library,	107,724 13
Military,	1,417 05
Operating and maintenance:—	
College supply,	1,650 30
Fire apparatus,	2,156 32
General maintenance,	172,769 99
Carpentry and masonry supplies,	6,252 49
Electrical supplies,	2,417 83
Equipment,	152,516 53
Heating and plumbing supplies,	9,844 07
Painting supplies,	1,739 07

*College Equipment (Estimated Value) — Concluded.*Operating and maintenance — *Con.*

Janitor's supplies,	\$863 33
Sewer line,	11,812 74
Water mains,	10,570 89
Physical education,	1,779 34
Rural social science: —	
Agricultural economics,	1,119 30
Agricultural education,	988 25
Rural sociology,	236 10
Short course,	536 80
Textbooks,	1,931 68
Trophy room,	1,200 00
Total,	\$590,752 92

Experiment Station Buildings (Estimated Value).

	Inventory at Beginning of Year.	Per Cent.	Cost at Beginning of Year less Per Cent Deter- ioration.	Repairs and Improve- ments during Year.	Total Value at Close of Year.
Agricultural laboratory,	\$14,483 32	2	\$14,193 65	\$31 13	\$14,224 78
Agricultural barn,	4,585 23	3	4,447 67	93	4,448 60
Agricultural farmhouse,	1,434 52	3	1,391 48	25 93	1,417 41
Agricultural glass house,	407 26	5	386 90	—	386 90
Cranberry buildings,	2,718 51	5	2,582 58	830 38	3,412 96
Plant and animal chemistry laboratory,	28,207 26	2	27,643 11	436 39	28,079 50
Plant and animal chemistry barns,	4,052 26	3	3,930 69	150 55	4,081 24
Plant and animal chemistry dairy,	1,770 59	3	1,717 47	—	1,717 47
Six poultry houses,	574 01	2	562 53	—	562 53
Entomological glass houses,	756 04	5	718 24	—	718 24
Tillson house,	570 93	5	542 38	16 02	558 40
Tillson barn,	1,140 00	5	1,083 00	—	1,083 00
Total,	\$60,699 93	—	\$59,199 70	\$1,491 33	\$60,691 03

Experiment Station Equipment (Estimated Value).

Apiary,	\$161 07
Agricultural economics department,	171 02
Agricultural laboratory,	7,563 90
Botanical laboratory,	6,692 98
Chemical laboratory,	24,317 12
Cranberry station,	3,632 40
Director's office,	5,940 16
Entomological laboratory,	23,598 84
Horticultural laboratory,	4,494 15
Meteorological laboratory,	758 00
Microbiological laboratory,	2,235 80
Poultry department,	5,338 33
Treasurer's office,	988 00
Total,	\$85,891 77

Inventory Summary.

Land,	\$132,238 08
College buildings,	960,096 50
College equipment,	590,752 92
Experiment Station buildings,	60,691 03
Experiment Station equipment,	85,891 77
Total,	\$1,829,670 30

	Acres.
College estate, area,	642.79
Cranberry station, Wareham, area,	23.67
Market-garden field station, Lexington, area,	12.00
Mount Toby demonstration forest, area,	755.27
Rifle range,	46.20
Pelham quarry, . . . . .	.50
Total acreage,	1,480.43

STUDENTS' TRUST FUND ACCOUNT.

	Disburse- ments, Year ending Nov. 30, 1919.	Receipts, Year ending Nov. 30, 1919.	Balance on Hand.	Balance brought for- ward Dec. 1, 1918.
Athletics,	\$11,232 22	\$9,918 44	—\$1,140 94	\$172 84
Dining hall,	63,848 95	76,299 55	—11,230 05	—23,680 65
Keys,	64 50	123 25	77 00	18 25
Student deposits,	37,679 25	44,967 24	17,856 64	10,568 65
Social Union,	970 57	1,471 58	817 93	316 92
Textbooks,	7,253 92	6,929 88	674 63	998 67
Athletic field,	723 82	822 27	—256 26	—354 71
Uniforms,	17 06	27 56	31 54	21 04
Fertilizer law,	11,660 23	11,660 23	—	—
Cow testing,	14,278 94	14,617 69	338 75	—
Dairy law,	616 69	593 02	—23 67	—
	\$148,346 15	\$167,430 71	\$7,145 57	—\$11,938 99
	—11,938 99	—	—	—
	7,145 57	—	—	—
	\$167,430 71	\$167,430 71	—	—

CONDENSED OPERATING STATEMENT OF THE DINING HALL.

	Operating Charges.	Income.
1918.		
Dec. 1, Balance,	\$23,680 65	-
1919.		
Nov. 30, Total disbursements,	63,848 95	-
Outstanding bills,	3,254 89	-
Total collections,	-	\$70,299 55
Accounts outstanding,	-	596 49
Inventory,	-	9,868 68
Balance,	-	4,019 77
	\$90,784 49	\$90,784 49

ENDOWMENT FUND.¹

	Principal.	Income.
United States grant (5 per cent),	\$219,000 00	\$7,300 00
Commonwealth grant (3½ per cent),	142,000 00	3,313 32
	-	\$10,613 32

¹ This fund is in the hands of the State Treasurer, and the Massachusetts Agricultural College received two-thirds of the income from the same.

BURNHAM EMERGENCY FUND.

	Market Value Dec. 1, 1919.	Par Value.	Income.
Two bonds American Telephone and Telegraph Company 4s, at \$810,	\$1,620 00	\$2,000 00	\$80 00
Two bonds Western Electric Company 5s, at \$970, . . .	1,940 00	2,000 00	100 00
One United States Liberty Bond 4s, at \$940, . . .	470 00	500 00	20 00
	\$4,030 00	\$4,500 00	\$200 00
Unexpended balance Dec. 1, 1918,	-	-	380 55
Cash on hand Nov. 30, 1919,	-	-	\$580 55

LIBRARY FUND.

Five bonds New York Central & Hudson River Railroad Company 4s, at \$850,	\$4,250 00	\$5,000 00	\$200 00
Five bonds Lake Shore & Michigan Southern Railroad Company 4s, at \$880,	4,400 00	5,000 00	200 00
Two shares New York Central & Hudson River Railroad Company stock, at \$70,	140 00	200 00	10 00
Amherst Savings Bank, deposit,	167 77	167 77	7 59
	\$8,957 77	\$10,367 77	\$417 59
Disbursements for fiscal year ending Nov. 30, 1919, . . .	-	-	417 59

SPECIAL FUNDS.

Endowed Labor Fund (the Gift of a Friend of the College).

Two bonds American Telephone and Telegraph Company 4s, at \$810,	\$1,620 00	\$2,000 00	\$80 00
Two bonds Lake Shore & Michigan Southern Railroad Company 4s, at \$880,	1,760 00	2,000 00	80 00
One bond New York Central Railroad debenture 4s, . . .	850 00	1,000 00	40 00
One bond Louisville Gas and Electric 7s,	1,000 00	1,000 00	69 61
Amherst Savings Bank, deposit,	143 39	143 39	6 49
One United States Liberty Bond 4½s,	940 00	1,000 00	41 45
	\$6,313 39	\$7,143 39	\$317 55
Unexpended balance Dec. 1, 1918,	-	-	76 20
Cash on hand Nov. 30, 1919,	-	-	\$393 75

Whiting Street Scholarship Fund.

One bond New York Central debenture 4s,	\$850 00	\$1,000 00	\$40 00
Amherst Savings Bank, deposit,	271 64	271 64	12 32
	\$1,121 64	\$1,271 64	\$52 32
Unexpended balance Dec. 1, 1918,	-	-	342 87
Cash on hand Nov. 30, 1919,	-	-	\$395 19

SPECIAL FUNDS — *Continued.**Hills Fund.*

	Market Value Dec. 1, 1919.	Par Value.	Income.
One United States Liberty Bond 4s, at	\$940 00	\$1,000 00	\$40 00
One United States Liberty Bond 4½s, at	940 00	1,000 00	41 45
One bond American Telephone and Telegraph Company 4s, at	810 00	1,000 00	40 00
One bond New York Central & Hudson River Railroad debenture 4s, at	850 00	1,000 00	40 00
One bond New York Central Railroad debenture 4s, at	850 00	1,000 00	40 00
Three bonds Pacific Telephone and Telegraph Company 5s, at \$880,	2,640 00	3,000 00	150 00
One bond Western Electric Company 5s, at	970 00	1,000 00	50 00
Boston & Albany Railroad Stock, ¾ shares at \$125,	453 00	362 00	31 68
Amherst Savings Bank, deposit,	72 75	72 75	3 28
Electric Securities Company bonds 1½% bonds at \$950,	1,121 00	1,180 00	59 00
Two bonds Louisville Gas and Electric 7s, at	2,000 00	2,000 00	139 22
	\$11,646 75	\$12,614 75	\$634 63
Unexpended balance Dec. 1, 1918,	-	-	295 33
	-	-	\$929 96
Disbursements for fiscal year ending Nov. 30, 1919,	-	-	15 00
	-	-	\$914 96
Cash on hand Nov. 30, 1919,	-	-	

Mary Robinson Fund.

Amherst Savings Bank, deposit,	\$142 00	\$142 00	\$6 45
Boston & Albany Railroad stock, ¾ share at \$125,	47 00	38 00	3 32
Electric Securities Company Bonds, 4½% bond, at \$950,	779 00	\$20 00	41 00
	\$968 00	\$1,000 00	\$50 77
Unexpended balance Dec. 1, 1918,	-	-	239 73
	-	-	\$290 50
Cash on hand Nov. 30, 1919,	-	-	

Grinnell Prize Fund.

Ten shares New York Central & Hudson River Railroad stock, at \$70,	\$700 00	\$1,000 00	\$50 00
Unexpended balance Dec. 1, 1918,	-	-	245 74
	\$700 00	\$1,000 00	\$295 74
Disbursements for prizes,	-	-	50 00
	-	-	\$245 74
Cash on hand Nov. 30, 1919,	-	-	

Gassett Scholarship Fund.

One bond New York Central & Hudson River Railroad debenture 4s, at \$850,	\$850 00	\$1,000 00	\$40 00
Amherst Savings Bank, deposit,	11 64	11 64	48
	\$861 64	\$1,011 64	\$40 48
Unexpended balance Dec. 1, 1918,	-	-	263 71
	-	-	\$304 19
Cash on hand Nov. 30, 1919,	-	-	

SPECIAL FUNDS — *Continued.**Massachusetts Agricultural College (Investment).*

	Market Value Dec. 1, 1919.	Par Value.	Income.
One share New York Central & Hudson River Railroad Stock at \$70,	\$70 00	\$100 00	\$5 00
Unexpended balance Dec. 1, 1918,	—	—	90 45
Cash on hand Nov. 30, 1919,	—	—	\$95 45

Danforth Keyes Bangs Fund.

Two bonds Pacific Telephone and Telegraph Company 5s, at \$880,	\$1,760 00	\$2,000 00	\$100 00
Two bonds Union Electric Light and Power Company 5s, at \$920,	1,840 00	2,000 00	100 00
Two bonds American Telephone and Telegraph Company 4s, at \$810,	1,620 00	2,000 00	80 00
Interest from student loans,	—	—	43 09
One United States Liberty Bond 4½s, at	940 00	1,000 00	41 45
	\$6,160 00	\$7,000 00	\$364 54
Unexpended balance Dec. 1, 1918,	—	—	1,023 24
	—	—	\$1,387 78
Total loans made to students during fiscal year, \$1,915 00			
Cash received on account of student loans, 1,105 00			
Excess of loans made over accounts paid by students,	—	—	810 00
Cash on hand Nov. 30, 1919,	—	—	\$577 78

John C. Cutter Fund.

One bond Pacific Telephone and Telegraph Company 5s, at	\$880 00	\$1,000 00	\$50 00
Unexpended balance Dec. 1, 1918,	—	—	126 13
	\$880 00	\$1,000 00	\$176 13
Disbursements for fiscal year to date,	—	—	14 63
Cash on hand Nov. 30, 1919,	—	—	\$161 50

William R. Sessions Fund.

One \$500 bond New York Central & Hudson River Railroad Stock 6s, at \$910,	\$455 00	\$500 00	\$30 00
Three United States Liberty Bonds, two at \$1,000 and one at \$500, 4s, at \$940,	2,350 00	2,500 00	100 00
One bond Toledo Light and Power Company 7s, at	1,000 00	1,000 00	70 00
One bond United Electric Light Company 6s, at	1,000 00	1,000 00	60 00
	\$4,805 00	\$5,000 00	\$260 00
Unexpended balance Dec. 1, 1918,	—	—	378 11
	—	—	\$638 11
Disbursements for fiscal year ending Nov. 30, 1919,	—	—	587 53
Cash on hand Nov. 30, 1919,	—	—	\$50 58

SPECIAL FUNDS — *Concluded.**Alvord Dairy Scholarship Fund.*

	Market Value Dec. 1, 1919.	Par Value.	Income.
One United States Liberty Bond 4s, at	\$940 00	\$1,000 00	\$40 00
One bond Toledo Light and Power Company 7s, at	1,000 00	1,000 00	70 00
Two bonds United Electric Light Company 6s, at	2,000 00	2,000 00	120 00
	\$3,940 00	\$4,000 00	\$230 00
Overdraft Dec. 1, 1918,	-	-	14 70
Cash on hand Nov. 30, 1919,	-	-	\$215 30

SUMMARY OF BALANCES ON HAND OF THE INCOME FROM FUNDS HELD IN
TRUST BY THE MASSACHUSETTS AGRICULTURAL COLLEGE.

Burnham emergency fund,		\$580 55
Endowed labor fund,		393 75
Whiting Street scholarship fund,		395 19
Hills fund,		914 96
Mary Robinson fund,		290 50
Grinnell prize fund,		245 74
Gassett scholarship fund,		304 19
Massachusetts Agricultural College investment fund,		95 45
Danforth Keyes Bangs fund,		577 73
John C. Cutter fund,		161 50
William R. Sessions fund,		50 58
Alvord dairy scholarship fund,		215 30
		<hr/>
		\$4,225 49
W. D. Cows and J. H. Howard, land,	\$733 33	
March 26, by check,	366 67	
		<hr/>
		366 66
		<hr/>
		\$3,858 83

I hereby certify that I have this day examined the Massachusetts Agricultural College account, as reported by the Treasurer, Fred C. Kenney, for the year ending Nov. 30, 1919. All bonds and investments are as represented in the treasurer's report. All disbursements are properly vouched for, and all cash balances are found to be correct.

CHARLES A. GLEASON,
Auditor.

AMHERST, Jan. 8, 1920.

HISTORY OF SPECIAL FUNDS.

Burnham emergency fund: —

A bequest of \$5,000 from T. O. H. P. Burnham of Boston made without any conditions. The trustees of the college directed that \$1,000 of this fund should be used in the purchase of the Newell land and Goessmann library.

The fund now shows an investment of \$4,000 00

Library fund: —

The library of the college at the present time contains 61,439 volumes. The income from the fund raised by the alumni and others is devoted to its increase, and additions are made from time to time as the needs of the different departments require. Dec. 27, 1883, William Knowlton gave \$2,000; Jan. 1, 1894, Charles L. Flint gave \$1,000; in 1887, Elizur Smith of Lee, Mass., gave \$1,315. These were the largest bequests, and now amount to . . .

10,000 00

Endowed labor fund: —

Gift of a friend of the college in 1901, income of which is to be used for the assistance of needy and deserving students,

5,000 00

Whiting Street scholarship fund: —

Gift of Whiting Street of Northampton, for no special purpose, but to be invested and the income used. This fund is now used exclusively for scholarship,

1,000 00

Hills fund: —

Gift of Leonard M. and Henry F. Hills of Amherst, Mass., in 1867, to establish and maintain a botanic garden, . . .

10,000 00

Mary Robinson fund: —

Gift of Miss Mary Robinson of Medfield, in 1874, for scholarship,

1,000 00

Grinnell prize fund: —

Gift of Hon. Wm. Claffin, to be known as the Grinnell agricultural prize, to be given to the two members of the graduating class who may pass the best oral and written examination in theory and practice of agriculture, given in honor of George B. Grinnell of New York,

1,000 00

Gassett scholarship fund: —

Gift of Henry Gassett of Boston, the income to be used for scholarship,

1,000 00

Massachusetts Agricultural College investment fund: —

Investment made by vote of trustees in 1893 to purchase one share of New York Central & Hudson River Railroad stock. The income from this fund has been allowed to accumulate,

100 00

Danforth Keyes Bangs fund: —

Gift of Louisa A. Baker of Amherst, Mass., April 14, 1909, the income thereof to be used annually in aiding poor, industrious and deserving students to obtain an education in said college, \$6,000 00

John C. Cutter fund: —

Gift of Dr. John C. Cutter of Worcester, Mass., an alumnus of the college, who died in August, 1909, to be invested by the trustees, and the income to be annually used for the purchase of books on hygiene, 1,000 00

Alvord dairy scholarship fund: —

Gift of Henry E. Alvord, who was the first instructor in military tactics, 1869-71, and a professor of agriculture, 1885-87, at this institution. The income of this fund is to be applied to the support of any worthy student of said college, graduate or postgraduate, who may be making a specialty of the study of dairy husbandry (broadly considered), with the intention of becoming an investigator, teacher or special practitioner in connection with the dairy industry, provided that no benefits arising from such fund shall at any time be applied to any person who then uses tobacco in any form, or fermented or spirituous beverages, or is known to have done so within one year next preceding, 4,000 00

William R. Sessions fund: —

In accordance with the request of my deceased wife, Clara Markham Sessions, made in her last will, I bequeath to the trustees of the Massachusetts Agricultural College, Amherst, Mass., the sum of \$5,000, it being the amount received by me from the estate of the said Clara Markham Sessions. The said \$5,000 to be kept by the said trustees a perpetual fund, the income from which shall be for the use of the Massachusetts Agricultural College; and according to the further request of my deceased wife, made in her last will, this is to be known as the William R. Sessions fund, and is to be a memorial of William R. Sessions; and it is my special request that the said trustees shall make record of the fact that this fund came from the estate of my deceased wife, Clara Markham Sessions, in accordance with her request made in her last will, . . . 5,000 00

\$49,100 00

FRED C. KENNEY,

Treasurer.

THE M. A. C. BULLETIN
AMHERST, MASSACHUSETTS

Vol. XII

MAY, 1920

No. 4

OPPORTUNITIES FOR WOMEN
IN
AGRICULTURE AND COUNTRY LIFE



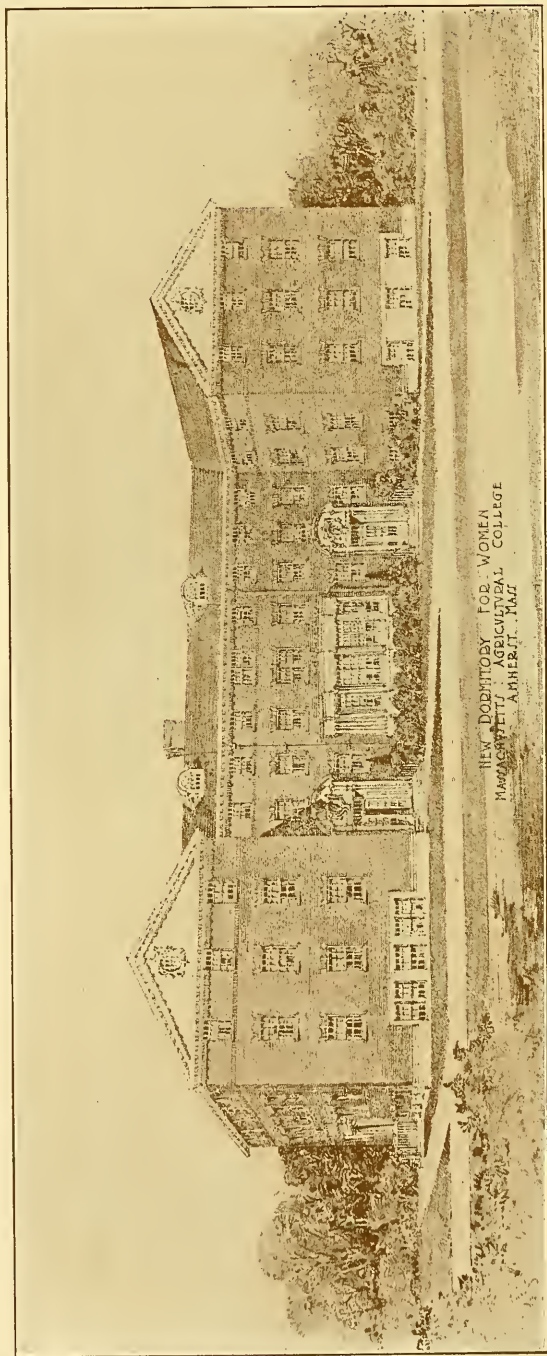
Published eight times a year by the
MASSACHUSETTS AGRICULTURAL COLLEGE
January, February, March, May, June, September, October, November

Entered at the Post Office, Amherst, Mass., as second-class matter

The College Purpose

“To be at home in all lands and all ages; to count nature a familiar acquaintance; and art an intimate friend; to gain a standard for the appreciation of other men’s work and the criticism of one’s own; to carry the keys of the world’s library in one’s pocket, and feel its resources behind one in whatever task he undertakes; to make hosts of friends among the men of one’s own age who are to be leaders in all walks of life; to lose oneself in generous enthusiasms, and co-operate with others for common ends; to learn manners from students who are gentlemen, and form character under professors who are Christians;—these are the returns of a college for the best four years of one’s life.”

Former President Hyde, of Bowdoin College



NEW DORMITORY FOR WOMEN
MASSACHUSETTS AGRICULTURAL COLLEGE
AMHERST, MASS.

WOMEN'S DORMITORY. — To be opened in the Autumn of 1920

OPPORTUNITIES FOR WOMEN IN AGRICULTURE AND COUNTRY LIFE

Women have ever been identified with the agricultural industry. From ancient times, especially in European countries, the practice of agriculture has been quite largely in the hands of women. For years in our own country women have been an important factor in certain branches of agriculture.

But in all this participation in agriculture by women there has been involved chiefly the peasant class. The tasks have been menial, no special training for the women has been required, and practically no leadership has been developed among them.

During the past quarter of a century, however, when women have sought and discovered larger and broader opportunities for gainful occupation, the calling of agriculture has not escaped attention. In this extensive field have been found many attractive vocations to which women of broad education and highly specialized training are adapted, and due to the rapid expansion and development of various agricultural industries, those women who have ventured into this profession have found ready employment, attractive salaries, and other advantages of trained leadership. The entrance of women into the calling of agriculture was so significant that in 1910 The Women's Educational and Industrial Union of Boston compiled a report of 45 pages setting forth in considerable detail the specific agricultural vocations in which women might expect to succeed.

But it was the problem of food production as emphasized by the recent War, which directed public attention increasingly toward the more complete utilization, not only of the labor of women, but also of their trained leadership in many directions; and in this emergency as in so many others, the response of women, young and old, was immediate, enthusiastic, generous and effective.

The whole world is now facing the stupendous problem of rehabilitation, of reorganization and of industrial, social, educational and moral development; moreover it is entering upon this task with a shortage of man power, and with its young leadership greatly reduced numerically by the process of war. This situation presents opportunities for leadership never before equalled which should appeal to young women about to choose a profession.



THE ENTOMOLOGICAL BUILDING is unusually well-equipped and contains laboratories for the study of Geology, Zoology and Entomology as well as an Experiment Station room and a well-equipped library and lecture rooms.



FLINT LABORATORY includes a complete outfit for handling market milk including clarifying and pasteurizing equipments; complete equipment for making butter, soft cheeses, ice cream and artificial ice. It is said to be the best building of its kind in the country.

VOCATIONAL OPPORTUNITIES

1. PRACTICAL AGRICULTURE AND HORTICULTURE.

A broader field is constantly opening for women in practical agriculture and horticulture. The possibilities are dependent upon training and experience. There is an increasing demand for women to manage dairy and poultry departments on general farms, and apparently there is a larger opportunity than formerly in fruit raising, vegetable gardening and floriculture. These in general are the lines of work open to women who must hire out as laborers or foremen, and these opportunities are constantly increasing in number.

Recently an active demand has developed for women to be of real service in branches above referred to in educational and other private and public institutions. Such positions, usually filled by men, call for technical training, adequate experience and continuity of service.

Some of the best paid farm positions for women are those in State Institutions, and the demand for trained women to fill these positions is greater than can be supplied at present. There is an increasing tendency to locate institutions, whose inmates are women and girls, in the country in order to give the inmates employment on the land.

In general, the best opportunities in practical work appear to be for women who have sufficient capital as well as a natural aptitude, training and experience to manage their own enterprises along the lines here referred to. Numerous women are succeeding who have a small piece of land near a local market and produce a good grade of fruits, flowers, vegetables, poultry and dairy products.

2. TEACHING.

There is a growing demand for well trained women to teach the various agricultural and horticultural subjects as well as the correlated sciences, both in college and high school, and also to serve as garden supervisors. In such positions in grade schools, high schools and even in colleges women have been successful and it appears that the demand for women teachers for these subjects is likely to increase.

3. EXTENSION WORK.

Women have in recent years found attractive employment in various branches of Extension work, chiefly in connection with projects in Home Economics. Opportuni-

ties are increasing for well trained women to serve as garden supervisors and club leaders.

4. RESEARCH WORK.

Botany, Chemistry, Zoölogy, Entomology, Microbiology, Parasitology, Physics, and Animal Pathology all provide opportunities for women trained in those lines, as technicians, laboratory assistants, curators, etc., and such employment pays salaries as good or better than those received by school teachers. In Experiment Stations the examination of material sent in, and the determination of the nature of the treatment needed to control the pests and diseases of animals and plants can be effectively carried on by women. As chemists, parasitologists and microbiologists, the field is as open to them as to men, and Colleges and Experiment Stations, as well as the United States Government, seek persons suitably trained for the work, in most cases irrespective of sex. Each year sees more women going into the lines of work here mentioned, and successfully sustaining themselves in them.

5. AGRICULTURAL BUSINESS.

There are certain clerical and secretarial positions connected with the agricultural industry in which women are prized in proportion to their business ability and their familiarity with the art and science of agriculture, horticulture and the allied sciences.

6. LANDSCAPE GARDENING.

In Landscape Gardening there is a good field for a small number of well trained women, but practically no demand for those who lack this thorough preparation. No woman should undertake to enter this field with less than the four-year baccalaureate course.

7. FOOD PRESERVATION.

Never before have the opportunities for work in food preservation been so attractive as now. The interest in food conservation and the spirit of thrift aroused during the War has given a great impetus to home canning and to the home manufacture of fruit and vegetable products.

The establishment of wayside tea rooms wherein canning is done and where jams, jellies, and other fruit products are offered for sale, the development of the farm or kitchen

factory in which high grade products are put up in glass for the special retail trade, the interest shown by institutions, state, county, industrial and educational, in installing and developing work along the lines of canning and food manufacturing and the continuance and development of the community or co-operative canning kitchens all offer splendid opportunities for women to enter this field of endeavor.

Women adapted to work of this sort will find their opportunity along one of two well defined lines, viz., as manager of an established plant or in the development of a business for one's self, the latter being by far the more profitable.

8. RURAL SOCIAL SERVICE.

For those women who seek to render special service in rural communities, there are two types of activities which will appeal to them and for which a training at an agricultural college would be quite necessary. For those women who contemplate returning to rural communities as home makers, a more adequate training, a better understanding and appreciation not only of the practice of agriculture, but also of the social and economic problems peculiar to the country, is essential and will prove of inestimable value in their endeavor to establish themselves as real leaders in their respective communities.

It appears that there will probably develop during the next few years a demand, perhaps somewhat limited, for the employment of women on salaries, who have a clear appreciation of country life and who have the tact and ability to deal with those problems. It is probable that women workers will be employed as agents of child welfare organizations, of rural recreation associations, of the county Y. W. C. A. The field of rural journalism is on the verge of a wider development, and in its expansion, properly trained women ought to find an adequate place.

One of the most significant services which can be rendered in rural communities is that to be rendered by the rural school teachers, who as a result of their training and experience have, in the first place, a genuine affection for the country and who, in the second place, have a clear appreciation of the special problems of the people who gain their living from the soil. The opportunities for leadership and service of a high order are almost without limitation for those young women who choose to follow the vocation of a rural school teacher.



WILDER HALL is noticeable as one of the best designed and best built buildings on the campus. It is the headquarters of the Division of Horticulture, the work here being almost exclusively in Pomology and Landscape Gardening.



FRENCH HALL houses the first separate Department of Floriculture established in this country. In addition the building contains the Departments of Forestry and Market Gardening

TRAINING IS REQUIRED

Leadership requires training, and effective service in the professions to which reference has been made is best assured by the educational advantages of an agricultural college.

The Massachusetts Agricultural College has for over fifty years trained men for positions of large responsibility in various agricultural pursuits. Among its graduates are found scores of highly successful farmers as well as some of the foremost scientific experts, administrators, and organizers in agricultural affairs to be found, not only in the United States, but indeed anywhere in the world. The various Short Courses have further served the agricultural interests of the state and nation by aiding in the training of hundreds of farmers and teachers.

To a less extent the Massachusetts Agricultural College has trained women for agricultural service. The first women to be graduated from the College from the four-year course received their degrees in 1905. From year to year others finished the work and the total graduates from 1905 to 1914 was 7. For the past few years the number coming to the College has greatly increased. From 1915 to 1919, 15 were graduated. At the same time the number of women attending the various Short Courses in Agriculture has greatly increased.

In the autumn of 1919, 19 women enrolled in the four-year course, 8 in the one-year and two-year Short Courses, and 11 in other courses. A good proportion of those enrolled in the winter school and practically all of those enrolled in the summer school are women.



A CAMPUS ROAD



STOCKBRIDGE HALL, MAIN AGRICULTURAL BUILDING
Contains offices, class rooms, and laboratories for various agricultural departments. Attached to this building is Bowker Auditorium, the largest assembly hall on the campus, seating nine hundred persons



DRAPER HALL—The College Dining Hall for Men and Women

COURSES OFFERED AT THE MASSACHUSETTS AGRICULTURAL COLLEGE

The College offers an agricultural training to various groups and classes of people and to meet the demand made upon it has organized the following courses:

1. FOUR-YEAR COURSE FOR THE B.SC. DEGREE.

Open to high school graduates meeting entrance requirements similar to those of other colleges. Trains for practical farming as well as for various other agricultural vocations.

2. TWO-YEAR COURSE IN PRACTICAL AGRICULTURE.

Open to young men and women seventeen years of age or over who have had at least a common school education. Trains efficiently for practical, profitable farm management.

3. WINTER SCHOOL (ten weeks).

Open to young men and women above 18 years of age, but organized primarily for adults. Emphasizes the intensive study of problems of farm management.

Begins about the first of January.

4. SUMMER SCHOOL (four weeks).

Offers work especially adapted to teachers and other workers in agriculture. Begins about the first of July. Instruction is given in various practical agricultural subjects, in the sciences relating thereto, and in rural social science.

5. GRADUATE SCHOOL.

Applicants must be college graduates. The courses given are for the training of highly specialized experts in various agricultural vocations.

HOME ECONOMICS

Elective courses in Home Economics are also offered at the present time in Textiles, and Clothing, Foods and Nutrition, Home Management and Home Nursing. It is hoped that this work will be developed to meet the needs of students desiring to give special attention to Home Making and related subjects.

EQUIPMENT

The entire plant of the Massachusetts Agricultural College is utilized in training women as well as men.

The Legislature in 1919, recognizing the growing and pressing demand for women trained in agriculture, appropriated \$127,400 for the construction of a dormitory, in which women attending the College may be comfortably accommodated. This building is now being constructed and it is expected that it will be ready for occupancy in the autumn of 1920. It will house ninety-eight students, and in addition will provide living quarters for the matron and caretakers. This building is located near the college dining hall where meals will be served.

With these facilities, the College now affords superior attractions for those young women of the State who desire to fit themselves for a lucrative vocation and who feel that in agriculture they will find expression for their full ability and leadership.

EXPENSES

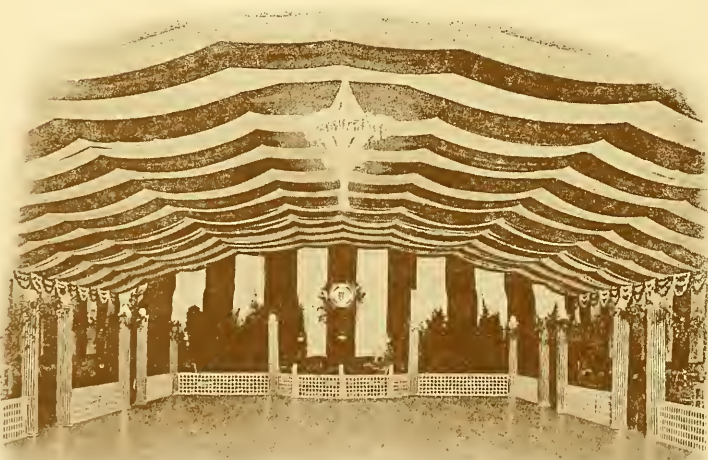
Tuition in all courses offered at the Massachusetts Agricultural College is free to citizens of the State. The necessary expenses for board, room and laundry are about ten dollars per week. In addition, small charges for laboratory fees and books must be met. For four-year students the estimated expense is approximately four hundred dollars per year.

STUDENT LIFE

An adviser of women has immediate responsibility for the welfare of the women students. The girls participate in many of the social and recreational activities of the men. Inasmuch as the number of women students at the College has been relatively small, but few social traditions exist for them. With the increased attendance of women students and with the opportunities afforded by the new dormitory, an adequate social life will readily be developed. A society for women has been organized, and provision has been made for athletics and physical education.



CLASS DAY — One of THE days of the four years.



Ready for
THE SOPH-SENIOR HOP
A scene that is an invitation

FACTS OF INTEREST ABOUT THE MASSACHUSETTS AGRICULTURAL COLLEGE

1. Is a public service institution established by Federal grant and now maintained largely by State appropriations.

2. Serves the agricultural interests of the State and Nation through work in agricultural research, resident instruction and extension service.

3. Opened in 1867 and for fifty-three years has educated men and women for leadership and service in agricultural professions.

4. Affords a technical training for the agricultural vocations which are not yet over crowded.

5. Is ideally situated in Amherst in the charming Connecticut Valley, ninety-seven miles from Boston, and twenty-five miles from Springfield.

6. Tuition is free to citizens of Massachusetts and the necessary living expenses, laboratory fees, etc., are moderate.

7. The main campus area including the farm, gardens, and experimental plots comprises an area of 600 acres. A forest of 750 acres on a nearby mountain adds to the educational facilities of the institution.

8. Land, Buildings and Equipment are valued at \$1,800,000.

9. The teaching faculty numbers 75. Others on the staff of administration, research and extension service bring the number to 150.

10. Enrollment in the winter of 1920 totaled 857, 486 in work of college grade, 33 in the graduate school, 236 in the one and two-year courses, 102 in ten weeks' winter course.

11. Requirements for admission to the four-year course are similar to those of other New England colleges. A grammar school preparation will admit to the various Short Courses.

If you will profit by an agricultural training you should take advantage of your own State Agricultural College.

For a catalogue and further information write the Secretary of the College, Amherst, Mass.



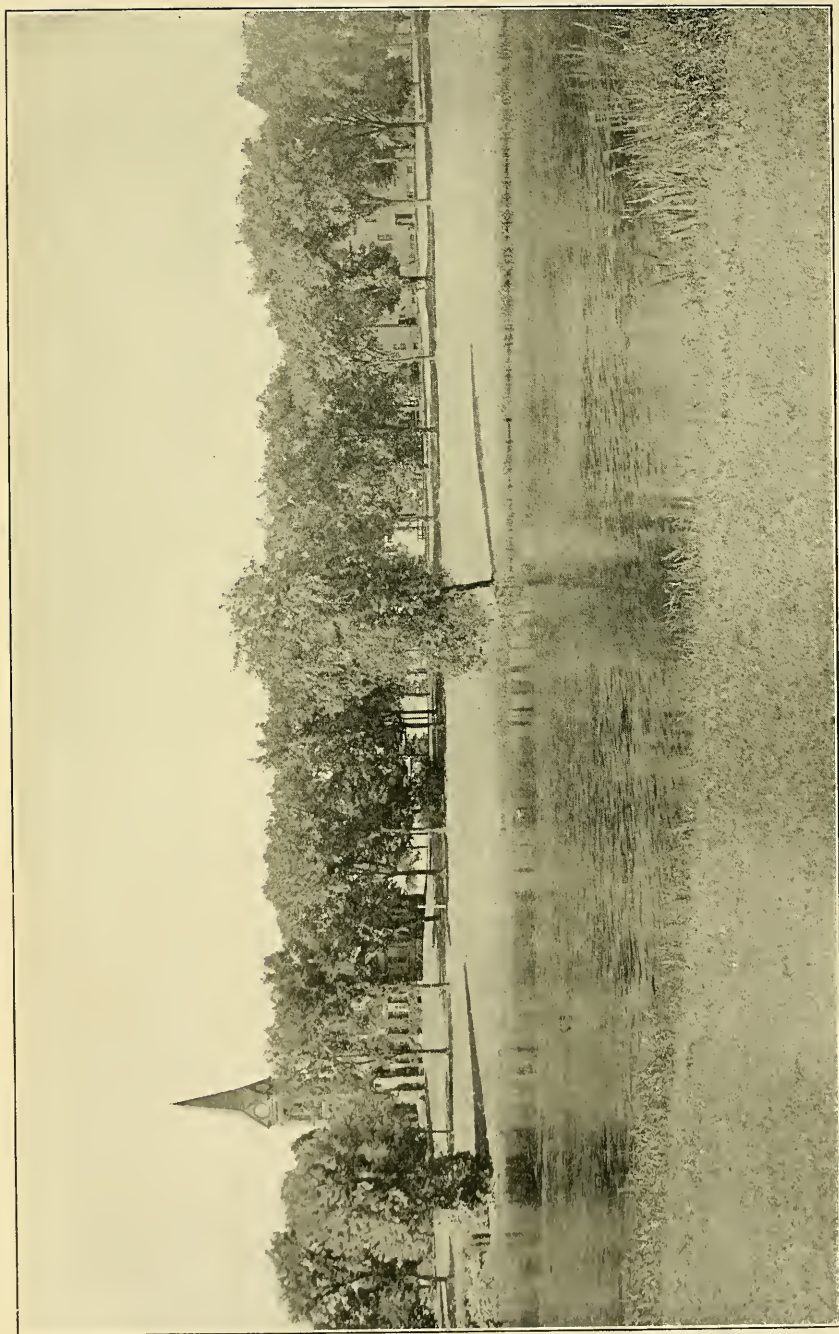
THE POND

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF EDUCATION

MASSACHUSETTS
AGRICULTURAL COLLEGE

ANNOUNCEMENT
OF THE
SUMMER SCHOOLS AND COURSES
1920





A View of the Campus, showing Library

The Commonwealth of Massachusetts

DEPARTMENT OF EDUCATION

THE M. A. C. BULLETIN

Amherst, Mass.

Volume XII

JUNE, 1920

Number 5

ANNOUNCEMENT

OF THE

SUMMER SCHOOLS AND COURSES

The Massachusetts Agricultural College
and the
Division of Elementary and Secondary
Education and Normal Schools
Co-operating

Published eight times a year by the Massachusetts Agricultural College, January,
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October 3, 1917, authorized on July 3, 1918

PUBLICATION OF THIS DOCUMENT
APPROVED BY THE
SUPERVISOR OF ADMINISTRATION.

FACULTY

KENYON L. BUTTERFIELD, A.M., LL.D.

President of the College

JOHN PHELAN, A.M.

Director of Short Courses

RALPH J. WATTS, B.Sc.

Secretary of the College

FRED C. KENNEY

Treasurer of the College

CHARLES R. GREEN, B.Agr.

Librarian of the College

- LUTHER BANTA, B.Sc. Poultry
Instructor in Poultry Husbandry
- ARTHUR B. BEAUMONT, Ph.D. Soil Fertility
Professor of Agronomy
- Mrs. GRACE D. BEAUMONT English
In charge of Unit Courses
- EDWARD J. BURKE, B.Sc. Pomology and Poultry
In charge of Unit Courses
- WALTER W. CHENOWETH, A.B., M.Sc. . . . Horticultural Manufactures
Professor of Horticultural Manufactures
- ALEXANDER E. CANCE, Ph.D. Agricultural Economics
Professor of Agricultural Economics
- ARTHUR L. DACY, B.Sc. Vegetable Gardening
Associate Professor of Vegetable Gardening

BROOKS D. DRAIN, B.Sc.	Fruit Growing
<i>Assistant Professor of Pomology</i>	
JAMES A. FOORD, M.S.A.	Farm Management
<i>Professor of Farm Management</i>	
LUCILE G. FRENCH	Foods
<i>Instructor in Practical Arts, Teachers' College</i>	
EDNA FULLER	Organized Play and Recreation
<i>Instructor, State Normal School, Fredonia, N. Y.</i>	
JOHN C. GRAY	Arithmetic
<i>Superintendent of Schools, Chicopee</i>	
CHRISTIAN I. GUNNESS, B.Sc.	Farm Machinery
<i>Professor of Rural Engineering</i>	
MARGARET HAMLIN, B.A.	Agricultural Opportunities
<i>Agricultural Counselor for Women</i>	
WILLIAM R. HART, A.M., LL.B.	Agricultural Education
<i>Professor of Agricultural Education</i>	
FRANKLIN E. HEALD, A.M.	Vocational Agricultural Education
<i>Agent for Agricultural Teacher-Training, State Department of Education</i>	
RICHARD L. HOLDEN, B.Sc.	Animal Husbandry
<i>Instructor in Animal Husbandry</i>	
HENRY F. JUDKINS, B.Sc.	Dairying
<i>Associate Professor of Dairying</i>	
WILLIAM L. MACHMER, A.M.	Mathematics
<i>Associate Professor of Mathematics</i>	
CHARLES E. MARSHALL, Ph.D.	Sanitation and Health
<i>Director of Graduate School and Professor of Microbiology</i>	
ALEXANDER A. MACKIMMIE, A.M.	French and Spanish
<i>Professor of French</i>	
FREDERICK A. McLAUGHLIN, B.Sc.	Botany
<i>Assistant Professor of Botany</i>	
JOHN C. McNUTT, B.Sc.Agr.	Animal Husbandry
<i>Professor of Animal Husbandry</i>	

BURR J. MERRIAM	Methods in Elementary Schools <i>Superintendent of Schools, North Adams</i>
ADELINE MOFFAT	Reading and Language <i>Instructor, State Normal School, Bridgewater, Mass.</i>
JOHN NEWLON	Rural Engineering <i>Instructor in Rural Engineering</i>
A. VINCENT OSMUN, M.Sc.	Plant Life <i>Professor of Botany</i>
C. H. PATTERSON	Dramatic Presentation <i>Professor of English</i>
LOYAL F. PAYNE, B.Sc.	Poultry Husbandry <i>Associate Professor of Poultry Husbandry</i>
GEORGE F. PUSHEE	Rural Engineering <i>Shop Assistant</i>
MRS. RUTH S. REED	Clothing <i>Assistant Home Demonstration Leader</i>
WILLIAM S. REGAN, Ph.D.	Insect Pests <i>Associate Professor of Entomology</i>
VICTOR A. RICE	Animal Husbandry <i>Assistant Professor of Animal Husbandry</i>
FREDERICK W. RIED	Practical Arts <i>Director of Practical Arts, State Normal School, Framingham, Mass.</i>
FRED C. SEARS, M.Sc.	Pomology <i>Professor of Pomology</i>
EDNA SKINNER, B.Sc.	Home Management <i>Adviser of Women and Professor of Home Economics</i>
ROY L. SMITH	History and Civics <i>Instructor, State Normal School, North Adams</i>
LELAND SPENCER, B.S.	Farm Management <i>Instructor in Farm Management</i>
CLARK L. THAYER, B.Sc.	Floriculture <i>Associate Professor of Floriculture</i>

CHARLES H. THOMPSON, M.Sc.	General Horticulture
<i>Assistant Professor of Horticulture</i>	
ALFRED L. TOWER, B.Sc.	Arithmetic
<i>In charge of Unit Courses</i>	
GILBERT S. WATTS, B.Sc.	Vegetable Gardening
<i>Instructor in Vegetable Gardening</i>	
WINTHROP F. WELLES, B.S.	Agricultural Education
<i>Professor of Agricultural Education</i>	
JAMES WHITING	Flower Gardening
<i>Foreman, Department of Floriculture</i>	
T. GEORGE YAXIS, M.S.Agr.	Dairying
<i>Assistant Professor of Dairying</i>	

ANNOUNCEMENT

The 1920 Summer School is planned especially to meet the needs of the following groups or classes of students:—

Teachers of agricultural education.

Public school teachers desiring general education.

Students who seek to gain a knowledge of practical agriculture, who can come to the college conveniently only during the summer season.

Ex-service men who are enrolled or who wish to enroll in the new Two-Year Course in Practical Agriculture.

Ex-service men who need special help in arithmetic, English, and general agricultural subjects to fit them for the Two-Year Course in Practical Agriculture.

The work of the Summer School is organized as follows:—

THE SUMMER SESSION. — Four weeks, June 28 to July 23. Instruction will be given in agriculture, horticulture, home economics, and rural social science by the regular college staff, and by special lecturers and teachers appointed for the summer session. The State Department of Education will provide special courses for public school teachers in methods of teaching, primary reading and language, arithmetic, history and civics. (See pages 17-45.)

COURSES IN AGRICULTURAL EDUCATION. — Six weeks, June 28 to August 6. These courses are designed for men now in administrative positions, teachers of agriculture looking for advancement, superintendents and principals who wish to administer high school departments and special schools under the vocational education act, and for men who wish to prepare for agricultural teaching.

during the sixth week of the Summer School, a conference of vocational agricultural teachers in Massachusetts will be held at the college. This conference is open to students of the Summer School. (See pages 45-53.)

THE TWO-YEAR COURSE IN PRACTICAL AGRICULTURE. — Eight weeks, June 28 to August 28. One hundred students now enrolled in the Two-Year Course in Practical Agriculture will continue in resident study during the summer. Instruction will be given in animal husbandry, dairying, farm management, fruit growing, poultry husbandry, rural engineering, vegetable gardening and floriculture. These courses are open to all students seventeen years of age or over who have completed a common school education. The attention of ex-service men who wish to spend a summer in study is especially directed to these courses. (See pages 53-62 of this bulletin.)

UNIT COURSES. — Eight weeks, June 28 to August 28. These courses are designed especially for ex-service students whose previous education has been limited. When demobilization was begun, the college immediately organized special six weeks' courses for returning soldiers, sailors, and marines. From these special six weeks' courses, the month to month courses, known as the Unit Courses, have been developed. There are no entrance examinations nor entrance requirements. The courses are so arranged that practically every one, regardless of previous education, age, or experience, may be accommodated. The work in each subject begins each month during the college year. Special emphasis is placed on English and arithmetic, since they are the greatest needs of the men enrolled in these courses. In addition to English and arithmetic, courses are provided in agronomy, animal husbandry, dairying, general agriculture, gas engines, pomology, poultry, and vegetable gardening. (See pages 62-64.)

COURSES FOR TEACHERS OF AGRICULTURE

A series of special courses for teachers of agriculture has been arranged by the State Department of Education and the Massachusetts Agricultural College. These courses deal with supervision and administration of agricultural education, teacher training, principles and methods of teaching, vocational education, and professional improvement problems. The instruction in these courses will be supplemented by lectures given by specialists from other States and from the Federal Department.

SPECIAL COURSES FOR PUBLIC SCHOOL TEACHERS

The preparation of a larger number of teachers for elementary schools is one of the greatest problems in present-day education.

The State Department of Education has provided the following special courses for teachers who desire to advance professionally, and for men and women who wish to prepare for teaching:—

Methods for elementary schools, with special reference to the rural school.

Methods in English for intermediate and grammar grades.

Primary language.

Primary reading.

Primary arithmetic.

Methods of teaching arithmetic for intermediate and grammar grades.

Methods of teaching history in the grammar grades.

Training in the duties of citizenship.

These courses will be given by experts in their respective fields.

In addition to these special courses, teachers may elect such courses as they desire from the general college program. The number of courses offered in the Summer School provides for combinations that will meet the needs of all. Many of the courses in agriculture, horticulture, home economics, physical education, and rural social science will prove valuable for teachers.

GENERAL INFORMATION

Entrance Requirements

There are no entrance examinations for the Summer School. The courses are open to all students seventeen years of age or over who can do and profit by the work selected.

Registration

Registration will take place in Room 114, Stockbridge Hall, from 9 A.M. until 5 P.M. Monday, June 28. No one will be allowed to register for full-time work after Friday, July 2. All class and laboratory work begins with the first period, Tuesday, June 29. Regular attendance is required in all classes. Permission for any irregularity of schedule or attendance must be had from the Short Course office. A limited visiting privilege will be granted to a few students who show special reasons for desiring to observe the work in particular classes. This privilege will be restricted in order not to interfere with the quality of the work of the Summer School. Students who are seriously interested in a course should enroll for it in the regular way.

All courses elected must be carried by the student in a manner satisfactory to the instructor in charge, and a final examination must be taken in the course at the close of the term unless the student is excused by the instructor.

* Social Life

One of the most attractive features of the Summer School is the opportunity afforded for recreation and social life. The program of the social events of the Summer School is under a joint committee of faculty and students. This program, though varied from year to year, includes trips to points of natural interest, picnics, community "sings," industrial excursions, dances, lectures, entertainments, etc.

The social program is so arranged that it does not interfere with the work of the school. Every effort is made by the management to see that the individual student has an opportunity not only for profitable work, but also to enjoy a good time during the four weeks spent at Amherst.

Athletics

Two experienced instructors, a man and a woman, will be in charge of the athletics and sports to teach and supervise the various activities in these directions. Classes and teams will be organized to suit the convenience of the student body wishing to participate in tennis, baseball, and other games.

Tuition, Fees, and Expenses

Tuition is free for the summer session for students enrolled in the four or six weeks' courses. There are no laboratory or incidental fees in connection with these courses. Students enrolled in the Two-Year Course in Practical Agriculture, or in the Unit Courses, pay the regular term laboratory fees given on page 56 of this bulletin. Tuition is free in these courses to residents of the Commonwealth; non-residents of the State pay a tuition fee of \$20 per term.

Instruction

Instruction is given by the regular faculty of the college by means of lectures, recitations, laboratory exercises, and practical field work. The courses for teachers in general education will be given by instructors provided by the State Department of Education. The college and the State Department of Education will co-operate in providing instruction for the courses in agricultural education. Forty instructors will offer courses at Amherst during the summer session.

Special — Ex-Service Men

Information regarding a limited number of Scholarships to be granted by the National War Work Council of the Young Men's Christian Association, which will cover all or part of the expense at the Summer School, may be obtained of any Young Men's Christian Association secretary, or from Samuel F. Bumpus, 167 Tremont Street, Boston, Mass.

Rules and Regulations

As a guide to those who come to the college for the first time the following extracts are taken from the regular rules of the college:—

The customary high standard of college men and women in honor, manliness, self-respect, and consideration for the rights of others constitutes the standard of student deportment.

It should be understood that the college, acting through its president or any administrative officer designated by him, distinctly reserves the right not only to suspend, but also to name conditions under which students may remain in the institution.

It is the custom of the college that all parties, gatherings, and other social events should first have the approval of some recognized college authority.

Certificates

A certificate, showing the standing earned in each subject in which the student enrolled, is issued at the close of the Summer School.

Rooms, Board, etc.

Rooms will be provided in the college dormitories and in private homes near the college grounds. In general, the dormitory rooms are in suites, consisting of two bedrooms and one study room. The bedrooms are furnished with single beds. The two dormitories known as North College and South College are reserved for women

students exclusively. The rooms are on three floors. The toilets and bathrooms are in the basements; water is not provided in the rooms. A uniform rate of \$2 a week for each person will be charged for these rooms, and each pupil will be expected to supply her own blankets, sheets, pillow cases, towels, etc. Convenient arrangements for laundry work may be made in Amherst.

All requests for dormitory rooms must be made to the college treasurer. A deposit of \$2 is required in order to secure a reservation in a dormitory. Upon receipt of the deposit students will be notified by the treasurer as to the location of the room. In case any change is desired a request should be made immediately, as room assignments will not be changed nor deposits refunded after the beginning of the summer session. The deposit is applied to the payment for the room.

Rooms outside the college vary considerably in their accommodations and somewhat in price, the charge ranging from \$2.50 to \$3.50 a week for each person. A list of available rooms in the village will be furnished to Summer School students at the time of registration. Every effort will be made by those in charge to see that every one has comfortable accommodations.

A few furnished houses at reasonable rentals are usually available in Amherst during July and August.

The college will maintain a cafeteria on the self-service plan in Draper Hall on the college grounds. Board may be had at from \$4 to \$7 per week. Good boarding places can also be secured outside of the college if desired.

THE COLLEGE AND AMHERST

The college campus occupies an attractive site three-quarters of a mile north of Amherst center. It is connected with the town and the railway station by electric car service. The college has over 700 acres of land, most of which is in a high state of cultivation, and illustrates most of the leading agricultural industries of Massachusetts. There is a large range of greenhouses of the most modern and approved type; there is a modern dairy barn with dairy cattle; there are good horses, pure-bred swine, sheep, and poultry; there are fields of corn, potatoes, clover, and grass in season; orchards of apple, peach, plum, and pear trees; tracts of good forest land, nurseries, and market gardens. There are also considerable tracts devoted to experiments, many of which are of unusual interest. Then there are well-equipped departments of botany, entomology, and chemistry, dealing in the most thorough manner with these special sciences. The advantages of the plant equipment and teaching staff are made available to Summer School students.

THE LIBRARY

The college library occupies the entire lower floor and basement of the Chapel-Library building. It contains more than 65,000 volumes in addition to a large number of unbound periodicals and pamphlets. Works on agriculture, horticulture, botany, entomology, and the various sciences predominate, but literature, history, economics, and sociology are well represented and receive due attention. In addition to a few newspapers and the best farm papers, the reading room is supplied with a good variety of popular periodical literature, encyclopedias, and general reference books. The equipment is such that the library ranks extremely well with the agricultural libraries of the country.

Summer School students should be able to find excellent material for their line of college work, and are cordially invited to make use of the library and its equipment. The librarian and library assistants are always on hand, ready and willing to be of assistance.

The library hours are from 8 A.M. to 12 M., and 1 P.M. to 5 P.M. every week day.

COURSES IN THE SUMMER SCHOOL

DEPARTMENT OF AGRONOMY

The Department of Agronomy has a good equipment for the presentation of its courses. The laboratories for soils and fertilizers include one for elementary work, supplied with locker equipment for 200 students, and one for advanced work, accommodating 80 students. These laboratories are equipped with steam and electric ovens, balances, centrifuge, microscopes, and other apparatus necessary for a study of soils and fertilizers. Storerooms, stock rooms, and balance rooms are located convenient to the laboratories. There is also a workroom attached, equipped with power machinery for grinding soils, fodders, and the like.

The crops' laboratories include one for seed study, having locker equipment for 50 students, and a laboratory for the study of cereals, forage crops, roots, etc., with lockers for 64 students. The equipment of these laboratories includes steam ovens, constant temperature electric ovens, ovens for seed germination, Brown-Duval moisture apparatus, balances, microscopes, collections of seeds, grasses, tubers, weeds, etc. A balance room, root cellar, and two storerooms, one of which is mouse-proof, are also used for crop work.

A modern steam-heated greenhouse, 25 by 35 feet, used for work in soils and crops, is a valuable part of the equipment. Near the greenhouse is a crop garden on which different varieties of corn, grasses, clovers, etc., are grown for demonstration purposes and as a source of material for class work. In addition, the general college farm of 250 acres is used for field study in soils and crops, and as a source of material.

Soil Fertility. — A course designed to acquaint the student with the nature of soils, their properties, and management, The origin and formation of soils, their physical and chemical characteristics, moisture control, including drainage and irrigation, tillage, the supply and maintenance of soil organic matter, soil acidity, and liming the soil will be considered. Attention will be drawn to factors contributing to the depreciation of soil fertility and to ways and means of maintaining permanent fertility. Five exercises a week; four lectures and one two-hour laboratory or field exercise; four weeks.

Professor Beaumont

Manures and Fertilizers. — This course is planned to supplement the general course in soil fertility. Manures, fertilizers and soil amendments will be studied in detail. Considerable time will be devoted to actual work with fertilizing materials by the student, and he will be expected to become thoroughly familiar with farm manures, forms of agricultural lime, and commercial fertilizers, their composition, properties, care, and use. Students taking this course will be expected to take the general course in soil fertility or to have had its equivalent. Five exercises a week, consisting of two lectures and three two-hour periods which will be used for laboratory work, field trips, or study periods; four weeks.

Professor Beaumont

DEPARTMENT OF ANIMAL HUSBANDRY

The department is equipped with an excellent laboratory, which has a seating capacity of 180 and which is fully adapted to the requirements. There are about 125 head of dairy cattle of various ages available for classroom work; among these are included superior representatives of the Jersey, Guernsey, Ayrshire, and Holstein breeds. There are flocks of pure-bred Shropshire and Southdown sheep of the best breeding and individuality. Considerable numbers of pure-bred Berkshire and Chester White pigs are maintained. The college possesses pure-bred Percherons and French coach horses, besides several work teams of different types, which are available for classroom purposes.

Types and Breeds. — This course is a study of the history of the various breeds of cattle, sheep, swine, and horses; their origin and development; their characteristics; and a discussion of the conditions to which each breed seems best adapted. The laboratory work will give the student an opportunity to do practice judging, which will familiarize him with animals of the different types and breeds. Textbook: Plumb, "Types and Breeds of Farm Animals." Three class hours and two two-hour laboratory periods a week; four weeks.

Professor McNutt

Feeding and Management. — A study of the fundamental principles of animal nutrition; of the composition and quality of feeding materials and their relative importance for the different classes of farm animals; of feeding standards and the calculation of rations. The latter part of the course will consist of a study of the feeding, care, and management of dairy cattle, swine, sheep, and horses, giving special attention to economic production. How to feed to get a large flow of milk, how to fatten, and how to grow breeding animals will receive proper attention. Five hours per week; four weeks.

Professor McNutt

DEPARTMENT OF DAIRYING

The dairy work is given in Flint Laboratory, a modern building designed especially for dairy work and equipped with the newest and best types of dairy machinery.

The pasteurizing room contains a milk clarifier, cooler, and two 200 gallon vat pasteurizers. There is an ample and modern sterilizing outfit, and a large and very well equipped refrigerating plant.

The room designed for cheese making contains double-jacketed vats, cheese mixer and draining racks, presses, etc. The butter-making room is well equipped with power and hand churns of various types, scales, and other accessories.

In the starter-making room there is a 50 gallon double jacketed vat, a 100 gallon vat pasteurizer, a 50 gallon starter can, and other smaller ones.

The separator room has a complete equipment of power and hand separators, milk heater, Babcock tester, sterilizer, etc.

The testing laboratory contains all necessary apparatus, both steam and hand, for Babcock testing, and individual apparatus necessary for each student.

Dairying. — This course is designed to acquaint the student with the science of dairying and its important place in the agriculture of New England. It is desirable that all people should know more of the value of milk and dairy products, and the vital place which they occupy in the diet of the American people. This course covers the composition and secretion of milk; the Babcock test for fat in dairy products; up-to-date methods of separating cream from milk; the modern ways of making butter and cheese of quality; the importance of milk as a food, its cheapness, care, and handling, and its relation to the public health. Five lectures per week; four weeks.

Associate Professor Judkins

Dairy Laboratory. — This course gives the actual practice in testing dairy products, handling milk, separating cream, and making butter and cheese as outlined in the foregoing course. Students taking the dairy laboratory work are required to take the dairy lectures as outlined above. Two three-hour laboratories per week; four weeks.

Associate Professor Judkins

DEPARTMENT OF FARM MANAGEMENT

The college farm of 250 acres is under the general supervision of the Department of Farm Management, and furnishes demonstration material. It includes improved land, pasture land, and a farm woodlot. The improved land illustrates the value of good culture and the best-known methods for the maintenance of fertility. The farm is equipped with suitable buildings and good machinery for the work carried on, of which the production of certified milk is an important branch. Several good farms in the vicinity, illustrating types of both special and general agriculture, may be inspected and studied. The offices of the department are in Stockbridge Hall.

Farm Management. — A study of some of the problems of modern farming and the factors that influence success, such as the choice of a region and of a farm, types of farming, size of farm, rotation of crops, and labor problems. Three lectures a week; four weeks.

Professor Foord

Farm Accounts. — Actual practice in the use of a simple system of farm accounting, including cost accounts suitable for the large or the small farm. Two two-hour laboratory periods a week; four weeks.

Professor Foord



At Work in the College Garden



A Class in Egg Packing

DEPARTMENT OF POULTRY HUSBANDRY

This department is well prepared to give practical instruction in poultry husbandry. The quarters and equipment in Stockbridge Hall furnish ample laboratory facilities for careful studies in avian anatomy and physiology, identification and value of the various grains and feedstuffs used for poultry, the different grades and varieties of eggs and poultry, both fresh and storage, and other work of a highly technical character.

The practical laboratory (poultry plant) comprises over 1,200 adult birds, divided into about 30 pens in various types of houses, the flocks varying in size from 10 to 200; two large incubator cellars containing a great variety of lamp and electric incubators, as well as two large mammoth machines; brooding facilities for 5,000 chicks, including a large open pipe brooder house for 1,200 chicks, and different kinds of brooders, stove, kerosene, and electric; laboratories for pen management; judging, culling, fattening, killing, picking, caponizing, compounding feeds, carpentry, etc.

In addition to the practical laboratory work actually done by the student he has an opportunity to keep under observation practical experiments and demonstrations that are being continually carried on for the benefit of students and practical poultrymen.

Poultry Husbandry. — This course includes a study of breeds and varieties, according to their standard and utility classification; incubation and brooding; housing; feeds and feeding; marketing eggs and poultry; and management of the flock. The laboratory exercises consist entirely of practical work. This includes a careful study of all the characters involved in selecting hens for high and low egg production; killing and dry picking, drawing, trussing, dis-jointing, and caponizing. Four lectures and one laboratory period a week; four weeks. Two sections.

Associate Professor Payne

DEPARTMENT OF RURAL ENGINEERING

The Department of Rural Engineering is located in Stockbridge Hall and in the Rural Engineering Building. Carpentry and forge work is done at the rural engineering shop, which is equipped with benches, forges, etc.

The equipment for farm machinery consists of a representative line of seed and tillage tools of the newest type. The work in farm motors is given in the rural engineering shop. Three stationary gas engines, four automobile motors, and five tractors are on hand all the time. Automobiles in need of repair are brought in to give students practice in the work of overhauling. The department possesses the machinery for doing practical work in concrete.

Farm Machinery and Gas Engines. — This course is intended to familiarize the student with the various types of farm implements, to teach him their operation and care, and to give practice in the adjustment and repair of the mechanical equipment on the farm. The various types of field implements are studied, and emphasis is laid on the selection of implements suited to New England conditions. The gas engine is studied; and the application of the engine to farm work is taken up in detail. The farm tractor and the automobile are given due importance, and considerable time is devoted to the care and repair of these machines. The various types of carburetors and ignition systems are studied, and practice given in the location and repair of engine troubles. Two lectures and three two-hour laboratory periods; four weeks. Two sections.

Professor Gunness

Repair of Farm Equipment. — The object of this course is to give practice in the handling of tools, which will help in the repair of farm machines and miscellaneous farm equipment. Practice is

given in forging, including drawing and shaping iron and steel, welding and tempering edge tools, and general blacksmith's repairing. Exercises also include pipe fitting, soldering, splicing rope, belt lacing, and babbiting and adjusting bearings. Practice is given in the use of machinists' tools, such as cold chisel, file, taps and dies, drill press, and lathe. Two two-hour laboratory periods; four weeks. Two sections.

Mr. Newlon

DEPARTMENT OF FLORICULTURE

The Department of Floriculture is housed in French Hall, a modern, well-lighted, and ventilated building. The department occupies two lecture rooms, one capable of accommodating 40 students, the other 90 students, and a large laboratory capable of accommodating 40 students at one time. In addition to these rooms the department has a specially prepared room for the storage of bulbous materials, and a large, general storage, soil, and fertilizer room.

The department is equipped with about 22,000 feet of glass, mainly devoted to the growing of roses, carnations, violets, sweet peas, chrysanthemums, and general bedding stock under commercial conditions, as well as a good collection of the ornamental plants found in private greenhouses.

A large perennial and annual garden of nearly 1,000 species and varieties is maintained for study by the students.

Garden Flowers.—This course aims to familiarize the student with the methods of propagation and culture, use and value of the most important plants used in flower gardens, including annuals, biennials, perennials, bedding plants, bulbs, and roses. Soils and fertilizers, as applied to flower gardening, will be considered. The Department of Floriculture has a large garden devoted to the culture of annuals and perennials which provides material for study. Three lectures and one two-hour laboratory period a week; four weeks. *Associate Professor Thayer*

Indoor Flower Growing.—This course is intended for those who wish to grow plants indoors without the use of a greenhouse. It will include a discussion of soils, fertilizers, and containers; methods of propagation and culture of plants suitable for use in the school-room or in the home. The filling and care of baskets, window and porch boxes will be considered. Two lectures and one two-hour laboratory period a week; four weeks. *Associate Professor Thayer*

DEPARTMENT OF HORTICULTURAL MANUFACTURES

The department occupies three laboratory rooms in Flint Laboratory, two in Fisher Laboratory, with offices in Wilder Hall and French Hall. The laboratories are fitted with desks for eighteen students. The desk equipment contains the necessary utensils for doing general laboratory work in food preservation. The general equipment of the department, both for the use of students and for manufacturing purposes, may be grouped under the following heads:—

1. *Canning*.—A modern canning outfit, including both steam-pressure cookers and hot water baths, hand and power can sealers, peeling and slicing machines, a string-bean cutter, heat-penetration thermometers, electric incubator, and a large assortment of all types of home canning equipment.

2. *Evaporation*.—Two small orchard evaporators, a tunnel drier, peeling machines, slicers, and a general assortment of driers adapted to home evaporation.

3. *Fruit Juices, Butters, etc.*—A hand cider mill, a motor-driven hydraulic press, a steam-jacketed kettle, an apple-butter cooker, and cider and vinegar testing apparatus.

Food Preservation I.—This course aims to place before the student the latest and best methods in canning, evaporating, and the making of fruit and vegetable products, together with a study of the most approved types of equipment.

Fruits and vegetables will be canned in both tin and glass, using the hot-water bath, the water-seal canners, steam-pressure canners, and steam pasteurizer. Special attention will be given to the preservation of fruits and fruit juices for culinary purposes. Both

home and commercial types of evaporators will be used for evaporating such fruits and vegetables as are available.

The manufacture of various fruit products, such as jams, jellies, preserves, butters, pastes, and leathers will occupy about one-half the course. The home manufacture of vinegar, sauerkraut, hominy, and other commonly used products will be studied if time permits.

Special attention will be given to the utilization of the surplus and cheap grades of fruits and vegetables so frequently a source of loss to the grower.

The course is planned primarily for the housewife and the teacher, but much of the work may be adapted to the community center or the small home factory. This course is a practical one, in that all theories and principles discussed in lectures will be applied by the student in the laboratory work.

Two lectures and three two-hour laboratory periods per week; four weeks. Class limited to fifteen students.

Professor Chenoweth

Food Preservation II. — This course is offered for those who cannot devote the full four weeks to this type of work. Either the canning and drying or the manufacturing of fruit and vegetable products as outlined above will be studied, as the class may elect. Two lectures and three two-hour laboratory periods; last two weeks. Class limited to fifteen students.

Professor Chenoweth

DEPARTMENT OF POMOLOGY

The Department of Pomology has 45 acres of orchard; two commercial vineyards, and a smaller one in which are shown the principal types of trellis and the leading methods of training grapes; several acres of small fruits, and nurseries where all of these various types of fruits are grown, in which students may see them in all stages of development; and a good equipment of orchard and nursery tools of all the principal types, enabling students to learn the value of each type. For orchard operations, such as spraying and pruning, the most approved makes of pumps, nozzles, pruning saws, knives, etc., are provided. For laboratory work in systematic pomology there is a collection of more than 100 wax models of apples, plums, pears, and peaches, in natural colors. The laboratory is also furnished with a large number of reference books on pomology; and fruit in a fresh condition is available in great variety, not only from the college orchards, but from other parts of Massachusetts and from many other States.

Fruit Growing. — A study of modern methods of propagating, planting, cultivating, pruning, fertilizing, and spraying fruit trees; planning and managing orchards; selling fruit. Lectures, demonstrations, and field exercises. Five exercises a week; four weeks. Two sections.

Professor Sears

DEPARTMENT OF VEGETABLE GARDENING

The equipment of the department is as follows: 10 acres of land devoted annually to the intensive production of all the vegetables commonly grown in Massachusetts; a large assortment of horse and hand garden tools; 500 linear feet of hotbeds and cold frames; 3,500 square feet of greenhouse space, devoted to the production of early vegetable plants and the maturing of lettuce, tomatoes, and cucumbers; classrooms and a well-equipped laboratory located in French Hall, a building of quite recent construction. An excellent collection of books on all phases of vegetable gardening are available in the college library.

Vegetable Gardening. — This course will consider the principles underlying the successful culture of vegetables in the home, school, community, or factory garden. It will include a study of the preparation of the land, fertilizers and manures, seeds and seeding, the growing of plants in hotbeds and cold frames, planning and planting the garden, garden tools, the harvesting and storing of the garden products. Application of the principles studied in the classroom will be made in practical exercises in the student's gardens and with the large variety of crops grown on the 10 acres of land operated by the Vegetable Gardening Department. Three classroom periods and two two-hour laboratory periods a week; four weeks. Two sections.

Associate Professor Dacy



Class Work in the Greenhouses



Winter School Students pruning Trees

DEPARTMENT OF ENTOMOLOGY

The equipment for the work in entomology is perhaps not excelled in this country. The new fireproof building is well equipped with lecture rooms, libraries, and museums for the use of students. The department possesses a rapidly growing collection of insects. The laboratory is in excellent condition. The insectary of the M. A. C. Experiment Station is in the same building. A greenhouse, where plants infested with injurious insects are under observation and experimental treatment, is also open to students.

Insect Life. — This is an introductory course arranged with particular reference to the needs of teachers in grade schools and high schools who are expected to teach about insects, either as a part of nature study or in their relation to agriculture. The course is also planned to be a useful one for persons not teachers who desire a general knowledge of insects and methods for their control. Familiarity with the most common insects, particularly the injurious ones, a general knowledge of how they live and how and when they may best be attacked, are the main topics included in the lecture work. Field exercises, examining living insects, their habits, and the injuries they cause, will be arranged for in addition to the regularly scheduled hours for those who may desire them. Five exercises a week; four weeks. Two sections.

Associate Professor Regan

DEPARTMENT OF MICROBIOLOGY

The microbiological work is housed in a newly constructed building especially designed for it. There are 4 class laboratory rooms, 8 private laboratory rooms, 1 lecture room, 5 incubator rooms, 3 sterilizing rooms, 3 hood rooms, 3 washing rooms, 3 inoculating rooms, 3 weighing rooms, an animal room, a photographic and a dark room, a sub-basement refrigerator room, a library, and 4 office rooms.

The class laboratory rooms are so arranged that individual desks are available for student use. Hot and cold water and gas connections are convenient for each desk; high-pressure steam and electric connections are also available. The building is well lighted and of sanitary construction; all the walls are of brick, and the building is fireproof.

The library is equipped with such books and current periodicals as are useful in the conduct of bacteriological work and investigations. Twenty-four scientific magazines are available regularly.

Hygiene and Sanitation. — Deviation from health, from the normal being, is disease. The human body is susceptible to deviation from health. Certain elements are responsible for the entrance of disease into the body. The body becomes weakened through exposure, lack of exercise, unsuitable food, abuses. Under such circumstances it lays itself open to attack. There is the attack from within, which consists of some organic derangement, and the attack from without, which makes it possible for foreign enemies, agents, or micro-organisms to enter.

Closely associated with the production of disease are intermediaries and causal factors, as ventilation, water supplies, sewage disposal, and food. They serve as vehicles for disease agents. The germs of

disease find their way through them and are carried by them. Besides, human contact seems to be the most important disseminator, and insects and animals may harbor or convey and in some instances instigate disease.

Then there are those conditions which react on the body in a physical manner and influence its mechanism, its operating facilities, as mental disturbances, character of food, conditions of living.

The course will treat the following subjects: (1) the human body in health and disease; (2) micro-organisms of disease; (3) products of micro-organisms and disease production; (4) channels of infection; (5) air and health; (6) water supply; (7) sewage disposal; (8) milk supply; (9) food poisonings; (10) food infections; (11) reciprocal relation of body and causal agent of disease; (12) factors of resistance; (13) vaccines; (14) use of sera, etc.; (15) infectious diseases; (16) infectious diseases; (17) isolation and disinfection; (18) principles of personal hygiene; (19) public health organization; (20) health, — a private and public asset. This course is especially designed to meet the needs of public schools. Demonstrations and lectures. Five hours per week; four weeks.

Professor Marshall

DEPARTMENT OF AGRICULTURAL ECONOMICS

The work of this department is conducted by means of lectures, readings, and research in both library and field. A catalogue, now containing some 12,000 cards, covering the various phases of agricultural economics, is maintained. The department is also supplied with a large collection of maps, charts, and statistical reports on the prices and supply of agricultural products. A goodly number of regular reports of the Bureau of Markets and other divisions of the United States Department of Agriculture are on file in the office of the department, and available for the use of students. Two series of bound volumes of bulletins are kept in the department offices, with duplicate series in the college library; one series already contains 12 volumes on "Co-operation in Agriculture," and the other, 15 volumes on "Marketing of Farm Products."

Marketing Agricultural Products. — This course deals with the principles, methods, and social cost of our present system of marketing farm products. The importance of marketing, fundamental principles, present methods of sale, movement of products from producer to consumer, the wholesale trade, the necessity of middlemen, the transportation factor, economic wastes, costs of marketing, prices of farm products, speculation, improvements in distribution, what the farmer can do, government assistance, organized marketing, collective bargaining, protective and remedial measures, are some of the topics covered.

Seventeen lectures. Texts, Weld and Adams. Each member of the class will be required to study the market for some farm product, and present a written report thereon. Five hours per week; four weeks. Two sections.

Professor Cance

DEPARTMENT OF RURAL SOCIOLOGY

The courses in rural sociology are designed for two purposes: first, to give students an appreciation of the general problems of country life; second, to afford a definite training for students who wish to take up some specific form of social service. In the last ten years rural sociology has been introduced as a subject into more than 50 per cent of the agricultural schools and colleges. There is a good demand for teachers, and an increasing opportunity in other directions in this subject. The courses afford the student an opportunity to pursue graduate as well as undergraduate work. The library of the college is unusually well equipped with rural sociological material.

Rural Sociology. — A seminar course designed for teachers, or prospective teachers of rural sociology, will be offered under the following conditions: —

The course this summer will be planned so as to familiarize the student with some of the literature in the field, and to lay the foundation for a directed course of reading and study to be carried on by the students during the following year.

The demand for teachers in this field of work far exceeds the supply. The positions are reasonably well paid and desirable, but they are available only to men of maturity, with rural experience and college training.

Registration for this course is limited to men who in the judgment of the instructor could later be recommended for a position. Five hours per week; four weeks.

Professor Phelan

DEPARTMENT OF BOTANY

Native Ferns. — This is a popular course for the study of our native ferns. Brief study of life history is conducted in the laboratory. Most of the time is spent in the field with identification keys and in becoming familiar with the ferns in their native haunts. Three two-hour periods a week; first two weeks.

Professor Osmun

Plant Life. — An outline of the anatomy, morphology, and physiology of higher plants. This course is especially suited to the needs of teachers of science and nature study and to amateur botanists. Previous training in the subject is not required. Five exercises a week; first two weeks.

Professor Osmun

Plant Diseases. — The more common diseases of vegetable, fruit, and flower crops are considered, together with methods of control. The course is planned to meet the needs of teachers and others interested in gardening and garden supervision. Diseased plant materials are used for illustrative purposes. The course in general botany should be taken as a preparation for this course by all who have had no previous training in botany. Five lectures a week; last two weeks.

Mr. McLaughlin

DEPARTMENT OF RURAL HOME LIFE

The food laboratory, located in the entomology building, is fitted with individual desks (cabinet form) to hold utensils and materials for each student. Each table is equipped with gas stoves. A storage cabinet is provided with bins for supplies and cupboard space for large utensils and illustrative material. This room is well lighted and pleasant. The clothing laboratory is attractively located in French Hall. The equipment consists of sewing machines, cabinets, work tables, cutting tables, electric irons, dress forms, and a collection of materials illustrating the production of textiles for clothing and household use.

Foods I. — A course planned to meet the needs of teachers and home makers who are concerned with the problem of selection and preparation of food. Study is made of the fundamental principles underlying the cookery of various types of foods to conserve the largest amount of nutrients. There will be laboratory work of practical value. This course must be accompanied by elementary dietetics. Three two-hour laboratory periods per week; four weeks.

Miss French

Elementary Dietetics. — The welfare of the family is so largely dependent upon food that this series of lectures is offered. Special study will be made of the needs of the body; the selection of foods to supply those needs; and the relative nutritive value of various foods. Consideration will be given to the planning of balanced dietaries, and to such special problems as infant feeding and school lunches. This course should be accompanied by Foods I. Two lectures per week; four weeks.

Miss French

Business of the Household. — There are many efficient methods successfully used in the business world which can be applied in the business of home making.

Since the home maker is largely responsible for all expenditures connected with the house, an important consideration in this course is the study of the family budget, the apportionment of the income, and the keeping of accounts.

Equally important is the standardization of household tasks, the study of systematic methods of work, selection and care of equipment, and the use of time and labor saving devices. Two lectures per week; four weeks.

Professor Skinner

Clothing I. — This course includes a study of textiles used in clothing; cost and care of clothing; designing and drafting patterns; and the making of clothing. The work consists of demonstrations, discussions, and practical laboratory work. Three two-hour laboratory periods and two lectures per week; four weeks.

Mrs. Reed

Clothing II. — Advanced course. This course is devoted to the more difficult problems in garment making, and illustrates the development of the fundamental principles studied in the first course. There will be demonstrations, discussions, and laboratory work. The method endeavors to eliminate all unnecessary movements, waste of time, energy, and material, trying on and fitting, and unwise designs. Open to students who have had Clothing I. Three two-hour laboratory periods and two lectures per week; four weeks.

Mrs. Reed



Practical Work in Vegetable Growing



Organized Play



An Outdoor Classroom at the Summer School

RELATED SUBJECTS

Dramatic Presentation. — The value of the presentation of scenes and of plays of superior merit, in connection with the study of English in schools for the teaching of literature, art, and the virtues of patriotism, self-sacrifice, and the like, as well as the great field for the drama in the rural communities as an aid to scientific methods in agriculture, high standards in rural life, and for self-development and delight, makes some knowledge of the interpretation of plays, of the stage and its parts, of its effective use and of the art of acting, very desirable. With these aims in view the members of this class will be rehearsed in several plays. Each member will appear in one or more plays. One or two of the best plays will be given a final presentation before the school. Five hours a week; four weeks. Two sections.

Professor Patterson

French and Spanish. — The courses in French and Spanish are intended primarily as self-improvement courses for teachers of these subjects. It will be the aim in conducting the courses to give opportunity for discussion of the methods of presenting and of studying the material in hand.

COURSE I, FRENCH. — Readings from modern French authors. Special study of the short story, with lectures. Written reports in French. Text-book, Buffum's "French Short Stories." Collateral readings from the library. Five hours a week; four weeks.

Professor Mackimmie

COURSE II, SPANISH. — The recitation course in modern Spanish readings, selected from Spanish-American literature. Textbook, "Cuentos de la América Española," by Coester. Five hours a week; four weeks.

Professor Mackimmie

Organized Play and Recreation. — The theory and demonstration of play as a creative force, developing in the individual social consciousness, and in the group individual responsibility for standards of living in the home and the community. There will be special emphasis on methods of organizing and directing games. An effort will be made to work out games that will contribute to the social life of the community. Demonstrations form a prominent feature of the work. Three lectures and two afternoon demonstrations a week; four weeks. Two sections.

Miss Fuller

Agricultural Opportunities for Women. — Agriculture is a field in which women are finding increasingly good opportunities.

The particular problems which the women engaged in farming will have to meet, and the special lines of farming in which they will have favorable opportunities, will be considered in a series of conferences.

Miss Hamlin

Design and Practical Arts. — Lectures and laboratory work developing the value of design, color, and handwork as a rural school asset. Work in binding and its various problems, basketry, elementary weaving, thin and thick cardboard construction, leather work, and rural dyeing; also other phases of rural prevocational subject-matter; also rural community craft-work. Those taking this work should bring 9 by 12 inch drawing paper, carbon paper, scissors, ruler, eraser, knife, and pencils. Five exercises a week; four weeks. Two sections.

Mr. Reid

COURSES OFFERED FOR PUBLIC SCHOOL TEACHERS

By STATE DEPARTMENT OF EDUCATION

Primary Language. — This course will deal with methods of presenting all types of language work given in the first four grades. There will be discussions of subject-matter, plans will be written, and lessons presented, whenever possible, to classes of children. Five exercises a week; four weeks.

Miss Moffit

Primary Reading. — The aim, in this course, is to give the students a clear conception of the principles underlying the teaching of reading in the first four grades. Subject-matter will be considered, methods of presentation worked out, and lessons presented. Five exercises a week; four weeks.

Miss Moffit

Arithmetic I, Primary. — This will be a course in methods of instruction in the work in number that is usually taken up in the first four grades, particular attention being given to the forms of objective work that may be used to put the instruction in this subject into line with fundamental principles of teaching. The main topics: —

I. NUMBER FACTS. — How to teach them with a view to a minimum of “telling and showing,” and the highest and best possible product at the lowest possible child-hour and teacher-hour cost.

II. APPLIED NUMBER. — (1) How to teach the child to state in written number language ordinary conditions and transactions in his everyday life which involve number.

(2) How to teach the child objectively to state and solve ordinary problems which involve arithmetical analysis.

III. DENOMINATE NUMBERS. — (1) What facts to teach in this subject in these grades, and how to conduct the work of written reductions.

(2) How, in surface measure, to develop the “surface” concept, and how to teach the subject objectively so that the child will be able to make surface computations with a degree of confidence and self-reliance.

Five exercises a week; four weeks.

Superintendent Gray

Arithmetic II, Intermediate and Grammar. — This is a course in common fractions, decimal fractions, percentage, and other subjects in the work in arithmetic in the intermediate and grammar grades. The main topics: —

I. COMMON FRACTIONS AND DECIMALS. — The aim will be (*a*) to familiarize the teacher with forms of simple, expressive objective work that may be used to give the pupil the means of working out for himself the changes in forms that he may find necessary when he attempts to operate objectively with fractional numbers; and (*b*) to show how the need of such changes, which objective work in the operations invariably reveals, stimulates the pupil to find what changes are necessary and to work them out.

II. PERCENTAGE AND ITS APPLICATIONS. — The aim will be to instruct the teacher in a simple diagram language in which the pupil (*a*) may give objective expression to the conditions of problems, and (*b*) may determine for himself the correctness of his own solutions.

III. BUSINESS FORMS. — The aim will be to show the teacher how the receipt, the order, the note, etc., may be developed, giving the pupil a large share in working out the statements that it should

contain, the form in which it should be arranged, and the uses that should be made of it.

Five exercises a week; four weeks.

Superintendent Gray

Method of Teaching History in the Grammar Grades. —

This will be a course in the methods of instruction in history in the upper grades. It will include a discussion of the subject-matter. Methods of presentation will be worked out and lessons presented. The topical method of teaching history will be emphasized. Teachers should bring with them any modern history of the United States. Kendall and Stryker's "History in the Elementary School," published by Houghton Mifflin Company, will furnish the basis for the work. Five exercises a week; four weeks.

Mr. Smith

Training in the Duties of Citizenship. — This will be a course in the methods of instruction in training in the duties of citizenship. This course will include a discussion of the educational value of pupil activities, including pupil participation in school government, junior civic leagues, school gardening, and the enlistment of pupils in public welfare movements. The classroom work will consist largely of illustrative lessons which will be discussed and worked out by the teachers themselves. The text used will be Turkington's "My Country," published by Ginn & Co. Five exercises a week; four weeks.

Mr. Smith

Methods in Elementary Schools, with Special Reference to the Rural School. — A general method course for teachers in schools of more than one grade, the one or two teacher rural school in particular.

This course will include a consideration of: What service can I render to the community and to education as a rural school teacher?

How can I use my school time to best advantage? What considerations should I have in mind in making my program? How shall I go about a classification of my pupils? What is the project method, and how can I use it? How can I organize my subject-matter so as to make it effective? What should be my standards of judging work? What special devices will be of use to me in my work? Lectures, reports, assigned readings, and class discussions. Five exercises a week; four weeks.

Superintendent Merriam

Methods in English for the Intermediate and Grammar Grades. — A method course for both experienced and inexperienced teachers in grades 4 to 8 in reading, literature, and grammar.

The course will include a consideration of: What is the reason for teaching children English? What ought I to accomplish? How am I to judge properly subject-matter? What attention shall I give to "Oral English"? How may I apply the project method? What special methods and devices shall I consider? How can I measure the results of my teaching? What uses may I make of pictures and illustrative materials? How may I help speech defects? What attention shall I give to formal grammar? How can I vitalize composition exercises? Students expecting to take this course are urged to bring samples of English work done by their pupils, and also such books as they may have concerning the teaching of English. Lectures, reports, assigned reading, and class discussions. Five exercises a week; four weeks.

Superintendent Merriam

SPECIAL IMPROVEMENT OPPORTUNITIES IN AGRICULTURAL EDUCATION

June 28 to Aug. 6, 1920

Teachers of agriculture need right ideals and definite notions for the daily tasks in teaching; also a knowledge of the larger field of education of which this work is a part is necessary if we are to expect a fit piece of work done and power in the teacher to stimulate and to inspire through the daily tasks. No State would wish its present complement of agricultural teachers to be satisfied to continue as such, devoid of ambition to occupy some day the superior positions in the administrative and teacher-training phases of the program of agricultural education. In other words, it would be a very short-sighted policy not to furnish opportunity for training men who will some day be called upon to fill these more advanced positions.

For these reasons the Massachusetts Agricultural College, in cooperation with the State Department of Education, will offer new special courses in the Summer School of 1920, in addition to the courses formerly given in the summer for the improvement of teachers of agriculture. These are not built on supposition or theory, but are aimed directly at the things a man in the position of director, supervisor, educational manager, and teacher-trainer must know and be able to do in order to carry on the work of his position successfully. These courses are full of the experience and best judgment of leading men who have made good in the positions concerned, and constitute in fact a symposium on the duties, problems, and possibilities of these positions.

Arrangements are being made for several such men from other States and from the Federal Department to supplement the service

of the specialists representing the College of Agriculture and the State Department of Education. The work reaches the point of concrete and visible reality in the annual summer conference of vocational agricultural teachers of Massachusetts, scheduled for the sixth week of the Summer School at the Agricultural College. This conference is open to the students of the Summer School, and is the opportunity to see and study some of the actual work in agricultural teaching at agricultural schools in this section of the State.

These courses are open to men now employed in advanced positions who feel the need of adding to their stock of information and inspiration, and to successful teachers of agriculture looking for advancement; also to superintendents and principals who wish to be prepared to administer high school departments and special schools under the vocational education acts. Since these courses are six weeks in length it may be possible to secure credit in them for a term toward a degree.

NEW SPECIAL COURSES

104. Supervision and Administration of Agricultural Education.—This is a specific purpose course which answers such questions as, “Being a supervisor, how can I make my work more pointed and more effective?” “I am a teacher-trainer. What are the ideals I should strive for in the teachers I prepare, and how can I accomplish this?” “I am looking ahead to being an administrator in vocational agricultural work; what do I need to know and be able to do?” It covers such topics and questions as educational managers, State directors, and supervisors of agricultural education have to answer in order to maintain the efficiency of this work in the State. It deals with the inter-relations of the work of teachers and administrators. This course is open to men now engaged in administrative or supervisory capacity, and to those who wish to become so engaged in the future.

I. SUPERVISION PLANS.

- Visitation program and reports of supervisor, including projects.
- Reimbursement plans.
- Subject and project gradation alternation by years.
- Duties and functions of supervisor.
- Project inspection and approval by supervisor.
- Equivalents of projects required *versus* allowed.
- Farm practice requirements.

II. SCHOOL SURVEY AND CHECK.

- Location and equipment of schools.
- Preliminary survey for school asking aid.
- Factors of approval of schools.
- Local organization and control.
- Admission qualifications.
- Aiding the weak department.
- Approval of course of study.
- Farm practice requirements.

III. TEACHERS AND TEACHING.

- Reserve supply of teachers.
- Organization of student's day.
- Local supervisory problems of directors.
- Vacations of teachers.
- Promotion of teachers within the State.
- Transfer of teachers from school to school.
- Exchange of teachers for temporary service.

IV. MASSACHUSETTS' PLAN OF SUPERVISION.

V. COMPLEMENTAL MATTERS.

- Advisory agricultural committee.
- General letters to teachers.
- Recruiting students in agricultural departments.
- Forms for reports, records, and accounts.
- Co-operation between teacher-training and supervisory agencies.

PHASES OF TEACHER-TRAINING.

- Apprentice teaching.
- College function.
- State function.
- Local school function.
- Problems arising.
- Other teaching practice and observation.
- Establishment of practice departments.
- Illustrative material for visual instruction.
- Kinds and extent of technical courses.
- Kinds and extent of professional courses.
- Plans for professional improvement work in Massachusetts.

Four hours per week; six weeks.

Professor Welles and Mr. Heald

108. Vocational Education, State and National.

I. VOCATIONAL LEGISLATION AND PURPOSE.

General purpose and plan.

A critical study of State and national vocational education acts.

Problems in the interpretation and application of vocational legislation.

II. PROGRESS IN VOCATIONAL EDUCATION DEVELOPMENT.

Review of vocational education in the United States.

The lines of industry in which progress is being made in vocational education, and present status with aims and purposes.

Establishment and control of vocational schools.

Factors of progress, including equipment, teaching force, courses of study, and employment of pupils.

The function of continuation schools in industry.

III. SPECIAL TYPES OF VOCATIONAL SCHOOLS.

Part-time schools and their possibilities.

Unit courses of instruction.

Evening school organization and possibilities.

Apprenticeships.

Types of vocational schools needed to meet vocational conditions.

Continuation schools.

IV. DEVELOPMENT OF VOCATIONAL EDUCATION IN MASSACHUSETTS.

V. COMPLEMENTAL MATTERS.

Essential non-vocational and related studies.

Dangers of exploitation by industry and how prevented.

Principles in general education to be emphasized in vocational education.

Vocational guidance in its relation to vocational education.

Analysis of operation in industry.

Application of operation analysis to agriculture.

Four hours per week; six weeks.

Division of Vocational Education and Professor Hart

Lecturers

In addition to the college staff and the members of the State Department of Education, the following men have been engaged to assist in the presentation of the above topics: Dean Alfred Vivian, College of Agriculture, Columbus, Ohio; Director R. W. Heim, Director of Vocational Education, Newark, Del.; Mr. L. S. Hawkins, Chief, Division of Vocational Education, Federal Board for Vocational Education, Washington, D. C.; Mr. A. K. Getman, Specialist in Agricultural Education, University of the State of New York, Albany, N. Y.; F. B. Jenks, Professor of Agricultural Education, College of Agriculture, University of Vermont, Burlington, Vt.

REGULAR COURSES

51. Principles and Methods of Teaching. — All good teaching is fundamentally a psychological process. Teaching vocational subjects must follow the lead of the laws of learning. The learning process involves both mental and physical activities. In order to show the bearing of these simple truths the following topics will receive emphasis: A study of the laws of learning; exhaustive inquiry into the meaning of interest; apperception; memory-images; judging and reasoning, and their application in teaching processes; habit formation; acquisition of skill; class management and organization of lesson-plans. Five hours per week; six weeks.

Professor Hart

76. Special Methods in Vocational Agricultural Teaching. — The teaching of a vocational subject differs from other teaching. There are some fundamental ideas regarding this work which mean success or failure in teaching. Results are more tangible. Judgments on the work are more quick and sharp accordingly. This course attempts to put vocational agricultural teaching on the road to success because it is based on sound industrial practice and carried out according to rational ideals. Some of the things covered are —

Vocational teaching on a basis of vocational processes.

Based on idea of production.

The place and size of the home project in the study.

Farm partnership as project arrangement.

Use of illustrative material.

Teaching class from raw materials of agriculture.

Project choosing and study plans.

Related mechanics.

The problem plan for study incentive.

Finding the problems for study in agriculture.

Cataloguing and using bulletins and illustrative material.

Introducing subject-matter on basis of apperception.

The art of questioning.

This course will continue for six weeks, but for the first two weeks will be adapted to the needs of employed teachers of the State. It should be of interest to successful and ambitious teachers desiring advancement; teachers supervising apprentices; teachers becoming department heads; those connected with teacher-training or supervision; directors and superintendents. Four hours per week; six weeks.

Professor Welles

103. Professional Improvement Problems. — A seminar course primarily for employed teachers and directors of vocational agriculture (prospective candidates admitted). Deals with the Massachusetts system as it is and the problems confronting the instructor. Includes plans for the coming season and campaigns for improved methods based on experiences of men in service. Has dealt with such topics as "Project Study Outlines," "Farm Practice Standards," "Motivation of Study," "Meeting the Individual Differences," and "Study Note-Books." The subject-matter varies from one season to another. The name of the course indicates its adaptation to special needs of the particular people in the group.

In case a sufficient number of both experienced and untrained men apply for this course, the group may be divided into two sections. Five double periods each week for the first two weeks; four single periods each week for the remainder of the term. Four hours per week; six weeks.

Mr. Heald



Ex-Service Men making the Transition from War to Peace



Two-Year Course Men testing Soil

THE TWO-YEAR COURSE IN PRACTICAL AGRICULTURE

The Two-Year Course in Practical Agriculture was established in 1918. Thirty-seven students were enrolled for the first term. During the past year 295 students have entered the course.

The course is especially arranged for men and women of farm experience who expect to make a business of some line of agricultural work, such as dairying, live-stock raising, horticulture, poultry, or general farming.

The course provides an excellent opportunity to secure training for life work for those students who do not have the time, money, or preparation to take the four-year college course.

In view of the fact that six months of farm experience is required before the course is completed, students who have not already had farm experience may take the course with profit.

The subjects and classes of the Two-Year Course are separate and distinct from those of the four-year courses.

The Two-Year Course in Practical Agriculture is so arranged that the student receives instruction in fundamental subjects, and is given an opportunity to select the lines of work during the second year in which he is particularly interested.

The first year consists of six months of study at the college. The term begins with the college fall term and closes with the winter term of the regular session. The same vacation periods are observed as in the regular four-year courses. The student pursues during the first year two courses in soil fertility, two courses in animal husbandry, two courses in fruit growing, one course in farm machinery,

one in shop mechanics, one in dairying, one in poultry, one in farm structure, one in hygiene, and one in farm law.

At the close of six months of study, students are required to gain six months of farm experience. The college will assist students in finding positions and in placing them on farms where the experience gained will be of great advantage. Thus, an effort will be made to place on a dairy farm the man expecting to take up dairying as his chief line of work, and a student of pomology on a fruit farm.

During the second year the student spends nine months in resident study. Courses in crops, insect pests, feeding, farm management, marketing, and farm problems are required of all students.

In addition, the student selects from the following list of subjects two which he will carry throughout the year: fruit growing, dairying, poultry husbandry, vegetable gardening, floriculture, and rural home life.

During the winter and spring terms of the second year there are elective subjects from which the student may complete his program. These elective subjects include: breeding, animal diseases, gas engines, dairying, carpentry, drainage and irrigation, agricultural credit, farm manufacturing, and dairy bacteriology.

The course is not intended for students enrolled in high schools. Such students should finish the high school course. Students enrolled in high schools who wish to take the course should bring a statement either from the principal of the high school or from parent or guardian asking permission to be enrolled.

This course will appeal not only to young men and women, but also to men and women of mature years and practical experience who wish to know more about the business of farming. Although the course is planned to meet the needs of those who are not graduates of high schools, the instruction is not preparatory or elementary in its nature, but is so arranged that it will be of value to all. The greater amount of academic training that some of the students may possess will in a measure be offset by the fund of practical knowledge possessed by many who have completed only the elementary schools.

Tuition, Fees, and Expenses

Tuition is free to residents of the Commonwealth. Students who are not residents of Massachusetts pay a fee of \$20 a term.

Besides the cost of room and board, there are other financial obligations voluntarily placed upon students which they should expect to meet. Chief among these are class assessments and taxes levied for the maintenance of various organizations, such as the Social Union, Athletic Association, weekly publications, etc. The following laboratory fees are charged:—

	Per Term.
Agronomy, S-1, S-2, S-26	\$1 50
Agronomy, S-25, S-27	2 00
Animal Husbandry, S-1	1 50
Dairying, S-2, S-25, S-26, S-27	3 00
Poultry, S-25, S-26, S-30	2 00
Rural Engineering, S-1, S-2, S-26, S-27, S-30	1 50
Vegetable Gardening, S-25, S-27	1 50

Reports and Certificates

Upon the satisfactory completion of the Two-Year Course the student is given a certificate showing the courses he has completed and the grades attained therein.

In order to obtain a certificate a student is expected to have satisfactorily completed 100 units of credit. A unit is the equivalent of one classroom exercise a week throughout a term of twelve weeks. Thus, a class which meets three times a week would give a student 3 units of credit toward a certificate. A class exercise may be one, two or three hours in length.

At the close of the term students will receive a formal report showing the standings gained in the subjects pursued by them, provided a request to receive such a report is made to the registrar of the college.

Positions

The college does not guarantee positions to students registered in any of its courses, but it has an opportunity to recommend students for a large number of positions. A record is kept of each student's work and of his farm experience, and his success in positions for which he has been recommended after he has finished his course. Thus far the demand for students, both men and women, has been far in excess of the supply. The opportunities for trained men and women, especially those who have had farm experience, are exceptionally good.

A student desiring a recommendation from the college must meet the following conditions: —

- (1) He must be of good character.
- (2) His previous record must be good.
- (3) His work in all courses must be satisfactory.

Students who have not previously had a considerable amount of farm experience cannot, as a rule, be recommended for positions of responsibility. This is especially true for the better positions for which managers or superintendents are wanted.

TWO-YEAR COURSE — SUMMER TERM

F-26. Farm Management and Farm Accounts. — A study of farming as a business; the correlation and adaptation of different farm enterprises, as dairy, orchard, poultry, to the specific farm. Land, labor, and capital requirements. Farm and building plans, and arrangements. The choice and purchase of a farm. Several laboratory periods will be devoted to practice in farm accounting. Farm experience is a prerequisite to this course. Three lectures and two laboratory periods a week; eight weeks. Credits, 3.

Professor Foord

F-26. Animal Breeding. — A study of the principles involved in reproduction and improvement of farm animals; the laws of heredity and variation; the various methods of breeding, — inbreeding, line breeding, out-crossing, grading, and cross breeding; the importance of selection; and a discussion of the needs and possibilities of improvement. Prerequisite: "Types and Breeds," and "Principles of Feeding." Textbook: Mumford, "The Breeding of Animals." Five class hours a week; eight weeks. Credits, 3.

Assistant Professor Rice

F-27. Dairy — Cream Separating and Butter Making. — This course covers the various methods of separating milk; the history, selection, care, and use of cream separators; the pasteurization and ripening of cream; testing of acidity in cream; the making and use of starters; a study of churns and churning; up-to-date methods of making butter; marketing butter, and tests for moisture and salt in butter. The laboratory work consists in the actual operation of separators and churns. Three class hours and two three-hour laboratory periods per week; eight weeks. Credits, 3. *Assistant Professor Yaxis*

F-29. Dairy Bacteriology. — Bacteria and other micro-organisms are the responsible agents for the changes which occur in milk and for the contagion which sometimes causes disease. They are found in milk at times when leaving the udder, they get in with the dust and dirt while milking, and they adhere to the dairy utensils which carry them over from one milking to the next. From the cow to the consumer there is the constant presence of these micro-organisms to contend with on the one hand and to foster on the other. All steps taken are significant in their control. The milking process, the handling of the cow, the condition of the milker, the cleansing of utensils, the management of the stable, and feeding, straining, aëration, cooling, clarifying, pasteurizing, — all are steps in the control of micro-organisms.

Many kinds of changes take place in milk, due to different kinds of micro-organisms. Many of these changes are sought, as the ripening of cream for butter, of milk for cheese, of milk for milk drinks; and many of these changes, also, are fought against, as ropy milk, sour milk, bitter milk, tainted milk, etc.

Micro-organisms of typhoid fever, scarlet fever, diphtheria, and others not infrequently find their way through the milk to the consumer, and produce epidemic forms of these diseases.

It is evident, therefore, that to handle milk and milk products safely it is desirable to know something of the agents which are the source of so much attention in the dairy. This indicates the nature of the substance of this course. This course is required of all students who elect dairying as one of their special lines of work. It is given by the Department of Microbiology. Five two-hour periods a week; eight weeks. Credits, 5.

Professor Marshall and Associate Professor Itano

F-26. Fruit Growing. — This course will be devoted to a consideration of two special subjects connected with the care of fruit plantations, viz., pruning and spraying. The course is placed in this term because this gives the best opportunity for practical work along these two lines in the college orchards and plantations.

The pruning of all kinds of fruits will be studied, and wherever possible the students will be taken into the plantations and given an opportunity to perform the actual work.

Modern methods of spraying will be considered (with a very brief discussion of fruit pests), and the student will be trained in the preparation and application of the different sprays. Five class hours a week; eight weeks. Credits, 3.

Assistant Professor Drain

F-26. Poultry Production, Marketing, Incubation, and Diseases. — This is a combination lecture and laboratory course, including the production of eggs for marketing and hatching purposes; production of broilers, roasters, capons, and methods of marketing poultry and poultry products; incubation; and the study of the common poultry diseases. The laboratory work will consist of a detailed study of the egg reports from the college and experiment station plants, and egg-laying contests, crate fattening, killing, picking, grading, and packing poultry. Three class hours and two two-hour laboratory periods per week; eight weeks. Credits, 3.

Associate Professor Payne

F-26. Vegetable Gardening. — This course will cover the construction and management of hotbeds, cold frames, and greenhouses, and the cultural details of the crops grown in them. In the classroom periods such subjects as farm manures, green manures, cover crops, commercial fertilizers and the planning of the future season's operations will be considered. Three class hours and two two-hour laboratory periods per week; eight weeks. Credits, 3.

Vegetable Gardening Department

F-26. Floriculture. — The courses are arranged to give the student a thorough foundation in the practical work of floriculture, with sufficient explanation of the scientific part of the work to enable

him to understand the "why" as well as to know how to do the various operations.

During the course a study will be made of the methods of preparing soils, watering, ventilating, and fumigating greenhouses. Special attention will also be given to the propagation of plants, and particularly the main crops of the florist, such as roses, carnations, sweet peas, violets, chrysanthemums, bedding plants, annuals, and perennials.

Sufficient time will also be devoted to the study of greenhouse construction and heating problems to acquaint the student with the principles involved, and to enable him to plan intelligently for the building of the greenhouses and frames necessary to conduct the florist business.

The course will be made as practical as possible, and students will need a working outfit of overalls and jumper, as they will be required to learn to do by doing. Two class hours and three two-hour laboratory periods per week; eight weeks. Credits, 3.

Mr. Whiting

F-26. Carpentry. — This course gives practice in the care and use of carpenter's tools through bench work, repair of farm equipment, and building construction. Small buildings are erected by the students to give practice in all the phases of house construction. Practice is given in the building of forms and in the mixing and placing of concrete. Five two-hour laboratory periods per week; eight weeks. Credits, 3.

Department

F-27. Gas Engines. — This course deals with the gasoline engine as used for stationary work, automobiles, and tractors. Instruction is given by means of lectures and textbooks, and by operating and repairing stationary engines, automobiles, and tractors. Special attention is given to overhauling and repairing. Two class hours and three two-hour laboratory periods per week; eight weeks. Credits, 3.

Department

General Horticulture. — This course is designed to give the student a knowledge of the plants used in ornamenting home grounds, streets, parks and cemeteries, together with their proper care and cultivation. It also deals with the making and care of lawns, walks and roads. The object of the course is to train men, as more efficient laborers, foremen or superintendents, for the care and management of private estates, parks and similar plantation. Five hours a week; eight weeks.

Assistant Professor Thompson.

UNIT COURSES

A student enters the agricultural Unit Courses if his previous education is not sufficient to permit of his taking up the work of the Two-Year Course. The agricultural Unit Courses begin every month in the year except September. Each man may select, in addition to the English and mathematics that is required, two or three lines of work to which he will expect to devote most of his time.

In connection with the Unit Courses there is much actual practice on the farms, orchards, gardens, in the dairies, barns, shops and greenhouses, and with poultry, live stock and farm machinery.

Unit Courses in English. — SS A. Oral English, reading, writing, spelling. Two hours a day, five times per week, one-hour periods, ten hours.

SS B. Reading, writing, spelling, composition, two hours per day, five times per week, ten hours.

SS C. Composition, business forms, letter writing, newspaper, and magazines, one hour a day, five times per week, five hours.

SS D. Composition, debating and public speaking, newspapers, and magazines, one hour a day, five times per week, five hours.

Unit Course in Arithmetic. — SS A. Fundamental processes, two hours per day, ten hours.

SS B. Fractions, decimals, and measurements, two hours per day, ten hours.

SS C. Percentage, mensuration, and business forms, one hour per day, five hours.

SS D. Elements of bookkeeping, one hour per day, five hours.

Unit Courses in Agriculture and Horticulture. — Unit Courses will be offered in the following subjects during July and August: —

Agronomy.
Animal Husbandry.
Dairying.
General Horticulture.

Fruit.
Vegetable Gardening.
Poultry.
Farm Mechanics.

THE MASSACHUSETTS AGRICULTURAL COLLEGE

Application for Enrollment

All classes meet five times a week unless otherwise specified. Indicate with a cross (X) the subjects you desire to take. Mail the blank to JOHN PHELAN, Director of Short Courses, Massachusetts Agricultural College, Amherst, Mass.

Subjects for Summer Session, June 28 to July 23

AGRICULTURE

Soil Fertility
Manures and Fertilizers
Types and Breeds
Animal Feeding and Management
Dairying
Farm Management
Poultry Husbandry
Repair Farm Equipment
Farm Machinery and Gas Engines

HORTICULTURE

Garden Flowers
Indoor Flower Growing
Food Preservation (four weeks)
Food Preservation (two weeks)
Fruit Growing
Vegetable Gardening

GENERAL EDUCATION

Primary Language
Primary Reading
Primary Arithmetic
Intermediate and Grammar Grade
Arithmetic
Methods of Teaching History
Citizenship
Methods for Intermediate and Grammar Grades

HOME LIFE AND PRACTICAL ARTS

Foods
Elementary Dietetics
Clothing I
Clothing II
Business of the Household

RELATED SUBJECTS

Insect Life
Agricultural Opportunities for Women
Oral English and Parliamentary Practice
Organized Play and Recreation
Native Ferns
Plant Life

Plant Diseases
Hygiene and Sanitation
Agricultural Economics
Rural Sociology
French
Spanish

Agricultural Education, June 28 to August 6

(These courses meet four times a week.)

Supervision and Administration of
Agricultural Education
Vocational Education, State and Normal

Principles and Methods of Teaching
Special Methods in Vocational Agricultural Teaching
Professional Improvement Problems

Subjects for Two-Year Course, June 28 to August 28

Farm Management
Fruit Growing
Dairying
Poultry
Vegetable Gardening
Floriculture

General Horticulture
Animal Breeding
Carpentry
Dairy Bacteriology
Gas Engines

AFTER SUMMER SCHOOL COMES

FARMERS' WEEK

JULY 26-30 Inclusive

IT will be a live meeting of unusual interest to all those engaged in farming in any of its branches, or in home-making. There will be lectures, demonstrations, exhibits, and addresses to make the "week" of special appeal.

You are cordially invited to stay over after Summer School and attend Farmers' Week. It will be worth while.

Call at the Extension Service office and ask for a program, or send a postal asking for one.

THE EXTENSION SERVICE

Massachusetts Agricultural College, Amherst, Mass.

“AT YOUR SERVICE”

MASSACHUSETTS
AGRICULTURAL COLLEGE

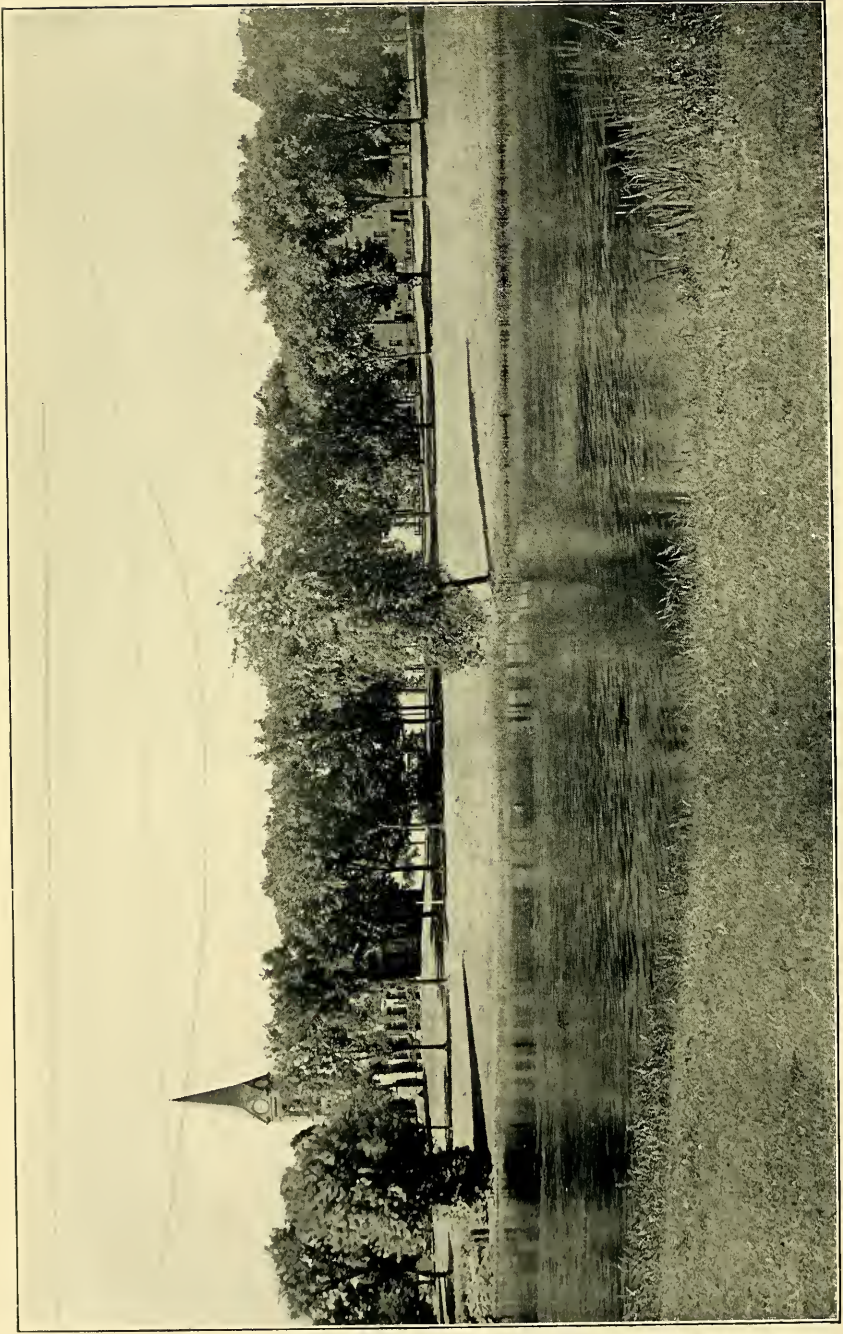
ANNOUNCEMENT

OF THE

TWO-YEARS COURSE IN PRACTICAL AGRICULTURE

1920-21





A View of the Campus, showing Library

THE M. A. C. BULLETIN

Amherst, Massachusetts

Volume XII

SEPTEMBER, 1920

Number 6

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THE TWO-YEARS SHORT COURSE IN PRACTICAL AGRICULTURE

OF THE

MASSACHUSETTS AGRICULTURAL COLLEGE



PUBLICATION OF THIS DOCUMENT
APPROVED BY THE
SUPERVISOR OF ADMINISTRATION.

CALENDAR, 1920-21

Two-Years Course

1920

September 27, Monday	Registration begins
September 29, Wednesday, 1.30 P.M.	Fall term begins; assembly
October 12, Tuesday	Holiday — Columbus Day
November 24-26, Wednesday, 12 M.-Friday, 1 P.M.	Thanksgiving recess
December 23, Thursday, 5 P.M.	Fall term ends

1921

January 3, Monday, 1 P.M.	Winter term begins
February 22, Tuesday	Holiday — Washington's Birthday
March 25, Friday, 5 P.M.	Winter term ends
April 4, Monday, 1 P.M.	Spring term begins
April 19, Tuesday	Holiday — Patriots' Day
May 30, Monday	Holiday — Memorial Day
June 25, Saturday,	Spring term closes
September 28, Wednesday, 1.30 P.M.	Fall term begins; assembly

STAFF

Officers of General Administration

KENYON L. BUTTERFIELD, A.M., LL.D.

President of the College

CHARLES R. GREEN, B.Agr.

Librarian of the College

EDWARD M. LEWIS, A.M.

Dean of the College

PHILIP B. HASBROUCK, B.Sc.

Registrar of the College

CHARLES H. PATTERSON, A.B., A.M.

Assistant Dean of the College

FRED C. KENNEY

Treasurer of the College

JOHN PHELAN, A.M.

Director of Short Courses

RALPH J. WATTS, B.Sc.

Secretary of the College

The Faculty of Instruction

MAX F. ABELL, B.Sc. Farm Management

Assistant Professor of Farm Management

LUTHER BANTA, B.Sc. Poultry Husbandry

Instructor in Poultry Husbandry

ARTHUR B. BEAUMONT, Ph.D. Soil Fertility

Professor of Agronomy

Mrs. GRACE D. BEAUMONT English

In charge of Unit Courses

EDWARD J. BURKE, B.Sc. Pomology and Poultry Husbandry

In charge of Unit Courses

ALEXANDER E. CANCE, Ph.D. Agricultural Economics

Professor of Agricultural Economics

WALTER W. CHENOWETH, A.B., M.Sc. . . . Horticultural Manufactures

Professor of Horticultural Manufactures

HERBERT P. COOPER, M.S.	Field Crops
<i>Assistant Professor of Agronomy</i>	
— — — — —	Poultry Husbandry
<i>Instructor in Poultry Husbandry</i>	
BROOKS D. DRAIN, B.Sc.	Fruit Growing
<i>Assistant Professor of Pomology</i>	
HENRY T. FERNALD, Ph.D.	Entomology
<i>Professor of Entomology</i>	
JAMES A. FOORD, M.Sc.Agr.	Farm Management
<i>Professor of Farm Management</i>	
WILLARD K. FRENCH, B.Sc.	Farm Management
<i>Assistant Professor of Farm Management</i>	
HELENA T. GOESSMANN, M.Ph.	English
<i>Instructor in English</i>	
CHARLES H. GOULD, B.Sc.	Fruit Growing
<i>Instructor in Pomology</i>	
JOHN C. GRAHAM, B.Sc.	Poultry Husbandry
<i>Professor of Poultry Husbandry</i>	
EMORY E. GRAYSON, B.Sc.	Physical Education
<i>Instructor in Physical Education</i>	
CHRISTIAN I. GUNNESS, B.Sc.	Rural Engineering
<i>Professor of Rural Engineering</i>	
MARGARET HAMLIN, B.A.	Agricultural Courses for Women
<i>Agricultural Counselor for Women</i>	
WILLIAM R. HART, A.M., LL.B.	Agricultural Education
<i>Professor of Agricultural Education</i>	
CURRY S. HICKS, B.Pd.	Physical Education
<i>Professor of Physical Education and Hygiene</i>	
RICHARD L. HOLDEN, B.Sc.	Animal Husbandry
<i>Instructor in Animal Husbandry</i>	
HENRY F. JUDKINS, B.Sc.	Dairying
<i>Associate Professor of Dairying</i>	

WILLIAM P. B. LOCKWOOD, M.Sc.	Dairying
<i>Professor of Dairying</i>	
CHARLES E. MARSHALL, Ph.D.	Microbiology
<i>Professor of Microbiology</i>	
FREDERICK G. MERKLE, M.Sc.	Soil Fertility
<i>Instructor in Agronomy</i>	
JAMES B. PAIGE, B.Sc., D.V.S.	Veterinary Science
<i>Professor of Veterinary Science</i>	
LOYAL F. PAYNE, B.Sc.	Poultry Husbandry
<i>Associate Professor of Poultry Husbandry</i>	
GEORGE F. PUSHEE	Rural Engineering
<i>Shop Assistant</i>	
WILLIAM S. REGAN, Ph.D.	Entomology
<i>Associate Professor of Entomology</i>	
VICTOR A. RICE, B.S.Agt.	Animal Husbandry
<i>Assistant Professor of Animal Husbandry</i>	
FRED C. SEARS, M.Sc.	Pomology
<i>Professor of Pomology</i>	
EDNA L. SKINNER, B.Sc.	Home Economics
<i>Professor of Home Economics</i>	
JAMES L. STRAHAN, M.Sc.	Rural Engineering
<i>Assistant Professor of Rural Engineering</i>	
LELAND SPENCER, B.Sc.	Farm Management
<i>In charge of Unit Courses</i>	
CHARLES H. THAYER	Agronomy
<i>Instructor in Agronomy</i>	
CLARK L. THAYER, B.Sc.	Floriculture
<i>Associate Professor of Floriculture</i>	
CHARLES H. THOMPSON, M.Sc.	Horticulture
<i>Assistant Professor of Horticulture</i>	
HAROLD F. TOMPSON, B.Sc.	Vegetable Gardening
<i>Professor of Vegetable Gardening</i>	

PAUL W. VIETS	Arithmetic
<i>In charge of Unit Courses</i>	
GILBERT S. WATTS, B.Sc.	Vegetable Gardening
<i>Instructor in Vegetable Gardening</i>	
WINTHROP F. WELLES, B.S.	Agricultural Education
<i>Professor of Agricultural Education</i>	
JAMES WHITING	Floriculture
<i>Foreman, Department of Floriculture</i>	
T. GEORGE YAXIS, B.Sc.	Dairying
<i>Assistant Professor of Dairying</i>	

The above list of names of the faculty includes not only those of teachers but also of members of the staff who bear administrative relation to the Two-Years men.

THE TWO-YEARS COURSE IN PRACTICAL AGRICULTURE

The Two-Years Course in Practical Agriculture was organized in 1918 to meet the demand for a thorough short course in agriculture and horticulture that might be taken by students who either did not possess college entrance requirements or who for one reason or another were unable to take the regular four-years college course.

The course is especially arranged and suited for young men and women who expect to make a business of some line of agricultural work, such as dairying, livestock raising, poultry, horticulture, general farming, etc.

That the course meets a specific demand in this State is shown by the fact that 209 men were enrolled in it during the year 1919-20.

This course will appeal not only to young men and women but also to men and women of mature years and practical experience who wish to know more about the business of farming. Although the course is planned to meet the needs of those who are not graduates of high schools, the instruction is not preparatory or elementary in its nature, but is so planned that it will be of value to all. The greater amount of academic training that some of the students may possess will in a measure be offset by the fund of practical knowledge possessed by many who have completed only the elementary schools.

The advantages of the college staff of specialists and the college plant with all its resources are thus made available to young men and young women who may not have had the opportunity of securing a high school education.

The two-years course is not intended for students enrolled in high schools. Such students should finish the high school course. Students enrolled in high schools who wish to take the course should bring a statement either from the principal of the high school or from parent or guardian asking permission to be enrolled.

The Two-Years Course in Practical Agriculture is organized as follows: the first year consists of six months of study at the college and six months of practical farm experience; during the second year the student is required to spend nine months in resident study at the college.

The work of placing students on selected farms is in charge of the Assistant Professor of Farm Management. Such farms are selected throughout the State as will enable the student to pursue the line of work he desires. Thus an effort is made to place the dairy student on a dairy farm, the student of pomology on a fruit farm, and so on. It should be clearly understood both by the employer and by the student that this six months of farm experience is educational in its nature. Farms are selected on the basis of the practical experience that will be gained from them by the students. This farm experience may, by arrangement, be secured on the home farm.

The work of the second year is distinctly vocational. The student selects at the opening of the fall term two subjects in which he is interested and which he will carry throughout the year. No student is allowed to carry more than three subjects in addition to his required courses. Any subject selected as a major interest must be carried throughout the three terms.

During the fall, winter and spring terms of the second year there are elective subjects from which the student may complete his program. These courses include: breeding, animal diseases, gas engines, dairying, carpentry, drainage and irrigation, agricultural credit, and dairy bacteriology.

Instruction

The instruction is given by the regular faculty by means of class-room teaching, laboratory exercises, and practical work. The work of the class-room is supplemented by demonstration work in the laboratory, dairy room, greenhouse, and stables. The library of 65,000 volumes offers exceptional opportunities for special study in agriculture, horticulture, and related sciences. The instruction is designed to offer plain, practical, direct information, and to establish the underlying reasons as well as the method employed in the various operations.

Entrance Conditions

There are no entrance examinations or entrance conditions other than that students must be seventeen years of age or over and have completed at least an elementary school course or its equivalent. They must have had six months' practical farm experience before they will be permitted to enroll for the work of the second year. This experience may be gained after the first year of study at the college.

In order that proper arrangements may be made for accommodations, it is important to know, as accurately as possible, the number of students who expect to attend. All persons intending to enroll in the Two-Years Course are advised to make application as early as possible to the Director of Short Courses.

Reports and Certificates

In order to obtain a certificate a student is expected to have satisfactorily completed 100 units of credit. A unit is the equivalent of one class-room exercise a week throughout a term of twelve weeks. Thus, a class which meets three times a week would give a student three units' credit toward a certificate. A class exercise may be one, two or three hours in length.

At the close of the term students will receive a formal report showing the standings gained in the subjects pursued by them, provided a request to receive such a report is made to the Registrar of the college.

Upon the satisfactory completion of the Two-Years Course the student is given a certificate showing the courses he has completed and the grades attained therein.

How to Enroll

1. Each student is required to file with the Treasurer of the college a statement, signed by the town (or city) clerk of the town (or city) from which he enrolls, stating that the parent or guardian of the student is a resident of that town. A blank for this purpose is found on page 81 of this catalogue.

2. Plan to arrive in Amherst so as to register not later than Monday, September 27, for the first term. For the second term classes will begin Monday, January 3.

3. Upon arrival, report at the office of the Director of Short Courses, located in South College, where information may be obtained in regard to board and room, schedule of classes, etc.

4. Make out the application for enrollment, which will be supplied by the Director of Short Courses. This enrollment may be made in advance by correspondence. Students who expect to take the courses are advised to correspond with the Director of Short Courses.

5. Present the application for enrollment at the office of the Registrar, who will issue a class card that must be signed by the (1) President, (2) Treasurer, (3) Director of Short Courses, and (4) by the instructors in whose classes the student enrolls.

6. Go to the Treasurer's office to pay laboratory fees.

7. Return the enrollment card *within one week* to the office of the Registrar. The card should have the signatures stated above.

8. Attend all general college exercises.

Rules and Regulations

The Director of Short Courses shall have charge of all cases of absence.

A student may be absent from 10 per cent of chapel exercises and from 10 per cent of the assemblies in each semester.

A student may be absent from 10 per cent of class exercises, except examinations, provided he meets all the requirements of his instructors for the omitted exercises. Every absence from any class exercise in excess of those allowed shall entail a deduction from the mark obtained in the course in which the absence occurred. Unexcused absences may be sufficient cause for subjecting the student to further discipline.

Absences from exercises immediately and consecutively preceding or following a holiday, recess or vacation announced in the published calendar shall be counted as double absences. No excuse shall be considered before the number of absences allowed in any semester is exhausted.

All physicians' certificates must be approved by the Professor of Physical Education and deposited with the Director of Short Courses within three days after the last absence covered by the certificate or they will be invalid.

All applications to the Director for excuses of absence shall be made in writing and presented in person. They must, if possible, be made in advance. If they cannot be made in advance they must be made within two days after the expiration of the period of absence, and they must contain a full statement of the reason of the delay in presenting them. A blank form will be furnished at the Short Course office.

In the record of absences two tardy marks shall be considered equivalent to one absence.

Any student who absents himself from an appointed examination without sufficient cause shall be given zero thereon. In such case he shall not be entitled to a make-up examination unless the Di-

rector so requests. A previously announced test may, at the discretion of the instructor, be regarded as a test or as an examination.

Every absence taken before enrollment (the signing of the registration card by the teacher) in a class will be deducted from the student's absence allowance in that class. The Director, however, may grant the special privilege of a visitor's card.

If a student's term mark in any subject falls below 60 per cent, or if he drops a course without the consent of the Director, he is thereby *failed* (F) in that subject. He shall be debarred from taking the final examination in that subject, and must repeat it with the following class.

If the average of the term mark and the final examination is below 60 per cent, the student is thereby *conditioned* (*).

Agricultural Opportunities for Women

Agriculture is a field in which women are finding increasingly good opportunities. Poultry keeping, fruit growing, floriculture, dairying, truck farming, general farming, — all offer favorable openings for women. In all of these branches of agriculture women are farming independently. There are also paid positions as farm workers or managers which are available for the agriculturally trained woman.

The demand for such women to fill agricultural positions during the past year was far in excess of the supply.

For the woman or girl whose home is already upon the farm the opportunity is exceptionally good. With the help of an agricultural education there are open to her many means of increasing her own or the farm income. With the knowledge of farm life which she already possesses, and with the possibility of securing occasional help from her family, she can easily carry on and develop a profitable enterprise of her own. The Two-Years Course in Agriculture will afford to the women who wish to engage in farming the practical training which they will need to fit them for their work, and will open to them new doors of opportunity. The particular problems

which the women engaged in farming will have to meet, and the special lines, etc., of farming in which they will have favorable opportunities, will be considered in a series of conferences.

Women who are interested in taking agricultural courses should correspond with Miss Margaret Hamlin, who acts as adviser for agricultural courses for women. Women interested in home economics should address Miss Edna L. Skinner.

Positions

The college does not guarantee positions to students registered in any of its courses, but it has an opportunity to recommend students for a large number of positions. A record is kept of each student's work and of his farm experience, and of his success in positions for which he has been recommended after he has finished his course. Thus far the demand for students, both men and women, has been far in excess of the supply. The opportunities for trained men and women, especially those who have had farm experience, are exceptionally good.

A student desiring a recommendation from the college must meet the following conditions:—

- (1) He must be of good character.
- (2) His previous record must be good.
- (3) His work in all courses must be satisfactory.

Students who have not previously had a considerable amount of farm experience cannot, as a rule, be recommended for positions of responsibility. This is especially true for the better positions for which managers or superintendents are wanted.

The Library

The college library occupies the entire lower floor and basement of the Chapel-Library building. It contains more than 65,000 volumes, in addition to a large number of unbound periodicals and pamphlets. Works on agriculture, horticulture, botany, entomology, and the

various sciences, predominate, but literature, history, economics, and sociology are well represented and receive due attention. In addition to a few newspapers and the best farm papers, the reading room is supplied with a good variety of popular periodical literature, encyclopedias, and general reference books. The equipment is such that the library ranks extremely well with the agricultural libraries of the country.

An agricultural reference library is maintained in Stockbridge Hall. Other branch libraries and reading rooms are provided in the department buildings, and these are open for the use of the Short Course and regular college students.

The library hours are from 8 A.M. to 6 P.M. and 7 to 9.30 P.M. every week day, and from 9 A.M. to 1 P.M. on Sunday in term time. Shorter hours prevail during the vacation season.

Short Course students should be able to find splendid material for their line of college work and are cordially invited to make use of the library and its equipment. The librarian and library assistants are always on hand, ready and willing to be of assistance.

Student Expenses

TUITION. — Tuition is free to residents of Massachusetts. Students who are not residents of Massachusetts are charged a tuition fee of \$60 a year. The tuition charged persons not citizens of the United States is \$120 a year. Students entering from Massachusetts are required to file with the President a statement, signed by either town or city clerk, stating that the applicant's father is a legal resident of Massachusetts; a similar statement is required of those entering from other States.

All students entering the college for the first time in this course are charged a matriculation fee of \$5, which in event of a student leaving the institution shall, if all bills due the college are paid, be remitted, or which shall upon graduation be considered as payment for the certificate.

Board may be obtained at the college dining hall. At present the price of board there is about \$6.50 a week.

Expenses

The necessary college expenses are estimated as follows:—

Tuition: citizens of Massachusetts, free; other citizens of the United States, \$60 a year; foreigners, \$120 a year.

	Low	High
Matriculation fee, first year	\$5 00	\$5 00
Room in private houses	72 00	110 00
Board, \$6.50 per week	234 00	234 00
Laundry, 50 to 85 cents a week	18 00	30 00
Laboratory fees	5 00	20 00
Books, stationery, and miscellaneous items	24 00	51 00
	\$358 00	\$450 00

The estimate given above is for the regular college year of nine months. The estimate for six months would be approximately two-thirds of the amount stated above.

INITIAL CHARGES

At the opening of the college year, before students are registered in their classes, the following charges are payable at the treasurer's office:—

	First Year	Second Year
Matriculation fee	\$5 00	-
Board (if at college dining hall) four weeks in advance	26 00	\$26 00
Assessment for support of Social Union	1 50	1 50
Laboratory fees	See below	See below
Student tax for support of athletics ¹	10 00	10 00
Student tax for support of nonathletic activities ¹	2 50	2 50

¹ While this is not essentially a college charge, the Treasurer of the college acts as collector for the student activity, and all students are expected to make the payment as indicated. The subscription price of the "Collegian" is fixed by the managers, the amount of athletic tax by vote of the student body.

LABORATORY FEES

The principles observed in establishing laboratory fees are the requirement that students pay for those materials actually used which cannot be supplied by the individual, and that the laboratory fees include a charge sufficient to guard against wanton waste and breakage. Fees may be established for any course without previous announcement. At present the fees charged are as follows:—

	Per Term
Agronomy, S-1	\$1 50
Agronomy, S-25	2 00
Animal Husbandry, S-1	1 50
Dairying, S-2, S-25, S-26, S-27	3 00
Poultry, S-25, S-26, S-30	2 00
Rural Engineering, S-1, S-2, S-26, S-27, S-30	1 50
Vegetable Gardening, S-25, S-27	1 50
Botany, S-27	1 00

OTHER EXPENSES

Prospective students should understand that the above estimates cover expenses which may be called strictly college expenses, and that there are other financial obligations voluntarily placed upon students which they should expect to meet. Chief among these are class assessments and taxes levied for maintenance of various organizations, such as the Social Union, Athletic Association, weekly publications, etc. Such expenses vary from \$15 to \$30 a year. Additional financial responsibility is also assumed by students joining clubs or entering into other social activities of the college. Besides the amount necessary for clothes and traveling, the economical student will probably spend between \$350 and \$450 per year.

Rooms

Students must secure rooms approved by the college. The assignment of rooms, and the general supervision of the housing of students, is in charge of the Director of Short Courses.

Women students are expected to occupy rooms in the college

dormitory and such houses or apartments as the college may provide. No woman student will be allowed to room in a private house without a special written permission from the Director.

Student Aid

SELF HELP. — Many students are obliged to find work of some sort to earn their way through college. It is recommended that no new student enter without having at least \$250 and preferably \$350 with which to pay his way until he can establish himself in some regular work. The college does not encourage students to enter without money in the expectation of earning their way entirely. The student will find it better either to work and accumulate money before coming to college, or to take more than two years in completing his course, or, instead, to borrow money sufficient to carry him through. No student should undertake work that interferes with his studies, and students should understand that, owing to the large number of applications for employment, no one man can receive a large amount of work at the college. A number of students find opportunities for earning money without depending upon the college to furnish them with work.

Application for student labor should be made directly to Kenyon L. Butterfield, President of the college. An applicant is required to present statements from parent or guardian and from a public official or other responsible person of the town or city in which he resides, explaining the necessity of the applicant's need of assistance. Students whose department or class work is not satisfactory are not likely to be continued in student labor. Opportunities for labor for Short Course men on the campus are limited to second-year men in the Two-Years Course in Practical Agriculture. Students, therefore, may find it rather difficult to obtain all the work they desire during their first year; as a matter of fact, however, any student who is capable of doing a variety of things, and who is a competent workman, usually finds little difficulty in obtaining all the work that he can do from the outset.

General Exercises

Chapel exercises are held two mornings each week. On Wednesday an afternoon assembly is held, to which some prominent layman or professional man is invited to speak. The object of these assemblies is to bring to the students discussions of topics of present-day interest. A special chapel service on Sunday is usually held during the winter months. Students are required to attend these general exercises, although the President is authorized to excuse from chapel any student who may object to attendance thereon because of his religious scruples, provided his request for excuse therefrom is endorsed by his parent or guardian.

Student Activities

A large number of student organizations furnish opportunity to students for work and leadership.

The Massachusetts Agricultural College Social Union was established about ten years ago. All students become members of the union by paying a small fee. The union is designed to become the center of student interests. In North College it has a trophy room and a large lounging room for music, reading, and study; in the basement of this building there is also a game room for pool and billiards. In the fall and winter months the union gives a series of entertainments, free to students and faculty.

The Young Men's Christian Association is active both socially and religiously. A Catholic club has also been organized.

The Two-Year Council is composed of representatives of the first and second year classes. This body serves as general director of the conduct in classes of the Two-Years men, and represents before the faculty the interests of this group of students.

Student Relations

The customary high standard of college men in honor, manliness, self-respect, and consideration for the rights of others constitutes the standards of student deportment.

Any student known to be guilty of dishonest conduct or practice must be reported by the instructor to the President for discipline.

The privileges of the college may be withdrawn from any student at any time if such action is deemed advisable.

It should be understood that the college, acting through its President or any administrative officer designated by him, distinctly reserves the right not only to suspend or dismiss students, but also to name conditions under which students may remain in the institution. For example, if a student is not doing creditable work he may not only be disciplined but he may also be required to meet certain prescribed conditions in respect to his studies, even though under the foregoing rules his status as a student be not affected. The same provision applies equally to the matter of absences ("cuts"). According to the rules a student is allowed a certain percentage of absences from class and other exercises. This permission, which implies a privilege and not a right, may be withdrawn at any time for any cause.

Similarly, also, it applies to participation in student activities. Though this will ordinarily be governed by the rules as already laid down, yet, if in the judgment of the college authorities a student is neglecting his work on account of these activities, the privilege of participating in them may be withdrawn for such time as is considered necessary. Moreover, it may be withdrawn as a punishment for misconduct. Prospective students or their parents may, upon application, obtain a copy of the faculty rules governing student relations to the college.

Infirmary

The college maintains an infirmary for the care of sick or injured students. The buildings now available for this purpose are quite inadequate for the needs of the institution, and it is hoped that in the near future other buildings of this kind may be erected and the general equipment somewhat amplified. At present two small buildings, built especially for hospital purposes, are used for the infirmary.

The following statement outlines the plan followed in the management of the infirmary with respect to students:—

MANAGEMENT OF THE INFIRMARY

Supervision

1. The infirmary is under the *general supervision* of Dr. Charles E. Marshall, who is designated as Supervisor of the Infirmary. A resident nurse is in *immediate* charge of the infirmary.

Use of Infirmary

2. Students are urged to go to the infirmary at any time that they are in need of the services rendered by the resident nurse or by a town physician. Inasmuch as the physical director gives special attention to all student diseases, it is to be expected that the majority of the students will go to the infirmary at his suggestion. This understanding, however, should in no way deter students from going to the infirmary voluntarily at any time.

General Health

3. Students are urged to consult the physical director or the resident nurse immediately when signs of physical disorder appear. Severe attacks of cold or other forms of illness can usually be avoided if treatment is administered in the incipient stage. The purpose of the infirmary is to help maintain the general good health of the students, as well as to furnish a suitable place for professional attention in cases of severe illness or accident.

General Fee

4. The infirmary fee will be at the rate of \$2 a day, and will be charged when one or more meals are obtained at the infirmary or when the student remains at the infirmary for one or more nights. A nominal charge will be made to out-patients for miscellaneous treatment of a minor character.

Additional Expenses

5. In addition to the fee charged as specified in paragraph 4, the following additional expenses will be charged to the patient: —

(a) *Nurses.* — In case a special nurse is required for the proper care of an individual, the services and board of this nurse will be paid by the patient. Such a nurse will be under the general supervision of the resident nurse.

(b) *Professional Service.* — If a student requires medical attention by a physician, he will be required to select his physician and become responsible for fees charged by the physician.

(c) *Supplies.* — Special medical supplies prescribed by a physician or nurse will be charged to the patient.

(d) *Laundry.* — Expense for personal laundry incurred by students while in the infirmary will be charged to the individual student.

The Course of Study of the Two-Years Course in Practical Agriculture

FIRST YEAR

<i>First Term</i>	<i>Second Term</i>	<i>Third Term</i>
Soil Fertility 3	Principles of Feeding . . . 3	Six months' farm experience
Types and Breeds 5	Fruit Growing 3	
Fruit Growing 3	Repair of Farm Equipment 2	
Sanitation and Hygiene . . 3	Dairy 3	
	Poultry 3	

Electives

<i>First Term</i>	<i>Second Term</i>
Farm Machinery 3	English 2
English 3	Farm Law 5
Farm Structures 5	Rural Home Life 3
Rural Home Life 3	Farm Arithmetic 3
Farm Arithmetic 3	Agricultural Opportunities ¹ 1
Agricultural Opportunities ¹ 1	

SECOND YEAR

<i>First Term</i>	<i>Second Term</i>	<i>Third Term</i>
Insect Pests 5	Farm Management 5	Plant Diseases 5
Feeding and Management . 3		Marketing ² 5
		Social and Economic Problems 3

Two electives must be chosen from the following list and carried throughout the second year: —

<i>First Term</i>	<i>Second Term</i>	<i>Third Term</i>
Fruit Growing 5	Fruit Growing 5	Fruit Growing 5
Dairy 3	Dairy 3	Dairy 3
Poultry 5	Poultry 5	Poultry 5
Vegetable Gardening . . . 5	Vegetable Gardening . . . 5	Vegetable Gardening . . . 5
Floriculture 5	Floriculture 5	Floriculture 5
General Horticulture . . . 5	General Horticulture . . . 5	General Horticulture . . . 5

Additional electives from which the student may choose, one in the winter and two in the spring term: —

<i>First Term</i>	<i>Second Term</i>	<i>Third Term</i>
Farm Manufacturing 3	Animal Breeding 3	Crops 5
Rural Home Life 3	Carpentry 3	Animal Diseases 3
	Dairy Bacteriology 3	Agricultural Credit ² . . . 5
	Rural Home Life 3	Drainage and Irrigation . . 3
		Rural Home Life 3
		Gas Engines 5
		Feeding and Management . . 3

¹ Required for women students.

² This course will not be given during 1920.



A Class in Egg Packing



Two-Years Course Men testing Soil

DESCRIPTION OF COURSES

AGRONOMY

The Department of Agronomy has a good equipment for the presentation of its courses. The laboratories for soils and fertilizers include one for elementary work, supplied with locker equipment for 200 students, and one for advanced work, accommodating 80 students. These laboratories are equipped with steam and electric ovens, balances, centrifuge, microscopes, and other apparatus necessary for a study of soils and fertilizers. Storerooms, stock rooms, and balance rooms are located convenient to the laboratories. There is also a workroom attached, equipped with power machinery for grinding soils, fodders, and the like.

The crops' laboratories include one for seed study, having locker equipment for 50 students, and a laboratory for the study of cereals, forage crops, roots, etc., with lockers for 64 students. The equipment of these laboratories includes steam ovens, constant temperature electric ovens, ovens for seed germination, Brown-Duval moisture apparatus, balances, microscopes, collections of seeds, grasses, tubers, weeds, etc. A balance room, root cellar, and two storerooms, one of which is mouse-proof, are also used for crop work.

A modern steam-heated greenhouse 25 by 35 feet, used for work in soils and crops, is a valuable part of the equipment. Near the greenhouse is a crop garden on which different varieties of corn, grasses, clovers, etc., are grown for demonstration purposes and as a source of material for class work. In addition, the general college farm of 250 acres is used for field study in soils and crops, and as a source of material.

S-1. Soils and Fertilizers.

This course will include, as far as possible, studies and discussions of the origin and formation of soils; classes and types of soils; the control of soil moisture; tillage operations; organic matter, its importance and maintenance; acid soils and liming. Considerable time will be devoted to actual work with fertilizing materials, and the student will be expected to become thoroughly familiar with farm manures, forms of agricultural lime, and commercial fertilizers, their composition, properties, care, and use. Two class hours and three two-hour laboratory periods or field exercises per week. Credits, 5.

Professor Beaumont and Assistants

S-25. Crops. (Second year, third term, elective.)

A course covering the rotation and structure of crops; their adaptation to soils and climate; varieties and the selection of seed; the preparation of the soil, fertilization, planting, cultivation, care, harvesting and use of field crops. Corn, oats, rye, barley, buckwheat, grasses, clovers, beans, peas, potatoes, and root crops will be studied. Actual practice with growing crops in the field and greenhouse, and with prepared specimens in the laboratory, including the judging of corn and potatoes, will be given. Two class hours a week and three two-hour laboratory periods. Credits, 5.

Professor Cooper and Assistants

ANIMAL HUSBANDRY

The department is equipped with an excellent laboratory, which has a seating capacity of 180 and which is fully adapted to the requirements. There are about 125 head of dairy cattle of various ages available for class-room work; among these are included superior representatives of the Jersey, Guernsey, Ayrshire, and Holstein breeds. There are flocks of pure-bred Shropshire and South-down sheep of the best breeding and individuality. Considerable numbers of pure-bred Berkshire and Chester-White pigs are maintained. The college possesses pure-bred Percheron horses, besides many work teams of different types, which are available for class-room purposes.

S-1. Types and Breeds. (First year, first term, required.)

This course is a study of the history of the various breeds of cattle, sheep, swine, and horses; their origin and development; their characteristics; and a discussion of the conditions to which each breed seems best adapted. The laboratory work will give the student an opportunity to do practice judging, which will familiarize him with the different types and breeds. Textbook: Plumb, "Types and Breeds of Farm Animals." Three class hours and two two-hour laboratory periods a week. Credits, 5.

Assistant Professor Rice

S-2. Principles of Feeding. (First year, second term, required.)

A study of the fundamental principles of animal nutrition; of the composition and quality of feeding materials and their relative importance for the different classes of farm animals. The latter part

of this course will be devoted to a study of feeding standards and the calculation of rations. Textbook: Henry and Morrison, "Feeds and Feeding." Three class hours a week. Credits, 3. *Mr. Holden*

S-25. Feeding and Management. (Second year, first term, required.)

This course will consist of a study of the feeding, care, and management of dairy cattle and sheep, giving special attention to economic production. How to feed to get a large flow of milk, how to fatten, and how to grow breeding animals will receive proper attention. Prerequisite: "Types and Breeds" and "Principles of Feeding." Textbook: Henry and Morrison, "Feeds and Feeding." Three hours a week. Credits, 3.

Assistant Professor Rice

S-26. Animal Breeding. (Second year, second term, elective.)

A study of the principles involved in reproduction and improvement of farm animals; the laws of heredity and variation; the various methods of breeding, — inbreeding, line breeding, outcrossing, grading, and crossbreeding; the importance of selection; and a discussion of the needs and possibilities of improvement. Prerequisite: "Types and Breeds" and "Principles of Feeding." Textbook: Mumford, "The Breeding of Animals." Three class hours a week. Credits, 3.

Assistant Professor Rice

S-30. Feeding and Management. (Second year, third term, elective.)

This course will consist of a study of the feeding and management of hogs and horses. The feeding and management of breeding stock as well as growing pigs will receive careful consideration. The feeding and management of work horses, brood mares, stallions and growing colts will also be considered. Three hours per week. Credits, 3.

Assistant Professor Rice



Making Butter



A Class in Cooking

DAIRYING

The dairy work is given in Flint Laboratory, a modern building designed especially for dairy work and equipped with the newest and best types of dairying machinery.

The pasteurizing room contains a milk clarifier, cooler, and two two-hundred gallon vat pasteurizers. There is an ample and modern sterilizing outfit, and a large and very well-equipped refrigerating plant.

The room designed for cheese making contains double-jacketed vats, cheese mixer and draining racks, presses, etc. The butter-making room is well equipped with power and hand churns of various types, scales, and other accessories.

In the starter-making room there is a fifty-gallon double-jacketed vat, a one-hundred-gallon vat pasteurizer, a fifty-gallon starter can, and other smaller ones.

The separator room has a complete equipment of power and hand separators, milk heater, Babcock tester, sterilizer, etc.

The testing laboratory contains all necessary apparatus, both steam and hand, for Babcock testing, and individual apparatus necessary for each student.

S-2. Dairy — Milk Testing. (First year, first term or second term, required.)

This course takes up the question of the importance of dairying in the United States, and especially in the New England States, giving the development of dairying from the earliest to the present time. It covers the secretion, composition, and properties of milk; reasons for variation in the per cent of fat in different samples of milk; the Babcock test for fat in milk and other dairy products;

other common milk tests; and shows the advantage of testing herds, cow tests associations, advanced registry work, etc. The laboratory work consists mainly in testing milk and dairy products for butter fat, solids, acidity, preservatives, etc. Two class hours and one three-hour laboratory period per week. Credits, 3.

Dairy Department

S-25. Dairy — Milk Products. (Second year, first term, elective.)

This course is mainly on soft cheese and ice-cream making, but includes some lectures on the manufacture of other milk products, such as artificial buttermilk, casein, condensed milk, milk powder, etc. It deals primarily with the up-to-date methods of making ice cream and various varieties of soft cheese, such as pimento, olive, nut, neufchatel, cottage, etc., and shows how a product of good quality can be made either as a means of marketing the entire milk supply or utilizing the surplus. Considerable attention is given to different methods of preparation for marketing. The laboratory work consists in the making of ice cream and various forms of soft cheese. Two class hours and one three-hour laboratory period per week. Credits, 3.

Dairy Department

S-26. Dairy — Market Milk. (Second year, second term, elective.)

This course takes up the history of market milk, its food value and use; attention is given to the necessary essentials in producing a clean product; the economics of milk production; the advantages of co-operative milk producers' organizations; the various methods of marketing milk; clarification; pasteurization; cooling, etc. The laboratory work consists in visiting dairy herds and city milk plants; the operation of machinery used in connection with market milk work. Two class hours and one three-hour laboratory period per week. Credits, 3.

Dairy Department

S-27. Dairy — Cream Separating and Butter Making. (Second year, third term, elective.)

This course covers the various methods of separating milk; the history, selection, care, and use of cream separators; the pasteurization and ripening of cream; testing of acidity in cream; the making and use of starters; a study of churns and churning; up-to-date methods of making butter; marketing butter, and tests for moisture and salt in butter. The laboratory work consists in the actual operation of separators and churns. Two class hours and one three-hour laboratory period per week. Credits, 3.

Dairy Department

FARM BUSINESS

Three courses dealing with farm business are required of all students: farm management, by Professor Foord of the Department of Farm Management and Farm Accounts; marketing of farm products, by Dr. Cance of the Department of Agricultural Economics; farm law, offered by Professor Hart of the Department of Agricultural Education; in addition, one elective course in agricultural credit is offered by the Department of Agricultural Economics.

S-26. Farm Management and Farm Accounts. (Second year, second term, required.)

A study of farming as a business; the correlation and adaptation of different farm enterprises, as dairy, orchard, poultry, to the specific farm. Land, labor, and capital requirements. Farm and building, plans and arrangements. The choice and purchase of a farm. Several laboratory periods will be devoted to practice in farm accounting. Farm experience is a prerequisite to this course. Three lectures and two laboratory periods a week. Credits, 5.

Professor Foord
Mr. _____

S-27. Business Principles of Farming and Marketing Farm Products. (Second year, third term, required.)

The purpose of this course is to present the business side or economics of agriculture. It is based upon the principle that products are produced to sell, that the real object is to produce large money returns; the goal is the largest possible net profits with a given amount of land, labor, money, and equipment. The course deals

with the possible types of profitable commercial agriculture in New England; the present location of the most profitable farming sections; the choice of a farm; the necessary investment, and the proportion to invest in land, in improvements, in stock and equipment, and in reserves for labor and supplies, on different kinds of farms.

Another section of the course treats of the principles of farm credit. Who should borrow, sources of credit, mortgage credit, farm loan associations, land banks, personal credit, national bank loans, credit unions, terms of credit, and how to use credit profitably, are some of the topics studied.

Another division of the subject is marketing farm products. This will be treated in a very practical manner. The following are some of the topics: marketing as a part of production; outlets for the sale of farm products; principles of marketing; description of wholesale methods of distribution; middlemen, functions and abuses; methods of sale; prices of farm products; price quotations; government aid in marketing; direct marketing; co-operative buying and selling; methods of successful co-operation; farmers' exchanges in Massachusetts; how to organize successfully.

Each student will be required to select some principal product in which he is interested and make a careful study of its production, handling, and marketing on a profitable commercial scale. This course is given by the Department of Agricultural Economics. Lectures, textbook, original study, and report. Five class hours a week. Credits, 5. This course will not be given in 1920.

Professor Cance

S-2. Farm Law. (First year, second term, required.)

The work of this course will cover such points as land, titles, public roads, rights incident to ownership of live stock, contracts, commercial paper, and distinctions between personal and real property. Text, written exercises, lectures, and class discussions. Five hours a week. Credits, 5.

Professor Hart

S-30. Agricultural Credit. (Second year, third term, elective.)

This course aims to give a knowledge of the customary business practice in giving and obtaining credit, the principles governing the economical use of credit, the means by which the credit of the individual may be improved, and the present-day efforts to make capital available to farmers on more favorable terms.

Among the topics which will be discussed are the following: the use and abuse of credit; the nature and use of the various kinds of credit instruments; the advantages of the various sources of credit; causes of variation in the interest rate; co-operative credit societies; the work of the Federal land banks; lessons from the experience of other States and countries. Three hours a week. Credits, 3. This course will not be given in 1920.

Mr. Sawtelle

POMOLOGY

Each student is required to take two courses in fruit growing. Three additional courses and a course in horticultural manufacture are provided for those who wish to make the study of fruit growing a specialty.

The Department of Pomology has 50 acres of orchard; two commercial vineyards, and a smaller one in which are shown the principal types of trellis and the leading methods of training grapes; several acres of small fruits; and a good equipment of orchard and nursery tools of all the principal types, enabling students to learn the value of each type. For orchard operations, such as spraying and pruning, the most approved makes of pumps, nozzles, pruning saws, knives, etc., are provided.

S-1. Fruit Growing. (First year, first term, required.)

This introductory course of the work in fruit growing will consist of a thorough study of the principal varieties of the different fruits. One of the most prolific causes of failure in the fruit business is the growing of wrong varieties; varieties requiring a dry soil are set in a wet soil; tender varieties are set in a wet soil or where only hardy ones should be used; quality, productiveness, and season of ripening are ignored; and varieties are set which might be excellent in Ohio or Virginia or Missouri, but which cannot be grown profitably in Massachusetts.

This course aims to lay the foundation for a better state of things, and the student will be given a thorough drill on the leading varieties of the different fruits, and will have an opportunity to test personally many of the leading varieties, especially of apples. Three class hours a week. Credits, 3.

Pomology Department

S-2. Fruit Growing. (First year, second term, required.)

This course will deal with questions concerning the establishing and maintaining of fruit plantations.

It will include a full discussion of the choice of a site for the plantation. Many an orchard has failed simply because it was put in the wrong place; on another site on the same farm it might have been a conspicuous success.

The soil preferences of varieties of fruits will be considered so that the student may avoid setting Rhode Island greenings where Baldwins should be grown, or Spies where Hubbardstons should stand.

The culture of fruit plantations will be considered, and the comparative value of sod and cultivation presented. Each system has its advantages and disadvantages; what are they, and under what conditions should each system be used?

Orchard implements will be discussed, examined, and tested in order that the student may see for himself their good and bad points.

The question of cropping orchards will be discussed; whether it is best to grow corn and beans and potatoes in the orchard, or to allow the trees to use all the land.

This course is required of all students. Three class hours a week. Credits, 3.

Pomology Department

S-25. Fruit Growing. (Second year, first term, elective.)

This course will deal with the picking, packing, storing, and marketing of fruits. More men fail on these points than anywhere else, in the fruit-growing business. There is a vast difference between good and bad cultivation or fertilizing of fruit plantations, but there is still more between good and bad picking or packing. The student in this course will have actual practice, so far as is possible, in the harvesting of all the fruits available in the college plantations. He will put these same fruits in storage and will later grade them and

put them up for market. At the same time he will receive lectures on all phases of the subjects under consideration. Five class hours a week. Credits, 5.

Pomology Department

S-26. Fruit Growing. (Second year, second term, elective.)

This course will be devoted to a consideration of two special subjects connected with the care of fruit plantations, viz., pruning and spraying. The course is placed in this term because this gives the best opportunity for practical work along these two lines in the college orchards and plantations.

The pruning of all kinds of fruits will be studied, and wherever possible the students will be taken into the plantations and given an opportunity to perform the actual work.

Modern methods of spraying will be considered (with a very brief discussion of fruit pests), and the student will be trained in the preparation and application of the different sprays. Five class hours a week. Credits, 5.

Pomology Department

S-27. Fruit Growing. (Second year, third term, elective.)

While orcharding will always be the leading phase of the fruit business in Massachusetts there are many unusual opportunities for success in growing the various small fruits. This course will deal with the problem of establishing and handling successfully plantations of strawberries, raspberries, blackberries, currants, gooseberries, and grapes, including such questions as the choice of varieties; the best types of soils; laying off and setting the plantation; the proper fertilizing; methods of pruning and training. The college has large plantations of most of these fruits so that the student will have ample opportunity for all types of practical work. Everything possible will be done to make the course of the utmost practical value, as well as to give the scientific principles on which our practices are based. Five class hours a week. Credits, 5.

Pomology Department

HORTICULTURAL MANUFACTURES

The department occupies three laboratory rooms in Flint Laboratory, two in Fisher Laboratory, with offices in Wilder Hall and French Hall. The laboratories are fitted with desks for 18 students. The desk equipment contains the necessary utensils for doing general laboratory work in food preservation. The general equipment of the department, both for the use of students and for manufacturing purposes, may be grouped under the following heads:—

1. *Canning*. — A modern canning outfit, including both steam-pressure cookers and hot-water baths, hand and power can sealers, peeling and slicing machines, a string-bean cutter, heat-penetration thermometers, electric incubator, and a large assortment of all types of home-canning equipment.

2. *Evaporation*. — Two small orchard evaporators, a tunnel drier, peeling machines, slicers, and a general assortment of driers adapted to home evaporation.

3. *Fruit Juices, Butters, etc.* — A hand cider mill, a motor-driven hydraulic press, a steam-jacketed kettle, an apple-butter cooker, and cider and vinegar testing apparatus.

S-25. Farm Manufacturing. (Second year, first term, elective.)

The utilization of the culls and low grades of fruits and vegetables is becoming a more important problem each year. Producers should be able to market their whole crop at a profit. The fundamental problems studied in this course will be: the manufacturing of apple

products from cull apples, the canning and drying of vegetables, and the making of vegetable products.

Students will be required to manufacture a large number of fruit products, keeping an accurate cost of materials together with a record of methods used. The canning and drying of fruits and vegetables will be studied in detail, and methods illustrated through laboratory exercises. One lecture period and two laboratory periods per week. Credits, 3.

Professor Chenoweth

POULTRY HUSBANDRY

The course in poultry husbandry includes one required and three elective courses.

This department is well prepared to give practical instruction in poultry husbandry. Our quarters and equipment in Stockbridge Hall furnish us with ample laboratory facilities for careful studies in avian anatomy and physiology, identification and value of the various grains and feedstuffs used for poultry, the different grades and varieties of eggs and poultry, both fresh and storage, and other work of a highly technical character.

Our practical laboratory (poultry plant) comprises over 1,200 adult birds, divided into about 30 pens in various types of houses, the flocks varying in size from 10 to 200; two large incubator cellars containing a great variety of lamp and electric incubators, as well as two large mammoth machines; brooding facilities for 5,000 chicks, including a large open pipe brooder house for 1,200 chicks, and different kinds of brooders, stove, kerosene, and electric; laboratories for pen management; judging, culling, fattening, killing, picking, caponizing, compounding feeds, carpentry, etc.

In addition to the practical laboratory work actually done by the student he has an opportunity to keep under observation practical experiments and demonstrations that are being continually carried on for the benefit of students and practical poultrymen.

S-2. Introductory Course. (First year, second term, required.)

This course covers opportunities in poultry culture, geographical distribution, classes, breeds, and varieties, incubation and brooding, growing stock, diseases, marketing poultry and poultry products,

feeding for egg and meat production, and poultry farm management. Textbook: Lewis, "Productive Poultry Husbandry." Three class hours per week. Credits, 3.

Associate Professor Payne

S-25. Judging, House Construction, Feeds and Feeding.
(Second year, first term, elective.)

This is an advanced course treating the following subjects: judging poultry for egg and meat production and exhibition purposes; poultry house construction; feeds and feeding; and management for egg production. The laboratory work supplementing these subjects will consist of a careful study of egg and meat type, score card, and comparison judging of fancy and utility poultry. Textbook: "The American Standard of Perfection." Three class hours and two two-hour laboratory periods per week. Credits, 5.

Mr. Banta

S-26. Poultry Production, Marketing, Incubation and Diseases. (Second year, second term, elective.)

This is a combination lecture and laboratory course, including the production of eggs for marketing and hatching purposes; production of broilers, roasters, capons, and methods of marketing poultry and poultry products; incubation; and the study of the common poultry diseases. The laboratory work will consist of a detailed study of the egg reports from the college and experiment station plants, and egg-laying contests, crate fattening, killing, picking, grading, and packing poultry. Three class hours and two two-hour laboratory periods per week. Credits, 5.

Associate Professor Payne

S-27. Brooding, Breeding and Management. (Second year, third term, elective.)

A lecture course covering the theory of brooding, a careful study of the various types of modern lamp, coal stove, and mammoth brooders. Breeding for egg and meat production will receive con-

siderable attention in this course, including a careful study of the breeding records from our experimental flocks. Poultry farm management will be taken up from the standpoint of the beginner, including location of farm, amount of capital to invest, planning the poultry buildings, cost of equipment, operating expenses, and a study of labor income from poultry farming compared with other branches of agriculture. Textbook: Dryden, "Poultry Breeding and Management." Three class hours per week. Credits, 3. Course S-30 is required as a part of this course.

Mr. Banta

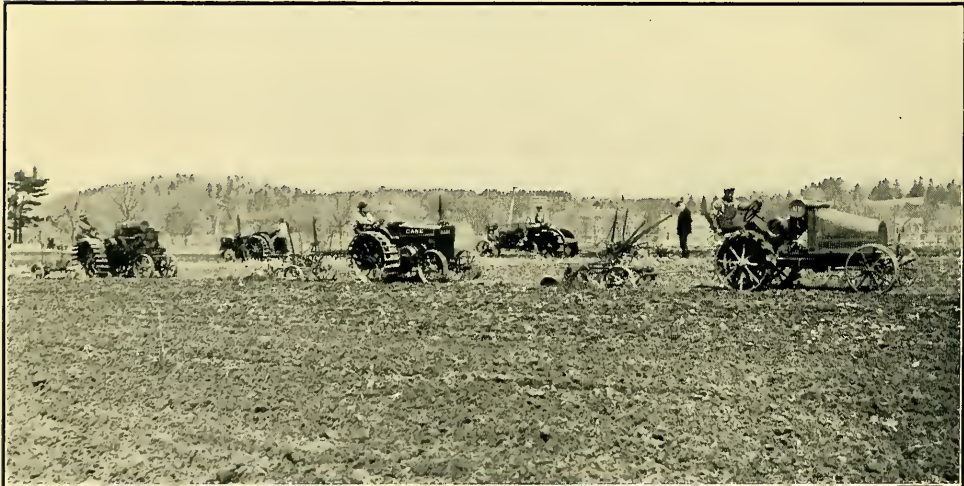
S-30. Laboratory Course. (Second year, third term, elective.)

Incubation and brooding, including the operation of small incubators and observation on mammoth machines, keeping accurate records as to the cost of operation, operating brooders, and calculating the cost of rearing chicks to certain ages. Two two-hour laboratory periods per week. Credits, 2. Course S-27 required as a part of this course.

Mr. Banta



Fertilizer Mixing



Tractors at Work

RURAL ENGINEERING

The Department of Rural Engineering is located in Stockbridge Hall and in the Rural Engineering Building. Carpentry and forge work is done at the rural engineering shop, which is equipped with benches, forges, etc.

The equipment for farm machinery consists of a representative line of seed and tillage tools of the newest type. The work in farm motors is given in the rural engineering shop. Three stationary gas engines, four automobile motors, and five tractors are on hand all the time. Automobiles in need of repair are brought in to give students practice in the work of overhauling. The department possesses the machinery for doing practical work in concrete.

S-1. Farm Structures. (First year, first term, elective.)

This course deals with the permanent farm improvements, including roads, fences, bridges, and buildings. The construction and maintenance of country roads are discussed, with special emphasis on the use of the road drag. The various types of fences and gates are studied and directions given for their construction. Practice is given in the making of concrete posts. Students are given practice in designing small culverts and bridges. The study of buildings relates to the planning and designing of the various farm buildings. The location and arrangement of buildings are studied, with the view of getting a convenient and economical plant. The use of concrete is discussed and practice given in its use. Heating and lighting of buildings and water and sewage-disposal systems are given due importance. Students are given practice in drawing plans of buildings and estimating cost of construction. Two class hours and three two-hour laboratory periods per week. Credits, 5.

Assistant Professor Strahan

S-4. Farm Machinery. (First year, first term, elective.)

This course is a study of the selection, use, and care of field implements, pumps, windmills, and miscellaneous farm equipment. Instruction is given by lectures, textbook and actual work on the implements in the shop and in the field. Special attention is given to the repair and maintenance of equipment. One class hour and two two-hour laboratory periods per week. Credits, 3.

Professor Guinness

S-2. Repair of Farm Equipment. (First year, second term, required.)

The object of this course is to give practice in the handling of tools, which will help in the repair of farm machines and miscellaneous farm equipment. Practice is given in forging, including drawing and shaping iron and steel, welding and tempering edge tools, and general blacksmith's repairing. Exercises also include pipefitting, soldering, splicing rope, belt lacing, and babbitting and adjusting bearings. Practice is given in the use of machinist's tools, such as cold chisel, file, taps, and dies, drill press, and lathe. Two two-hour laboratory periods. Credits, 2.

Mr. Pushee

S-26. Carpentry. (Second year, second term, elective.)

This course gives practice in the care and use of carpenter's tools through bench work, repair of farm equipment, and building construction. Small buildings are erected by the students to give practice in all the phases of house construction. Practice is given in the building of forms and in the mixing and placing of concrete. Three two-hour laboratory periods per week. Credits, 3.

Mr. Pushee

S-27. Gas Engines. (Second year, third term, elective.)

This course deals with the gasoline engine as used for stationary work, automobiles, and tractors. Instruction is given by means of lectures and textbooks, and by operating and repairing stationary engines, automobiles, and tractors. Special attention is given to overhauling and repairing. Three class hour and two two-hour laboratory periods per week. Credits, 5.

Professor Guinness

S-30. Drainage and Irrigation. (Second year, third term, elective.)

This course takes up the different methods of draining land, with practice in running levels, estimating sizes of tile and ditches, and installing drainage systems. The common irrigation systems are studied, giving special attention to the spray or overhead systems. One class hour and two two-hour laboratory periods per week. Credits, 3.

Professor Guinness

VEGETABLE GARDENING

The equipment of the department is as follows: 10 acres of land devoted annually to the intensive production of all the vegetables commonly grown in Massachusetts; a large assortment of horse and hand garden tools; 500 linear feet of hotbeds and cold frames; 3,500 square feet of greenhouse space, devoted to the production of early vegetable plants and the maturing of lettuce, tomatoes, and cucumbers; classrooms and a well-equipped laboratory located in French Hall, a building of quite recent construction. An excellent collection of books on all phases of vegetable gardening is available in the college library.

To the young man who hopes to engage in the business of growing vegetables for market in Massachusetts there are offered three courses, — one in each term of the second year, — which afford instruction in the important details of this highly specialized type of horticulture. Upon his knowledge of these details and their careful observance will depend in large measure his success in the business. Among them may be cited: —

1. The types of soil best adapted to vegetable growing, and the best methods of handling them so that they may retain their proper texture and fertility while producing in some cases three crops in the same season; farm manures, green manures, cover crops, and commercial fertilizers; the best tools and methods of tilling the land and the practices of drainage and irrigation.

2. The cultural details of some twenty to thirty vegetables. These include optimum soil and climatic conditions, proper dates and methods of seeding, transplanting and thinning, the best varieties of each to use under different conditions and for different purposes; special details in their growth, such as pruning, training, tying,

blanching, etc.; the control of injurious insects and diseases; and methods of harvesting, marketing, and storing the crops.

3. The construction and management of hotbeds, cold frames, and greenhouses, which are usually an adjunct to the production of vegetables in the open.

The training in vegetable gardening will combine, with a study of the principles underlying the art, practical exercises intended to develop skill in performing the various operations. Ample opportunity is given for the latter in the greenhouses and gardens of the department.

S-25. Vegetable Gardening. (Second year, first term, elective.)

The work of this term will include a study of the different types of soils used in the production of vegetable crops, the classification of vegetables, and the cultural details of those grown as fall crops, with particular attention to harvesting, marketing, and storing. Two class hours and three two-hour laboratory periods per week. Credits, 5.

Vegetable Gardening Department

S-26. Vegetable Gardening. (Second year, second term, elective.)

At this season of the year the practical work will naturally be such as can be carried on in the greenhouses. It will cover the construction and management of hotbeds, cold frames, and greenhouses, and the cultural details of the crops grown in them. In the class-room periods such subjects as farm manures, green manures, cover crops, commercial fertilizers, and the planning of the future season's operations will be considered. Three class hours and two two-hour laboratory periods per week. Credits, 5.

Vegetable Gardening Department

S-27. Vegetable Gardening. (Second year, third term, elective.)

During this term actual operations of seed sowing, transplanting, cultivating, spraying, etc., will be performed with outdoor crops. The cultural details of the vegetables grown will be studied. Special attention will be given to the organization of a typical market-gardening business. Two class hours and three two-hour laboratory periods per week. Credits, 5.

Vegetable Gardening Department

ENTOMOLOGY

The equipment for the work in entomology is perhaps not excelled in this country. The new fireproof building is well equipped with lecture rooms, libraries, and museums for the use of students. The department possesses a rapidly growing collection of insects. The laboratory is in excellent condition. The insectary of the M. A. C. Experiment Station is in the same building. A greenhouse, where plants infested with injurious insects are under observation and experimental treatment, is also open to students.

S-25. Insect Pests and their Control. (Second year, first term, required.)

This course is given as an introduction to a knowledge of insects in their relation to agriculture and to health. It takes up the most serious insect pests of our crops, treating of their life histories and habits as connected with methods for their control. Some of the insects included are the San José scale, oyster-shell scale, plant lice, squash bug, codling moth, peach borer, tent caterpillar, gypsy moth, brown-tail moth, European corn-borer, cutworms, fall webworm, asparagus beetles, apple-tree borer, wireworms, white grubs, the currant worm, etc. In addition, sufficient time will be given to insecticides and other methods for insect control to enable the student to prepare and use them intelligently. Consideration of some of the insects causing disease or otherwise injuring man or domestic animals will also be included in the course. Five hours per week. Credits, 5.

Professor Fernald

FLORICULTURE

The offices and class rooms of the Department of Floriculture are located in French Hall. Of the two lecture rooms one will accommodate 40 students, the other 90 students; a laboratory, equipped with slate-covered tables, will accommodate 40 students. In the basement of the building the department has a specially prepared room for bulb storage, a fertilizer and tool room, and a large room for general storage purposes.

The glass area of the department consists of approximately 20,000 square feet, divided as follows: French Hall range of 7,200 square feet, a durable practical commercial range, composed of palm and fern, violet, carnation, rose, and students' houses; the old Durfee range of 7,400 square feet, devoted to the growing of decorative, conservatory, and bedding plants, and chrysanthemums; one house of 3,200 square feet, suitable for propagating work and general plant culture; and approximately 2,200 square feet in cold frames and hot-beds.

In addition the department has two acres of land used for the summer culture of carnations, violets, gladioli, dahlias, sweet peas, bedding plants, etc. This includes a garden of about 4,700 square feet devoted to the culture of annuals. A large collection of biennials and herbaceous perennials is maintained and is being enlarged from year to year.

The courses offered are intended for students who are interested especially in commercial floriculture.

S-25. Greenhouse Management. (Second year, first term, elective.)

An introductory course, dealing with the origin, growth, and importance of the floricultural industry; greenhouse construction and

heating; general principles of greenhouse management, including soils and their preparation, fertilizers, watering, ventilation, and fumigation; methods of plant propagation. Three class hours and two two-hour laboratory periods per week. Credits, 5.

Professor Thayer
Mr. Whiting

S-26. Commercial Floriculture. (Second year, second term, elective.)

This course will be devoted primarily to the consideration of the culture of the important commercial crops. Special attention will be given to the culture of roses, carnations, chrysanthemums, violets, and sweet peas. Three class hours and two two-hour laboratory periods per week. Prerequisite, Floriculture S-25. Credits, 5.

Professor Thayer
Mr. Whiting

S-27. Commercial Floriculture. (Second year, third term, elective.)

A continuation of Floriculture S-26. In addition a part of the course will be devoted to floral arrangement, including the use of flowers in funeral designs and sprays, table decorations, corsages, vase, and basket arrangements. Bedding plants, annuals, and herbaceous perennials of value to the commercial florist will also be considered. Three class hours and two two-hour laboratory periods per week. Prerequisite, Floriculture S-26. Credits, 5.

Professor Thayer
Mr. Whiting

BOTANY

The Department of Botany occupies Clark Hall, a fireproof building containing laboratories and lecture rooms of modern construction, finely lighted and equipped with microscopes and other apparatus and a large collection of charts; also an herbarium numbering more than 40,000 plants and including one of the best fungus collections in the country. A glass-enclosed laboratory for plant physiology adjoins the building and provides unusual facilities for the study of phenomena of plant life. A greenhouse supplies plant material for classes and is used also for experimental work of the department. The experiment station laboratories devoted to botanical research are in this building. Facilities and equipment for the study of plant life and plant diseases are excelled in few institutions.

S-27. Plant Diseases. (Second year, third term, required.)

Diseases of crops annually exact a toll amounting to many millions of dollars. The importance of controlling these diseases is generally recognized, and the modern farmer considers a knowledge of methods of combating the pests which destroy his crops a necessary part of his equipment. In this course the student is taught to recognize the more common diseases of farm, garden, and orchard crops, and control measures are discussed in detail. Lectures are general, and in the laboratory opportunity is afforded for the handling and detailed examination of diseased plant materials. The course has a very practical application in modern agriculture. As an introduction to the study of diseases, the first part of the course is devoted to consideration of the principles of plant growth, nutrition, and reproduction, and of the types of plants, especially the lower forms, which have an economic bearing on agriculture. Four class hours and one two-hour laboratory period per week. Credits, 5.

Assistant Professor McLaughlin

MICROBIOLOGY

The microbiological work is housed in a newly constructed building especially designed for it. There are four class laboratory rooms, eight private laboratory rooms, one lecture room, five incubator rooms, three sterilizing rooms, three hood rooms, three washing rooms, three inoculating rooms, three weighing rooms, an animal room, a photographic and a dark room, a sub-basement refrigerator room, a library, and four office rooms.

The class laboratory rooms are so arranged that individual desks are available for student use. Hot and cold water and gas connections are convenient for each desk; high-pressure steam and electric connections are also available. The building is well lighted and of sanitary construction; all the walls are of brick, and the building is fireproof.

The library is equipped with such books and current periodicals as are useful in the conduct of bacteriological work and investigations. Twenty-four scientific magazines are available regularly.

S-1. Hygiene and Sanitation. (First year, first term, required.)

Deviation from health, from the normal being, is disease. The human body is susceptible to deviation from health. Certain elements are responsible for the entrance of disease into the body. The body becomes weakened through exposure, lack of exercise, unsuitable food, abuses. Under such circumstances it lays itself open to attack. There is the attack from within, which consists of some organic derangement, and the attack from without, which makes it possible for foreign enemies, agents, or micro-organisms to enter.

Closely associated with the production of disease are intermediaries and causal factors, as ventilation, water, supplies, sewage disposal, and food. They serve as vehicles for disease agents. The

germs of disease find their way through them and are carried by them. Besides, human contact seems to be the most important disseminator, and insects and animals may harbor or convey and in some instances instigate disease.

Then there are those conditions which react on the body in a physical manner and influence its mechanism, its operating facilities, as mental disturbances, character of food, conditions of living.

It is the purpose of this course to discuss the nature of diseases, what causes them, the significance of sanitation and hygiene in preventing them, and the methods of control; in other words, to study, in the light of present knowledge, how to preserve health and prevent deviation from health. Three class hours a week. Credits, 3.

Dr. Marshall

Dairy. S-29. Dairy Bacteriology. (Second year, second term, elective.)

Bacteria and other micro-organisms are the responsible agents for the changes which occur in milk and for the contagion which sometimes causes disease. They are found in milk at times when leaving the udder, they get in with the dust and dirt while milking, and they adhere to the dairy utensils which carry them over from one milking to the next. From the cow to the consumer there is the constant presence of these micro-organisms to contend with on the one hand and to foster on the other. All steps taken are significant in their control. The milking process, the handling of the cow, the condition of the milker, the cleansing of utensils, the management of the stable, and feeding, straining, aeration, cooling, clarifying, pasteurizing, — all are steps in the control of micro-organisms.

Many kinds of changes take place in milk, due to different kinds of micro-organisms. Many of these changes are sought, as the ripening of cream for butter, of milk for cheese, of milk for milk drinks; and many of these changes, also, are fought against, as ropy milk, sour milk, bitter milk, tainted milk, etc.

Micro-organisms of typhoid fever, scarlet fever, diphtheria, and others not infrequently find their way through the milk to the consumer, and produce epidemic forms of these diseases.

It is evident, therefore, that to handle milk and milk products safely it is desirable to know something of the agents which are the source of so much attention in the dairy. This indicates the nature of the substance of this course. This course is required of all students who elect dairying as one of their special lines of work. Three hours a week. Credits, 3.

Dr. Marshall and Assistants

VETERINARY SCIENCE

The Department of Veterinary Science occupies a modern laboratory and hospital stable, built in accordance with the latest principles of sanitation. Every precaution has been taken in the arrangement of details to prevent the spread of disease, and to provide for effective heating, lighting, ventilation, and disinfection.

The main building contains a large working laboratory for student use, and several small private laboratories for special work. There is a lecture hall, a museum, a demonstration room, a photographing room, and a workshop. The hospital stable contains a pharmacy, an operating hall, a post-mortem and dissecting room, a poultry section, a section for cats and dogs, and six sections, separated from each other, for horses, cattle, sheep, and swine. The laboratory equipment consists of a dissectible Auzoux model of the horse and Auzoux models of the foot and the leg, showing the anatomy and the diseases of every part. The laboratories also have modern, high-power microscopes, microtomes, incubators, and sterilizers, for work in every department of veterinary science, including pathology, serology, and parasitology. There are skeletons of the horse, the cow, the sheep, the dog, and the pig, and a growing collection of anatomical and pathological specimens. The lecture room is provided with numerous maps, charts and diagrams.

Animal Husbandry. S-27. Animal Diseases. (Second year, third term, elective.)

The aims of the course in animal diseases will be to give the student a knowledge of the structure and function of the various organs of the animal body, particularly those most liable to become involved in disease, and to acquaint him with the nature, causes,

diagnosis, and prevention of the more common animal diseases, stress being laid upon those which are preventable by the adoption and practice of a judicious system of care and management. The lectures and textbook work will be supplemented by demonstrations with such clinical material as may be available. Three class hours a week. Credits, 3.

Dr. Paige

ENGLISH

A fair command of written and spoken English is a very necessary part of the equipment of the practical farmer of to-day. Five credits in English are required of students in the Two-Years Course in Practical Agriculture. The work will give direct help to the student in preparation for the other subjects he is carrying in college, and also aims to give him control of the ordinary business and social forms. Those students who enter with sufficient preparation in English will be allowed to substitute electives for these two courses. A preliminary examination will be given to determine the students who may wisely be excused from the work in English. All students will be required to take this examination. Any student who shows by his work in other classes that he has need of further help in English will be enrolled in the English class, even if he has previously been excused.

S-1. English. (First year, first term, elective.)

The first part of the course includes drill in the use of text and reference books, preparation of notes from readings and lectures, and a consideration of right and wrong methods of study. The second part of the course deals with composition, letter writing, business forms, and usages. Three class hours a week. Credits, 3.

Miss Goessmann

S-2. English. (First year, second term, elective.)

This course will continue the work of the first term in composition, business forms, and usages. A study will be made of the elements of public speaking, parliamentary law, and practice. Two class hours a week. Credits, 2.

Miss Goessmann

FARM ARITHMETIC

This course presupposes a general knowledge of arithmetic.

S-1. Farm Arithmetic. (First year, first term, elective.)

The work of the first course consists for the most part of the solution of problems relating to farm life, such as the raising of crops, live stock, farm machinery, construction of farm buildings, drainage, etc. Three class hours per week. Credits, 3.

S-2. Farm Arithmetic. (First year, second term, elective.)

During the second term the course includes the elements of book-keeping, commercial papers, etc. Three hours per week. Credits, 3.

FARM AND COMMUNITY PROBLEMS

Students enrolled in the Two-Years Course meet in a seminar once a week to discuss farm and community problems. Successful farmers, poultrymen, and fruit growers are asked to appear at these meetings to discuss practical problems that arise in connection with farm and community life. Attendance at these meetings is required.

An assigned course of reading, with a written examination covering readings and lectures, forms a part of this course. Each speaker will, at the conclusion of the lecture, answer questions on the topic presented. A list of dates and speakers will be given out when the student enrolls.

S-27. Social and Economic Problems. (Second year, third term, required.)

The purpose of this course is to acquaint the students with present-day problems of economics, sociology, and politics. The first part of the course will deal with general problems; during the second part a study will be made of the social, economic, and political aspects of rural community life. Readings, discussions, and written reports. Three hours a week. Credits, 3.

Professor Sims

Agricultural Opportunities for Women. (First year, first or second terms, required of women students.)

Agriculture is a field in which women are finding increasingly good opportunities.

The particular problems which the women engaged in farming will have to meet, and the special lines of farming in which they will have favorable opportunities, will be considered in a series of conferences. One class hour per week. Credits, 1.

Miss Hamlin

RURAL HOME LIFE

The farm and the farm home are a unit. It is impossible to consider one without the other. The growing interest in agriculture on the part of women is most encouraging. But even when women make a business of agriculture they are essentially home makers.

Is it not as vital for a woman to study the business of home management as to study the business of farm management?

If balanced rations are essential for the best growth and development of pigs, poultry, and cows, is it not as essential to understand the fundamental principles of feeding the family?

The woman farmer can be a far more useful member of the community if she has also studied the business of home making, the relation of the home to the community, the responsibility of the home maker as a consumer, the problems of healthy recreation and nutrition of the family. There is greater need than ever before for women to study the tasks that are essentially women's work.

It is with this in mind that the following courses are offered for women in the Two-Years Course in Practical Agriculture.

S-1. The Business of the Household. (First year, first term, elective.)

There are many efficient methods so successfully used in the business world which can be applied in the business of home making.

Since the home maker is largely responsible for all expenditures connected with the house, an important consideration in this course is the study of the family budget, the apportionment of the income, and the keeping of accounts.

Equally important is the standardization of household tasks, the study of systematic methods of work, selection and care of equip-

ment, the use of time and labor saving devices. Three class hours per week. Credits, 3.

Professor Skinner

S-5 and S-27. Foods. (First year, second term, and second year, third term, elective for women.)

Every woman concerned with the welfare of her family is seeking to know how to vary her menus, to select food wisely, and to prepare it so that the greatest amount of nutriment may be saved.

Special study will be made of the needs of the body and the selection of foods to supply those needs; also care in the handling and keeping of foods, and planning meals for efficiency and economy.

Balanced menus are not vague and mysterious, but result from the application of a few fundamental principles. Many people are underfed, not from a lack of food but from an unwise choice.

Consideration will be given also to such special problems as infant feeding and school lunches.

This course will include laboratory work of practical value.

We are pleased to announce that a very attractive laboratory has been newly equipped for this work. Two two-hour laboratory periods and one lecture per week. Credits, 3.

Professor Skinner

S-29. Home Nursing. (Second year, second term, elective for women.)

It should be far easier to keep well than to become sick, provided one understands the fundamental principles of hygiene, thus insuring the care of the family health.

However, every home maker needs some knowledge of home care of the sick, including the study of simple diseases and their prevention, the care of young children and invalids, and first aid to the injured. Three class hours per week. Credits, 3.

Home Economics Department

S-31 and S-33. Clothing. (Second year, first and third term, elective for women.)

An important problem in the home to-day is the selection of suitable fabrics; therefore their character, cost, and durability are studied with reference to planning a wardrobe for a limited income.

Consideration will also be given to the principles of design, appropriateness, and simplicity in dress to develop good taste.

There will be practical work in sewing and making garments. Recently a very attractive laboratory for sewing has been equipped adequately for this work. One class hour and two two-hour laboratory periods. Credits, 3.

Home Economics Department

SHORT COURSES AT THE MASSACHUSETTS AGRICULTURAL COLLEGE

This bulletin describes the work of the Two-Years Course, and a brief statement is made of the other short courses.

Short courses have been maintained by the Massachusetts Agricultural College for a number of years. They have made a universal appeal, proving attractive and valuable to experienced farmers and farm women, to college graduates who wished to know more about the science of agriculture, to young men and young women who expect to be engaged in farming, to teachers, club workers, and ministers. Short courses open the door of opportunity for busy men and women who wish to increase their efficiency and earning power. The aim of short course work is not to provide preparatory or elementary instruction, but to afford the largest amount of information and training in agricultural lines in the shortest possible time.

In this State there are thousands of young men and young women who are to become future farmers, orchardists, poultry producers, dairy men and women. It is to the interest of both the individual and the State that these young men and young women keep pace with the rapid development of agriculture. There are also many mature men and women well past the usual school age who desire to acquaint themselves with the more recent developments in agricultural science and practice. It is to meet these needs that short courses are offered.

Information in regard to any of the short courses may be obtained from the college. Short courses include, in addition to the Two-Years Course in Practical Agriculture, the One-Year Vocational Poultry Course, the Summer School, the Winter School, and Unit Courses. A description of these courses is given in the following pages.

A ONE-YEAR VOCATIONAL COURSE IN POULTRY HUSBANDRY

J. C. GRAHAM, LOYAL F. PAYNE, LUTHER BANTA, *Instructors.*

This course is designed for graduates of the agricultural vocational schools and others who wish to take a truly vocational course and can spend one year only at college. This course begins with the winter term in January, and extends through the college year. It is limited to 15 students.

The institution of this One-Year Vocational Course in Poultry Husbandry is to meet the needs of those who wish to specialize in this branch of agriculture and who feel they cannot spend either two or four years in doing it. The course is intermediate between the college course and the ten weeks' short course, and is designed to prepare the student for practical poultry keeping, either for pleasure or for profit. "Learn to do by doing" is our motto. A more or less detailed outline is given below, and the general plan is as follows: the students begin with Course 1, Elementary Poultry Keeping, and elect about 15 credits from other subjects listed in Course 6. From the close of the Winter Short Course, about March 10, until college closes the latter part of June they devote all of their time to poultry work. During the summer vacation students have an opportunity to secure additional practical experience on general or specialized farms. With the opening of college in the fall, students again devote all of their time to poultry work, finishing the course at the end of the fall term, the latter part of December. As the busy season with poultrymen begins soon after the first of the year, the students, by finishing the course before the holiday season, are ready to accept attractive positions or enter business for themselves.

Course of Study

Course 1. Elementary Poultry Keeping. A textbook course supplemented with lectures, recitations, etc., covering the entire field of elementary poultry keeping, special emphasis being laid upon the following subjects: opportunities in poultry keeping, poultry house construction, feeds and feeding, breeds and breeding, incubation, brooding, growing stock, marketing, and poultry diseases. Five recitations per week throughout the year.

Course 2. A practical laboratory course covering the following subjects: carpentry, fattening, killing, picking, dressing, caponizing, avian anatomy and physiology, making and applying disinfectants and lice powder, also identification and study of poultry feeds, etc. Two laboratory periods per week from October until December, inclusive.

Course 3. Poultry Judging. Fall term. A study of the "Standard" and economic classification of poultry, including score card and comparative judging of exhibition and utility poultry for egg and meat characters. Selecting hens for high and low production (or culling) will receive special emphasis in this course. "The American Standard of Perfection" will be used for a text. Two two-hour laboratory periods per week.

Course 4. A practical laboratory course in incubation, brooding, and growing stock. Students receive practice in operating small and mammoth incubators as well as kerosene and coal stove brooders. Some time is devoted to natural incubation and brooding. Equivalent to five laboratory periods per week from March to June, inclusive.

Course 5. A conference, observation, and general reading course, equivalent to one or two recitations per week during the spring and fall terms. In this course the student will become thoroughly acquainted with the best literature on poultry subjects through books, station bulletins, scientific articles, poultry magazines, etc. A thorough discussion of the problems met by the practical poultryman is a strong feature of this course.

Course 6. Supplementary Courses. Each student shall select from the winter short course enough of the following subjects to give him at least 12 to 18 credit hours: pomology, soils, agronomy, rural engineering, beekeeping, market gardening, animal husbandry, farm management, dairying, etc.

Course 7. Poultry Management. A general poultry practice course in the care and management of poultry, the work to be done morning, noon, and night, and other periods as necessity requires, the class to be responsible for the work in caring for specified flocks, under the supervision of instructors, from March until college closes, and from October until December, inclusive. Equivalent to six two-hour periods per week.

Entrance Requirements

Applicants must be at least eighteen years of age and have a good elementary education.

Fees

There is no tuition for residents of Massachusetts, but a laboratory fee of \$5 is required for the fall term and the same for the spring term.

For further information concerning this course, write Poultry Department.

THE SUMMER SCHOOL

The Four-Weeks Summer School for 1920 was under the joint direction of the college and the Division of Elementary and Normal Schools. The following courses were offered:—

Agriculture

Soil Fertility
 Manures and Fertilizers
 Types and Breeds
 Feeding and Management
 Dairying
 Poultry
 Farm Management
 Farm Accounts
 Farm Machinery and Gas Engines
 Repair of Farm Equipment

Horticulture

Garden Flowers
 Indoor Flower Growing
 Food Preservation I
 Food Preservation II (two weeks)
 Fruit Growing
 Vegetable Gardening

Home Life and Practical Arts

Foods
 Elementary Dietetics
 Clothing I
 Clothing II (advanced)
 Business of the Household

Education

Primary Language
 Primary Reading
 Arithmetic I, Primary
 Arithmetic II, Intermediate

Education — Con.

Method of teaching History in
 Grammar Grades
 Training in the Duties of Citizen-
 ship
 Methods in Elementary Schools
 Methods in English for the Inter-
 mediate and Grammar Grades
 Design and Practical Arts
 Oral English and Parliamentary
 Practice
 Organized Play and Recreation

Related Subjects

Insect Life
 Hygiene and Sanitation
 Marketing Agricultural Products
 Plant Diseases
 Rural Sociology
 Agricultural Opportunities for
 Women

Vocational Agricultural Teaching

Principles and Methods of Teach-
 ing
 Special Methods in Vocational Agri-
 cultural Teaching
 Professional Improvement Prob-
 lems

In addition to the Four-Weeks School, a six-weeks course in Agricultural Education, from June 28 to August 6, was given.

The Two-Years Course was continued for an eight-weeks term during the summer, from June 28 to August 28.

THE WINTER SCHOOL

The Winter School is intended for young and old who wish to avail themselves of a short period of intensive training along agricultural lines. This school has been established for a number of years at the college, and has proved to be very popular with farmers, their wives, sons, and daughters, teachers, college graduates, and others. This school begins January 3. It offers instruction in the following:—

Group A. General Agriculture

- Soil Fertility
- Field Crops
- Types and Breeds of Live Stock
- Live Stock Feeding
- Animal Breeding
- Dairying
- Dairy Bacteriology
- Animal Diseases
- Poultry Husbandry

Group B. Horticulture

- Fruit Growing
- Market Gardening
- Floriculture
- Horticultural Manufacture

Group C. Farm Business

- Farm Management
- Farm Accounts

Group D. Related Subjects

- Botany
- Entomology
- Farm Structures
- Farm Machinery
- Agricultural Opportunities

Group E. Home Making

- Foods
- Clothing
- The Business of the Household

Group F. Vocational Agricultural Teaching

UNIT COURSES

A student enters the agricultural Unit Courses if his previous education is not sufficient to permit of his taking up the work of the Two-Years Course. The agricultural Unit Courses begin every month in the year except September. Each man may select, in addition to the English and mathematics that is required, two or three lines of work to which he will expect to devote most of his time.

In connection with the Unit Courses there is much actual practice on the farms, orchards, gardens, in the dairies, barns, shops, and greenhouses, and with poultry, live stock, and farm machinery. These courses are limited to students sent by the Federal Board for Vocational Education.

July

Separators and Separating
 Bush Fruit
 Grasses
 Cultural Details of Hardy Crops
 English
 Arithmetic
 Gas Engines

August

Cream Ripening and Butter Making
 Packing and Storing
 Cash Crops
 Study of Insects and Diseases and
 their Control
 English
 Arithmetic
 Gas Engines

October

Ice-cream Making
 Varieties of Fruit other than Apple
 Soil Classification
 Study of Harvesting, Marketing
 and Storing Vegetables
 English
 Arithmetic
 Gas Engines

November

Soft Cheese Making
 Varieties of Apple
 Soil Management — Moisture, Con-
 trol, Tillage
 Manures, Cover Crops, Fertilizers,
 Crop Rotation, etc.
 English
 Arithmetic
 Gas Engines

December

Dairy Bacteriology
 Packing and Marketing of Fruits
 Soil Management — Organic Matter, Liming
 Study of the Character of the Vegetable Gardening Business
 English
 Arithmetic
 Gas Engines

January

Dairy Cattle, Breeds
 Establishing the Orchard
 Fertilization Theories
 Vegetable Forcing
 English
 Arithmetic
 Gas Engines

February

Breeding and Management
 Cultivation and Fertilizing
 Fertilizer Materials
 Cultural Details of Principal Forcing Crops
 English
 Arithmetic
 Gas Engines

March

Dairy Feeding
 Pruning Tree Fruits
 Fertilizer Practices
 Elementary Study of the Seed, the Plant; growing Early Vegetable Plants
 English
 Arithmetic
 Gas Engines

April

Composition and Secretion of Milk
 Pruning Grapes and Bush Fruits
 Cropping Systems
 Study of the Soil; Planning the Home Garden
 English
 Arithmetic
 Gas Engines

May

Testing of Milk
 Spraying
 Cereal Crops
 Cultural Details of Hardy Crops
 English
 Arithmetic
 Gas Engines

June

Market Milk (Handling)
 Strawberries
 Legumes
 Cultural Details of Tender Crops
 English
 Arithmetic
 Gas Engines

DIRECTORY OF INFORMATION

A. The College

Those desiring college catalogues, the President's annual report, and other pamphlets giving full information relative to entrance requirements, courses of study, expenses, opportunities for student labor, and so forth, should address Ralph J. Watts, Secretary, Amherst, Mass.

All questions regarding admission to the college, either to the freshman class or to advanced standing, should be addressed to Prof. P. B. Hasbrouck, Registrar, Amherst, Mass.

B. Experiment Station

The Experiment Station conducts investigations in as many lines of agricultural science and practice as its funds will permit. It has charge of the inspection of commercial fertilizers, commercial feeding stuffs, and milk-testing apparatus. Branch stations in cranberry and market-garden culture are maintained in other sections of the State.

The station considers the farmers' problems to be its problems, and desires to keep in touch with them.

Requests for bulletins reporting the results of experiments and inspections, and for other information on the work of the station, should be addressed to Sidney B. Haskell, Director of the Experiment Station, Amherst, Mass.

C. The Graduate School

Questions relating to courses offered leading to the degrees of Master of Science and Doctor of Philosophy, admission and work required, should be addressed to Dr. Charles E. Marshall, Director of the Graduate School, Amherst, Mass.

D. The Extension Service

Inquiries of a general nature regarding the work of the Extension Service, extension publications, or requests for new lines of work should be addressed to John D. Willard, Director of Extension Service, Amherst, Mass.

E. Short Courses

For information concerning the Short Courses, the Two-Years Course in Practical Agriculture, the Ten-Weeks Winter School, the Summer Schools, write or apply to John Phelan, Director of Short Courses, Amherst, Mass.

SHORT COURSE ENROLLMENT

Two-Years Course, 1919-1920

Adams, George William	Pittsfield	5 Kendrick Place
Allen, Chester Carolton	West Rutland	120 Pleasant Street
Almy, Roger Warren	New Bedford	10 North College
Amsden, Maude Ella	Petersham	Mount Pleasant
Anderson, Walter Raldolph	East Pepperell	34 North Prospect Street
Andrews, Harold Leslie	Stafford, Conn.	15 Amity Street
Arel, Theophile	Holyoke	15 Phillips Street
Arp, Dietrich	Milwaukee, Wis.	36 North Prospect Street
Arruda, Anthony Peter	New Bedford	36 North Prospect Street
Ashforth, Arthur Clifton	Brockton	70 Lincoln Avenue
Baird, Francis William	Waltham	7 Nutting Avenue
Barrows, Edward Fletcher	Brattleboro, Vt.	75 Pleasant Street
Barrows, Harold Clayton	Mendon	20 Lessey Street
Baxter, Samuel Ballantine	Tenafly, N. J.	5 Kendrick Place
Bemis, Raymond Battles	Spencer	15 Phillips Street
Bennett, William Whytal	Arlington	101 Pleasant Street
Blumen, David	Smolensk, Russia	101 Pleasant Street
Bobb, Linn	Philadelphia, Pa.	Mount Pleasant
Bronsdon, William Abbott	Baldwinsville	75 Pleasant Street
Brooker, John Patrick	Roxbury	34 Pleasant Street
Bruce, Mary Elizabeth	Dorchester	79 Pleasant Street
Bryant, Frank Kenneth	Lowell	8 Kellogg Avenue
Burke, Leslie Joseph	Medford	12 Cottage Street
Burnett, Marston	Cambridge	14 Nutting Avenue
Burnham, Theodore Shelley	Essex	53 Lincoln Avenue
Burrington, Raymond Wells	North Amherst	North Amherst
Burrington, Reginald Clifton	North Amherst	North Amherst
Butler, James Stoddard	Keene, N. H.	-
Carpenter, Ruth	Hudson	Draper Hall
Carroll, Margaret Adelaide	Dorchester	Draper Hall
Chace, Chester William	Springfield	3 Nutting Avenue
Chadwick, Walter	Lawrence	20 Lessey Street
Chandler, Donald Carlyle	New Gloucester, Me.	15 Hallock Street
Chapel, Walter	Bolton	36 North Prospect Street
Chrisfield, Edward Richardson	Needham	101 Pleasant Street
Christensen, Frank William	North Easton	13 Phillips Street
Clapp, Horace Damon	Easthampton	8 Kellogg Avenue
Clark, Chester Frederic	Fitchburg	North Amherst
Clark, Elbridge Theodore	Millis	45 East Pleasant Street
Clark, William Guster	Amherst	11 Amity Street
Colton, Hartman Dudley	Springfield	45 Pleasant Street
Connor, Raymond James	Worcester	52 Lincoln Avenue
Conroy, Maurice	New Bedford	West Experiment Station
Converse, John Kendrick	Andover	79 Pleasant Street

Corey, Raymond Stanley	Amherst	35 East Pleasant Street
Cornell, Ivan Manley	Brookline	36 North Prospect Street
Crocker, Fred Carlton	North Adams	35 East Pleasant Street
Crosby, Leon Rolland	Tyngsborough	34 Pleasant Street
Crowell, Homer Merrill	New York, N. Y.	35 East Pleasant Street
Currier, Napoleon	Lawrence	108 Pleasant Street
Danske, Frank	Holyoke	35 East Pleasant Street
Davis, Frederick Oscar	Windsor, Vt.	21 Amity Street
Day, Roland Wight	Medfield	83 Pleasant Street
Dill, Clarence Elmer	Raynham Center	North Amherst
Doane, Robert Allen	North Brookfield	70 Lincoln Avenue
Dole, Stevens Field	Greenfield	45 Pleasant Street
Douglas, Harry Lawton	Lowell	M. A. C. Farmhouse
DuFresne, Francis Armand	Lenox	North Amherst
Dunbar, Charles Basil	Taunton	Ye Aggie Inn
Eastman, Roger Austin	Amherst	North Amherst
Estey, Roger Bradshaw	Somerville	6 Kellogg Avenue
Faufaw, R. W.,	Derby Line, Vt.	36 North Pleasant Street
Finn, William Francis	Chelsea	North Amherst
Firth, Frank Lemuel	Worcester	81 Pleasant Street
Flanders, John Leonard, Jr.	Scuthville	20 Lessey Street
Ford, Clarence Eugene	St. Louis, Mo.	Eames Street
Frary, Frank Tayler	Southampton	8 Kellogg Avenue
Gibbons, William Frank	Fitchburg	120 Pleasant Street
Gifford, Franklin Maynard, Jr.	Middleborough	34 North Prospect Street
Girard, Albert John	East Brimfield	29 East Pleasant Street
Graeff, Charles Albert	New York, N. Y.	Sunderland
Greenfield, Abraham	Springfield	4 Chestnut Street
Grieve, Alexander Watson	Dorchester	7 Nutting Street
Gruver, Raymond Charles	Lowell	35 Northampton Road
Gustafson, Gustaf Albert	Wilmington	North Pleasant Street*
Hall, Robert Hancock	Waverley	35 East Pleasant Street
Hamilton, Grant Ethan	Cyrus	20 Lessey Street
Hamilton, Weston Alexander	Salem	13 Phillips Street
Hancock, Russell Hagen	Vineyard Haven	18 Nutting Avenue
Hanifin, Robert Emmett	Belchertown	10 Maple Avenue
Hare, Ambrose Henry	Leominster	71 South Pleasant Street
Hartwell, Nathan Haywood	Rockland	4 Nutting Avenue
Hartwell, Robert Mantor	Buckland	M. A. C. Farmhouse
Haskell, Wilder Alexander	Holyoke	North Amherst
Hawes, Leon Roy	Sudbury	33 East Pleasant Street
Hayden, Arthur Leo	Natick	35 North Prospect Street
Hayes, William Bointon	South Deerfield	120 Pleasant Street
Heffernan, Cyril James	Dorchester	12 McClure Street
Heinlein, Edward Baneroff	South Natick	17 Pleasant Street
Hoyt, Perley Luther	Perkinsville, Vt.	20 Lessey Street
Hubbell, James Platt	Boston	36 North Prospect Street
Huekins, Norman Charles	Dorchester	9 Fearing Street
Huntley, Robert Ernest	Somerville	73 Pleasant Street
Igo, Bernard James	West Somerville	101 Pleasant Street
Jacques, John William	Malden	60 Pleasant Street
Jauncey, Oakleigh Wells	Williamstown	36 North Prospect Street
Jewett, Joseph Winthrop	Arlington	23 East Pleasant Street
Johnson, William James	Medford	7 Nutting Avenue
Jordan, Emmett Philmore	Smithfield, Va.	101 Pleasant Street

Kallio, Toivo Matthew	Middlefield	8 North Prospect Street
Keller, Earle Franklin	Augusta, Me.	4 Chestnut Street
Kelley, John Joseph	Amherst	71 South Pleasant Street
Kilton, Donald Gilbert	Worcester	79 Pleasant Street
Kimball, Elforest Franklin	Danvers	34 Pleasant Street
Kimball, Howard Augustus	Littleton	9 Fearing Street
Kirchner, Robert Walter	Pittsfield	40 Mount Pleasant
Knight, Henry Elbridge	Easton, Mo.	20 Lessey Street
Knight, Herbert Allen	Ludlow	45 Pleasant Street
Komla, Stanley	Cambridge	101 Pleasant Street
Krikorian, Krikor Hovanes	Bridgeport, Conn.	12 Cottage Street
Landstrom, Oscar Nathaniel	Heath	5 Nutting Avenue
Langelier, Edgar Joseph	Lynn	18 Nutting Avenue
Lawrence, Harold Tildon	Rhodesia, South Africa	29 Northampton Road
Lawson, John Thomas	New Bedford	60 Pleasant Street
Leone, Anthony	Boston	North Amherst
Libby, Ben Frank	Springfield	Experiment Station
Libby, Carl Estes	Springfield	East Experiment Station
Loomer, Gordon Powell	Waverley	4 Chestnut Street
Lord, George Walker	Framingham	70 Lincoln Avenue
Lounsbury, Francis Edward	Cambridge	101 Pleasant Street
MacLeod, Norman Frederick	Lynn	35 North Prospect Street
MacMillan, Murray	Medford	36 North Prospect Street
Mahakian, John	Boston	4 Chestnut Street
Malhoit, Alfred William	Worcester	R. F. D. No. 3, Amherst
Mason, Gerald Joe	Barre, Vt.	North Pleasant Street
Maxson, John Warren	Philadelphia, Pa.	21 Fearing Street
McCluskey, Joseph James	Bangor, Me.	101 Pleasant Street
McFarlan, John Wesley	Cincinnati, O.	75 Pleasant Street
McGilvery, Peter Joseph	Cambridge	3 Pleasant Street
Miller, Fred Reuben	Bernardston	20 Lessey Street
Moczarski, Joseph	Holyoke	Triangle Street
Morse, Harold Sterling	Arlington	23 East Pleasant Street
Morse, Herbert Edgar	Foxborough	18 Nutting Avenue
Mullen, Frank Myles	Fayville	44 Triangle Street
Mumford, William Henry	Springfield	36 North Prospect Street
Narkin, Isadore	Philadelphia, Pa.	75 Pleasant Street
Newell, Joseph Delaplane	Brooklyn, N. Y.	Inwood
Newhall, Gordon William	Brookline	45 Pleasant Street
Norris, Frank White	Dorchester	12 Cottage Street
Nowers, Rodman Clark	Danvers	45 East Pleasant Street
Oakos, John Joseph	Wollesley	17 Pleasant Street
O'Brien, Katherine Frances	Lawrence	29 Lincoln Avenue
O'Shan, David	New York, N. Y.	47 Pleasant Street
Owens, Zorayda Kathleen	Haverhill	29 Lincoln Avenue
Parkes, Charles Ransom	New York, N. Y.	120 Pleasant Street
Parsons, Phillips Henry	Southampton	79 Pleasant Street
Peirce, Albert Kimball	Arlington	101 Pleasant Street
Pellis, Abraham	Chelsea	41 Pleasant Street
Percy, Minot Simons	Arlington	101 Pleasant Street
Porkins, George Burton	Woburn	21 Fearing Street
Phipps, Carleton Lawrence	Holliston	60 Pleasant Street
Pickard, Herbert Peirce	Concord Junction	17 Kellogg Avenue
Porrovehio, Carl James	Charlemont	5 Nutting Avenue
Potwin, Bert Louis	Woodstock, Conn.	35 East Pleasant Street

Purdy, Donald Ring	Waverley	4 Chestnut Street
Quinn, William Robert	Natick	34 Pleasant Street
Raymond, Matthew George	Boston	108 Pleasant Street
Reid, Howard Stanton	Franklin	9 South Colloge
Richards, Osgood Samuel	Jamaica Plain	32 North Prospect Street
Rideout, Lawrence Walter	Amherst	17 Kellogg Avenue
Ripley, Lucien Lawrence	Montague	17 Cottage Street
Robinson, Frederick Charles	Westford	54 Pleasant Street
Rollins, Guy Emery	Selden, Me.	3 Nutting Avenue
Root, Howard Chapin	Colrain	20 Lessy Street
Rossier, Hardy Samuel	Newport, Vt.	17 Kellogg Avenue
Rowe, Everett Elliot	Bolton	53 Lincoln Avenue
Rowe, George Joseph	Greenfield	66 Pleasant Street
Rowe, Herbert Malcolm	Beverly	116 Pleasant Street
Ruggieri, Salver	Summit, R. I.	12 Cottage Street
Russell, Paul Belford	West Medway	6 Nutting Avenue
Sadowski, Stephen Anthony	South Boston	35 East Pleasant Street
Savage, John Francis	Dorchester	71 South Pleasant Street
Sawyer, John Henry	North Brookfield	70 Lincoln Avenue
Segelman, Max	Chelsea	9 Fearing Street
Shaw, Charles Dudley	Westfield	13½ Amity Street
Shaw, Walter Bruce	Sutton	8 Kellogg Avenue
Shevlin, Frank James	Woonsocket, R. I.	101 Pleasant Street
Smith, Raymond Leslie	East Hartford, Conn.	11 Triangle Street
Smith, Royce Walter	Boston	4 Chestnut Street
Snelling, Samuel William	Lincoln	4 Chestnut Street
Spinney, Joseph Warren	Allston	25 Lincoln Avenue
Spooner, Roy Adelbert	Dorchester	34 Pleasant Street
Spooner, William Danforth	Brimfield	Waid Farm
Spring, Earle Nelson	Millers Falls	M. A. C. Farmhouse
Steele, Gordon Ellis	Waverley	4 Chestnut Street
Stiles, Allan Langille	Littleton	6 Nutting Avenue
Sutherland, John Francis	South Boston	Mount Pleasant
Talbot, William Joseph	Quincy	8 Hallock Street
Taylor, Arthur Raymond	Framingham	13 Phillips Street
Thorn, Henry Holton	Deerfield	120 Pleasant Street
Trafton, Walter Richard	Swampscott	12 Cottage Street
Van Derpoel, Ernest Collins	Chicopee Falls	33 East Pleasant Street
Vartanian, Neshan	Indian Orchard	41 Pleasant Street
Veselak, Helen Clara	Westfield	Draper Hall
Wackerbarth, William Rudolph	Morenci, Ariz.	13 Phillips Street
Walsh, John, Jr.	Bedford	North Pleasant Street
Ward, William David	Newton	44 Triangle Street
Warner, Harry Freeman	Wollaston	7 Phillips Street
Watson, Alan Wendell	Providence, R. I.	17 Kellogg Avenue
Whitcomb, Harold Adams	Concord Junction	6 Nutting Avenue
White, Alice Louise	Bristol, Conn.	Mount Pleasant
Whitmore, Raymond Swett	Arlington Heights	4 Chestnut Street
Wickwire, Harry Wyndom	Worcester	35 East Pleasant Street
Wiggin, Theron Herman	Norwood	83 Pleasant Street
Wilson, Stewart Hemingway	Thompsonville, Conn.	53 Lincoln Avenue
Wilson, Harvey William	Boston	101 Pleasant Street
Wolf, Henry	Amherst	4 Chestnut Street
Wood, Matthew Arnold	South Portland, Me.	6 Nutting Avenue
Young, George Thomas	Wilkinsonville	8 Kellogg Avenue

Vocational Poultry Course

Abair, Peter Dorcey	Worcester	41 Pleasant Street
Abercrombie, Edward Marion	Greenfield	120 Pleasant Street
Denovon, Albert Peter	New Brunswick, Can.	70 Lincoln Avenue
Follansbee, Harry Mayoh	Enfield, N. H.	North Amherst
Goodnow, Lewis Weston	Greenfield	15 Phillips Street
Hatch, Henry Donald	Auburn, Me.	29 North Prospect Street
Jorgensen, George Arthur	Floral Park, N. Y.	13½ Amity Street
McFague, Maurice Graeme	Wollaston	70 Lincoln Avenue
Mcsher, Roy Wilson	East Bridgewater	36 North Prospect Street
Nestle, Harold George	Amherst	Leverett Street
Torrey, Hamilton	Springfield	118 Pleasant Street
Von Bieberstein, Herbert	Boston	81 Pleasant Street
Wenz, Philip Henry	East Dedham	North Amherst

Rural Engineering Course

Ash, Walter George	Anthony, R. I.	75 Pleasant Street
Burt, John Holton	Hyde Park	7 Phillips Street
Clarke, William John	Ipswich	101 Pleasant Street
Flanagan, Matthew Joseph	Roxbury	101 Pleasant Street
French, Percy Jackson	Rockland	4 Chestnut Street
Jarvis, Albert Arthur	East Boston	Sigma Phi Epsilon
Landry, Theodore Joseph	New Brunswick, Can.	101 Pleasant Street
Logan, Michael John	Atlantic	37 Cottage Street
MacDonnell, Charles Angus	Cambridge	3 Pleasant Street
Mirault, Joseph Dustin	Holyoke	15 Phillips Street
Nelson, Guy Leslie	Milford, N. H.	71 South Pleasant Street
Sale, Charles Raymond	Pittsfield	37 Cottage Street
Sharp, James Milne	Dorchester	101 Pleasant Street
Syrett, Clifford Franklin	Springfield	17 Kellogg Avenue
Thoubboron, Frank William	Brooklyn, N. Y.	39 Main Street
Whitbeck, Henry	Alandar	5 McClellan Street

Summary of Short Courses

	Men	Women	Total
Two-Years Course, 1919, winter term ¹	31	6	37
Ten-Weeks Course, 1919 ¹	43	20	63
First Six-Weeks Course, 1919 ¹	13	-	13
Second Six-Weeks Course, 1919	9	1	10
Vocational Poultry Course, March to June, 1919	6	-	6
Summer School, 1919	46	192	238
Summer Course for Federal Men, 1919	31	-	31
Two-Years Course, 1919-20	201	8	209
Vocational Poultry Course, 1919-20	13	-	13
Rural Engineering Course, 1919-20	16	-	16
Total	409	227	636
Counted twice	46	-	46
	363	227	590

¹ Names published in catalogue for May, 1919.

MASSACHUSETTS AGRICULTURAL COLLEGE, AMHERST

PRESIDENT'S OFFICE.

The Massachusetts Agricultural College charges a yearly tuition fee of \$120 to foreigners and of \$60 to others who are not residents of Massachusetts. In order to satisfy the college authorities that an applicant is entitled to free tuition they require a statement signed by the clerk of the city or town in which the applicant resides, certifying to the fact that the father of the applicant is a legal resident of said city or town. Such a statement may be made on the form below. If this is not presented when the student registers, the Treasurer has no option but to collect tuition on the basis of \$120 per year.

KENYON L. BUTTERFIELD.

DEC. 20, 1919.

To the President of the Massachusetts Agricultural College.

This is to certify that on the date specified below, the father of

is a legal resident of _____

City

State

Signed _____

Town or city clerk

Date _____

(Seal)

Mail this blank with your application blank to

JOHN PHELAN, *Director of Short Courses*
MASSACHUSETTS AGRICULTURAL COLLEGE, AMHERST, MASS.

APPLICATION FOR ENROLLMENT

IN THE

TWO-YEARS COURSE IN PRACTICAL AGRICULTURE

OFFERED BY THE

MASSACHUSETTS AGRICULTURAL COLLEGE, AMHERST

Name.....

Date of Application.....

Post Office.....Street.....State.....

Present Occupation.....

Previous Education.....

Finished Elementary Schools at.....

High School: Number of Years.....Where.....

College.....Where.....

Farm Experience: Number of Years.....Type of Farm.....

Reference.....

Name

Address

Name and address of person to notify in case of illness or accident:.....

.....

Mail this blank to John Phelan, Director of Short Courses, Massachusetts Agricultural College.

MASSACHUSETTS
AGRICULTURAL COLLEGE

THE TEN WEEKS' WINTER SCHOOL
1921



THE M. A. C. BULLETIN
Amherst, Massachusetts

Volume XII

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Number 7

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The Ten Weeks' Winter School

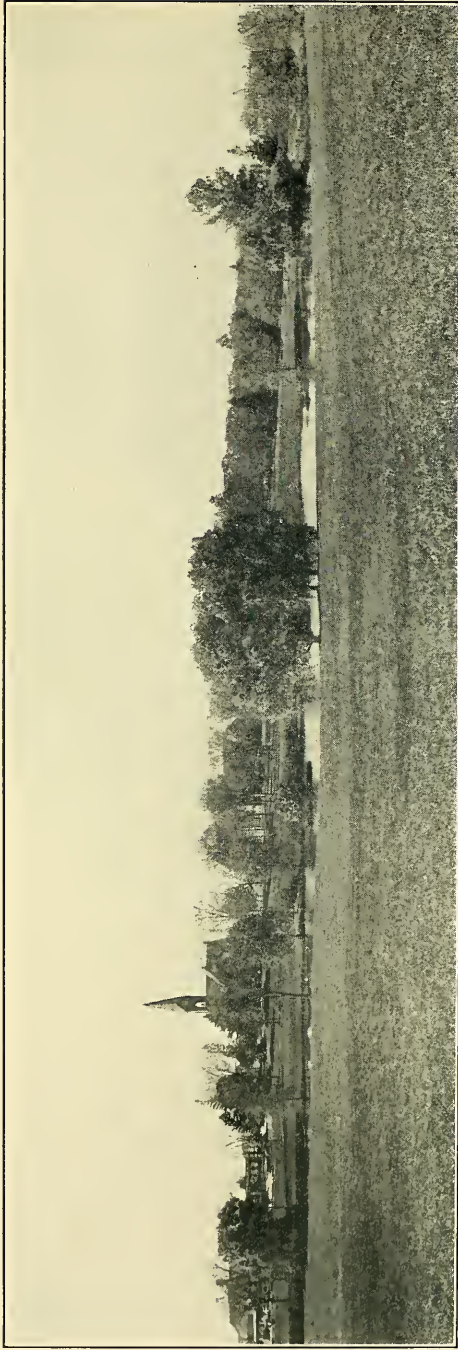
OF THE

MASSACHUSETTS AGRICULTURAL COLLEGE



BOSTON
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32 DERNE STREET
1920

PUBLICATION OF THIS DOCUMENT
APPROVED BY THE
SUPERVISOR OF ADMINISTRATION.



A view of the campus

STAFF OF INSTRUCTION, 1921

KENYON L. BUTTERFIELD, A.M., LL.D.

President of the College

EDWARD M. LEWIS, A.M.

Dean of the College

JOHN PHELAN, A.M.

Director of Short Courses

DEPARTMENT

WALTER W. CHENOWETH, A.B., M.Sc.	. . . . .	Horticultural Manufactures
<i>Professor of Horticultural Manufactures</i>		
JAMES A. FOORD, M.Sc. Agr.	. . . . .	Farm Management
<i>Professor of Farm Management</i>		
CHRISTIAN I. GUNNESS, B.Sc.	. . . . .	Rural Engineering
<i>Professor of Rural Engineering</i>		
MARGARET HAMLIN, B.A.	. . . . .	Agricultural Opportunities for Women
<i>Agricultural Counselor for Women</i>		
ROY D. HARRIS, B.Sc.	. . . . .	Vegetable Gardening
<i>Instructor in Vegetable Gardening</i>		
WILLIAM R. HART, A.M., LL.B.	. . . . .	Agricultural Education
<i>Professor of Agricultural Education</i>		
FRANKLIN E. HEALD, M.A.	. . . . .	Vocational Agricultural Education
<i>Agent for Agricultural Teacher-Training, Massachusetts Board of Education</i>		
FREDERICK A. McLAUGHLIN, B.Sc.	. . . . .	Botany
<i>Assistant Professor of Botany</i>		

DEPARTMENT

CHARLES E. MARSHALL, Ph.D.	Microbiology
<i>Professor of Microbiology</i>	
JAMES B. PAIGE, B.Sc., D.V.S.	Veterinary Science
<i>Professor of Veterinary Science</i>	
HARLOW L. PENDLETON, B.Sc.	Dairying
<i>Instructor in Dairying</i>	
WILLIAM S. REGAN, Ph.D.	Entomology
<i>Assistant Professor of Entomology</i>	
VICTOR A. RICE, B.Sc.	Animal Husbandry
<i>Assistant Professor of Animal Husbandry</i>	
WILLIAM F. ROBERTSON, B.Sc.	Horticultural Manufactures
<i>Instructor in Horticultural Manufactures</i>	
WILLIAM E. RYAN, B.Sc.	Poultry Husbandry
<i>Instructor in Poultry Husbandry</i>	
SCHUYLER M. SALISBURY, B.Sc.	Animal Husbandry
<i>Professor of Animal Husbandry</i>	
FRED C. SEARS, M.Sc.	Fruit Growing
<i>Professor of Pomology</i>	
ADELBERT SHEFFIELD	Dairying
<i>Superintendent of Dairy Manufactures</i>	
EDNA SKINNER, B.Sc.	Home Economics
<i>Professor of Home Economics</i>	
JAMES L. STRAHAN, M.Sc.	Rural Engineering
<i>Assistant Professor of Rural Engineering</i>	
CHARLES H. THAYER	Soil Fertility
<i>Instructor in Agronomy</i>	
CLARK L. THAYER, B.Sc.	Floriculture
<i>Professor of Floriculture</i>	
GUY A. THELIN, B.Sc.	Field Crops
<i>Instructor in Agronomy</i>	

DEPARTMENT

LORING V. TIRRELL, B.Sc.	Animal Husbandry
<i>Instructor in Animal Husbandry</i>	
GLENN E. UPTON, B.Sc.	Dairying
<i>Instructor in Dairying</i>	
WINTHROP F. WELLES, B.Sc.	Agricultural Education
<i>Professor of Agricultural Education</i>	
JAMES WHITING	Floriculture
<i>Foreman, Department of Floriculture</i>	
T. GEORGE YAXIS, M.Sc.	Dairying
<i>Assistant Professor of Dairying</i>	

CHARLES R. GREEN, B.Agr.
Librarian of the College

THE TEN WEEKS' WINTER SCHOOL

Jan. 3, 1921, to March 11, 1921

The attention of the student is directed to the Special Two-Weeks' Tractor Course which is offered for the first time this year in connection with Short Courses, and to the change in date of the beginning of the Vocational Poultry Course (see page 27).

GENERAL INFORMATION

The Ten Weeks' Winter School was organized in 1900. It has proved a great opportunity during the past twenty years for several thousand students who could not afford to avail themselves at any other time of the advantages offered by the college. The courses given in the Ten Weeks' Winter School are not elementary or preparatory in their nature, but are designed to meet the needs of a student body who vary in academic preparation from college graduates to graduates of the common schools; in age from eighteen to sixty years, and in farm experience from young men and women who have had no experience whatever to more mature men and women who are now actually engaged in the management of their own farms. Ten weeks being a comparatively short period of time, the courses are exceedingly concentrated and practical.

The instruction is given largely by the regular faculty of the college by means of lectures, recitations, laboratory exercises and practical work. (Assistance is given from time to time by non-resident lecturers on special subjects.) The work in the classroom is supplemented by demonstration work in the laboratory, dairy-

room, greenhouse, and stables. The work is planned to bring before the students the result of the latest investigations in agricultural science and to point out their practical application.

ENTRANCE CONDITIONS

There are no entrance requirements or entrance conditions other than that the students shall be eighteen years of age and shall have completed the elementary or common schools.

FEES AND EXPENSES

There is no tuition in the winter school, nor are laboratory fees charged in connection with any of the courses. Each student is required to pay the treasurer a \$5 registration fee. The student is required to purchase such books as may be needed: The average cost of books is approximately \$10.

BOARD AND ROOM

Students must secure rooms approved by the college. The assignment of the rooms and the general supervision of the housing of students are in charge of the Director of Short Courses, from whom information of available rooms may be had in advance. Rent for furnished rooms in approved houses varies in price from \$2.50 to \$4 a week for each occupant. Board may be had at the college dining hall for approximately \$7 a week.

ELECTION OF STUDIES

The choice of subjects is left to the student, but students are advised to elect not less than ten nor more than twenty-five hours per week. A class that meets for one hour a day for five days per week is reckoned as five credit hours. A two or three hour laboratory period counts as one class hour.

REGISTRATION

Students will be registered in classes Monday, January 3, at the Short Course Office. Classes will begin Tuesday, January 4, at 8 o'clock, A.M.

RULES AND REGULATIONS

As a guide to those who come to the college for the first time, the following extracts are taken from the regular rules of the college:—

The customary high standard of college men in honor, manliness, self-respect, and consideration for the rights of others constitutes the standard of student deportment.

It should be understood that the college, acting through its president or any administrative officer designated by him, distinctly reserves the right not only to suspend but also to name conditions under which students may remain in the institution.

Regularity of attendance and conformity to general college rules are required of all winter school students.

GENERAL EXERCISES

On Wednesday afternoon an assembly is held at which some prominent layman or professional man is invited to speak. The object of these assemblies is to bring to the students discussions of topics of present-day interest.

POSITIONS

The college does not guarantee positions to students registered in any of its courses, but it has an opportunity to recommend students for a large number of positions. Thus far the demand for students, both men and women, has been far in excess of the supply. The opportunities for trained men and women, especially those who have had farm experience, are exceptionally good.

A student desiring a recommendation from the college must meet the following conditions: —

1. He must be of good character.
2. His previous record must be good.
3. His work in all courses must be satisfactory.

Students who have not previously had a considerable amount of farm experience cannot, as a rule, be recommended for positions of responsibility. This is especially true for the better positions for which managers or superintendents are wanted.

THE LIBRARY

The college library occupies the entire first and second floors of the Chapel-Library building. It contains more than 65,000 volumes in addition to a large number of unbound periodicals and pamphlets. Works on agriculture, horticulture, botany, entomology, and the various sciences predominate, but literature, history, economics, and sociology are well represented and receive due attention. In addition to a few newspapers and the best farm papers, the reading room is supplied with a good variety of popular periodical literature, encyclopedias, and general reference books. The equipment is such that the library ranks extremely well with the agricultural libraries of the country.

An agricultural reference library is maintained in Stockbridge Hall. Other branch libraries and reading rooms are provided in the department buildings, and these are open for the use of the Short Course and regular college students.

The library hours are from 8 A.M. to 6 P.M. and 7 to 9.30 P.M. every week day, and from 9 A.M. to 1 P.M. on Sunday in term time. Shorter hours prevail during the vacation season.

Short Course students should be able to find splendid material for their line of college work and are cordially invited to make use of the library and its equipment. The librarian and library assistants are always on hand, ready and willing to be of assistance.

SCHOLARSHIPS

The Jewish Agricultural and Industrial Aid Society of New York instituted in 1908 a system of free scholarships to enable the children of Jewish farmers to attend the short winter courses offered by the agricultural colleges in the States in which they reside. The scholarships are awarded by competition, which consists in the writing of a brief essay on an agricultural topic. Children of Jewish farmers living and working on the farms of their parents are eligible to compete for these scholarships.

Applications for these scholarships should be made to The Jewish Agricultural and Industrial Aid Society, 174 Second Avenue, New York City.

DESCRIPTION OF COURSES

GENERAL AGRICULTURE

1. Soil Fertility

A course in which the origin of soils, their properties and management, will be studied. Emphasis will be placed on: the control of soil moisture; tith and tillage; importance and maintenance of soil organic matter; manures, their composition, value, preservation, and use; and the properties and use of commercial fertilizers. Three lectures a week.

Mr. Thayer

2. Field Crops

The production of field crops for New England; species and varieties, agricultural characteristics, methods of culture, rotations, harvesting, and curing. The laboratory work gives the student practice in seed selection and testing for quality, purity, and germination, and in corn and potato judging. Course 1 required. Two lectures and one two-hour laboratory period a week.

Mr. Thelin

3. Types and Breeds of Livestock

Outlines of the market classes and grades of beef cattle, horses, sheep, and swine, placing emphasis upon the characteristics of each class and its adaptations. The characteristics, the adaptations, and, so far as it is possible, the historic development of each of the more important breeds of livestock are also carefully studied, as well as their distribution in America. Special emphasis is laid upon dairy cattle and horses in the judging work. Three lectures and two two-hour judging periods a week.

Mr. Tirrell



A class in field crops



Sheep judging

4. Livestock Feeding

A study of the physiology of nutrition, the composition of feed-stuffs, and of rational economic feeding. The feeding of dairy cattle and their management for profitable milk production receives first attention. Similarly, the feeding of horses, of beef cattle, of sheep, and of swine is studied. Three lectures a week.

Assistant Professor Rice

5. Animal Breeding

A discussion of the more common problems pertaining to the breeding of livestock, their explanation and solution; in-breeding; cross-breeding; grading. The work of the most successful men in history is studied. Time is given to the study of pedigrees of the different breeds of dairy cattle and other stock. Two lectures and one two-hour laboratory period a week.

Professor Salisbury

6. Dairying

(a) Testing milk and milk products: composition and properties of milk, Babcock test for fat, tests for acidity; moisture and salt in butter. Two lecture hours, one two-hour laboratory period.

(b) Manufactures: study of separators, separating, ripening cream, making starters, making butter, and making cottage cheese and other soft cheese. Two lecture hours, two three-hour laboratory periods.

(c) Market milk: a study of market milk conditions, production, care and handling; various types of dairy buildings. One lecture hour, one two-hour laboratory period.

(d) Dairy arithmetic: problems of the dairy. One two-hour laboratory period.

Dairy Department

NOTE. — Dairy students are required to take (a), (b), (c), and (d), also the course in dairy bacteriology; (a) only, open to other students.

7. Dairy Bacteriology

The characteristics and functions of bacteria and their relation to the different branches of the dairy industry. The scientific basis for cream ripening, sterilization, pasteurization, control of fermentation, and the production of the best quality of market milk. Two lectures and one two-hour laboratory period a week.

Professor Marshall

8. Animal Diseases and Stable Sanitation

Lectures upon some of the common diseases of livestock, giving special attention to methods of prevention, care, and sanitation; the treatment of emergencies and accidents; how to keep animals healthy. Three lectures a week.

Professor Paige

9. Poultry Husbandry

This course meets the needs of those who can spend only a short time at the college, but who wish to get a general survey of poultry keeping and some technical knowledge of the latest and most scientific methods in vogue. It is a lecture and laboratory course, the former covering opportunities in poultry culture, poultry housing, winter egg production, incubation and brooding, feeds and feeding, poultry management, and the most popular methods of marketing poultry and eggs in Massachusetts. The laboratory work consists of demonstrations and practical work in killing, picking, caponizing, judging and culling for egg production, and studying types and construction of incubators and brooders. Practical work in operating brooders is given to as many as can be accommodated. The large poultry plant furnishes facilities for demonstrating various methods of housing and feeding. A splendid opportunity is afforded those who have time for observation work outside of class hours. Five lectures and one two-hour laboratory period per week.

Poultry Department

10. Fruit Growing

This course deals with the practical side of the growing and marketing of fruits. Especial attention is given to such questions as selection of site for the plantation, choice of varieties, grafting and budding, spraying, pruning, cultivation and cover crops, fertilizing the fruit plantation, packing, and marketing. Lectures, supplemented by demonstrations, and, whenever possible, actual work by the student. Students electing Fruit Growing are also required to take Course 1, and it is recommended that they take Courses 18 and 19. Three lectures and one two-hour laboratory period a week.

Pomology Department

11. Vegetable Gardening

Massachusetts can boast of some of the most intensive and successful market gardening in the United States. The methods employed deserve careful study.

Within the limits set by the length of the course and season of the year, acquaintance is made with the general nature of the business, and detail study given to the leading problems.

Laboratory work, actually studying material and doing work, is made an important part of the course.

Late in the course some time is devoted to a study of actual problems presented by students, all taking part in classroom conferences.

Students electing this course are required to take Course 1, and it is recommended that they take Courses 18 and 19. Three lectures and two two-hour laboratory periods a week.

Mr. Harris

12. Floriculture

This course is designed primarily for students who are interested in commercial floriculture. Some of the topics considered are greenhouse construction and heating, greenhouse management, and

methods used in growing important commercial crops. A portion of the course will also be devoted to a consideration of gardening and garden flowers. Special trips are taken to study floricultural establishments in the State; students desiring credit for the course are required to take these trips. Students electing this course are required to take Course 1, and it is recommended that they take Courses 18 and 19. Five lectures a week; laboratory work or field trips on Saturday.

Professor Thayer and Mr. Whiting

13. Horticultural Manufactures

The utilization of culls and low-grade fruits and vegetables and the marketing of excess crops are always serious problems to the producer. The economic conversion of these materials into palatable nutritious food products is becoming a greater necessity each year.

This course aims to place before the student the fundamental principles underlying the various means of food preservation and the manufacturing of food products.

The canning, drying, and storage of fruits and vegetables, together with the manufacture of many of their products, will be studied in detail and the methods illustrated with laboratory exercises. Students will be given opportunity to do canning and drying, to manufacture many fruit and vegetable products, and to investigate storage conditions. The work in both classroom and laboratory will be of such a character as to be readily applied in the home or in the farm factory. Two lectures and two laboratory periods per week.

Professor Chenoweth and Mr. Robertson

14. Farm Management

A study of some of the problems of modern farming and the factors that influence success, such as the choice of a region and of a farm, types of farming, size of farm, rotation of crops, and labor problems. Two lectures a week.

Professor Foord

15. Farm Accounts

Actual practice in the use of a simple system of farm accounting, including cost accounts suitable for the large or the small farm. Two two-hour laboratory periods a week.

Professor Foord

16. The Supply and Marketing of Farm Products in Massachusetts¹

The course will attempt to show what products New England can most profitably produce and how and when they can best be marketed. The principles of marketing, the importance of marketing as compared with production, the best outlets for sale, proper methods of preparation, packing, shipping, storing, advertising and selling, direct marketing, use of motor truck, trolley freight and express, collective selling, planning production with a view to marketing, will be some of the topics presented. Each student will be given an opportunity to study the market for some product in which he is interested. Twenty lectures. Original study of particular product.

Department of Agricultural Economics

17. Sources and Use of Agricultural Credit¹

The course deals with the need, the sources, the methods of obtaining farm capital in New England. When and when not to borrow; length of loan, methods of payment, interest, amortization, loan associations, Federal land banks, mortgage credit, personal loans, collateral, and like practical topics are discussed. Safe and unsafe securities, notes, bonds, stocks, and investments are discussed. Twenty lectures.

Department of Agricultural Economics

¹ Omitted during 1921.

18. Botany

A study of the structure, functions, and diseases of greenhouse, garden, orchard, and field crops, together with methods of disease prevention, including spraying and the application of fungicides. Two lectures a week.

Assistant Professor McLaughlin

19. Entomology

The Course in Entomology covers the topics outlined below. It is aimed to cover the fundamentals of the subject rather fully. Time will permit the discussion of only the more important of the injurious and beneficial insects with which we have to deal in this section of the country.

1. Insects and their nearest relatives — how to distinguish them.
2. Structure or make-up of insects and the practical application of this knowledge in insect control.
3. Development, metamorphoses (changes), and stages of insect life.
4. Composition, preparation, combination, and use of insecticides, fumigants, etc.
5. Spraying apparatus and its use.
6. Beneficial and injurious insects.
 - A. The life history, habits, behavior, and control of some of the most important insect pests of —
 - (1) Orchard and small fruit pests.
 - (2) Market-garden and field-crop pests.
 - (3) Greenhouse pests.
 - (4) Forest and shade-tree pests, and pests of ornamental plants.
 - (5) Domestic animal pests.
 - (6) Household pests and those attacking man.
 - (7) Insects and their relation to the transmission of disease; *i.e.*, how insects affect public health.
 - B. Beneficial insects.

Three lectures a week.

Mr. Dowd

20. Farm Structures

The purpose of this course is twofold: First, to study the principles of arrangement and interior design of the various farm buildings, including the general-purpose barn, horse barn, dairy stable, milk house, tool shed, ice house, root cellar, poultry house, etc.; materials of construction, including concrete, wood, and iron; farm gates and fences. Second, to give practice in drawing and reading blue prints, to the end that the student will have a means of precisely expressing his design ideas, and thus be able to transmit them to a builder or contractor without ambiguity.

Practice will be given in handling Portland cement concrete in the rural engineering shop, where ample facilities are available. In the drafting room will be prepared one complete set of drawings to be worked up from any design problem selected by the individual student, and which will include the writing of appropriate specifications. Two lectures and two two-hour laboratory periods per week.

Assistant Professor Strahan

21. Farm Machinery

This course is a study of the selection, use, and care of field implements, pumping equipment, and gas engines. Special attention is given to the application of the gas engine to automobiles and tractors. Practice is given in operating and repairing machines in the shop. Two lectures and three two-hour laboratory periods per week.

Professor Gunness

22. Rural Sanitary Science and Hygiene

Significance of sanitary science in the relation to health; the theories of disease; air and ventilation; water and its protection; sewage, disposal and purification; foods, their care, preservation,

decomposition, and nutrition; vaccines and serum treatment; carriers of disease, immunity and susceptibility; infectious diseases; disinfection and care of infectious diseases. Two lectures a week.

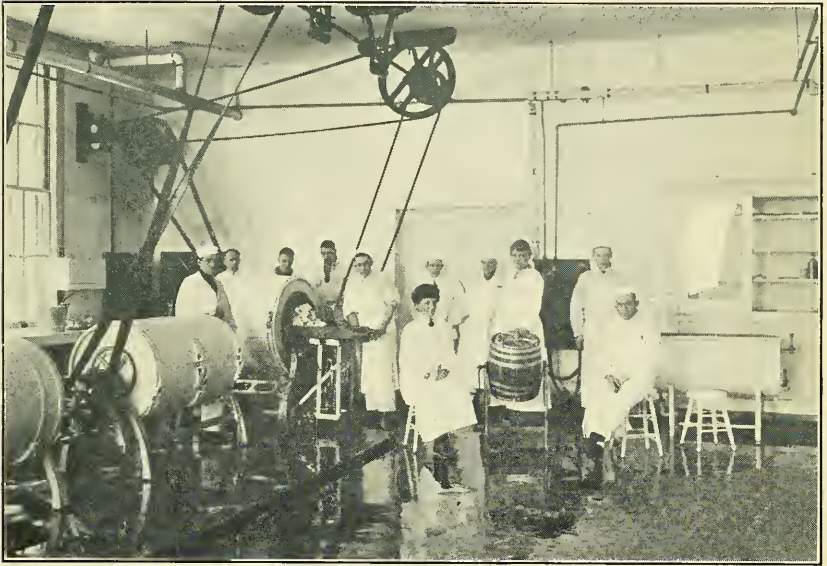
Professor Marshall

23. Agricultural Opportunities for Women

Agriculture is a field in which women are finding increasingly good opportunities.

The particular problems which the women engaged in farming will have to meet, and the special lines of farming in which they will have favorable opportunities, will be considered in a series of conferences. One class hour per week.

Miss Hamlin



Winter school students making butter



Laboratory work in the vineyard

HOMEMAKING

Owing to the increasing demand for instruction in homemaking, provision has been made in the winter school for a course combining homemaking with agriculture.

There are many women and girls throughout the State who are vitally interested in studying home problems and at the same time would like to become proficient in some phase of agriculture, as poultry, gardening, floriculture, or fruit growing. The college is able to extend this unusual opportunity.

Attractive laboratories have been newly equipped for homemaking work, and will be at the disposal of all women students in the winter school.

24. Foods

When one realizes that on an average about 30 or 40 per cent of the family income must be spent for food, it is easy to understand that this is one of the most timely topics of the day in the interest of thrift and health.

Special study will be made of the needs of the body and the selection of foods to supply those needs; also care in the handling and keeping of foods. Emphasis will be given to the application of fundamental principles in planning balanced menus. An unwise choice of foods may result in sickness rather than health.

Consideration will be given also to such special problems as infant feeding and school lunches. This course will include laboratory work of practical value. One lecture and two two-hour laboratory periods per week.

Miss Skinner

25. Clothing

Textiles will be scarce for some time because the world wasted during the war its reserves of clothing and household supplies. Therefore consideration must be given to making over and extend-

ing the use of fabrics as well as the selection of new materials. Their character, cost, and durability are studied with reference to planning a wardrobe for a limited income, emphasizing the beauty of simplicity and suitability. There will be practical work in sewing and making garments. One lecture and two two-hour laboratory periods per week.

Department of Home Economics

26. The Business of the Household

Good management is a science. For generations women have failed to apply to the business of homemaking many efficient methods so successfully used in the business world.

Since the homemaker is largely responsible for all expenditures connected with the house, an important consideration in this course is the study of the family budget, the apportionment of the income, and the keeping of accounts.

Equally important is the standardization of household tasks, the study of systematic methods of work, selection and care of equipment, the use of time and labor-saving devices. Three class hours per week.

Miss Skinner

27. Home Care of the Sick

Health preservation and home care of the sick are of prime importance at the present time.

It should be far easier to keep well than to become sick, provided one understands the fundamental principles of hygiene, thus insuring the care of family health.

However, every homemaker needs some knowledge of home care of the sick, including the study of simple diseases and their prevention, the care of young children and invalids, and first aid to the injured. Three class hours per week.

Miss Skinner

VOCATIONAL AGRICULTURAL TEACHING

Under a joint agreement with the Massachusetts Department of Education the training of teachers of agriculture for vocational schools is undertaken by the Massachusetts Agricultural College in the following lines:—

1. Regular college courses, four or five years, leading to a degree.
2. Shorter courses to supplement the training of more mature men who are partly qualified through practical experience, or through scientific study of agriculture, or through study of methods and principles of education, or through teaching experience.
3. Professional improvement training for employed teachers in regular college courses, or courses in the winter term, or courses specially organized on request of a sufficient number of students.

The Winter Short Course period provides in part for the second and third lines. An intensive course during the first two weeks is provided for the instructors who may leave their teaching for only a brief period. This course may be continued on a lighter schedule for such persons as may be able to remain throughout the winter term.

For all of these there will be an opportunity to take courses in general agricultural teaching, special Massachusetts problems, and agricultural subject-matter. An attempt will be made to furnish any subject-matter course which enough men may request.

High school principals and science teachers who have had farm experience, or practical agriculturists, may find this an opportunity to qualify for vocational teaching, — a field in which the demand keeps ahead of the supply.

The educational courses supplemented by an adequate amount of agriculture will be credited by the Department of Education towards approval of candidates or for professional improvement programs. Similar courses are offered in the summer school.

Principles and Methods of Teaching

The aim of this course is to present the fundamental principles of teaching. It treats such topics as interest, apperception, imaging, reasoning, and other activities of the mind in its learning processes, and endeavors to apply the study of these in each student's case in order that he may learn to promote such mind activities in others. Five exercises per week.

Professor Welles

Special Methods in Vocational Agricultural Teaching

This course consists of intensive work on some of the most important principles underlying the teaching of vocational agriculture. These will be worked out in connection with such topics as the community relations of the vocational work, the planning of a lesson or a series of lessons, the teaching of the lessons planned, the supervision of study, and the work on the home project.

In case both experienced and untrained men apply for this course, the group may be divided into two sections. Five exercises per week.

Professor Welles

Seminar Course in Agricultural Education

This course is designed primarily for graduate students. The work is planned for persons holding supervisory positions, such as principalships, superintendencies, directorships, etc., as well as for teachers who are looking forward to such advanced positions. Such topics will be taken up for investigation as will meet the needs of the group electing this work. Such subjects as organization, supervision, and administration of agricultural schools and vocational education are included.

Students who are eligible to the graduate school of the Massachusetts Agricultural College may receive credit towards an advanced degree for this work if their undergraduate studies in education warrant it. By arrangement.

Professor Hart

Professional Improvement Problems I

A seminar course for prospective teachers of vocational agriculture and employed teachers with limited experience. Deals with the Massachusetts system as it is and the problems confronting the instructor. Similar to Course II, which is intended for more experienced instructors or those who have attended a similar course before this season.

Under special arrangement of the Massachusetts Department of Education and the Massachusetts Agricultural College, students in this course may be admitted to Professor Hart's course in principles and methods of teaching.

Class meets for double periods five days each week for first two weeks. May be continued, on request, for a longer term at four days each week.

Mr. Heald

Professional Improvement Problems II

A seminar course for employed teachers or directors of vocational agriculture, dealing with problems which constantly arise in the agricultural schools of the State. Includes plans for the coming season and campaigns for improved methods based on experiences of men in service; for this season special emphasis on summer teaching of related subjects, the teaching and scoring of skills, the utilizing of individual differences, and the use of questions in relation to project study.

Under special arrangement of the Massachusetts Department of Education and the Massachusetts Agricultural College, students in this course may be admitted to Professor Hart's course in principles and methods of teaching.

Class meets for double periods five days each week for two weeks. May be continued, on request, for a longer term at four days each week.

Mr. Heald

SPECIAL TRACTOR COURSES

To meet the demand for short intensive courses in gas engines and tractors, the Department of Rural Engineering offers special two weeks' schools. The work is so arranged that the student spends the day in the lecture room, shop, or laboratory. Much time is given to practical work. The laboratory for farm motors is equipped with field machines, gasoline engines, tractors, and pumps. A complete assortment of machine accessories, consisting of carburetors and magnetos, is available for thorough instruction in gas engines. The enrollment in each of these schools is limited to 12 students. Candidates for the school will be enrolled in order of the application. The first 12 applications will make up the first school; the second 12, the second school, etc. The school will not be given for less than 10 students. Each school is limited to 12 students in order that each may receive individual attention and guidance in his work. Students are required to attend every class exercise and laboratory exercise. The students' working day begins at 9 o'clock, thus making it possible for many to come to Amherst by street car in the morning. No classes are held on Saturday. The registration fee for this course is the same as for the Winter School. There are no shop or laboratory fees. Arrangements for board and room may be made through the Short Course Office. The special tractor courses will be given during the spring term. Announcement of the dates of these courses will be made later.

THE ONE-YEAR VOCATIONAL COURSE IN POULTRY HUSBANDRY

J. C. GRAHAM, LOYAL F. PAYNE, LUTHER BANTA, WILLIAM E. RYAN, *Instructors.*

The institution of the One-Year Vocational Course in Poultry Husbandry is to meet the needs of those who wish to specialize in this branch of agriculture and devote practically all of their time to it, and who feel they cannot spend either two or four years in college. "Learn to do by doing" is the slogan for this course.

The material for this course has been carefully selected from the various courses for the four-year students. Use is made of the very practical portions, but enough of the more scientific work is given to enable the student to get a thorough grasp of the "whys and wherefores" of the subject. The former has been much enlarged upon, and an immense amount of practical laboratory work in care and management of poultry is required. The aim is to develop as much skill as time will permit. As this group of men are interested particularly in poultry husbandry, a minimum amount of work in other agricultural subjects is required, such as agronomy, fruit growing, market gardening, animal husbandry, agricultural engineering, etc., and considerable latitude is allowed in electing these courses.

The general plan is as follows: during the winter term the student takes Course 1, outlined below, and, in addition, selects about 15 credits in winter school work. From the beginning of the spring term, about April 4, until college closes in June, he devotes all his time to poultry work, taking Courses 1, 4, 5, and 7. During the fall term the student again devotes all his time to poultry work, continuing Courses 1, 5, and 7, in addition to Courses 2 and 3. As will be seen, the short course brings the student in contact with other

members of the faculty and acquaints him with important correlated work. As the class is limited to 12, it will be well for those who wish to take advantage of it to apply at once.

Course of Study

Course 1. Elementary Poultry Keeping. — A textbook course supplemented with lectures, recitations, etc., covering the entire field of elementary poultry keeping, special emphasis being laid upon the following subjects: opportunities in poultry keeping, poultry house construction, feeds and feeding, breeds and breeding, incubation, brooding, growing stock, poultry farm management, and poultry diseases. Five recitations per week throughout the year.

Course 2. — A practical laboratory course covering the following subjects: carpentry, fattening, killing, picking, dressing, caponizing, avian anatomy and physiology, making and applying disinfectants and lice powder, also identification and study of poultry feeds, etc. Two laboratory periods per week from October until December, inclusive.

Course 3. Poultry Judging. — Fall term. This course embodies the latest methods of judging egg production capacity by external characters as approved by the American Association of Instructors and Investigators in Poultry Husbandry; the history and evolution of our breeds and varieties of domestic fowl, their standard qualities, and their preparation and judging for exhibition purposes. In the latter portion of the course the "American Standard of Perfection" is used as a text. Two two-hour laboratory periods.

Course 4. — A practical laboratory course in incubation, brooding, and growing stock, equivalent to five laboratory periods per week from March to June, inclusive.

Course 5. — A conference, observation, and general reading course equivalent to one or two recitations per week during the fall and spring terms. In this course the student will become thoroughly acquainted with the best literature on poultry subjects through

books, station bulletins, scientific articles, poultry magazines, etc. A thorough discussion of the problems met by the practical poultrymen is a strong feature of this course.

Course 6. Supplementary Courses.—Each student shall select from the winter short course enough of the following subjects to give him at least 18 to 20 credit hours: pomology, soils, agronomy, market gardening, animal husbandry, farm management, dairying, rural engineering. Women may select courses in home economics.

Course 7. Poultry Management.—A general poultry practice course in the care and management of poultry, the work to be done morning, noon, and night, and other periods as necessity requires, the class to be responsible for the work in caring for specified flocks under the supervision of instructors from April until college closes, and from October until December, inclusive.

Entrance Requirements.—Applicants must be at least eighteen years of age and have a good elementary education.

Fees.—There is no tuition for residents of Massachusetts, but a laboratory fee of \$5 is required for the spring term and the same for the fall term.

Under the new arrangement, this course will begin Jan. 3, 1921, and continue until the last of December.

For further information concerning the course, write Poultry Department.

SHORT COURSES AT THE MASSACHUSETTS AGRICULTURAL COLLEGE

The Massachusetts Agricultural College offers through its short course administration the following schools and courses for 1920-21: —

The Two-Year Course in Practical Agriculture.

The Ten Weeks' Winter School.

The Summer School.

The One-Year Vocational Course in Poultry Husbandry.

The Two-Year Course

The Two-Year Course in Practical Agriculture is designed for young men and women, seventeen years of age or over, who have at least a common school education. This course was begun in December, 1918, with an enrollment of 37 students. The small enrollment was due to the fact that young men of military age were subject to the draft.

The enrollment for 1919-20 was 300 students.

The Two-Year Course in Practical Agriculture is so arranged that the student receives instruction in fundamental subjects, and is given during the second year an opportunity to select the lines of work in which he is particularly interested.

The first year consists of six months of study at the college. The term begins with the college fall term and closes with the winter term of the regular session. The same vacation periods are observed as in the regular four-year course.

The course of study is shown on page 31: —

THE COURSE OF STUDY OF THE TWO-YEAR COURSE IN PRACTICAL AGRICULTURE

First Year

<i>First Term</i>	<i>Second Term</i>	<i>Third Term</i>
Soil Fertility 3	Principles of Feeding . . 3	Six months' farm experience.
Types and Breeds . . . 5	Fruit Growing 3	
Fruit Growing 3	Repair of Farm Equipment 2	
Sanitation and Hygiene . 3	Dairy 3	
	Poultry 3	

Electives.

<i>First Term</i>	<i>Second Term</i>	
Farm Machinery 3	English 2	
English 3	Farm Law 5	
Farm Structures 5	Rural Home Life 3	
Rural Home Life 3	Farm Arithmetic 3	
Farm Arithmetic 3	Agricultural Opportunities ¹ 1	
Agricultural Opportunities ¹ 1		

Second Year

<i>First Term</i>	<i>Second Term</i>	<i>Third Term</i>
Insect Pests 5	Farm Management 5	Plant Diseases 5
Feeding and Management . 3		Marketing ² 5
		Social and Economic Problems 3

Two electives must be chosen from the following list and carried throughout the second year:—

<i>First Term</i>	<i>Second Term</i>	<i>Third Term</i>
Fruit Growing 5	Fruit Growing 5	Fruit Growing 5
Dairy 3	Dairy 3	Dairy 3
Poultry 5	Poultry 5	Poultry 5
Vegetable Gardening . . 5	Vegetable Gardening . . 5	Vegetable Gardening . . 5
Floriculture 5	Floriculture 5	Floriculture 5
General Horticulture . . 5	General Horticulture . . 5	General Horticulture . . 5

Additional electives from which the student may choose, one in the winter and two in the spring term:—

<i>First Term</i>	<i>Second Term</i>	<i>Third Term</i>
Farm Manufacturing . . . 3	Animal Breeding 3	Crops 5
Rural Home Life 3	Carpentry 3	Animal Diseases 3
	Dairy Bacteriology . . . 3	Agricultural Credit ² . . 5
	Rural Home Life 3	Drainage and Irrigation . 3
		Rural Home Life 3
		Gas Engines 5
		Feeding and Management . 3

¹ Required for women students.

² This course not given during 1920.

The work of placing students on selected farms is in charge of the assistant professor of farm management. Such farms are selected throughout the State as will enable the student to pursue the line of work he desires. Thus an effort is made to place the dairy student on a dairy farm, the student of pomology on a fruit farm, and so on. It should be clearly understood both by the employer and by the student that this six months of farm experience is educational in its nature. Farms are selected on the basis of the practical experience that will be gained from them by the students. This farm experience may, by arrangement, be secured on the home farm.

The course is not intended for students enrolled in high schools. Such students should finish the high school course. Students enrolled in high schools who wish to take the course should bring a statement either from the principal of the high school or from parent or guardian asking permission to be enrolled.

This course will appeal not only to young men and women, but also to men and women of mature years and practical experience who wish to know more about the business of farming. Although the course is planned to meet the needs of those who are not graduates of high schools, the instruction is not preparatory or elementary in its nature, but is so arranged that it will be of value to all. The greater amount of academic training that some of the students may possess will in a measure be offset by the fund of practical knowledge possessed by many who have completed only the elementary schools.

The Ten Weeks' Winter School

The Ten Weeks' Winter School is described in this bulletin. It was first organized about 1900, and has proved to be very popular with a more mature class of students.

The Summer School

The 1920 Summer School was under the joint direction of the Massachusetts Agricultural College and the Massachusetts Department of Education. Twenty-eight courses were offered in agriculture and horticulture, and seventeen courses in education. The enrollment was the largest in the history of the college. It is expected that this plan of co-operation will be continued during 1921, additional courses being offered to those who attended the 1920 Summer School.

DIRECTORY OF INFORMATION

A. The College

Those desiring college catalogues, the President's annual report, and other pamphlets giving full information relative to entrance requirements, courses of study, expenses, opportunities for student labor, and so forth, should address Ralph J. Watts, Secretary, Amherst, Mass.

All questions regarding admission to the college, either to the freshman class or to advanced standing, should be addressed to Prof. P. B. Hasbrouck, Registrar, Amherst, Mass.

B. The Experiment Station

The Experiment Station conducts investigations in as many lines of agricultural science and practice as its funds will permit. It has charge of the inspection of commercial fertilizers, commercial feeding stuffs, and milk-testing apparatus. Branch stations in cranberry and asparagus culture are maintained in other sections of the State.

The station considers the farmers' problems to be its problems, and desires to keep in touch with them.

Requests for bulletins reporting the results of experiments and inspections, and for other information on the work of the station, should be addressed to Fred W. Morse, Acting Director of the Experiment Station, Amherst, Mass.

C. The Graduate School

Questions relating to courses offered leading to the degrees of Master of Science and Doctor of Philosophy, admission and work required, should be addressed to Dr. Charles E. Marshall, Director of the Graduate School, Amherst, Mass.

D. The Extension Service

Inquiries of a general nature regarding the work of the Extension Service, extension publications, or requests for new lines of work should be addressed to John D. Willard, Director of Extension Service, Amherst, Mass.

E. Short Courses

For information concerning the Short Courses, the Two-Year Course in Practical Agriculture, the Ten Weeks' Winter School, the Summer Schools, write or apply to John Phelan, Director of Short Courses, Amherst, Mass.

THE MASSACHUSETTS AGRICULTURAL COLLEGE

TEN WEEKS' WINTER SCHOOL

Application for Enrollment

I hereby make application for admission to the Ten Weeks' Winter Courses which are to begin Jan. 3, 1921. I am enclosing the registration fee of five dollars (\$5) in cash, check, or money order. (Designate which one.)

Name (Mr., Mrs., or Miss).....

Home address

Date of application.....

My choice of courses is as follows: —

1. 3. 5.

2. 4. 6.

.....

Mail this blank, enclosing fee, to John Phelan, Director of Short Courses, Massachusetts Agricultural College, Amherst, Mass. Checks or money orders should be made payable to the Massachusetts Agricultural College.





