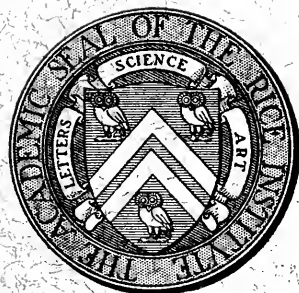


THE  
RICE INSTITUTE  
PAMPHLET

Vol. XXXIV January, 1947

No. 1

ANNOUNCEMENTS ISSUE



ANNOUNCEMENTS FOR THE ACADEMIC YEAR  
BEGINNING SEPTEMBER EIGHTEENTH  
NINETEEN HUNDRED AND  
FORTY-SEVEN

*THE RICE INSTITUTE PAMPHLET is published at Houston, Texas, and is issued in January, April, July, and October. It was entered as second-class matter, April 15, 1915, at the post office at Houston, Texas, under the act of August 24, 1912.*

THE  
RICE INSTITUTE  
PAMPHLET

Vol. XXXIV

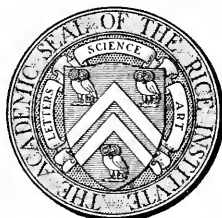
January, 1947

No. 1

ANNOUNCEMENTS FOR 1947-1948  
OF THE RICE INSTITUTE

FOUNDED IN THE CITY OF HOUSTON, TEXAS  
BY WILLIAM MARSH RICE  
AND DEDICATED BY HIM TO THE  
ADVANCEMENT OF LETTERS  
SCIENCE AND ART

OPENED FOR THE RECEPTION OF STUDENTS  
IN THE AUTUMN OF  
NINETEEN HUNDRED AND TWELVE



THE BOARD OF TRUSTEES

HARRY CLAY HANSZEN: CHAIRMAN  
GEORGE RUFUS BROWN: VICE-CHAIRMAN  
HARRY CAROTHERS WIESS: VICE-CHAIRMAN  
FREDERICK RICE LUMMIS: SECRETARY-TREASURER  
LAMAR FLEMING, JR.  
WILLIAM ALEXANDER KIRKLAND  
GUS SESSIONS WORTHAM

TRUSTEES EMERITI

ALEXANDER SESSUMS CLEVELAND  
EDGAR ODELL LOVETT  
BENJAMIN BOTTS RICE  
JOHN THADDEUS SCOTT

\*LD  
4711  
.R3a  
1947/48

# THE RICE INSTITUTE PAMPHLET

ANNOUNCEMENTS FOR 1947-48

Vol. XXXIV

January, 1947

No. 1

---

---

## CONTENTS

PAGE

ACADEMIC CALENDAR . . . . .	v
OFFICERS OF ADMINISTRATION . . . . .	vi
THE RICE INSTITUTE . . . . .	1
THE NAME . . . . .	1
BRIEF HISTORICAL SKETCH . . . . .	1
INSTRUCTIONAL STAFF . . . . .	6
FACULTY . . . . .	6
FACULTY IN NAVAL SCIENCE . . . . .	14
ASSISTANTS AND FELLOWS . . . . .	14
FACULTY COMMITTEES . . . . .	17
REQUIREMENTS FOR ADMISSION TO THE RICE INSTITUTE . . . . .	19
GENERAL UNDERGRADUATE REQUIREMENTS . . . . .	19
SPECIFIC PLAN OF UNDERGRADUATE ADMISSION . . . . .	20
PROCEDURES FOR UNDERGRADUATE ADMISSION . . . . .	22
ADMISSION OF TRANSFERS FROM OTHER COLLEGES . . . . .	24
SPECIAL INFORMATION FOR ALL UNDERGRADUATE APPLICANTS . . . . .	25
ADMISSION TO GRADUATE STANDING . . . . .	26
EXPENSES . . . . .	28
FEES . . . . .	28
RESIDENTIAL ACCOMMODATIONS . . . . .	30
HEALTH SERVICE . . . . .	30
STIPENDS AND FUNDS . . . . .	31
FELLOWSHIPS . . . . .	31
SCHOLARSHIPS AND AWARDS . . . . .	34
OPPORTUNITIES FOR SELF-HELP . . . . .	43
CURRICULA AND DEGREES . . . . .	44
STANDING IN SCHOLARSHIP OF UNDERGRADUATE STUDENTS . . . . .	53

	PAGE
LECTURES AND PUBLICATIONS . . . . .	55
PUBLIC LECTURES . . . . .	55
FACULTY LECTURES . . . . .	55
THE SHARP LECTURES . . . . .	55
THE GODWIN LECTURES . . . . .	55
MUSIC LECTURES . . . . .	56
THE ROCKWELL LECTURES . . . . .	56
RICE INSTITUTE LECTURES . . . . .	56
THE RICE INSTITUTE PUBLICATIONS . . . . .	57
LIBRARIES AND LABORATORIES . . . . .	58
LIBRARY . . . . .	58
LABORATORY INSTALLATION . . . . .	58
STUDENT ACTIVITIES . . . . .	67
PUBLICATIONS AND ORGANIZATIONS . . . . .	67
HONOR SYSTEM . . . . .	68
HONOR SOCIETIES . . . . .	68
SUBJECTS OF INSTRUCTION FOR 1947-48 . . . . .	69
COURSES IN ARTS AND SCIENCES . . . . .	69
BIOLOGY . . . . .	69
BUSINESS ADMINISTRATION AND ECONOMICS . . . . .	74
CHEMISTRY . . . . .	77
EDUCATION . . . . .	83
ENGLISH . . . . .	85
GERMAN . . . . .	88
HISTORY . . . . .	89
MATHEMATICS . . . . .	93
PHILOSOPHY . . . . .	97
PHYSICS . . . . .	98
PSYCHOLOGY . . . . .	103
ROMANCE LANGUAGES . . . . .	104
SOCIOLOGY AND PHILANTHROPY . . . . .	106
COURSES IN PHYSICAL TRAINING AND PHYSICAL EDUCATION . . . . .	107
PHYSICAL TRAINING . . . . .	107
PHYSICAL EDUCATION . . . . .	108
COURSES IN ENGINEERING . . . . .	111
ENGINEERING . . . . .	113
CHEMICAL ENGINEERING . . . . .	114
CIVIL ENGINEERING . . . . .	117
ELECTRICAL ENGINEERING . . . . .	120
MECHANICAL ENGINEERING . . . . .	123
COURSES IN ARCHITECTURE . . . . .	125
COURSES IN NAVAL SCIENCE . . . . .	129
INDEX . . . . .	137

# ACADEMIC CALENDAR

## 1947

September 18 . . . .	Registration of Students in the Academic, Architectural, and Physical Education Courses
September 19 . . . .	Registration of Students in Engineering
September 22 . . . .	Opening of Courses
September 24 . . . .	Matriculation Address
November 26 . . . .	Beginning of Thanksgiving Recess at 6:00 P.M.
December 1 . . . . .	Resumption of Courses at 8:00 A.M.
December 20 . . . . .	Beginning of Christmas Recess at 1:00 P.M.

## 1948

January 5 . . . . .	Resumption of Courses at 8:00 A.M.
January 26-February 5 .	February Examinations
February 9 . . . . .	Resumption of Courses at 8:00 A.M.
February 22 . . . . .	Washington's Birthday (Monday, February 23, a holiday)
March 2 . . . . .	Texas Independence Day
April 21 . . . . .	San Jacinto Day
April 24 . . . . .	Main Entrance Examination Period
May 24-June 4 . . . . .	Final Examinations
June 5-7 . . . . .	Thirty-Fifth Commencement
June 19 . . . . .	Second Entrance Examination Period (principally for transfers)

---

September 16 . . . . .	Registration of Students in the Academic, Architectural, and Physical Education Courses
September 17 . . . . .	Registration of Students in Engineering
September 20 . . . . .	Opening of Courses
September 22 . . . . .	Matriculation Address
November 24 . . . . .	Beginning of Thanksgiving Recess at 6:00 P.M.
November 29 . . . . .	Resumption of Courses at 8:00 A.M.
December 18 . . . . .	Beginning of Christmas Recess at 1:00 P.M.

## 1949

January 3 . . . . .	Resumption of Courses at 8:00 A.M.
January 24-February 3 .	February Examinations

EDGAR ODELL LOVETT, Ph.D., Sc.D., LL.D.  
*President Emeritus*

## OFFICERS OF ADMINISTRATION

WILLIAM VERMILLION HOUSTON, Ph.D.  
*President*

HARRY BOYER WEISER, Ph.D.  
*Dean*

HUGH SCOTT CAMERON, M.E.  
*Assistant Dean for Student Activities*

SAMUEL GLENN McCANN, M.A.  
*Registrar*

JOSEPH DAVID THOMAS, A.M.  
*Assistant Registrar*

JOHN THOMAS McCANTS, M.A.  
*Bursar*



ANNOUNCEMENTS FOR 1947-1948

Digitized by the Internet Archive  
in 2010 with funding from  
Lyrasis Members and Sloan Foundation

# THE RICE INSTITUTE

## THE NAME

THE institution bears the name of the founder, the late William Marsh Rice. It aspires to university standing of the highest grade. Dedicated to the advancement of literature, science, and art, its educational program of liberal and technical learning may justify the designation "Institute" as representing the functions of a teaching university and, at least in some of its departments, those of the more recent research institutions established in this country and abroad.

## BRIEF HISTORICAL SKETCH

MORE than fifty years ago several public-spirited citizens of the community asked Mr. Rice to bear the expense of building a new public high school for the city of Houston. This direct gift to the city's welfare Mr. Rice was unwilling to make, but a little later, taking into his confidence a half-dozen friends, he made known to them his desire to found a much larger educational enterprise for the permanent benefit of the city and state of his adoption. These gentlemen were organized into a Board of Trustees for the new foundation, which was incorporated in 1891 under a broad charter granting the trustees large freedom in the future organization of a non-political and non-sectarian institution to be dedicated to the advancement of letters, science, and art. As a nucleus for an endowment fund, Mr. Rice at this time made over an interest-bearing note of two hundred thousand dollars to the original Board of Trustees, consisting of himself and the late James A. Baker, J. E. McAshan, E. Raphael, F. A. Rice, A. S. Richardson, and C. Lombardi. Under the terms of the charter, the board is a self-perpetuating body of seven members. Vacancies since its organization have been filled by the election of the late William Marsh Rice, Jr., Mr. Benjamin Botts Rice, Mr. Edgar Odell Lovett, Mr. John Thaddeus Scott, Mr. Alexander Sessums Cleveland, the late Edward Andrew Peden, the late Robert Lee Blaffer, Mr. Harry Clay Hanszen, Mr. George Rufus Brown, Mr. Harry Carothers Wiess, Dr. Frederick

Rice Lummis, Mr. Lamar Fleming, Jr., Mr. William Alexander Kirkland, and Mr. Gus Sessions Wortham.

It was the unalterable will of the founder that the development of the work which he had conceived should progress no further during his lifetime. However, in the remaining days of his life he increased the endowment fund from time to time by transferring to the trustees the titles to certain of his properties, and in the end made the new foundation his residuary legatee. Upon the termination of the long years of litigation which followed Mr. Rice's death in 1900, the Board of Trustees found the Institute in possession of an estate divided by the provisions of the founder's will into almost equal parts available for equipment and endowment, respectively. While proceeding to convert the non-productive properties of the estate into income-bearing investments, the trustees called Mr. Edgar Odell Lovett, a professor in Princeton University, to assist them in developing the founder's far-reaching plans. Before taking up his residence in Houston, the future president visited the leading educational and scientific establishments of the world, returning in the summer of 1909 from a year's journey of study that extended from England to Japan. About this time negotiations were completed by which the Institute secured a campus of three hundred acres situated on the extension of Houston's main thoroughfare, three miles from the center of the city—a tract of ground universally regarded as the most appropriate within the vicinity of the city.

Another early decision of the trustees of the Institute was the determination that the new university should be housed in noble architecture worthy of the founder's high aims; and upon this idea they entered with no lower ambition than to establish on the campus of the Institute a group of buildings conspicuous alike for their beauty and for their utility, which should stand not only as a worthy monument to the founder's philanthropy, but also as a distinct contribution to the architecture of our country. With this end in view they determined to commit to Messrs. Cram, Goodhue, and Ferguson, of Boston and New York, the task of designing a general architectural plan to embody in the course of future years the realization of the educational program which had been adopted for the Institute. Such a general plan, the work of the late Ralph Adams Cram, exhibiting in itself many attractive elements of the architec-

ture of Italy, France, and Spain, was accepted by the board in the spring of 1910. Immediately thereafter plans and specifications for an administration building were prepared, and in the following July the contract for its construction was awarded; three months later the erection of a mechanical laboratory and power-house was begun, and by the next autumn the construction of two wings of the first residential hall for men was well under way. In the preparation of preliminary plans for its initial building operations, the Institute enjoyed the coöperation of an advisory committee consisting of the late Professor Ames, director of the physical laboratory, and afterwards president, the Johns Hopkins University; Professor Conklin, director of the biological laboratory, and at present professor emeritus and special lecturer, Princeton University; the late Professor Richards, chairman of the department of chemistry, Harvard University; and the late Professor Stratton, director of the National Bureau of Standards, subsequently chairman of the corporation of the Massachusetts Institute of Technology. In 1911, on the seventy-fifth anniversary of Texas Independence, the cornerstone of the administration building was laid by the trustees. This building, the mechanical laboratory of the engineering quadrangle, the power-house, and the first two wings of the first residential hall for men were ready for occupancy at the beginning of the first academic year in the fall of 1912. The third wing of this residential hall, begun in 1913, was first occupied by students in the autumn of 1914; while the construction of the physics laboratories and lecture amphitheater, begun also in 1913, was completed in the summer of 1914 from plans prepared by Messrs. Cram and Ferguson under the direction of Mr. H. A. Wilson, D.Sc., F.R.S., resident professor of physics in the Institute. In January, 1916, ground was broken for the first wing of the second residential group for men; the construction of this wing was completed by September, 1916. Further building operations were suspended during the war. In the meantime the athletic field house and other structures of the exhibition field were erected in 1920. At the commencement exercises of 1923 ground was broken for the new laboratory for chemistry, the plans for which were prepared by Messrs. Cram and Ferguson and Mr. W. W. Watkin, associate architects, under the direction of Mr. H. B. Weiser, Ph.D., resident professor of chemistry in the Insti-

tute. The construction of this laboratory was completed during the academic year 1924-25.

Through personal association with several generations of Rice students, Mr. George Cohen, of Houston, was led to make generous provision for the Robert and Agnes Cohen House in honor of his parents, for long years well-known and highly respected citizens of Texas. This beautiful building, constructed in the materials and architecture of the first of the Rice quadrangles, designed to afford to the faculty the advantages of a club-house on the campus, was dedicated at the annual homecoming meeting of the Association of Rice Alumni on Thanksgiving Day of the year 1927.

In the early autumn of 1912, an academic festival in observance of the formal opening of the Institute was held under altogether favorable conditions of weather, most generous coöperation of the community and commonwealth, and the heartening encouragement of several hundred scholars and scientists who came to Houston to assist in the launching of the new university. Chief among these distinguished representatives of life and learning were the twelve foreign savants who had consented to participate in the inaugural program by preparing series of lectures in the liberal humanities of philosophy, history, letters, and art, and in the fundamental sciences of mathematics, physics, chemistry, and biology. A complete account of the proceedings of the four days devoted to this celebration has been embodied in three commemorative volumes, in which there appear, in particular, the inaugural lectures.

The actual work of instruction of the first academic year began on the twenty-third day of September, 1912, the anniversary of the death of the founder. In the presence of the trustees of the Institute, members of the teaching staff, and representative citizens of the community, the first class of students was received in the faculty chamber of the administration building with appropriate ceremonies on September 26. The scholastic work of the first academic year was limited to a single class of Freshmen of a standard of preparation as high as the best public and private high schools were capable of attaining.

The first class consisted of seventy-seven members, of whom thirty-six were granted degrees at the first commencement in June, 1916. From that small beginning, the enrollment has expanded

until it reached the limit that could be handled of about one thousand five hundred students. Since 1924 it has been necessary to limit the admission of new students to four hundred in order to keep the total enrollment within the limits indicated by available funds. In the thirty-five years of its history over thirteen thousand individuals have attended the Rice Institute, and over five thousand five hundred degrees have been awarded in thirty-three commencement exercises.

In 1941, upon attaining the age of seventy, Mr. Lovett announced his retirement as president. He was prevailed upon to continue in active service until a successor could be appointed. Because of the second world war this appointment was delayed almost five years until Mr. William V. Houston assumed the presidency in March, 1946, and Mr. Lovett was made President Emeritus.

# INSTRUCTIONAL STAFF

## FACULTY

ALTENBURG, EDGAR

A.B. (Columbia) 1911, M.A. (Columbia) 1912, Ph.D. (Columbia) 1916

Assistant Professor of Biology

BATTISTA, JOSEPH LLOYD

Certificat d'Études françaises (Bordeaux) 1919, Diplômé d'Études supérieures (Bordeaux) 1919, B.A. (Michigan) 1920, M.A. (Washington Univ.) 1923, M.A. (Harvard) 1929

Instructor in Spanish and Italian

BONNER, TOM WILKERSON

B.S. (Southern Methodist) 1931, M.A. (Rice) 1932, Ph.D. (Rice) 1934

Professor of Physics

BOURGEOIS, ANDRÉ MARIE GEORGES

Bachelier ès Lettres (Paris) 1921, Bachelier en Droit (Paris) 1923, Certifié d'Études supérieures de lettres (Paris) 1930, M.A. (Texas) 1934, Docteur d'Université (Paris) 1945, Officier de l'Instruction Publique 1945

Assistant Professor of French

BRADEN, PATRICK O'CONNOR

B.S. in M.E. (Rice) 1944

Instructor in Mechanical Engineering

BRAY, HUBERT EVELYN

B.A. (Tufts) 1910, M.A. (Harvard) 1916, Ph.D. (Rice) 1918

Professor of Mathematics

BRUNK, HUGH DANIEL

A.B. (California) 1940, M.A. (Rice) 1942, Ph.D. (Rice) 1944

Instructor in Mathematics

CALHOUN, HAROLD EUGENE

B.A. (Rice) 1932

Instructor in Architecture



CALKIN, JOHN WILLIAMS

A.B. (Columbia) 1933, A.M. (Harvard) 1934, Ph.D. (Harvard)  
1937

Associate Professor of Mathematics

CAMDEN, CHARLES CARROLL

A.B. (Centre College) 1925, M.A. (Iowa) 1928, Ph.D.  
(Iowa) 1930

Assistant Professor of English

CAMERON, HUGH SCOTT

M.E. (Stevens) 1925

Assistant Professor of Mechanical Engineering and Assistant  
Dean for Student Activities

CHANDLER, ASA CRAWFORD

B.A. (Cornell) 1911, M.S. (California) 1912, Ph.D. (California)  
1914

Professor of Biology

CHAPMAN, ALAN JESSE

B.S. in M.E. (Rice) 1945

Instructor in Engineering

CHILLMAN, JAMES, JR.

B.S. in Arch. (Pennsylvania) 1913, M.S. in Arch. (Pennsylvania)  
1914, F.A.A.R. (Am. Acad. in Rome) 1922

Associate Professor of Architecture

CRAIG, HARDIN, JR.

A.B. (Princeton) 1929, A.M. (Harvard) 1931, Ph.D. (Harvard)  
1937

Associate Professor of History

DAVIES, JOSEPH ILOTT

B.A. (Rice) 1928, M.A. (Rice) 1929, Ph.D. (Rice) 1937

Assistant Professor of Biology

DEZURKO, EDWARD R.

B.S. in Ed. (Illinois) 1939, B.S. in Arch. (Illinois) 1940, M.S. in  
Arch. (Columbia) 1942

Assistant Professor of Architecture

DIX, WILLIAM S.

B.A. (Virginia) 1931, M.A. (Virginia) 1932, Ph.D. (Chicago)  
1946

Assistant Professor of English

DOGGETT, JOHN RENTZ, JR.

B.S. in M.E. (Rice) 1936

Instructor in Mechanical Engineering

DUNAWAY, JAMES KARL

B.A. (Rice) 1936, B.S. in Arch. (Rice) 1937, M.A. (Rice) 1938,

M.S. (Columbia) 1941

Assistant Professor of Architecture

EHRHARDT, CHARLES D., JR.

B.S. in M.E. (Rice) 1941

Instructor in Mechanical Engineering

FREUND, FRIEDRICH ERNST MAX

Ph.D. (Leipzig) 1902

Professor of German

FULTON, JAMES STREET

B.A. (Vanderbilt) 1925, M.A. (Vanderbilt) 1929, Ph.D. (Cornell) 1934

Assistant Professor of Philosophy

FUSON, REYNOLD CLAYTON

A.B. (Montana) 1920, A.M. (California) 1921, Ph.D. (Minnesota) 1924

Visiting Professor of Chemistry

GALLEGLY, JOSEPH S., JR.

B.A. (Rice) 1925, M.A. (Rice) 1926

Instructor in English

GARRISON, ALLEN DARNABY

B.A. (Rice) 1918, M.S. (Rice) 1920, Ph.D. (Rice) 1921

Associate Professor of Chemical Engineering

GIRARD, PIERRE LÉON

Bachelier ès Lettres (Paris) 1932, Licencié ès Lettres (Paris) 1934, Diplômé d'Études supérieures (Paris) 1936, Agrégé de l'Université (Paris) 1943

Assistant Professor of French

HARTSOOK, ARTHUR J.

A.B. (Nebraska Wesleyan) 1911, B.S. in Ch.E. (M.I.T.) 1920, M.S. (M.I.T.) 1921

Professor of Chemical Engineering

HEAPS, CLAUDE WILLIAM

B.S. (Northwestern) 1909, Ph.D. (Princeton) 1912

Professor of Physics and Director of the Library

HERMANCE, GILBERT LESLIE

B.S. (Oregon) 1927, M.A. (Columbia) 1930

Associate Professor of Physical Education

HODGES, JOHN ELTON

B.B.A. (Texas) 1935, M.B.A. (Texas) 1937

Assistant Professor of Economics

HODGES, LEE

S.B. (Harvard) 1930, M.A. (Rice) 1934

Instructor in French and Spanish

HOUSTON, WILLIAM VERMILLION

B.A., B.S. in Ed. (Ohio State) 1920, S.M. (Chicago) 1922, Ph.D.

(Ohio State) 1925

Professor of Physics and President of the Rice Institute

LEAR, FLOYD SEYWARD

A.B. (Rochester) 1917, A.M. (Harvard) 1920, Ph.D. (Harvard)

1925

Professor of History

LEIFESTE, A. A., JR.

A.B. (Southwestern) 1934, B.S. in Arch. (Rice) 1941

Instructor in Architecture

LEWIS, ARTHUR ORCUTT, JR.

A.B. (Harvard) 1941, A.M. (Harvard) 1942

Instructor in English

LOUIS, ANDREW

Ph.B. (Wesleyan) 1929, Ph.D. (Cornell) 1935

Assistant Professor of German

LOVETT, EDGAR ODELL

A.B. (Bethany) 1890, M.A., Ph.D. (Virginia) 1895, Ph.D. (Leip-

zig) 1896, LL.D. (Drake, Tulane, Baylor, Bethany), Sc.D. (Col-

orado College)

President Emeritus of the Rice Institute

LYLE, C. COLLIS, JR.

B.A. (Cornell) 1933, M.A. (Cornell) 1934

Instructor in German

**MCCANN, SAMUEL GLENN**

Ph.B. (Wooster) 1914, M.A. (Rice) 1917  
Instructor in Jurisprudence and Registrar

**MCCANTS, JOHN THOMAS**

B.S. (Marion Inst.) 1902, B.A. (Marion Inst.) 1905, M.A. (Virginia) 1906, M.A. (Yale) 1909  
Instructor in Business Administration and Bursar

**MCDOUGLE, CLYDE CALVIN**

B.S. in Ph. Ed. (Rice) 1942  
Instructor in Physical Education

**MCENANY, MICHAEL VINCENT**

B.S. in E.E. (Colorado College) 1929, M.A. in Physics (Dartmouth) 1931  
Assistant Professor of Electrical Engineering

**McKILLOP, ALAN DUGALD**

A.B. (Harvard) 1913, A.M. (Harvard) 1914, Ph.D. (Harvard) 1920  
Professor of English

**MANDELBROJT, SZOLEM**

B.S. (Warsaw) 1917, Docteur ès Science (Paris) 1923  
Professor of Mathematics

**MANDEVILLE, CHARLES EARLE, JR.**

B.A. (Rice) 1940, M.A. (Rice) 1941, Ph.D. (Rice) 1943  
Instructor in Physics  
(On leave of absence)

**MARSH, MALCOLM RAY**

B.S. in C.E. (Texas) 1927  
Instructor in Engineering Drawing

**MILLIGAN, WINFRED O.**

A.B. (Illinois College) 1930, M.A. (Rice) 1932, Ph.D. (Rice) 1934, Sc.D. (Illinois College) 1946  
Assistant Professor of Chemistry

**MORAUD, MARCEL**

Bachelier ès Lettres (Poitiers) 1907, Licencié ès Lettres (Paris) 1908, Diplômé d'Etudes supérieures (Paris) 1910, Agrégé de l'Université (Paris) 1914, Docteur ès Lettres (Paris) 1933  
Professor of French

MOREHEAD, JAMES CADDALL, JR.

A.B. (Princeton) 1935, B.Arch. (Carnegie Inst. of Tech.) 1939  
Assistant Professor of Architecture

NEELY, JESS CLAIBORNE

LL.B. (Vanderbilt) 1924

Director of Athletics and Head Football Coach

NICHOLAS, HENRY OSCAR

A.B. (Oberlin) 1919, Ph.D. (Yale) 1923

Associate Professor of Chemistry

OBERLÉ, EUGENE JEAN

A.B. (Stanford) 1915, A.M. (Stanford) 1916

Instructor in French

PARISH, JOHN EDWARD

B.A. (Sam Houston) 1934, M.A. (Texas) 1941

Instructor in English

PATTIE, FRANK ACKLEN

B.A. (Vanderbilt) 1922, M.A. (Princeton) 1923, M.A. (Harvard)

1925, Ph.D. (Princeton) 1925

Assistant Professor of Psychology

PERRY, WILLIAM C.

B.A. (Rice) 1938, LL.B. (Texas) 1941

Instructor in Business Law

RICHTER, GEORGE HOLMES

B.A. (Rice) 1926, M.A. (Rice) 1927, Ph.D. (Rice) 1929

Associate Professor of Organic Chemistry

RISSE, J. R.

A.B. (Franklin and Marshall) 1931, M.A. (Princeton) 1935,

Ph.D. (Princeton) 1938

Assistant Professor of Physics

RUSSELL, DONALD MATTHEWS

B.S. in M.E. (Pittsburgh) 1934

Instructor in Mechanical Engineering

RYON, LEWIS BABCOCK

C.E. (Lehigh) 1917

Professor of Civil Engineering

SHELTON, FRED VERNON

B.A. (Rice) 1926, M.A. (Rice) 1928, M.A. (Univ. Nac. de Mexico) 1942

Assistant Professor of French

SIMONS, VERNE FRANKLIN

A.B. (Kansas) 1923, A.M. (Kansas) 1925, C.P.A. 1931

Assistant Professor of Economics

SIMS, JAMES REDDING

B.S. in C.E. (Rice) 1941

Instructor in Civil Engineering

SLAUGHTER, JOHN WILLIS

A.B., B.D. (Lombard) 1898, Ph.D. (Michigan) 1901

Lecturer in Civics and Philanthropy

SMITH, JOHN TREANOR

B.S. in Ch.E. (Rice) 1940, M.S. (Michigan) 1941, Ph.D. (Michigan) 1943

Assistant Professor of Chemistry

SQUIRE, CHARLES FRANCIS

Ph.D. (Johns Hopkins) 1937

Assistant Professor of Physics

TALMAGE, ROY V.

A.B. (Maryville College) 1938, M.A. (Richmond) 1940

Instructor in Biology

TEN BRINK, KARL CORNELIUS

B.S. in Ch.E. (Rice) 1937, M.A. (Rice) 1939, Ph.D. (Rice) 1940

Instructor in Chemical Engineering

THOMAS, JOSEPH DAVID

Ph.B. (Chicago) 1929, A.M. (Chicago) 1930

Assistant Professor of English and Assistant Registrar

TSANOFF, RADOSLAV ANDREA

B.A. (Oberlin) 1906, Ph.D. (Cornell) 1910

Professor of Philosophy

ULRICH, FLOYD EDWARD

B.S. in E.E. (Union College) 1926, M.S. in E.E. (Union College) 1928, A.M. (Harvard) 1929, Ph.D. (Harvard) 1938

Assistant Professor of Mathematics

- WATERS, JAMES STEPHEN  
B.S. (Rice) 1917  
Professor of Electrical Engineering
- WATKIN, WILLIAM WARD  
B.S. in Arch. (Pennsylvania) 1908  
Professor of Architecture
- WEISER, HARRY BOYER  
B.A. (Ohio State) 1911, M.A. (Ohio State) 1912, Ph.D. (Cornell)  
1914  
Professor of Chemistry and Dean
- WELSH, HUGH CLAYTON  
M.D. (Texas) 1923  
Instructor in Biology
- WHITING, GEORGE WESLEY  
A.B. (West Virginia) 1908, A.M. (Harvard) 1913, Ph.D. (Chi-  
cago) 1926  
Assistant Professor of English
- WILLIAMS, GEORGE GUION  
B.A. (Rice) 1923, M.A. (Rice) 1925  
Assistant Professor of English
- WILSON, HAROLD ALBERT  
M.A. (Cambridge) 1904, M.Sc. (Leeds) 1897, D.Sc. (London)  
1900, F.R.S.  
Professor of Physics
- WISCHMEYER, CARL RIEHLE  
B.S. in E.E. (Rose Polytechnic) 1937, M.Eng. in E.E. (Yale)  
1939, E.E. (Rose Polytechnic) 1942  
Assistant Professor of Electrical Engineering
- WYATT, EDWIN MATHER  
B.S. (Kansas Teachers College) 1917, M.S. (Wisconsin) 1927  
Instructor in Engineering Drawing
- YOUNG, HOMER HARRY  
B.A. (Austin College) 1930, M.A. (Southern Methodist) 1937  
Instructor in Education

## FACULTY IN NAVAL SCIENCE

*(As of January 1, 1947)*

BOORMAN, JAMES ALBERT, JR.  
B.S. (U.S. Naval Academy) 1938  
Commander, USN  
Assistant Professor of Naval Science

COOPER, JACOB ELLIOTT  
B.S. (U.S. Naval Academy) 1926  
Captain, USN  
Professor of Naval Science

EARLY, CLELAND EDWARD  
B.A. (Texas Christian) 1941  
Major, USMC  
Assistant Professor of Naval Science

SAMPSON, ROBERT ROY  
B.S. (U.S. Naval Academy) 1931  
Commander, USN  
Assistant Professor of Naval Science

TATONE, LIGE  
B.A. (Berea) 1946  
Lieutenant (j.g.), USN  
Instructor in Naval Science

## ASSISTANTS AND FELLOWS

BANEWICZ, JOHN JOSEPH  
Sc.B. in Chem. (Brown) 1944  
Fellow in Chemistry

BAUMGARTEN, HENRY ERNEST  
B.A. (Rice) 1943, M.A. (Rice) 1944  
Fellow in Chemistry

BESDIN, DAVID JACOB  
B.S. (Miami) 1946  
Fellow in Physics



BRUNSON, EMMETT EVANDER

B.A. (Rice) 1929, M.A. (Columbia) 1932

Assistant in Physical Education and Coach of Track

BUSHEY, GORDON LAKE

B.S. in Ch.E. (Rice) 1943, M.A. (Rice) 1944

Eastman Fellow in Chemistry

DARNELL, REZNEAT MILTON, JR.

B.S. (Southwestern at Memphis) 1946

Fellow in Biology

DEAN, ALICE CROWELL

B.A. (Rice) 1916, M.A. (Rice) 1919

Librarian and Assistant in Mathematics

DONALDSON, JOHN RILEY, JR.

B.S. (Rice) 1945

Fellow in Physics

EVANS, JOHN ELLIS

B.A., B.S. in Ed. (Ohio State) 1936, M.A. (Ohio State) 1937

Fellow in Physics

FARISS, ROBERT ELWYN

B.S. (Rice) 1942

Fellow in Chemistry

FISCHER, KATHERINE MARTHA

B.A. (Rice) 1944, M.A. (Rice) 1945

Assistant in History

GRAGG, HUGH ERNEST

B.A. (Rice) 1941, B.S. in Arch. (Rice) 1942

Fellow in Architecture

HARRIS, JAMES COLWELL

B.A. (Rice) 1942, M.A. (Rice) 1944

Fellow in Physics

HAY, WALLACE SIMPSON

Sc.B. in Chem. (Brown) 1943

Fellow in Chemistry

LOVE, WILLIAM FREEMAN

B.S. (Rice) 1945

Fellow in Physics

- McCALL, MILDRED  
B.A. (Rice) 1946  
Fellow in History
- MACKEY, WILLIAM STURGES, JR.  
B.A. (Rice) 1943  
Assistant in Business Administration
- MALICH, CHARLES WILSON  
B.A. (Rice) 1940, M.A. (Minnesota) 1942  
Fellow in Physics
- MORGAN, CHESTER STEPHEN, JR.  
B.S. in Ch.E. (Rice) 1944  
Fellow in Chemistry
- PEARSON, ANGUS GEORGE  
B.A. (Texas) 1938  
Fellow in Physics
- PEARSON, ERNA HERZOG  
B.A. (Texas) 1945, M.A. (Texas) 1946  
Assistant in Mathematics
- PHILLIPS, GERALD CLEVELAND  
B.A. (Rice) 1944  
Fellow in Physics
- RANDALL, ROYAL WILLIAM, JR.  
B.A. (Rice) 1944  
Fellow in Physics
- SLAWSON, EUGENE  
B.A. (Texas Christian) 1944  
Fellow in Physics
- SWANSON, DON RICHARD  
B.S. (Calif. Inst. of Tech.) 1945  
Fellow in Physics
- TAYLOR, HOWARD EDWARD  
B.A. (Rice) 1942, M.S. (Calif. Inst. of Tech.) 1943  
Assistant in Mathematics
- TERRELL, NELSON JAMES, JR.  
B.A. (Rice) 1944  
Fellow in Physics

- VONDY, ELIZABETH CAROL  
B.A. (Rice) 1946  
Fellow in English
- WATT, LORE MERTEN  
B.A. (Rice) 1946  
Fellow in Chemistry
- WEBSTER, JACKSON DAN  
B.S. (Whitworth) 1939, M.S. (Cornell) 1941  
Fellow in Biology
- WHITE, THOMAS JEFFERSON  
B.A. (Rice) 1940  
Assistant in Mathematics
- WHITEHURST, HARRY BERNARD  
B.A. (Rice) 1944  
Fellow in Chemistry
- WOJECKI, EDWARD J.  
B.S. (Louisiana Tech.) 1936  
Assistant in Physical Education

## FACULTY COMMITTEES

- THE President is *ex officio* a member of all committees.
- COMMITTEE ON ADMISSIONS: Mr. McCann, chairman; Messrs. Bonner, Garrison, Lear, Ryon, Thomas, and Ulrich.
- COMMITTEE ON GRADUATE INSTRUCTION: The Dean of Graduate Studies, *ex officio*, chairman; Messrs. Chandler, McKillop, Weiser, and Wilson.
- COMMITTEE ON EXAMINATIONS AND STANDING: Mr. McCants, chairman; Messrs. Lear, McEnany, Richter, and Ryon.
- COMMITTEE ON SCHEDULES: Mr. McCann, chairman; Messrs. Bray, Camden, Cameron, and Nicholas.
- COMMITTEE ON THE LIBRARY: The Director of the Library, *ex officio*, chairman; Messrs. McKillop, Richter, and Tsanoff.
- COMMITTEE ON STUDENT ACTIVITIES: The Assistant Dean for Student Activities, *ex officio*, chairman; Messrs. Bourgeois, Davies, Hermance, Shelton; the Adviser to Women; the Chairman

of the Hall Committee; the Chairman of the Honor Council; the President of the Student Association; the President of the Women's Council.

COMMITTEE ON GROUNDS AND BUILDINGS: Mr. Watkin, chairman; Messrs. Chillman, Hartsook, Sims, and Waters.

COMMITTEE ON PUBLICATIONS: Mr. Thomas, chairman; Messrs. Moraud, Pattie, Whiting, and Williams.

COMMITTEE ON PUBLIC LECTURES: Mr. Tsanoff, chairman; Messrs. Altenburg, Milligan, Slaughter, and Wilson.

COMMITTEE ON OUTDOOR SPORTS: Mr. Bray, chairman; Messrs. Hermance and Nicholas; representatives of the R Association; Messrs. H. P. Melton and A. M. Tomforde.

NAVY COMMITTEE: Mr. Weiser, chairman; the Professor of Naval Science; Messrs. Hermance, McCann, McCants, Ryon, and Watkin.

COMMITTEE ON HEALTH SERVICE: Mr. Hermance, chairman; Dr. Welsh; Messrs. Cameron, Chandler, McCann, and McCants; the Adviser to Women; the Manager of the Residential Halls.

EXECUTIVE COMMITTEE: The President, ex officio, chairman; the Dean; Messrs. McKillop, Richter, and Ryon.

# REQUIREMENTS FOR ADMISSION TO THE RICE INSTITUTE

## GENERAL UNDERGRADUATE REQUIREMENTS

SINCE the opening in 1912, the Rice Institute has maintained high standards of admission consistent with its general policy of high standards in education. The rapid growth in population of Houston and the Southwest, accompanied by an even more rapid increase in the demand for college training, forced the Institute in 1924 to limit the size of its student body in order to retain the standards of instruction previously established. As the number of applications since that time has greatly exceeded the available space, admission has thus become competitive.

Students are registered only in September of each year. In September, 1947, approximately four hundred new undergraduate students will be admitted to the Institute.

In general, candidates for admission are required to present evidence of good health, satisfactory testimonials as to their character, and evidence of graduation from an approved public or private high school. The work of fifteen standard, accredited units is required for admission to the Freshman Class. No candidate will be approved with fewer than fifteen acceptable units. There is no admission "with conditions" or "on individual approval," and no "special" students are accepted. The merits of each applicant are considered individually and with reference to the facilities available at the Institute. The determination of eligibility for admission has been delegated to the Committee on Admissions.

Toward the required total of fifteen units each candidate should present, from the list of subjects printed below, the following distribution of basic preparatory subjects:

English, 4	Trigonometry, $\frac{1}{2}$
Social studies, at least 2	Foreign language, 2 (preferably Latin)
Algebra, 2	Science, 2 (biology, chemistry, or physics)
Plane geometry, 1	Electives, $1\frac{1}{2}$ , selected from the list below

Variations in the above distribution of units will be considered individually in the case of unusually promising candidates. Approved variations, however, are the exception rather than the rule, and approval is subject to the discretion of the Committee on Admissions.

*List of Subjects with Values in Units*

BIOLOGY 1; BOTANY 1; CHEMISTRY 1; CIVICS  $\frac{1}{2}$  or 1; ENGLISH 3 or 4; FRENCH 2, 3, or 4; GERMAN 2, 3, or 4; HISTORY (Ancient 1, Medieval and Modern 1, World 1, English 1, American 1, Texas  $\frac{1}{2}$ ); LATIN 2, 3, or 4; MATHEMATICS (Algebra 2, Plane Geometry 1, Solid Geometry  $\frac{1}{2}$ , Trigonometry  $\frac{1}{2}$ ); SPANISH 2, 3, or 4; PHYSICS 1; PHYSICAL GEOGRAPHY  $\frac{1}{2}$ ; PHYSIOLOGY  $\frac{1}{2}$ ; GENERAL SCIENCE 1; ZOOLOGY 1.

## SPECIFIC PLAN OF UNDERGRADUATE ADMISSION

IN addition to the application of the foregoing general, quantitative requirements, and effective for the class applying for admission in September, 1947, acceptance of candidates will be based on the following:

1. Satisfactory personal qualifications, including good health, good character, industry, coöperation, definiteness of purpose, etc.
2. Satisfactory mental qualifications for the course desired, as shown by grades in high school subjects, by relative rank in the graduating class, by mental tests administered by the high schools or required by the Institute, and by subject-matter examinations in certain basic courses that will be prescribed for certain candidates by the Committee on Admissions.

Personal qualifications (1, above) will be determined by a health report from the applicant's family physician, by one or more statements of recommendation from teachers or school officials, and by a personal interview with a member of the Committee on Admissions, or with a representative of that committee. Mental quali-

fications (2, above) will be determined by the methods outlined below.

**Admission by Certificate.** Each year a portion of the quota of new students will be filled on the basis of satisfactory personal qualifications and a certificate of an outstanding high school record leading to graduation. Students ranking high in a sizable graduating class, about whose preparation there is no question, either quantitatively or qualitatively, *will be admitted without entrance examinations*. The size of this group will be determined each year by the Committee following the receipt and study of the initial group of records in February. Prospective high school graduates ranking in the top 25 per cent are especially encouraged to apply for admission, although rank in this bracket does not necessarily insure admission without examination.

**Admission by Examination.** Applicants whose records do not warrant admission by certificate will be given an opportunity, *if approved by the Committee on Admissions*, to establish the adequacy of their preparation by taking entrance examinations in two fundamental subjects, English and mathematics. These examinations will also be available as an aid in determining the relative capacity of applicants competing for places in the limited quota when the problem cannot be satisfactorily solved by reference to the high school records.

These examinations will be general in nature and especially designed to test capacity as well as fundamental knowledge. No special preparation, other than normal high school work, is necessary, and specimen copies of examinations are not available for distribution. In English, the examination will test the applicant's general knowledge of literature and his ability in reading and in composition, including such matters as organization of subject matter, paragraphing, spelling, and punctuation. In mathematics, the examination will cover the basic operations involved in the usual high school course in algebra and in plane geometry. Since many high schools give the final work in algebra in the second semester of the Senior year, the April examination will include the work of one and one-half years of algebra as given in this state (through factoring, radicals, and quadratic equations) and of one year of plane

geometry. The June examination will cover two years' work in algebra, one year's work in plane geometry, and some elementary trigonometry. These examinations will be two hours in length; they will be graded by members of the English and mathematics departments of the Institute. While an absolute grade will be assigned, a most important secondary result will be the determination of the applicant's relative standing in comparison with that of other candidates. It is obvious, therefore, that isolated results will be meaningless. Consequently, no grade will be issued to the applicant, and his relative standing will be the confidential information of the Committee on Admissions.

According to the schedule printed on page 25, these examinations will be offered to applicants designated by the Committee on Admissions both at the Institute and in examination centers in certain of the cities of the Southwest. In case an applicant designated for an examination is unable because of distance to present himself at the Institute or at some other center, permission will be granted for him to take the examination, on the announced date, under the supervision of one of his teachers or school officials. Arrangements should be made well in advance of the scheduled examination date by submitting a letter from the person agreeing to supervise the test, stating that the required arrangements will be made. As indicated below, the major examination period is scheduled for April, although a secondary examination period will be available in June for late applicants. Attention is called to the fact that the number of places remaining in the quota by June will inevitably be small. Except where excessive hardship is involved, due to distance or other factors, no examinations will be given at other times, and following the June period no examinations will be available. No candidate will be approved for more than one effort at the examinations in any year.

## PROCEDURES FOR UNDERGRADUATE ADMISSION

**Application** for undergraduate standing should be filed on forms available from the Registrar of the Institute. For the convenience of Houston applicants, the proper application forms will be made



available also in the general Registrar's Office of each public and private high school. These forms should be filed as early as possible after the completion of the work of the first semester of the Senior year, not later than March 1 of a given year, if the applicant is to be considered when action is first taken on applications. As indicated previously, applications will be considered throughout the spring, and a second examination period is scheduled in June. However, attention is called to the fact that admission will become more difficult as time elapses and the quota is gradually filled. In fact, the quota may be filled at any time after May 1, although the general policy will be to keep some space open until July 1.

**Interviews** of all applicants who can conveniently present themselves at the institute will be held between December 15 and April 1 each year at a time scheduled by the Institute. Applicants living at a distance who cannot conveniently come to Houston will be given opportunities for interviews in the last two weeks of March in certain cities of the Southwest,<sup>1</sup> at a date and place to be announced individually to each applicant who submits his application papers before March 1. Those who, because of distance, are unable to meet interview engagements either in Houston or at one of centers just referred to will be interviewed individually by alumni; or, if that should be impossible, their applications will be given full consideration without the interview. In no case need the applicant assume any responsibility for the interview until notified of the time and place. However, applicants from a distance who happen to find it convenient to come to Houston between December 15 and April 1 will be interviewed at the Institute at the time of their visit to Houston.

**Examinations** will be given at the Institute and in certain cities on the fourth Saturday in April.<sup>1</sup> *This is the principal examination date.* Applicants applying late may be admitted to examinations on the third Saturday in June. The June examinations will be held only at the Rice Institute unless individual arrangements are made for the supervision of the examinations by a teacher or school offi-

<sup>1</sup>It is contemplated that, if sufficient need exists, students will be interviewed and examined in Beaumont, Dallas, Fort Worth, and San Antonio.

cial in the applicant's home town. Again, applicants are urged to apply in time for consideration in the first action, as the quota may be filled at any time after May 1.

### ADMISSION OF TRANSFERS FROM OTHER COLLEGES

IN general, applicants for transfer from other colleges and universities will be admitted under procedures similar to those outlined above for high school graduates, except that applicants for transfer to courses of pure and applied science usually will be required to take examinations to determine their admission and their placement in Rice courses that are essential as prerequisites. For example, an applicant for transfer into the second year's work in engineering at Rice normally will be required to pass examinations in mathematics and in physics or chemistry, or in all three, to determine his fitness to take up the work of the Sophomore year in these essential subjects. Attention is directed to the fact that the unit of credit at Rice is the full year course. Advanced credit will not be considered in courses that are not approximately the same in content as the courses given at the Institute. Advancement toward graduation is made by courses. Should a student fail to prove completely qualified for all the work of the Sophomore year, he may possibly be admitted to some of it while being required to take certain other courses of Freshman standing. Each case will be dealt with individually.

Applicants for transfer who are not admitted on certificate, but who are approved for examinations, will normally take them in June, following the completion of the year's work, at the same time that high school examinations are given, viz., the third Saturday in June. Space will be held for a certain number of transfers until they have the opportunity to take the June examinations, if examinations should be required. Also, arrangements may be made for the supervision of these examinations, on the scheduled date, in the institution which the student has been attending. As in the case of applicants from high school, interviews will be arranged at the Institute during the winter and spring, and in certain cities in the last two weeks in March. When necessary, designated alumni representatives will also aid in conducting interviews.

## SPECIAL INFORMATION FOR ALL UNDERGRADUATE APPLICANTS

### *Calendar of Applications, Interviews, and Examinations*

February 1–March 1 . . . . .	Period for filing applications, of both high school students and transfers
December 15–April 1 . . . . .	Main interview period for applicants who can come to the Institute
Last two weeks of March . . .	Interview period for applicants living at a distance <sup>1</sup> and who cannot come to Houston
Fourth Saturday in April . . .	Main examination period <sup>1</sup> (for high school graduates or Seniors)
Third Saturday in June . . . . .	Second examination period, at the Institute only (for high school graduates and for transfers)

NOTICES of action taken by the Committee on Admissions will be mailed somewhat prior to the examination dates in April and in June: notices that certain applicants have been accepted by certificate and without examination, and also notices that others designated by the Committee will be admitted to the examinations. A student who has been admitted to the Institute will be required within two weeks after the date on the notice of acceptance to signify his intentions in writing, accompanied by a payment of \$25.00 which will be credited on his account as full payment of the registration fee required at the opening of the session. Should such a student fail to register without giving notice of change of intentions prior to August 1, the \$25.00 payment will be forfeited. The payment will be returned if the student changes his plans and serves notice before August 1. After August 1 it will be refunded only in case of hardship because of illness, etc.

Since most records will be acted upon prior to the close of the school year, *it is the duty of the applicant to furnish a supplementary*

<sup>1</sup>It is contemplated that, if sufficient need exists, students will be interviewed and examined in Beaumont, Dallas, Fort Worth, and San Antonio, the exact location and time of interviews and examinations to be furnished the applicants individually.

*transcript showing graduation from high school and the grades of the final semester.* In this connection it is pointed out emphatically that the admission granted to students whose courses are in progress is "provisional." Previous favorable action will be revoked if the grades of the final semester fail to maintain the previously established high level.

For further information, publications, or application forms, candidates for admission as undergraduates should communicate with the Registrar of the Institute. On requesting application forms, the candidate should clearly indicate whether or not he is a prospective high school graduate or a prospective transfer from another college.

### ADMISSION TO GRADUATE STANDING

THE Rice Institute offers excellent opportunities for properly qualified graduates to undertake advanced study and research leading to the master's and doctor's degrees. Work leading to the degree of Master of Arts or Master of Science is available in many departments; work leading to the degree of Doctor of Philosophy is available in the fields of biology, chemistry, mathematics, and physics. Applicants are required to present evidence of graduation or of prospective graduation from an accredited college or university, with academic records showing high promise for advanced study and research. Each applicant and his record will be considered individually and with reference to the facilities of the Institute for research in the field of his interest.

Graduate candidates are advised to take the Graduate Record Examination, arrangements for which may be made by writing the Graduate Record Examination, 437 West 59th Street, New York, 19, N.Y. Arrangements must be made through that central office, although the Institute maintains an examination center for the supervision of the examinations. Preference will be given to applicants who earn high scores on examinations given by this organization. At the discretion of the Committee on Graduate Instruction, the Graduate Record Examination or other examinations may be required of individual applicants.

The Institute publishes an annual bulletin, the *Graduate Announcements* (July issue of THE RICE INSTITUTE PAMPHLET), in

which courses of graduate study are announced and information is given regarding the assistantships and fellowships that are available. This bulletin and the graduate application form may be obtained from the Registrar of the Institute.

## EXPENSES

THE opportunities for study and research offered by the Rice Institute are open without tuition both to young men and to young women. Students, of course, are expected to meet all expenses incurred in the purchase of textbooks, drafting instruments, notebooks, examination papers, and certificates and diplomas. Laboratory expenses in the experimental courses in pure and applied science are met by laboratory fees. Extra charges will be made for excessive use of material, for excessive and unusual breakage, and for other damage to equipment.

### FEEs

<b>Registration fee</b> . . . . .	\$25.00
(An annual fee required of all students.)	
<b>Late registration fee</b> . . . . .	5.00
<b>Examination fee</b> . . . . .	5.00
(A fee to cover the cost of examinations and transcripts.)	
<b>Diploma fee</b> . . . . .	5.50
(A fee required of all candidates for degrees.)	
<b>Blanket-tax</b> . . . . .	9.60
(An annual charge for student activities.)	
<b>Health Service fee</b>	
DORMITORY RESIDENTS . . . . .	10.00
TOWN STUDENTS . . . . .	5.00
<b>Gymnasium fee</b>	
Every male student pays this fee for the use of gymnasium equipment during his undergraduate residence. The fee is paid once only by a student entering as a	
FRESHMAN . . . . .	16.00
SOPHOMORE . . . . .	12.00
JUNIOR . . . . .	8.00
SENIOR . . . . .	4.00
GRADUATES (Annual charge, optional) . . . . .	4.00

## Laboratory fees

BIOLOGY 100.....	\$30.00
220, 240, 340, 380, 450, 470, 480.....	25.00
390.....	15.00
360, 410.....	12.50
CHEMISTRY 100, 110, 200, 310.....	30.00
220, 300.....	40.00
410, 430, 440.....	25.00
470a, 470b.....	20.00
PHYSICS 100, 200.....	15.00
300b, 310a, 330a, 340b.....	5.00
PSYCHOLOGY 300.....	1.00
400.....	4.00
PHYSICAL EDUCATION 400.....	15.00
410.....	20.00
ENGINEERING 130, 280.....	10.00
ENGINEERING 130 (Deposit for the purchase of drawing instruments. Balance refunded.).....	40.00
ENGINEERING 250.....	20.00
ENGINEERING 260.....	5.00
CHEMICAL ENGINEERING 305.....	30.00
405.....	40.00
515, 575.....	50.00
CIVIL ENGINEERING 320b.....	5.00
300b, 320a, 460.....	10.00
300a, 330b, 420.....	15.00
440.....	20.00
ELECTRICAL ENGINEERING 300, 330, 340.....	15.00
440.....	35.00
450.....	25.00
500, 510, 540.....	50.00
520.....	25.00
MECHANICAL ENGINEERING 300.....	20.00
330a, 410.....	10.00
310.....	40.00
420.....	30.00
440.....	25.00
ARCHITECTURE (Every student enrolled in the department.)	25.00

ARCHITECTURE 210, 410, if taken alone.....\$15.00

No student in arrears in his bills, including obligations to loan funds, will be admitted to any of the examinations, or be given any certificate or report of academic standing.

### RESIDENTIAL ACCOMMODATIONS

Rooms in the residential halls for men, completely furnished exclusive of linen, may be had for one hundred and thirty dollars per year, twenty-five dollars of the rental being paid when the lease is signed, sixty-five dollars paid on September sixteenth, and the remainder paid on February ninth. As the charge for table board will be made at actual cost, the monthly price, payable in advance, will probably vary during the year. Until November first, a blanket-charge of approximately one dollar and forty-five cents per day will be made. Rooms in the halls will be let in the order of applications received. Such applications should be addressed to the Office of the Bursar. The residential halls are governed by a student Hall Committee, under the general supervision of the Assistant Dean for Student Activities.

Accommodations for the residence of young women on the university grounds are not available at present, but there is access to rooms for rest and study, and to tennis courts and other forms of recreation, under the supervision of Miss Sarah Louise Lane, B.A. (Rice), B.S. in Library Service (Columbia), Adviser to Women. Information concerning desirable places of residence for young women students may be had from Miss Lane.

### HEALTH SERVICE

A HEALTH SERVICE located in West Hall is maintained for students. This service includes dispensary and infirmary care. The school physician makes scheduled sick calls and can be called in case of an emergency. A registered nurse is on duty during school hours; a qualified attendant is available at all hours. Information regarding the facilities and care can be secured at the Office of the Health Service (reached by the east entrance of West Hall).



# STIPENDS AND FUNDS

## FELLOWSHIPS

THE Rice Institute seeks to interpret in a large way its dedication to the advancement of letters, science, and art. It not only looks to the employment of these disciplines in the development of the life of the individual and in that of the race, but it would also play its part in the progress and enlargement of human knowledge by contributions of its own resident professors and scholars. Accordingly, there have always been associated with the staff of the Institute advanced students in training for careers both as teachers and as research workers. With this end in view, provision is made for a variety of fellowships available to graduates of this and other institutions. There are several memorial fellowships that have been founded and endowed by gift or bequest on the part of friends of the Rice Institute. These provide a stipend designed to enable the holder to devote his full time to study and research in his chosen field. There are also several industrial fellowships maintained by companies interested in the development of technical fields and the training of competent scientists and engineers. In addition, a number of teaching fellowships are available.

Persons desiring to be considered for appointment as fellows should consult with the departments in which they desire to work and should make application to the Registrar as early as possible.

### THE WALTER B. SHARP MEMORIAL FUND FOR RESEARCH IN PURE AND APPLIED SCIENCE

In memory of her husband, the late Walter B. Sharp, one of the earliest and most successful of the pioneers in the development of the petroleum industry in this country, Mrs. Estelle B. Sharp, of Houston, has endowed at the Rice Institute the Walter B. Sharp Memorial Fund for Research in Pure and Applied Science. The income from this fund is to be used for the maintenance of resident or traveling fellowships in scientific research, preference to be given to geological research, with special reference to petroleum and allied products. A requisite for eligibility to these fellowships is the de-

gree of Doctor of Philosophy, or similar standing in this or other institutions. The awards are to be known as the Walter B. Sharp Fellowships, and the holders thereof as the Walter B. Sharp Fellows of the Rice Institute. The first Walter B. Sharp Fellow, at a stipend of \$2500, was appointed for the academic year 1931-32.

#### THE SAMUEL FAIN CARTER FELLOWSHIP

The late Mrs. Carrie B. Carter established at the Rice Institute in 1932 the Samuel Fain Carter Fellowship in memory of her husband, one of the first promoters of the lumber industry in Texas and the founder of the Second National Bank of Houston. In accordance with the terms of the gift, the endowment of \$20,000 is administered in trust by the Second National Bank. The annual income of this trust fund is to be awarded to a graduate student of the Rice Institute, or a white graduate of an approved institution of learning, for the purpose of enabling the student to continue in postgraduate work, preferably at the Rice Institute, and, when the appropriate graduate schools shall have been organized, precedence is to be given to candidates in banking, business administration, and forestry. In the meantime, the award is to be made for the prosecution of postgraduate work in history and allied subjects, in science or engineering, or other branches of liberal and technical learning for which facilities for advanced work may be available at the Rice Institute. Should a graduate of any institution other than the Rice Institute receive the award, then the postgraduate work shall be done only at the Rice Institute. The holder is to be known as the Samuel Fain Carter Fellow of the Rice Institute. The award is to be made by the faculty, on the basis of highest standing in scholarship, with consideration of financial circumstances, personality, and physical fitness. The first Samuel Fain Carter Fellow was appointed for the academic year 1933-34.

#### ORA N. ARNOLD FELLOWSHIP FUND

Under the will of Mrs. Ora Nixon Arnold there was established in 1936 a fund to assist in securing a better understanding between the people and governments of Mexico, the South American States, the West Indies, and the Philippine Islands. The income is to be used in financing traveling fellowships to be allotted to grad-

uates of the Rice Institute of outstanding ability and character, or to a graduate of the University of Mexico of equal distinction.

#### THE TRAVELING FELLOWSHIP IN ARCHITECTURE

Provision for a Rice Institute Traveling Fellowship in Architecture has been made by the Alumni of the Department of Architecture and the Architectural Society of the Rice Institute, who have pledged themselves to raise funds to be given each year to a student in architecture for the purposes of foreign and domestic travel and study. The selection of the holder of the Traveling Fellowship is to be made annually by the faculty by means of a formal competition, in which students or graduates of the Rice Institute are eligible to participate.

#### THE JAMES A. BAKER AND ALICE GRAHAM BAKER BEQUEST

By the last will and testament of the late Captain James A. Baker, for more than fifty years Chairman of the Board of Trustees of the Institute, the trustees have received a fund in excess of \$60,000 to be known as the James A. Baker and Alice Graham Baker Bequest. The fund is to be kept invested by the trustees and the income thereof "used in part, by the Institute, in establishing scholarships and fellowships, and to pay in whole or in part the salaries of its professors, teachers and lecturers, and in the payment of annual prizes to the students to stimulate their interest in their work."

#### THE CATHARINE WITHERS ROPER AND BENJAMIN E. ROPER MEMORIAL FUND

The late Mary Withers Roper has bequeathed to the Rice Institute the residue of her estate in a sum in excess of \$11,000 as a memorial to her mother and father, Catharine Withers Roper and Benjamin E. Roper, pioneering contemporaries of the founder of this institution. Only the income of this fund may be expended; the principal thereof is to be kept intact in the permanent endowment fund of the Institute. Miss Roper passed away at the advanced age of eighty-four years. She began teaching very early in life, and at the time of her retirement a few years ago she had spent an active life of sixty years in teaching in the schools of this vicinity. Through

this memorial there become associated in perpetuity the family names of two long lives that were lived for the children of others.

#### THE EASTMAN KODAK COMPANY FELLOWSHIP

The Eastman Kodak Company maintains on a year-to-year basis a fellowship for predoctoral study in physical chemistry. The present amount of the stipend is \$1200.

#### THE DOW CHEMICAL COMPANY SCHOLARSHIP OR FELLOWSHIP

On the initiative of Dr. Willard H. Dow, President of the Dow Chemical Company, a scholarship or fellowship was established by the Company in September, 1943, on a year-to-year basis, to be awarded to a Rice student in chemistry, chemical engineering, or physics. A Senior student receiving the award will be the Dow Chemical Company Scholar; a graduate student receiving this award will be the Dow Chemical Company Fellow. The present amount of the stipend is \$750.

#### THE HUMBLE OIL AND REFINING COMPANY FELLOWSHIPS

In September, 1945, the Humble Oil and Refining Company established at the Rice Institute two fellowships for X-ray diffraction research. The amount of the stipend will be based in each case on the previous training of the fellow.

#### SOCONY VACUUM FELLOWSHIP

The Socony Vacuum Oil Company has established at the Rice Institute a fellowship for research work in the general field of physics of the liquid and solid state. This fellowship carries a stipend of \$1500 per year, and is awarded to a graduate student who has completed one or more years of graduate work in physics.

### SCHOLARSHIPS AND AWARDS

WHILE seeking to develop its students in character, in culture, and in citizenship, the Rice Institute will reserve for scholarship its highest rewards and in particular for evidences of creative capacity in productive scholarship. To encourage this devotion to learning there have been devised through the donations of friends of the In-

stitute a number of undergraduate scholarships to be awarded preferably to those students who have been in residence at the Institute for at least one year. Moreover, honorary scholarships without stipend may be granted to students whose scholastic standing shows marked ability. Certain endowed scholarships, as noted below, are for the benefit of graduate students.

#### THE GRAHAM BAKER STUDENTSHIP

The first of the undergraduate scholarships to be established at the Institute is the Graham Baker Studentship, founded by the late Captain and Mrs. James A. Baker, of Houston, in memory of their eldest son, the late Frank Graham Baker. This studentship is awarded annually to a student of the Rice Institute upon the basis of highest standing in scholarship, and the holder is known as the Graham Baker Student for the year. The award is announced at the commencement convocation in June, and the annual stipend is \$175. The first award was made for the academic year 1918-19.

#### THE HOHENTHAL SCHOLARSHIPS

The Hohenthal Scholarship Fund is a gift to the Rice Institute made through the good offices of the late William M. Rice, Jr., from the estate of the late Lionel Hohenthal, of Houston, who in his last will and testament instructed his executor, Mr. Rice, to devote the residue of his estate to the founding of a permanent memorial to Mr. Hohenthal's mother, father, and brother. The scholarships provided by this fund are known as the Hohenthal Scholarships, and the holders as the Hohenthal Scholars of the Institute. These scholarships are awarded annually to students of high standing in scholarship who are earning a substantial part of their college expenses. The first awards were made for the academic year 1918-19.

#### THE D.A.R. SCHOLARSHIP

The John McKnitt Alexander Chapter of the Daughters of the American Revolution has provided an endowed undergraduate scholarship at the Rice Institute. Under the present conditions of this scholarship it is awarded to a young woman student on admission to the Institute and carries with it an annual stipend of \$175. The first award was made for the academic year 1919-20.

## THE ELLEN AXSON WILSON SCHOLARSHIP

The Axson Club, an organization of Houston women in the interests of literary pursuits, has endowed at the Rice Institute a permanent scholarship in memory of Ellen Axson Wilson (the late Mrs. Woodrow Wilson). The scholarship is awarded from year to year to a young woman student of the Institute of Junior or Senior standing. The annual stipend of the Ellen Axson Wilson Scholarship is \$350, and the first award of the scholarship was made for the academic year 1922-23.

THE ELIZABETH BALDWIN LITERARY SOCIETY  
SCHOLARSHIP

The Elizabeth Baldwin Literary Society of the Rice Institute is maintaining annually a scholarship with a view to providing permanent endowment therefor. This scholarship is available to a student of the Rice Institute, either a young man or a young woman, the candidate to be chosen by the faculty on grounds of scholarship, personality, and physical vigor. The present annual stipend of the Elizabeth Baldwin Literary Society Scholarship is \$200, and the first award of the scholarship was made for the academic year 1926-27.

## THE PALLAS ATHENE LITERARY SOCIETY SCHOLARSHIP

The Pallas Athene Literary Society of the Rice Institute is providing an annual scholarship at the Rice Institute, with the intention of raising a permanent endowment for the scholarship. This scholarship is open to a young woman student of the Rice Institute, to be selected by the faculty on grounds of scholarship, personality, and physical vigor. The present annual stipend of the Pallas Athene Literary Society Scholarship is \$175, and the first award of the scholarship was made for the academic year 1926-27.

## THE DANIEL RIPLEY SCHOLARSHIP

In memory of her husband, the late Daniel Ripley, for many years a prominent citizen of Houston, the late Mrs. Edith Ripley established by the donation to the Institute of \$10,000, the Daniel Ripley Scholarship. The annual income of this trust fund is to be

awarded to that self-supporting young man or woman student completing the Freshman year at the Rice Institute who receives the highest grades. The first award of the Daniel Ripley Scholarship was made for the academic year 1927-28.

#### THE JUNIOR ENGINEERING SCHOLARSHIP

To foster interest in engineering education at the Rice Institute and to provide for recognition for work well done, an anonymous donor is contributing to the Rice Institute the sum of \$175 annually as a stipend for the Junior Engineering Scholarship, to be awarded to that male student in a regular engineering course of the Junior year who has the highest scholastic standing in his courses taken that year. This scholarship is restricted to no particular field of engineering, the selection of the scholar is made by the faculty, and in making the selection account is taken of individual qualifications of character and personality, but no consideration is to be given to the financial circumstances of the student. The first award of the Junior Engineering Scholarship was made for the academic year 1928-29.

#### THE EDITH RIPLEY SCHOLARSHIPS

The late Mrs. Edith Ripley, of Houston, established three Edith Ripley Scholarships by the donation of \$10,000 to the Rice Institute, the income of which is to be distributed equally and annually to three young women students of the Institute to be selected by the faculty. In selecting the beneficiaries of this donation, consideration is to be given to the mental, moral, and womanly qualities of the candidates, as well as to their financial necessities. The first awards of the three Edith Ripley Scholarships were made for the academic year 1928-29.

#### THE MARY PARKER GIESEKE SCHOLARSHIP

Mr. Fred A. Gieseke, of Houston, and his daughter, Mrs. James Carter Boone, a graduate of the Rice Institute, established the Mary Parker Gieseke Scholarship in memory of the late Mrs. Fred A. Gieseke, by a gift to the Rice Institute of \$5000. This memorial scholarship is to be awarded annually for high standing in scholarship to a student of the Rice Institute who has been in residence at

least one year. The first award of the Mary Parker Gieseke Scholarship was made for the academic year 1929-30.

#### THE THOMAS AUBREY DICKSON AND PAULINE MARTIN DICKSON SCHOLARSHIPS

The late Mrs. Pauline Martin Dickson, of Houston, in execution of the wishes of herself and her husband, the late Dr. Thomas Aubrey Dickson, bequeathed a sum of \$10,000, the income of which is to be paid semi-annually to the Rice Institute for the support of scholarships to be known as the Thomas Aubrey Dickson and the Pauline Martin Dickson Scholarships, to be awarded by the faculty, on the basis of scholarship, to self-supporting students of the Institute, young men or young women. The first awards of the Dickson Scholarships were made for the academic year 1932-33.

#### THE CHAPMAN-BRYAN MEMORIAL SCHOLARSHIP

By bequest of the late Miss Johnelle Bryan, of Houston, made on behalf of herself and her sister, the late Mrs. Caro Bryan Chapman, the Rice Institute has received the sum of \$2500 for the endowment of the Chapman-Bryan Memorial Scholarship at this institution. The scholar on this foundation, a student of the Institute, is to be selected by the faculty on the basis of high standing, personality, and physical fitness. The first award of the scholarship was made for the academic year 1937-38.

#### THE LADY WASHINGTON TEXAS CENTENNIAL AWARD

From the Lady Washington Chapter of the Daughters of the American Revolution, the Rice Institute has received the sum of \$1000 in endowment of the Lady Washington Texas Centennial Award. This award is to be made yearly for scholarship to a young woman student of the Rice Institute, preference to be given to Houston students of Sophomore standing. The first award was made for the academic year 1937-38.

#### THE KATIE B. HOWARD SCHOLARSHIP

The Axson Club has raised the sum of \$5000, with the expectation of increasing that sum to \$10,000, for the maintenance of the Katie B. Howard Scholarship in memory of Mrs. A. R. Howard,



the first president of the Axson Club. The income of this fund is awarded from year to year to a young woman student of the Institute. The first award of the Katie B. Howard Scholarship was made for the academic year 1937-38.

#### THE SAMUEL S. ASHE SCHOLARSHIP

Mrs. Sallie Ashe Fitch has endowed a scholarship at the Rice Institute in memory of her father, Samuel S. Ashe, who for many years and until his death was a prominent citizen of Houston, and in full sympathy with the purposes and aspirations of the Rice Institute. This scholarship is to be awarded annually to a deserving but necessitous young man or young woman of the Freshman class of the Institute on completing the work of that year with highest grades. The first award of the Samuel S. Ashe Scholarship was made for the academic year 1939-40.

#### ENGINEERING ALUMNI SCHOLARSHIP

As evidence of their continued interest in engineering education at the Rice Institute, the Engineering Alumni are providing an annual stipend of \$300 for that engineering student, of good character and personality, entering his Senior year, who shows by his scholastic record and his interest and participation in student affairs that he gives promise of being a credit to the engineering profession. Consideration is to be given to the financial circumstances of the student and the award is to be contingent on his continuing his work at the Rice Institute. The first award of the Engineering Alumni Scholarship was made for the academic year 1938-39.

#### THE THOMAS RICHARD FRANKLIN AND JULIA HADLEY FRANKLIN SCHOLARSHIPS

The late Mrs. Mabel Franklin Asten, daughter of a family distinguished in the history of the city and commonwealth, has bequeathed to the Rice Institute approximately \$62,000 to constitute, as a memorial to her father and mother, the Thomas Richard Franklin and Julia Hadley Franklin Scholarship Fund. The income of this fund is to be devoted to the awarding of annual scholarships to properly qualified students of the Institute. Both male and female students shall be eligible to Franklin Scholarships, and in

awarding them, the Institute shall take into consideration not only the scholarly standing but also the financial necessities of the candidates. The recipients are known as the Thomas R. Franklin and Julia H. Franklin Scholars. The first awards were made for the academic year 1939-40.

#### THE WALSH SCHOLARSHIP IN ARCHITECTURE

The Walsh Scholarship in Architecture, in memory of the late Timothy Walsh, F.A.I.A., of the firm of Maginnis and Walsh of Boston, Massachusetts, is being established by his son, Mr. James A. Walsh, of Houston. The scholarship provides a stipend of \$100 annually to be awarded by the faculty by means of a formal competition, to a student completing his fourth year in architecture, for the purpose of assisting him to carry on through his fifth year. The first award was made for the academic year 1941-42.

#### THE R ASSOCIATION SCHOLARSHIP

The R Association, composed of present and former students of the Institute who have received a letter in a major sport, is providing annually a scholarship in the sum of \$175. This scholarship is to be awarded by the Committee on Examinations and Standing of the Institute, on grounds of high scholarship, either to a member of an athletic team or to a member of the Rice Institute Band. The first award of the R Association Scholarship was made for the academic year 1941-42.

#### THE PREMEDICAL SOCIETY SCHOLARSHIP

The Premedical Society, consisting of students looking forward to the study and practice of medicine, is providing biennially a scholarship in the sum of \$200. This scholarship is to be awarded by the Committee on Examinations and Standing of the Institute to the student with the highest scholarship record in the premedical course, and without reference to financial need. The first award of the Premedical Society Scholarship was made for the academic year 1942-43.

#### THE MAX AUTREY MEMORIAL SCHOLARSHIPS

Under the last will and testament of the late Mrs. Nettie S. Autrey, for many years a resident of Houston, the Rice Institute

received a cash bequest of \$20,000 to be known as the Max Autrey Scholarship Fund, from the income of which scholarships are to be awarded, on such terms as the authorities of the Institute may determine, as a memorial to the donor's son, Max Autrey, in service in the first world war and since deceased. The students receiving such awards are to be designated as Max Autrey Memorial Scholarship Students. From the income of this bequest the first awards of three Max Autrey Memorial Scholarships, based on character, personality, and high scholastic standing, were made for the academic year 1942-43.

#### THE COLLEGE WOMEN'S CLUB FUND OF THE RICE INSTITUTE

In January, 1942, the trustees of the Institute received from the College Women's Club of Houston a check for \$5000 for the endowment of a fund to be known as the College Women's Club Fund of the Rice Institute, to be held in trust by the trustees and kept invested by them. From the income of this fund an award is to be made annually to some woman Senior at Rice whom the President of the Institute and his committee may select as an outstanding student, to be used by her in working on her master's degree, either at Rice or some university of the same rank. The first award of a scholarship from the College Women's Club Fund was made for the academic year February to October, 1944.

#### SCHOLARSHIP OF THE HOUSTON CHAPTER OF THE AMERICAN PETROLEUM INSTITUTE

The Houston Chapter of the American Petroleum Institute provides a sum of \$100 on an annual basis for an engineering scholarship available to a Junior student of Rice, conditioned on class standing, extracurricular activities, and his continuing his Senior year at Rice.

#### THE LADY GEDDES PRIZE IN WRITING

The Right Hon. Sir Auckland Geddes, British Ambassador to the United States, Godwin Lecturer of the Rice Institute in 1921, has endowed at Rice a prize in writing, which is to bear the name of Lady Geddes. This prize is to be awarded annually from the income of the endowment of \$1000.

The first award of the Lady Geddes Prize in Writing was made at the end of the academic year 1922-23, the competition of this award being open to members of the Freshman and Sophomore classes of the Rice Institute, and the subjects assigned pertaining to the relations between Great Britain and the United States.

#### THE OWEN WISTER LITERARY SOCIETY FUND

The Owen Wister Literary Society of the Rice Institute is providing an annual donation at the Rice Institute, with the intention of raising a permanent endowment. This gift, approximating \$100 annually, the Society has assigned to the library for the purchase of books on the history of Texas and the West.

#### THE RICHARDSON FUND FOR RICE STUDENTS

The late Mrs. Libbie A. Richardson, wife of the late Alfred S. Richardson, who was a charter member of the Board of Trustees of the Rice Institute, bequeathed in trust to the Houston Bank and Trust Company as trustee, a fund amounting at present to approximately \$50,000, the income therefrom to be used in educating necessitous young men and women at the Rice Institute.

#### THE GRANT WILLIAM JORDAN AND CORA JORDAN MEMORIAL FUND

Under the will of the late Mrs. Cora Jordan, a resident of Houston, the bulk of her estate was left in trust with the Houston Bank and Trust Company as trustee, the income therefrom to be used in assisting worthy young men and women in obtaining an education at the Rice Institute. The Jordan Memorial Fund amounts at present to approximately \$51,000.

#### THE SARA STRATFORD FUND

The Sara Stratford Fund for Women Students of the Rice Institute, in memory of the late Mrs. Sara Stratford, first Adviser to Women, who served faithfully and efficiently in that capacity from the opening of the Institute, has been established by her daughter, Mrs. William Bradshaw Torrens, her immediate successor as Adviser to Women. The first awards from the Sara Stratford Fund were made in the autumn of 1931.

#### THE MARY ALICE ELLIOTT LOAN FUND

In memory of their daughter, the late Mary Alice Elliott, who at the time of her death was a student in architecture at the Rice Institute in the class attaining, at the graduation of 1931, the degree of Bachelor of Science in Architecture, Mr. Card G. Elliott, of Houston, and the late Mrs. Elliott, undertook the establishing of a fund of \$2500 for the maintenance of the Mary Alice Elliott Loan Fund for Foreign Travel and Study in Architecture. A loan of \$500 from this fund is to be available each year, on recommendation of the faculty, to an architectural graduate who has received honorable mention in the annual competition for the regular Traveling Fellowship.

The first award from the Mary Alice Elliott Loan Fund was made for the academic year 1931-32.

#### THE ROBERT PILCHER QUIN AWARD

By a group of student friends of the late Robert Pilcher Quin, a member of the Class of 1933, provision has been made for an annual "Bob Quin Award," in the form of a medal, for qualities in athletics, leadership, scholarship, and sportsmanship in which he himself excelled. The first of these medals was awarded for the academic year 1930-31.

#### EDWARD BOWERS ARRANTS AWARD

In 1943 a fund was established to provide for a gold medal to be presented annually to the architectural student with the best five-year scholastic record.

### OPPORTUNITIES FOR SELF-HELP

IN addition to the stipends of fellowships and endowed scholarships, there are, on the campus and in the city, opportunities in considerable variety for worthy and deserving students to earn a part of their living expenses while attending the Institute. Information concerning such openings may be obtained from the Bursar. Thanks also to the generosity of a number of citizens of Houston, there are available several student loan funds. Inquiries concerning the administration of these funds should be addressed to the Bursar.

## CURRICULA AND DEGREES<sup>1</sup>

THE Rice Institute offers several baccalaureate, professional, and advanced degrees in arts and sciences, physical education, engineering, and architecture. All programs except that in physical education<sup>2</sup> are so arranged that the degree of Bachelor of Arts is taken at the end of four years; the student may then be admitted to candidacy for a professional or an advanced academic degree. The Institute does not have schools of medicine and law, but in the courses of arts and sciences the essential premedical and prelegal subjects can be elected. Fifth-year and sixth-year degree programs are offered in engineering and architecture. Students wishing to specialize with view to research work and university teaching may proceed by graduate study to the degrees of M.A. and Ph.D.

During the first two years of the four-year B.A. curriculum, a considerable part of the work is prescribed, but during the last two years each student is allowed, within certain restrictions, to select the subjects he studies. In the majority of the courses the formal instruction offered consists of three lectures a week throughout the academic year, together with concurrent laboratory work in certain subjects.

Courses are divided into three groups:

GROUP A—languages and literature

GROUP B—history, social studies, philosophy, education

GROUP C—mathematics and science

---

Freshmen and Sophomores will be registered according to the following programs:

<sup>1</sup>Students who matriculated prior to 1947 should consult the 1946-47 *Announcements*, pages 51-57, 85-86, 92, 107, 112-116, and 132-133. However, attention is directed to the fact that for all students matriculating in 1946, as well as subsequently, the minimum requirement for graduation with any bachelor's degree is now twenty six-semester-hour courses or the equivalent.

<sup>2</sup>For the four-year schedule leading to the degree of Bachelor of Science in Physical Education, see pages 108-109.

**Academic***First Year*

- (1) Mathematics 100
- (2) Physics 100, Chemistry 100, or Biology 100
- (3) English 100<sup>1</sup>
- (4) French or German
- (5) History 100 or 110
- (6) Physical Training 100 (men only)

*Second Year*

- (1) Mathematics 200 or 210, or a science
- (2) English or general literature elective
- (3) French or German
- (4) Elective in Group B
- (5) Free elective<sup>2</sup>

**Science-Engineering***First Year*

- (1) Mathematics 100
- (2) Physics 100
- (3) Chemistry 100
- (4) English 100<sup>1</sup>
- (5) History 100 or 110
- (6) Engineering 130
- (7) Physical Training 100 (men only)

*Second Year*

- (1) Mathematics 200 or 210
- (2) Physics 200; *biology and premedical majors substitute Biology 100*
- (3) Chemistry 220
- (4) English elective<sup>3</sup>
- (5) German<sup>3</sup>
- (6) Engineering 280

<sup>1</sup>Naval R.O.T.C. students take English 110 and Naval Science 101-102.

<sup>2</sup>Naval R.O.T.C. students take Naval Science 201-202.

<sup>3</sup>Naval R.O.T.C. students in chemistry or chemical engineering take Naval Science 201-202 instead of English; other N.R.O.T.C. science-engineering majors take Naval Science 201-202 instead of German.

**Architecture***First Year*

- (1) Mathematics 100
- (2) Chemistry 100
- (3) English 100
- (4) French
- (5) History 100 or 110
- (6) Architecture 100
- (7) Physical Training 100 (men only)

*Second Year*

- (1) Mathematics 200 or 210
- (2) English or general literature elective
- (3) French
- (4) Architecture 200
- (5) Architecture 210
- (6) Architecture 220b (second half-year only)

Juniors and Seniors will be registered according to the following programs:

**Academic***Third and Fourth Years<sup>1</sup>*

Ten courses, at least one in each group in each year. Major fields will be defined within the groups. Departments will give aid in planning programs for majors<sup>2</sup> and candidates for honors, and will make additional requirements or recommendations for such students.

**Biology, Chemistry, Mathematics, and Physics<sup>1</sup>***Third Year*

- (1) Science in major field
- (2) Science in major field

<sup>1</sup>The schedule of every student must be approved by his department of specialization in each of these two years.

<sup>2</sup>Academic majors are offered in business administration and economics, English, history, modern languages, philosophy, and prelegal studies.



- (3) Science outside major field
- (4) French or German
- (5) Humanity elective; *premedical majors take psychology*

#### *Fourth Year*

- (1) Science in major field
- (2) Science in major field
- (3) Free elective outside major field
- (4) Biology
- (5) Humanity elective

### Honors Courses

The third- and fourth-year honors courses in arts and sciences are intended for students who wish to specialize in particular branches of knowledge with a view to research work, teaching, or later professional studies. In view of these special objects, the requirements in such courses will be more severe than in the general courses in the same subjects. A student proposing to take an honors course must present an excellent record of the first two years, and must otherwise satisfy the department in which he intends to specialize that he is well qualified. He will be required to take the work provided for honors students in the major subject during each of the last two years and, in addition, certain courses in allied subjects, all within the framework of the general programs for Junior and Senior academic and science majors, as stated immediately above. It is a decided advantage for students in honors courses to have had some preparation in French or German before entering college.

A student who wishes to become a candidate for a degree with honors should report his candidacy at the beginning of his third year and renew his application at the beginning of his fourth year.

The degree of B.A. with honors will be awarded at the end of the fourth year to students who have successfully completed an honors course. Candidates for honors who are not making satisfactory progress may be required to discontinue their honors course and may be excused such part of a general course as is equivalent to the work they have done.

**Chemical Engineering***Third Year*

- (1) Organic Chemistry (Chemistry 300A)
- (2) Elective in Group C
- (3) Algebra (Mathematics 230a) (first half-year)  
Engineering Mechanics (Engineering 230b) (second half-year)
- (4) Scientific German (German 210)
- (5) Engineering Economics (Economics 360)

*Fourth Year*

- (1) Physical Chemistry (Chemistry 310)
- (2) Elements of Chemical Engineering (Ch.E. 305)
- (3) Industrial Chemistry (Ch.E. 315)
- (4) Heat Machinery (M.E. 330a) (first half-year)  
Strength of Materials (C.E. 330b) (second half-year)
- (5) Direct and Alternating Current Machinery and Circuits (E.E. 330)
- (6) Humanity elective

**Civil, Electrical, and Mechanical Engineering***Third Year (uniform)*

- (1) Mathematics 300 or 310
- (2) Business Administration 220 (one semester)<sup>1</sup>  
Elementary Electronics (E.E. 340) (one semester)<sup>1</sup>
- (3) Plane Surveying (Engineering 250) (one semester)  
Kinematics (Engineering 260) (one semester)
- (4) Engineering Mechanics (Engineering 300)
- (5) Engineering Economics (Economics 360)
- (6) Humanity elective<sup>2</sup>

<sup>1</sup>Marine Corps candidates take Elementary Electronics (E.E. 340) in the first half-year and Naval Science 401M in the second half-year.

<sup>2</sup>Naval R.O.T.C. students (Navy candidates) take Naval Science 301-302; Marine Corps candidates take Naval Science 301 (first half-year) and Naval Science 302M (second half-year).

*Fourth Year (uniform except Course 4)*

- (1) Direct and Alternating Current Machinery and Circuits (E.E. 300)
- (2) Thermodynamics and Heat Engines (M.E. 300)
- (3) Strength of Materials (C.E. 340)
- (4) Mechanical Processes (M.E. 310) (*electrical and mechanical engineers*)  
Advanced Surveying, and Stresses in Structures (C.E. 320) (*civil engineers*)
- (5) Fluid Mechanics (C.E. 350) (first half-year)  
Algebra (Mathematics 230a) (second half-year)<sup>1</sup>

**Architecture***Third Year*

- (1) Physics 100
- (2) Elective (business administration, sociology, or psychology)
- (3) Architecture 300
- (4) Architecture 310
- (5) Architecture 330

*Fourth Year*

- (1) Architecture 400
- (2) Architecture 410
- (3) Architecture 420
- (4) Architecture 430
- (5) Architecture 440

---

Students in the fifth and subsequent years will be registered according to the following programs:

**Master of Arts**

A student who has completed a general or an honors course for the B.A. degree may obtain the Master of Arts degree after the suc-

<sup>1</sup>Naval R.O.T.C. students (Navy candidates) take Naval Science 402; Marine Corps candidates take Naval Science 402M.

cessful completion of one year of graduate work. A candidate for this degree must elect a principal subject, and submit his schedule in writing when he reports his candidacy. Such a schedule must represent the equivalent of four advanced courses to be passed with high credit. The work shall consist of (*a*) personal investigation, the results of which must be submitted as a thesis, and (*b*) at least two advanced courses of lectures, one of which must be a graduate course in the principal subject. In addition, candidates for the M.A. degree must pass a public examination.

### Doctor of Philosophy

A student who has completed a course for the B.A. degree may be admitted as a candidate for the degree of Doctor of Philosophy. In addition to high attainment, preparation for this degree involves usually at least three years of graduate work. Candidates for the degree must submit a thesis and pass a public examination. The thesis must present a distinctly original contribution to the subject. It must be published in an accredited journal or series, and a copy must be deposited in the Institute library.

### Chemical Engineering

#### *Fifth Year (B.S. in Ch.E.)*

- (1) Colloid Chemistry (Chemistry 410) (first half-year)  
Advanced Organic Chemistry (Chemistry 440) (second half-year)
- (2) Plant Inspection (Ch.E. 445) (first half-year)  
Plant Design (Ch.E. 415) (second half-year)
- (3) Unit Operations (Ch.E. 405)
- (4) Chemical Engineering Thermodynamics (Ch.E. 425a) (first half-year)  
Chemical Engineering Thermodynamics (Ch.E. 425b) (second half-year)
- (5) Chemical Literature (Chemistry 480) (first half-year)  
Seminar (Ch.E. 485) (second half-year)
- (6) Composition and Expression for Engineers (English 380) (first half-year)

*Sixth Year (Ch.E., or M.S. in Ch.E.)*

- (1) Advanced Topics in Chemical Engineering (Ch.E. 505)
- (2) Experimental Problem and Thesis (Ch.E. 515), or  
Research and Thesis (Ch.E. 575)
- (3) Elective (an advanced course in chemistry, chemical engineering, physics, or mathematics)
- (4) Approved engineering elective
- (5) Seminar (Ch.E. 485) (second half-year)

**Civil Engineering***Fifth Year (B.S. in C.E.)*

- (1) Steel and Timber Structures (C.E. 460)
- (2) Concrete Structures (C.E. 440)
- (3) Water Supply, Hydrology, Sewage, and Sanitation (C.E. 435)
- (4) Highways; Soil Mechanics; Foundations (C.E. 425)
- (5) Seminar (Engineering 400)
- (6) Contracts and Specifications; Industrial Management (M.E. 460)

**Electrical Engineering***Fifth Year (B.S. in E.E.)*

- (1) Advanced Electrical Circuits and Transmission Lines (E.E. 400 or 430)
- (2) Advanced Electrical Machinery (E.E. 410)
- (3) Electrical Design (E.E. 420)
- (4) Advanced Electronics (E.E. 440)
- (5) Seminar (Engineering 400)
- (6) Contracts and Specifications; Industrial Management (M.E. 460)
- (7) Advanced Laboratory Measurements (E.E. 450)

*Sixth Year (E.E., or M.S. in E.E.)*

- (1) Advanced Circuit Analysis (E.E. 500)
- (2) Thesis (E.E. 510)

- (3) Advanced Electrical Power Engineering (E.E. 520), or  
Advanced Communications Engineering (E.E. 540)
- (4) Approved elective
- (5) Approved elective

### **Mechanical Engineering**

#### *Fifth Year (B.S. in M.E.)*

- (1) Mechanical and Machine Design (M.E. 410)
- (2) Power Plants; Heating; Ventilation; Air Conditioning (M.E. 420)
- (3) Materials; Metallurgy; Internal-combustion Engines (M.E. 440)
- (4) Contracts and Specifications; Industrial Management (M.E. 460)
- (5) Seminar (Engineering 400)
- (6) Humanity elective

### **Architecture**

#### *Fifth Year (B.S. in Architecture)*

- (1) Architecture 500a
- (2) Architecture 510b
- (3) Architecture 520a
- (4) Architecture 530
- (5) Architecture 540b
- (6) Architecture 550

#### *Sixth Year (M.A.)*

- (1) Architecture 600
- (2) Architecture 630
- (3) Elective (advanced course)

## STANDING IN SCHOLARSHIP OF UNDERGRADUATE STUDENTS

**Schedules of Undergraduate Students.** The regular schedule for all undergraduate academic students matriculated in or since 1946 is five courses each year. The regular schedules for students of engineering matriculated in or prior to 1946 may be found in the 1946-47 *Announcements* beginning at page 112. Schedules for all new students entering in September, 1947, may be found in the present *Announcements* beginning at page 44; these schedules will be valid also for previously matriculated students of physical education, and, in general, for previously matriculated students of architecture.

**Examinations.** Regular written examinations are given in all courses at the close of each semester. Other examinations are given from time to time at periods determined by the instructors. These examinations are conducted under a student honor system. (See page 68.)

**Withdrawal of Students.**<sup>1</sup> A student will be required to withdraw from the Institute if he fails in as much as one-half of the work of his schedule. He will also be required to withdraw for failure to come off probation within one year. Any student desiring to withdraw voluntarily from the Institute must resign in person or by letter at the Registrar's Office. Voluntary withdrawal will not be accepted within five weeks of the beginning of any semester examination period, unless the student's class grades as of the date of withdrawal conform to the requirements for good standing.

**Readmission.** A student who withdraws from the Institute may be readmitted only with special permission of the Committee on Examinations and Standing.

<sup>1</sup>For all students enrolled in or before September, 1946, application of the regulations above shall be based on the number of courses. For students entering in September, 1947, application of these regulations shall be based on semester hours.

**Probation.**<sup>1</sup> A student will be placed on probation at the end of any term in which he fails to pass three-fifths of his work, or in which he fails to make a grade of III<sup>2</sup> or better in two-fifths of his work. He will be restored to good standing if during a term in which he is on probation he passes three-fifths of his work and makes a grade of III<sup>2</sup> or better in two-fifths of his work. A student on probation is not permitted to be a candidate for or to hold any elective office, or to serve as editor, assistant editor, business manager, or assistant business manager of a college publication.

**Removal of Deficiencies.** With the approval, in advance, of the Committee on Examinations and Standing, deficiencies may be removed by work of high quality in an approved summer school.

**Promotion.**<sup>1</sup> To attain promotion a student must pass each year four-fifths of the work of his full regular schedule and earn grades of III<sup>2</sup> or better in at least two-fifths of such work. Students on probation at the end of an academic year are not promoted.

**Graduation.**<sup>1</sup> To be recommended for a degree a student must pass all the work prescribed for the degree and must make a grade of III<sup>2</sup> or better in as much as two-fifths of the work.

<sup>1</sup>For all students enrolled in or before September, 1946, application of the regulations above shall be based on the number of courses. For students entering in September, 1947, application of these regulations shall be based on semester hours.

<sup>2</sup>Grade symbols have the following meanings: I, very high standing; II, high standing; III, satisfactory standing; IV, poor standing; V, failure.



# LECTURES AND PUBLICATIONS

## PUBLIC LECTURES

THE Rice Institute undertakes to provide frequent public lectures for the benefit of the citizens of Houston as well as for its students. These serve to supplement the more formal exercises of instruction and to present subjects of timely interest from all domains of learning.

### FACULTY LECTURES

A series of Sunday afternoon lectures by members of the faculty is regularly scheduled during the fall months. From October 27 to December 8, 1946, the series of seven lectures related to the general topic of "Recent Advances in Scientific Research" was presented. The general subject and the titles of the individual lectures are announced a few weeks before the lectures are delivered.

### THE SHARP LECTURES

The first lectureship at the Rice Institute was established by Mrs. Estelle B. Sharp, of Houston, and had to do primarily with topics in the social sciences. The Sharp Lectureship was inaugurated in the autumn of 1918 by a course of lectures on "The Obligations and Privileges of Citizenship—a plea for the study of social science," by the late Sir Henry Jones, F.B.A., professor in the University of Glasgow. Subsequent lectures have been delivered by the late Professor Andrew C. McLaughlin, of the University of Chicago, by Dr. T. R. Glover, of Cambridge University, by Sir Robert Falconer, of the University of Toronto, and by Professor Edwin G. Conklin, of Princeton University.

### THE GODWIN LECTURES

The Godwin Lectures were established in 1919 by Mr. Herbert Godwin, of Houston, and were devoted initially to subjects of public concern during the period of reconstruction after World War I. The lectures were inaugurated in 1920 by the Hon. William Howard Taft. Later lectures have been delivered by Sir Auckland Geddes,

British Ambassador to the United States, and by President A. Lawrence Lowell, of Harvard University.

#### MUSIC LECTURES

A series of lectures dedicated to the promotion of interest in music both in the Rice Institute and in the community was founded anonymously in 1922 by a citizen of Houston. The series was inaugurated in the spring of 1923 by a course of lectures on music in the life of the community and of the nation, delivered by Mr. John Powell, the American composer and pianist. Other lectures have been delivered by Mlle. Nadia Boulanger, of Paris, by Sir Henry Hadow, Vice-Chancellor of the University of Sheffield, by MM. Maurice Ravel and A. Honegger, of Paris, by Professor George D. Birkhoff, of Harvard University, and by Mr. Harold Morris.

#### THE ROCKWELL LECTURES

These lectures were inaugurated by Sir Robert Alexander Falconer in April, 1938. Later lectures have been delivered by Dr. Harris Elliot Kirk, by Dean Roscoe Pound, by Dr. Joseph Richard Sizoo, by Professor William Ernest Hocking, by Dr. Robert Russell Wicks, by Dr. Ralph W. Sockman, and by Dr. George A. Buttrick.

The Rockwell Lectures for 1947 will be delivered on March 25, 26, and 27 by Professor Charles W. Hendel, of Yale University, on the subject of "Human Existence, Civilization, and Religion."

#### RICE INSTITUTE LECTURES

From time to time the Rice Institute invites scholars of distinction to lecture for varying periods of time. In most cases these lectures are open to the public as well as to the faculty and student body. During May, 1946, Dr. Carl D. Anderson, of the California Institute of Technology, and Professor The Svedberg, of the University of Upsala, spoke on scientific subjects. In November, 1946, Professor Raymond Dexter Havens, Caroline Donovan Professor of English Literature at the Johns Hopkins University, lectured on poetry. Dean Wilbur W. White, of Western Reserve University, was scheduled to lecture on January 14, 15, and 16, 1947, on the general subject, "The United States and World Peace."

## THE RICE INSTITUTE PUBLICATIONS

AMONG the publications of the Rice Institute are included a Descriptive Brochure for general distribution, a Student Handbook presented to students at the beginning of each academic year, a weekly Calendar of Events announcing forthcoming campus activities, and THE RICE INSTITUTE PAMPHLET, published quarterly and now including the *Announcements* (January issue) and *Graduate Announcements* (July issue).

# LIBRARIES AND LABORATORIES

## LIBRARY

THE main library of the Institute has been provided with temporary quarters in the administration building. Department libraries for mathematics, physics, and biology are located in the physics building, for chemistry and engineering in the chemistry building.

It has been the policy of the Institute in building up the library, first, to supply such books as are necessary to supplement the courses of instruction; second, to acquire material as it is needed to support the research work of the faculty and graduate students. Besides several hundred current literary and scientific journals, the library contains about seventy-five thousand back files of important serial publications, the fields of science and technology being very completely represented among these holdings. The book collection at present, including bound periodicals, contains about 200,000 volumes.

Through the generosity of Mrs. W. W. Fondren, who has donated \$1,000,000 for the purpose, a new central library building is to be constructed immediately. This building, which will house practically all the department libraries, is designed to secure the most convenient grouping of subject materials in the various branches of technology and the humanities. It will be completely air-conditioned and will provide the most modern facilities for all library activities. These facilities include seminar rooms, faculty studies, a music room with complete sound equipment, an exhibition gallery, a projection room, and a photographic room equipped for photostating and microfilming. The open-stack system will be used, and reading oases and carrels are to be liberally distributed throughout the stack areas.

## LABORATORY INSTALLATION

THE laboratories for physics and biology are located on the north side of the academic court, adjoining the administration building, and are connected with the latter by a continuation of the original

cloister. The buildings are constructed of brick and marble, corresponding in design to the style as defined in the administration building, but of a simpler character expressing their purpose as laboratories. The main building is 275 x 56 feet, with two stories and a basement. It is connected to a building 121 x 72 feet, containing a large lecture room seating about 300.

### Physics

The physics department occupies two large laboratories and two research rooms in the eastern end of the main building, and also the lecture room building. In the latter are six rooms fitted for research work in physics, a battery room in which a battery of 100 Edison storage cells of 300 ampere-hours' capacity has been installed, a switchboard room, motor generators for charging the batteries and supplying direct current to the lecture rooms and laboratories, a liquid air plant, two constant-temperature research rooms, a preparation room, a large darkroom, a well-equipped workshop, and a students' workshop. Elevators for moving heavy apparatus are provided. The physics laboratory now contains a fine collection of modern apparatus suitable for teaching and research work in all branches of physics. The equipment includes apparatus for research work on electrical properties of gases, electronics, ultrahigh-frequency electromagnetic waves, magnetic properties, and nuclear physics. For work on nuclear physics a 200,000 volt d.c. source and a 2,000,000 volt generator are available, and automatic cloud expansion chambers for photographing proton and other tracks. Three instrument makers, one of whom is a glass blower, are employed in the construction of special apparatus for research work. The department library contains all important textbooks, works of reference, and complete sets of journals.

### Biology

The department of biology is for the present situated in the west end of the main building of the physics laboratories. It has laboratories capable of seating one hundred and fifty students; lecture rooms with lantern for microscopic and other forms of projection;

research rooms, preparators' room, store rooms, etc. Laboratory work is available in all the courses offered, and modern and fully equipped microscopes are provided. Facilities are available for advanced research work in such subjects as parasitology, bacteriology, entomology, physiology, genetics, and ecology. The department is also equipped with an extensive series of specimens, microscope slides, casts, and charts for the study of zoology. Binocular microscopes, microtomes of various kinds, thermostats, embedding baths, and considerable accessory equipment, including physiological apparatus, are available for research work. Most of the important current zoological periodicals are to be found in the library.

### **Chemistry and Chemical Engineering**

The laboratories for chemistry and chemical engineering are housed in a three-story building of maximum rectangular dimensions of 307 and 181 feet, with ample attic and basement accommodations, built around several open courts facing the south. Of brick and stone, steel and concrete construction, the building embodies the prevailing architectural beauty and simplicity of technical plan exhibited in the earlier science laboratories of Rice. Provision is made for adequately equipped, separate laboratories for both research and instruction in the half-dozen major branches of chemistry and chemical engineering, with an even larger number of smaller laboratories for corresponding work in the more highly specialized subjects of the science. In all the laboratories there is an abundance of natural light, while an elaborate system of artificial ventilation removes all fumes through a central draft tower, so designed as to constitute of itself one of the architectural features of the building. Careful consideration has been given both to the anticipated growth of the institution and to the normal development of the department. The departments are well equipped with modern apparatus and materials for research and for lecture room and laboratory work in inorganic, organic, analytical, physical, colloid, electro-, physiological, and industrial chemistry, and chemical engineering. In the library will be found the more important journals, works of reference, and standard textbooks on the

different branches of chemistry and chemical engineering. These books and periodicals are accessible to all students.

Some of the more special chemistry equipment includes two General Electric X-ray diffraction units, a Seemann X-ray diffraction analysis apparatus, a Seemann electron diffraction apparatus with high-voltage supply consisting of a constant-potential keneutron rectifying unit operated from a motor-generator, two Philips-Metalix crystal analysis units, an X-ray diffraction camera for colloidal solutions, an X-ray diffraction camera using focused monochromatic x-radiation, a Moll recording microphotometer, a Zeiss auto collimating spectrograph, a Zeiss slit ultramicroscope, a Zeiss interferometer, a refractometer, a Leitz micro- and macro-motion photographic outfit, a quadrant electrometer, Leeds and Northrup type K potentiometers, Coleman glass-electrode  $pH$  electrometers, Beckman glass electrode acidimeters, Richard's high-pressure compressibility apparatus, Sharples super-centrifuges, a porcelain basket type centrifuge, specially designed thermostats for precise determinations, Pregl micro-analytical outfits including several Kuhlman balances, Bruun 100-plate bubble-cap fractional distillation apparatus complete, and basal metabolism apparatus.

The chemical engineering equipment includes an experimental double-effect Swenson evaporator with vertical and horizontal effects, a Buflovak standard vacuum shelf drier, Sperry plate-and-frame and Kelly filter presses, experimental humidification, dehumidification, and air conditioning apparatus, a 15-plate Stokes experimental fractionating column and distillation apparatus complete, equipment for crushing and grinding including jaw, roll, disc, and ball mills, Tyler screening equipment, heat and fluid flow equipment, an experimental rotary drier, an experimental cabinet drier, a stoneware-packed absorption tower, an adsorption tower, a flotation unit, a spiral scraper thickener with "Lightnin" direct-drive mixer, a Pyrex flanged-pipe hydraulic separator with Jeffrey-Traylor electric vibrator feeder, a Kane gas-fired automatic steam boiler, a Sargent calorimeter, Orsat flue gas apparatus, a throttling calorimeter, a stoneware suction filter, water softening and water treating equipment, gas and electric furnaces, a Reichert metallographic microscope, etc. Each laboratory room is equipped with the necessary conveniences, such as water, gas, alternating and

direct current, air blast, hoods, suction pumps, etc. The lecture rooms are suitably arranged for the illustration of lectures by experiment and lantern projection.

### Psychology

The psychological laboratory at present occupies six rooms on the first floor of the chemical laboratory adjoining the large lecture hall of that building. The equipment consists of the apparatus necessary for the laboratory exercises and demonstrations in an advanced course in human experimental psychology. A number of instruments suitable for research are available, and more apparatus is being added for research as needed. A large darkroom is provided for experiments on vision.

### Architecture

The department of architecture is located on the second floor of the chemistry building, and is equipped with three large general drafting rooms, modern in all their appointments. The first-year drafting room is fitted with an oversize blackboard, 6'-0" x 18'-6", for the instructional drawing of accurate perspectives and the solution of problems in shades and shadows at scales suitable to demonstration. The second- and third-year drafting room is of sufficient size to accommodate classes with a large individual drafting table for each student. The fourth- and fifth-year drafting room accommodates twenty-five students at this level, each fifth-year student being provided with two large drafting tables for design and construction. The library of architecture adjoins the drafting rooms and is equipped with the standard architectural publications necessary for reference and research, files of architectural periodicals, plates, photographs, and lantern slides. In addition, a current file of major building materials, products, and mechanical equipment of buildings is readily available for reference in construction courses. A "Materials Museum" is being established in conjunction with these files. Faculty offices adjoin the library and drafting rooms, and contain complete files of each student's work throughout his residence at the Institute. A black and



white line reproducing machine is provided for making such prints as essential to modern methods of instruction. Classroom and lecture rooms are nearby; two are equipped for the showing of slides and the presentation of 16mm. instructional films with sound. The equipment of the department includes a projector for this use. The freehand studio is well equipped with plaster casts from the antique and examples of historic ornament. A portion of this studio is reserved for instruction in water color. The department also possesses models for elementary instruction and for the teaching of advanced classes in construction.

### **Engineering Drawing**

Drafting rooms for instruction in engineering drawing are located at present in the mechanical laboratory and its annex, and are equipped like the best industrial installations. Instruction is given in the use of blueprinting machines, in photostating, and in accessories such as universal drafting machines, planimeters, etc.

### **Civil Engineering**

The civil engineering laboratory is equipped with the usual surveying instruments, transits, levels, compasses, and plane tables of wide variety of standard American makes. There is also a large assortment of the necessary auxiliary equipment such as tapes, rods, range poles, etc. The drafting room is fully equipped with instruments not required by each individual student, such as planimeters, protractors, special slide-rules, railroad curves and irregular curves consisting of splines and weights, and calculating machines. The materials testing laboratory of this department is equipped with one 50,000 pound Riehlé universal machine, one 60,000 pound Riehlé hydraulic testing machine, one Olsen 15,000 pound universal machine, one 100,000 pound Olsen universal machine, one 200,000 pound Olsen universal machine, one 60,000 inch-pound Riehlé torsion machine, a Riehlé standard paving brick rattler, a Riehlé two-gang Deval abrasion machine, a Bureau of Standards flow table, suitable equipment for tension tests of belting, an Olsen-Boyd 1000 pound automatic briquette testing machine, a Tyler

Ro-tap testing sieve shaker, and the necessary auxiliary apparatus for making the usual tests. An R. R. Moore endurance testing machine and a Riehlé universal impact machine have been added recently. The hydraulics laboratory is equipped with a Worthington 200 gallon per minute, 100 ft. head volute centrifugal pump with a directly connected slip ring motor; a simplex Venturi meter; trapezoidal, triangular, and rectangular weirs; a Pelton-Doble impulse wheel; and necessary gauges and other usual equipment.

### Electrical Engineering

The equipment of the electrical engineering laboratories is ample for a thorough study of direct and alternating current circuits, machines, and controls, as well as for investigations in the electronics and communications fields. In the power laboratories, examples of a wide variety of rotating machinery, transformers, control devices, industrial electronic devices (including mercury arc power rectifiers and X-ray equipment), servo-mechanisms, and instruments are available; among these are examples of the practice of each of the leading manufacturers, and in some instances where trends are worthy of note, older equipment is available to allow comparison with more modern products. The electronics laboratory is equipped for investigations in voice recording, wire communication, radio, and micro-wave fields, and for basic studies of electronic tubes and their circuits. Instruments, other measuring apparatus, and standards are sufficient to make any measurements likely to be needed, and are maintained on the level of current practices and advancements in the fields to which they apply.

Power supplies and switching facilities are flexible, with ample test tables and lighting provided. Permanent setup of apparatus is an exception, occurring only in the case of equipment too large to be moved conveniently, the greater part being individually mounted in such a manner that the student may have an opportunity to develop initiative and self-reliance in its arrangement for investigations without taking appreciable time from the investigation itself. Plug-and-jack connections are used extensively.

In addition to being a part of the communications laboratory equipment, a 1 kilowatt short-wave transmitter, with several of

the latest communications and broadcast receivers, affords opportunity for electrical engineering students to become proficient in the operation of these facilities as an extracurricular activity.

### **Mechanical Engineering**

The mechanical engineering laboratory is equipped with units which present basic principles and represent present-day practices and methods in their respective fields.

The steam laboratory includes high- and low-speed, simple and compound reciprocating engines, condensing and non-condensing turbines, together with condensers and other auxiliaries for making complete tests of various kinds. Internal-combustion engines of two- and four-stroke cycle, spark and compression ignition, high- and low-speed types, using liquid and gas fuels, are installed so that power or heat balance tests may be performed. Compression refrigeration systems, employing different refrigerants, can be used in combination with the requisite blowers, ducts, cooling tower, washer, and insulated test room, for air-conditioning investigations; separate tests of each of these pieces of equipment are also capable of performance. The study of the properties of metals and alloys is supplemented by laboratory investigation using equipment designed for testing the hardness, for the microscopic and macroscopic examination, and for the production of photographs, of ferrous and non-ferrous metals. Photographic work, for the metallographic, internal combustion, or other laboratories, is accomplished in a darkroom. Work in the heat treating of metals is done with automatically and manually controlled furnaces, and can be coordinated with equipment in the forge, machine, and welding shops. Electric and gas sets are used to impart information on the practice and problems involved in the welding process. Manufacturing processes are further emphasized in the machine and wood shops, each including machine tools of all general types used for production, and some tools for special applications.

Throughout all laboratories, various specially designed setups, such as that for the investigation of the action of steam in a nozzle, make possible actual contact with direct application of theoretical concepts. In general, the laboratories are designed to permit opera-

tion for purposes of instruction, testing, investigation, and research, and are arranged to accommodate the pursuit of any inquiry requiring coördination of facilities in several laboratories.

A well-stocked tool, apparatus, and instrument room with the most advanced types of engine indicators, speed-, pressure-, temperature-, and weight-measuring instruments, steam- and fuel-calorimeters, fuel testing equipment, and the like, together with machine tool cutters, drills, reamers, etc., and hand tools, enhances the usefulness of each of the larger installations, and makes for the most flexible use of every piece of equipment.

# STUDENT ACTIVITIES

## PUBLICATIONS AND ORGANIZATIONS

ALL students, upon matriculation, become members of the Student Association, which organizes and directs the various activities named below and through its officers, who form the Student Council, represents the students to the faculty, administration, and other institutions. The special problems of the women students on the campus are the concern of the Women's Council.

The various activities, covering cultural, professional, and avocational needs, include the publications: *The Campanile* (an annual) and *The Thresher* (a weekly); the musical clubs: the Band and the Choral Club; and the specialized societies: student branches of the American Society of Civil Engineers, the American Institute of Electrical Engineers, and the American Society of Mechanical Engineers, the Student Affiliates of the American Chemical Society, the Architectural Society, the Engineering Society, the Girls' Club, the Premedical Society, Rover Crew No. 1 of Houston, the Rice Institute Chapter of the Texas Collegiate Academy of Science, and the Veterans' Organization.

There are different language clubs, and various religious clubs for the several religions and their denominations. Through the generosity of the late Mrs. James L. Autry, as a memorial to her husband, the late James L. Autry, of Houston, the Diocese of Texas of the Protestant Episcopal Church is maintaining in the immediate vicinity of the Rice Institute, Autry House, as a social and religious center. The cornerstone of Autry House was laid during the commencement ceremonies of the Class of 1921. To this community group of the Episcopal Church, Mrs. E. L. Neville, of Houston, in memory of her brother, the late Edward Albert Palmer, has contributed the beautiful Edward Albert Palmer Memorial Chapel, which was dedicated November 27, 1927. All the opportunities of these establishments are available to the students of the Rice Institute irrespective of religious affiliation. Other religious bodies have intimated that they are considering future provision for similar undertakings in the neighborhood of the Rice Institute.

Each of the four classes, Freshman, Sophomore, Junior, and Senior, has an organization for its government and the solution of special problems.

### HONOR SYSTEM

EXAMINATIONS are conducted under a student honor system, which is administered by an Honor Council whose members are elected annually from and by the student body. This council is responsible to the faculty, through the Assistant Dean for Student Activities, for the validity of all examinations and for the investigation and prosecution of cases of violation of the system.

### HONOR SOCIETIES

#### THE PHI BETA KAPPA SOCIETY

The Senate of the United Chapters of Phi Beta Kappa at its meeting in December, 1927, voted to recommend the establishment of a chapter at the Rice Institute, and at a meeting of the National Council held in September, 1928, the institution of the Rice, or Beta of Texas, chapter was duly authorized. The chapter was formally installed on March 1, 1929, by the secretary of the United Chapters.

#### THE SOCIETY OF THE SIGMA XI

The Society of the Sigma Xi, for the promotion of research in science, on the occasion of its thirty-eighth annual convention in December, 1937, acting upon the recommendation of the Executive Committee, duly authorized the establishment of a chapter of the Society at the Rice Institute. The formal installation of the Rice chapter by the president of the national organization took place on March 23, 1938.

#### THE TAU BETA PI ASSOCIATION

The Tau Beta Pi Association, organized about half a century ago to interest engineering students in competing for high standing in scholarship, authorized, at its annual convention, in October, 1940, the establishment of a chapter of the Association at the Rice Institute. The Rice chapter, the Gamma of Texas, was formally installed on December 18, 1940, by the national secretary of the Association.

# SUBJECTS OF INSTRUCTION FOR

1947-48

Of the courses to be offered during the scholastic year 1947-48 it is possible to announce those described below. The numbers designating the courses have the following signification: courses whose numbers begin with 1 are open to all students of the Institute; courses whose numbers commence with 2 are open to Sophomores, Juniors, and Seniors; those beginning with 3 are open to Juniors and Seniors; those beginning with 4 are Senior courses; those beginning with 5 or 6 are designed primarily for graduates.

Figures entered in parentheses at the left below the description of each course signify the number of class hours per week, the number of laboratory hours per week, and the number of semester hours' credit for the completed course.<sup>1</sup> Thus, the entry (3-0-3) below English 380 means that the course meets three times per week, has no laboratory, and (being a one-semester course) is worth three semester hours' credit. The entry (3-3-8) below Physics 100 means that the course meets three hours per week, has three hours of laboratory work per week, and (being a two-semester course) is worth eight semester hours' credit. Names of instructors, as shown at the lower right of course descriptions, are subject to change.

## COURSES IN ARTS AND SCIENCES

### Biology

**Biology 100.** *General Biology.* An introductory course in biology on the general principles underlying living things. A general vertebrate type is considered first, and this is used as a basis for an introduction to physiology, immunology, embryology, cytology, genetics,

<sup>1</sup>Credit in terms of semester hours is normally the sum of the number of class hours per week and one-third the number of laboratory hours per week, multiplied by the number of semesters of the course. In certain courses, however, the laboratory work carries no credit or less than full credit.

ecology, and classification. Structure and function are, when possible, considered together; emphasis is placed on the former in the laboratory, and the more dynamic aspects are presented in lecture with the aid of demonstrations and motion pictures. Plants are briefly considered in comparison with animals. The latter part of the course deals with various animal forms and their evolution, with emphasis on progressive differentiation of structure and adaptation to environment.

(3-3-8)

*Mr. Davies*

**Biology 220.** *Parasitology, and the Biology of Public Health.* The first part of the year is devoted to a study of the relation of insects and their allies to the spread of disease, with special emphasis on such important disease transmitters as mosquitoes, flies, etc. Following this the parasitic worms and protozoa are studied, especially those of local importance, causing hookworm disease, malaria, syphilis, etc. The final part of the year is devoted to a very brief introduction to sanitary bacteriology, with special reference to fundamental techniques. A general cultural course for academic and premedical students. Prerequisite: Biology 100.

(3-3-8)

*Mr. Chandler*

**Biology 240.** *General Zoology.* A course, following the General Biology course, for students preparing to teach biology or zoology in high schools, and for students desiring a cultural course in the subject. The various phyla of animals are considered from the standpoint of their general organization in relation to their habits, and special attention is given to their natural history, life cycles, ecological relationships, and economic and conservational importance. The first half-year is devoted to invertebrates, the second half to vertebrates. Such subjects as biology of populations, social life, ecological communities, migration, artificial cultivation, and identification are considered. The laboratory work is supplemented by field trips. Prerequisite: Biology 100.

(3-3-8)

**Biology 340.** *Comparative Anatomy.* A study of the structure and evolutionary development of vertebrate animals, beginning with the more primitive forms and leading up to an understanding of mammalian anatomy. Designed for Junior or Senior premedical



students. Alternates with Bacteriology (Biology 470). Prerequisite: Biology 100.

(3-3-8)

**Biology 360. *Evolution.*** The genetical basis of evolution is first briefly considered. The study of evolution itself is then taken up, with chief emphasis on palæontology. It includes a consideration of cosmic and geological evolution, the succession of animal and plant forms in time, including man's place in this process and his present and possible future evolution. Prerequisite: Biology 100.

(3-2-7)

*Mr. Altenburg*

**Biology 380. *Physiology and Histology.*** The functions of the various organs are studied and correlated with microscopic structure. Students are familiarized with physiological apparatus and methods, including the making of graphic records, in addition to a systematic study of tissue structure, and experience with the usual histological techniques. Recommended for Junior or Senior pre-medical students and students specializing in biology. Alternates with Embryology (Biology 450). Prerequisite: Biology 100.

(3-3-8)

*Mr. Davies* (Not offered in 1947-48)

**Biology 390. *Anatomy and Public Health.*** A course of lectures and laboratory work for students of physical education. The first term is devoted to the study of human anatomy and physiology and the physiology of exercise. The second term covers health legislation, social problems, vital statistics, epidemiology, care of water, milk, and other foods, sewage disposal, housing, and ventilation, including trips to study the health practices and conditions of public utilities.

(3-3-8)

*Dr. Welsh*

**Biology 400. *Special Work.*** This course consists of advanced work in special fields of biology for students specializing in the subject, adapted to the needs of individual students. Library, laboratory, and field work under the direction of the instructor, with conferences once or twice a week. Registration in this course will not be permitted without the consent of the instructor concerned.

*Mr. Altenburg, Mr. Chandler, or Mr. Davies*

**Biology 410.** *Genetics and Eugenics.* This course is devoted to a study of heredity, with frequent references to human material. Prerequisite: Biology 100.

(3-2-7)

*Mr. Altenburg*

**Biology 420.** *Helminthology.* Classification, taxonomy, identification, and life cycles of parasitic worms, and a study of economic importance, treatment, and control of helminthic diseases of man and animals. For students intending to specialize in parasitology. Prerequisites: Biology 100 and 220.

(1-9-8)

*Mr. Chandler* (Not offered in 1947-48)

**Biology 430.** *Medical Entomology.* Classification, taxonomy, identification, life cycles, and control of arthropod parasites, disease vectors, and poisonous species. For students intending to specialize in parasitology. Prerequisites: Biology 100 and 220.

(1-9-8)

*Mr. Chandler*

**Biology 450.** *General Embryology.* A comparative study of the early development of animals with special reference to the higher vertebrates. The principles and important results of experimental embryology are also discussed. Recommended for Junior or Senior premedical students. Alternates with Physiology and Histology (Biology 380). Prerequisite: Biology 100.

(3-3-8)

*Mr. Davies*

**Biology 470.** *General Bacteriology and Immunology.* Sterilization, preparation of media, and methods of cultivation; disinfection; nature and relationships of various types of micro-organisms; introduction to bacteriology of air, soil, water, sewage, dairy products and other foods, and important human, animal, and plant diseases; the principles of immunology and their application to preventive and curative medicine. Special emphasis on public health and hygienic aspects of the subject. Prerequisite: Chemistry 100. Recommended for Junior or Senior premedical students. Alternates with Comparative Anatomy (Biology 340).

(3-3-8)

*Mr. Chandler* (Not offered in 1947-48)

**Biology 480.** Subject to be announced, and hours to be arranged.

**Biology 510.** *Graduate Research in Genetics.* Continuation of this work in successive years will be numbered Biology 610, 710, etc.

**Biology 530.** *Graduate Research in Embryology or Physiology.* Continuation of this work in successive years will be numbered Biology 630, 730, etc.

**Biology 560.** *Graduate Research in Parasitology or Bacteriology.* Continuation of this work in successive years will be numbered Biology 660, 760, etc.

The following four-year schedule is recommended for students preparing to enter medical or dental schools,<sup>1</sup> or to become medical technicians:

*First Year*

- (1) Mathematics 100
- (2) Physics 100
- (3) Chemistry 100
- (4) English 100
- (5) History 110
- (6) Engineering 130
- (7) Physical Training 100 (men only)

*Second Year*

- (1) Mathematics 200
- (2) Biology 100
- (3) Chemistry 220B
- (4) English elective
- (5) German 100
- (6) Engineering 280

*Third Year*

- (1) Biology 380 or 450 (as offered)
- (2) Biology 340 or 470 (as offered)
- (3) Chemistry 300B

<sup>1</sup>Under state law the medical and dental colleges of the University of Texas require a course in American history and a course in American government before the respective professional degrees are awarded. History 110 and 310 meet this requirement. The University of Texas will, however, permit those subjects to be taken in summer school or by correspondence at any time prior to completion of the professional course.

- (4) French 100 or German 200
- (5) Psychology 300

*Fourth Year*

- (1) Biology 450 or 380 (as offered)
- (2) Biology 470 or 340 (as offered)
- (3) Elective in chemistry or physics
- (4) Biology 220
- (5) Humanity elective

For students preparing to enter graduate schools of nursing leading to the M.N. degree, the basic academic course (see pp. 44 ff.) may be followed, with biology and chemistry as sciences in the first and second years. The major courses should be selected from Group B, and at least one additional course in biology is recommended.

### Business Administration and Economics

**Business Administration 200.** *Elementary Accounting.* Fundamental concepts and procedures of the financial record-keeping and financial reporting systems of the modern economy. An initial purpose of the course is that of building a sound philosophy in accordance with which to develop the principles of modern accounting. The course then follows the generally accepted theory that the study of accounting principles and methods furnishes the most satisfactory approach to an understanding of the mechanics of the modern business world. While the course is basically accounting, the organization and procedures of business are emphasized throughout. A two-semester course. Open to academic students only.

(3-0-6)

*Mr. Simons*

**Business Administration 220.** *Accounting Survey I.* A one-semester course planned along the same lines as Business Administration 200, condensed and modified to meet the needs of the engineering student who can give but one semester to the subject. Given in both fall and spring semesters. Not open to academic students.

(3-0-3)

*Messrs. Mackey and Simons (first semester)  
and Mr. Mackey (second semester)*

**Business Administration 225.** *Accounting Survey II.* Special consideration is given to the practical aspects of accounting for sole proprietorships, partnerships, and corporations, and also to trading, manufacturing, and other common types of business enterprises. The course provides a second-semester continuation of Business Administration 220 for physical education Sophomores. Given only in the spring semester. Not open to academic or engineering students.

(3-0-3)

*Mr. Simons*

**Business Administration 310.** *Introduction to Modern Business Law.* This course includes a brief background of the history and philosophy of law; a study of the essentials of the law of contracts, agency, bailments, bills and notes, sales, and corporations; and a summary of the law of torts, crimes, domestic relations, and property.

(3-0-6)

*Mr. Perry*

**Business Administration 390.** (a). *Accounting Control.* The methods of accounting for the various elements of manufacturing, distribution, and financial cost are treated with special emphasis on the use of cost information in administration and control. Job order, process, and standard cost procedures. The function of the budget in control. (First half-year.)

(b). *Auditing.* Financial examination theory, practice, and procedure; internal control; balance sheet and detailed examinations; working papers and reports. Largely based on integrated case study. (Second half-year.)

This course is given in alternate years beginning with the academic year 1947-48. Prerequisite: Business Administration 200.

(3-0-6)

*Mr. Simons*

**Business Administration 400.** *Intermediate and Advanced Accounting.* Further development of accounting as a tool of the business executive. Construction of financial and operating statements; partnerships; corporations; valuation of assets and liabilities; funds and reserves; interpretation of financial and operating statements; application of funds; insurance; consignment, installment, and branch sales; statement of affairs; receiverships; parent and subsidiary accounting; consolidations, mergers, and financing; foreign exchange; estates and trusts; budgets. While the course is basically

accounting, the organization and procedures of the modern business world are emphasized throughout. A two-semester course given in alternate years. Prerequisite: Business Administration 200.

(3-0-6) *Mr. Simons* (Not offered in 1947-48)

**Business Administration 410.** *Income Tax Problems.* A study of the Federal income tax laws as they apply to the various types of business units. A laboratory course primarily for Seniors who are desirous of taking the examination for the C.P.A. certificate. Prerequisite: Registration in Business Administration 390 or 400.

(0-3-2) *Mr. Simons*

**Economics 100.** *Introduction to Business and Economics.* A survey course designed to introduce the student to the social setting and the economic bases of modern industry. Planned for students of physical education.

(3-0-6)

**Economics 200.** *Elements of Economics.* Introduction to economic theory and an analysis of the operation and problems of our modern economic system.

(3-0-6)

**Economics 300.** (a). *Money and Banking.* The American monetary system; the gold standard; bimetallism; meaning of inflation; credit and credit instruments; organization and regulation of commercial and investment banks; the Federal Reserve System; principles of foreign exchange. (First half-year.)

(b). *Monetary Theory.* Price levels; monetary and banking policies and their effect on business fluctuations; international monetary problems. (Second half-year.)

Prerequisite: Economics 200.

(3-0-6)

*Mr. J. Hodges*

**Economics 350.** (a). *Elements of Statistical Method.* Collection, classification, and presentation of data; use of graphic methods; analysis of frequency distributions; introduction to the theory of sampling and statistical inference; analysis of time series; index numbers; correlation. (First half-year.)

(3-2- )

(b). *Applications of Statistical Method.* Advanced problems in sampling and correlation; industrial applications of statistical principles; use of statistics in the control of business enterprise. (Second half-year.)

(3-0-6)

*Mr. J. Hodges*

**Economics 360.** *Engineering Economics.* Economic analysis with particular reference to forms of business organizations; behavior of costs and prices; influence of technological changes upon volume of production and employment; industrial promotion and finance; the relative economy of engineering alternatives; interest and annuities; valuations and appraisals; depreciation; fixed and variable costs; economics of equipment replacement; mortality studies for physical property. A two-semester course. Open only to engineers.

(3-0-6)

*Mr. J. Hodges*

### Chemistry

**Chemistry 100.** *Introductory Chemistry and Qualitative Analysis.* Three lectures and four hours of laboratory work weekly. Students who have not had chemistry in high school will be required to attend one extra class hour per week during the first term. A general introductory course dealing with the fundamental phenomena and principles of the science. During the first half-year the laboratory exercises are arranged to verify and illustrate the principles and facts which are discussed in the lectures. During the last half-year the laboratory work deals with the general principles and methods of qualitative analysis.

(3-4-8)

*Messrs. Nicholas and Weiser*

**Chemistry 110.** *General Chemistry.* Two lectures, one recitation, and three hours of laboratory work weekly. This is a general introductory course differing from Chemistry 100 only in giving more attention to elementary organic chemistry and biochemistry. It is designed especially for and open only to students taking the course in physical education.

(3-3-8)

*Mr. Bushey*

**Chemistry 200.** *Introductory Physical and Physiological Chemistry.* Three lectures and three hours of laboratory work weekly. This course is open to academic students who wish to elect a second course in chemistry, and to premedical students desiring another chemistry course in addition to those specifically recommended. The lectures and laboratory work of the first half-year deal with the physical properties of gases, liquids, and solids; solutions; etc. The lectures and laboratory work of the second half-year are devoted to a study of the physiological processes of the animal body, such as digestion, metabolism, and nutrition, and to blood and urine chemistry. Prerequisite: Chemistry 100.

(3-3-8)

*Mr. Nicholas*

**Chemistry 220A.** *Quantitative Analysis.* Three lectures and eight hours of laboratory work weekly. The course aims to familiarize the student with the fundamental principles of analytical chemistry and, by extensive laboratory and problem work, with the application of these principles to a variety of representative analytical processes. Special emphasis is placed on chemical mathematics and stoichiometry, and throughout the work attention is given to general analytical technique. This course is required of all chemical engineers and of academic students who expect to take further work in chemistry. Prerequisites: Chemistry 100 and Physics 100.

(3-8-11)

*Mr. Smith*

**Chemistry 220B.** *Quantitative Analysis.* Three lectures and four hours of laboratory work weekly. The same course as Chemistry 220A except for the amount of laboratory work. Recommended for all premedical students.

(3-4-8)

*Mr. Smith*

**Chemistry 300A.** *Organic Chemistry.* Three lectures and four hours of laboratory work weekly. The course is designed to give a thorough survey of aliphatic and aromatic chemistry with an introduction to the heterocyclic compounds, and to present the theories relating to their structure and reactions. Prerequisite: Chemistry 220.

(3-4-8)

*Mr. Richter*



**Chemistry 300B.** *Organic Chemistry.* Three lectures and four hours of laboratory work weekly. A course arranged primarily for premedical students and academic students not specializing in chemistry. This course differs from Chemistry 300A only in the type of laboratory preparations. The laboratory work is devoted chiefly to the synthesis of typical examples of general and local anesthetics, disinfectants, analgesics, arsenicals, biological preparations, alkaloids, and dyes. Prerequisite: Chemistry 220 or special permission from the department of chemistry. (See page 73 for course recommended for premedical students.)

(3-4-8)

*Mr. Richter*

**Chemistry 310.** *Physical Chemistry.* Three hours of lectures and recitation and four hours of laboratory work weekly. A quantitative study of theoretical and physical chemistry dealing with the forms of matter, changes of state and energy, kinetics, equilibrium, electrochemistry, photochemistry, and atomic structure. Prerequisites: Chemistry 220 and Physics 200.

(3-4-8)

*Mr. Garrison*

**Chemistry 410.** *Colloid Chemistry.* Three lectures and four hours of laboratory work weekly during the first half-year. An introductory course dealing with the theories of colloid chemistry and their applications. Prerequisites: Chemistry 300 and 310.

(3-4-4)

*Mr. Weiser*

**Chemistry 420.** *Advanced Physical Chemistry.* Two lectures and one conference on problems weekly during the second half-year. Structure of matter, methods in physical chemistry, phase rule, X-ray and electron diffraction analysis, electro- and optical methods.

(3-0-3)

*Mr. Milligan*

**Chemistry 430.** *Advanced Inorganic Qualitative Analysis.* Two lectures and four hours of laboratory work weekly during the second half-year. The course includes the application of organic reagents for the identification of metallic ions, and a study of the detection of some of the less familiar elements. Prerequisite: Chemistry 310.

(2-4-3)

*Mr. Nicholas*

**Chemistry 440.** *Advanced Organic Chemistry and Qualitative Analysis.* Two lectures and six hours of laboratory work weekly during the second half-year. This course embodies a systematic procedure for the separation and identification of pure organic compounds. It aims to review, by actual laboratory contact, the important reactions of the main series of organic substances.

(2-6-4)

Mr. Richter

**Chemistry 450.** *Advanced Quantitative Analysis.* Two lectures and six hours of laboratory work weekly during the first half-year. A study of advanced topics in quantitative analysis with emphasis on recent methods. The laboratory work includes examples of the types of analyses covered in the lectures. Prerequisites: Chemistry 300 and 310.

(2-6-4)

(Not offered in 1947-48)

**Chemistry 470.** *Experimental Problems.* Students who are specializing in chemistry may elect in their Senior year at least nine hours weekly during the first or second half-year, or both, in experimental problems under the direction of some member of the staff of instruction.

**Chemistry 480.** *Chemical Literature.* One lecture weekly during the first half-year. The course is devoted to a study of the arrangement of chemical literature and its use in industrial and research work. A topic will be assigned to each student every week for a thorough library investigation. This course is required of all students specializing in chemistry or chemical engineering.

(1-0-1)

Mr. Richter

The schedules of undergraduate students majoring in chemistry must be approved by the department in each of the last two years. Academic students desiring to take a general course in chemistry involving one subject each year should take Chemistry 100, 220, 300, and 310.

#### *Graduate Courses in Chemistry*

Courses numbered 500 and 600 are open only to students of full graduate standing. Senior courses in chemistry and chemical engineering (courses numbered 400) may be taken by graduate students for only partial graduate credit.

**Chemistry 500. *M.A. Thesis.*** Graduate students who are working toward the M.A. degree in chemistry are expected to elect at least nine hours a week in research under the direction of some member of the staff of instruction. Prerequisite: Satisfactory completion of qualifying examinations. (See pages 82-83.)

**Chemistry 510. *Adsorption.*** Three lectures or conferences weekly during the second half-year. A course in advanced colloid chemistry dealing with the nature and mechanism of adsorption and its relation to such phenomena, among others, as the stability of colloidal systems and contact catalysis.

(3-0-3)

*Mr. Weiser*

**Chemistry 520. *Theory of Valence.*** Three lectures weekly during the second half-year. A consideration of inter-atomic forces and their relationship to the structure and properties of matter. (Alternates with Chemistry 530.)

(3-0-3)

*Mr. Smith* (Not offered in 1947-48)

**Chemistry 530. *Heterogeneous Equilibrium.*** Two lectures weekly during the second half-year. A study of the problems of heterogeneous equilibrium from the standpoint of the phase rule. (Alternates with Chemistry 520.)

(2-0-2)

*Mr. Smith*

**Chemistry 540. *Advanced Organic Chemistry.*** Two lectures weekly during the first half-year. A consideration of some of the theoretical aspects of organic chemistry with particular reference to such topics, among others, as tautomerism, geometrical and optical isomerism, and the chemistry of carbohydrates. (Alternates with Chemistry 560.)

(2-0-2)

*Mr. Richter* (Not offered in 1947-48)

**Chemistry 550. *Microchemical Analysis.*** One lecture and six hours of laboratory work weekly during the first half-year. A course in quantitative micro-analysis based on the procedures of Fritz Pregl. Prerequisite: Chemistry 440.

(1-6-3)

*Mr. Richter*

**Chemistry 560. *Advanced Physiological Chemistry.*** Two lectures weekly during the first half-year. The course is open only to

graduate students who have some knowledge of the fundamentals of physiological chemistry. The course deals with the chemistry of blood, respiration, urine, energy metabolism, and the endocrines. (Alternates with Chemistry 540.)

(2-0-2)

*Mr. Nicholas*

**Chemistry 600.** *Ph.D. Thesis.* Graduate students who are working toward the Ph.D. degree in chemistry are expected to elect at least twelve hours a week in research under the direction of some member of the staff of instruction. Prerequisite: Satisfactory completion of qualifying examinations. (See below.)

**Chemistry 610.** *Application of X-ray Diffraction Methods.* Three lectures weekly. Application of X-ray diffraction methods to inorganic and colloid chemistry. Identification of solid phases, determination of particle size, X-ray analysis of simple types of structures, electron diffraction, and principles and operation of modern X-ray apparatus.

(3-0-6)

*Mr. Milligan*

**Chemistry 620.** *Advanced Inorganic Chemistry.* Two lectures weekly and a seminar fortnightly. A study of the chemical elements and their compounds from the standpoint of the periodic law. Modern developments in inorganic chemistry will receive special attention.

(2-0-4)

*Mr. Smith* (Not offered in 1947-48)

**Chemistry 640.** *Heterocyclic Chemistry.* Two lectures weekly. A consideration of the chemistry of heterocyclic systems.

(2-0-4)

*Mr. Richter*

In addition to the general requirements for advanced degrees given on pages 49 and 50, the following specific requirements must be met by candidates taking their major work in chemistry:

(1) For admission to full graduate standing, candidates for advanced degrees must have completed general courses equivalent to Chemistry 100, 220, 300A, and 310 of the Rice Institute, and at least one full-year course of more advanced work equivalent to the corresponding 400 course in chemistry of the Rice Institute.

(2) For admission to Chemistry 500 and 600 (Thesis), a graduate

student must pass satisfactorily comprehensive qualifying examinations covering inorganic, analytical, organic, and physical chemistry and scientific German. The examinations for Chemistry 600 cover more advanced topics such as are included in the 400 and 500 courses in chemistry. These examinations will be given at the beginning of the academic year before October first.

(3) A candidate for the degree of Master of Arts is required to complete, in addition to a thesis, two full-year courses in chemistry, one of which must be a 500 course; and one approved 300 or 400 course in mathematics, physics, or biology. The first week in May of the last year of residence, the candidate will be given three-hour written examinations in general chemistry and organic chemistry, and must pass also a final public oral examination.

(4) A candidate for the degree of Doctor of Philosophy is required to complete, in addition to a thesis, a minimum of four full-year graduate courses in chemistry, and one advanced course in mathematics, physics, or biology. He must satisfy the members of the staff under whom he is working that he possesses a reading knowledge of scientific French and German. The first week in May of the last year of residence, the candidate will be given comprehensive written examinations covering the main branches of chemistry, with special emphasis on the branch in which the candidate is working, and in addition must pass a final public oral examination.

Graduate assistants and fellows who devote as much as six hours per week to teaching will, in general, be expected to spend two years in residence for the master's degree and four years in residence for the doctor's degree.

### **Economics: see Business Administration and Economics**

#### **Education**

**Education 310.** *The History of Education.* First half-year: a survey of educational thought and practice from ancient to modern times. Second half-year: a continuation of the history of modern education with special attention to American institutions. Recommended: Philosophy 300 or one course in history.

(3-0-6)

*Mr. Young*

**Education 410.** *Basic Principles of Secondary Education.* First half-year: an introduction to educational psychology. Second half-year: an examination of the principles of secondary education, including methods of instruction, curriculum planning, and administration. Prerequisite: Psychology 300 or Philosophy 300.

(3-0-6)

*Mr. Young*

The Department of Education of the State of Texas will grant, under the Certificate Law of 1921, the following certificates to students of the Institute:

1. **FOUR-YEAR ELEMENTARY CERTIFICATE.** An elementary certificate valid for four years will be granted to students who have satisfactorily completed five full courses, one of which is in education and bears on elementary teaching, another of which is in English, and of which not more than two are in the same subject.

2. **SIX-YEAR ELEMENTARY CERTIFICATE.** An elementary certificate valid for six years will be granted to those who have satisfactorily completed two years of college work, including two full courses in education.

3. **PERMANENT ELEMENTARY CERTIFICATE.** A permanent elementary certificate will be granted to the holders of the six-year certificates after five years of successful teaching, or after four years of successful teaching and one year of college work taken after the issuance of the certificate.

4. **TWO-YEAR HIGH SCHOOL CERTIFICATE.** A high school certificate valid for two years will be granted to students who have completed five full courses, of which one is in education and another in English.

5. **FOUR-YEAR HIGH SCHOOL CERTIFICATE.** A high school certificate valid for four years will be granted to students who have completed two years of college work, including two full courses in education, of which one is concerned with secondary education.

6. **PERMANENT HIGH SCHOOL CERTIFICATE.** A permanent high school certificate will be granted to holders of the bachelor's degree who have had two full courses in education, one of which bears on training for secondary teaching, and who have completed three years (twenty-seven months) of successful teaching subsequent to taking the degree.

Students desiring to secure a permanent high school certificate before beginning teaching should have, in addition to the courses mentioned above, two additional courses in education, one of which must deal with methods, observation, and practice teaching. One-third of the work of this latter course must bear upon training for secondary education.

Attention should also be called to the fact that a college course in "Constitutions" is required for the issuance of a teacher's certificate in Texas. History 310 is planned to meet this requirement.

Students expecting to secure the Institute's recommendation for a teaching position should consult the department offering the work of their primary interest, in order that their course of study may be properly planned.

### English

**English 100.** *English Composition; Study of Fundamental Literary Forms.* The primary purpose of the course is to give students the command of written English which is necessary for later work in college. A secondary but still important purpose is to examine the chief types of prose and poetry, as a foundation for further courses in literature or for private reading. Required of Freshmen. (3-0-6) *Messrs. Camden, Dix, Gallegly, Lewis, Parish, Whiting, and Williams*

**English 110.** A course similar to English 100, meeting two hours per week. For students taking a course in naval science. (2-0-4) *Mr. Thomas*

**English 200.** *Outlines of the History of English Literature.* Colateral reading of major authors representative of the various periods. (3-0-6) *Mr. McKillop and others*

**English 210.** *Argumentation and Public Speaking.* Practical training in the fundamentals of effective speech, written argument, and debate. Designed to prepare the student for the ordinary demands of business life. Platform speaking, themes, conferences. This course is planned for students of physical education. (3-0-6) *Mr. Gallegly*

**English 220.** *Composition and Expression.* Primarily for engineers. Letters, reports, and argumentation. Study and discussion of selected prose readings.

(3-0-6)

(Not offered in 1947-48)

**English 230.** *Selected Great Books of European Literature.* Readings, lectures, discussions, and reports.

(3-0-6)

(Not offered in 1947-48)

**English 300.** *English Drama from Its Beginnings to 1642.* The development of the drama will be traced from the miracle plays and the moralities through the plays of Shakespeare and his contemporaries to the closing of the theaters. Some emphasis will be placed upon the development of Shakespeare as a dramatist, and upon the indebtedness of Shakespeare to the earlier drama.

(3-0-6)

Mr. Camden

**English 310.** *Modern British and American Poetry.* A survey of poetic development in Great Britain and America from 1890 to 1945: the revolt of the 1890's, the Irish Renaissance, the Georgians, the poetry of the two World Wars, the "new" American poetry.

(3-0-6)

Mr. Williams

**English 320.** *Modern Drama.* Special study of Ibsen, Strindberg, Shaw, Barrie, Galsworthy, O'Neill, and Anderson; reading of representative recent English, American, and Continental plays; lectures upon theatrical history, acting, and dramatic tendencies.

(3-0-6)

Mr. Whiting

**English 330.** *Advanced Writing.* The writing of essays, stories, plays, and novels. Time is given also to problems of marketing manuscripts. Stories will be read and analyzed, and critical theories discussed. Frequent conferences. Open to Juniors and Seniors, and to Sophomores upon recommendation of an instructor.

(3-0-6)

Mr. Williams

**English 340.** *The English Novel.* Major novelists of the eighteenth, nineteenth, and early twentieth centuries.

(3-0-6)

Mr. McKillop

**English 360.** *English Drama from 1660 to 1900.* This course begins with the opening of the theaters after the Puritan Revolution



and covers the drama of the Restoration, the eighteenth century, and the nineteenth century.

(3-0-6) *Mr. Camden* (Not offered in 1947-48)

**English 370.** *Milton and His Contemporaries.* Special study of Milton and some of the minor writers of the seventeenth century, including Donne, Herbert, Cowley, Bunyan, Pepys, and Dryden.

(3-0-6) *Mr. Whiting* (Not offered in 1947-48)

**English 380.** *Composition and Expression for Engineers.* (Semester course.) Training in the writing of business letters and technical reports, and in written and oral argument. Selected readings in engineering subjects. Platform speaking. Prerequisite: English 100.

(3-0-3) *Messrs. Gallegly and Thomas*

**English 390.** *Major American Writers.* A number of American books of the nineteenth and twentieth centuries are studied in relation to the background of American thought. The novel is the form to which most attention is given, and the primary emphasis is placed on literary qualities.

(3-0-6) *Mr. Dix*

**English 400.** *Shakespeare.* A close study of certain of the comedies, histories, and tragedies, with lectures on the interpretation of these plays in the light of the Elizabethan mind. Open only to Seniors.

(3-0-6) *Mr. Camden*

**English 420.** *Romantic and Victorian Literature.* Special study of the poetry from Coleridge to Swinburne; reading of selected prose from Lamb to Pater. Study of the biographical, social, and political background.

(3-0-6) *Mr. Whiting*

**English 430.** *Eighteenth Century Prose and Poetry.*

(3-0-6) *Mr. McKillop*

**English 500.** *Chaucer.* Extensive reading in the *Canterbury Tales* and *Troilus and Criseyde*.

(3-0-6) (Not offered in 1947-48)

**English 510.** *Old English: "Beowulf."*  
(3-0-6) (Not offered in 1947-48)

**English 530.** *Topics in English Literary History.* Graduate research.

Requirements for honors course in English: four courses in English; two courses in modern languages, preferably French, German, or Italian; two courses in philosophy or history; all to be Junior or Senior courses and to be passed with high grades. Individual schedules and quality of work must be satisfactory both to the department and to the Committee on Examinations and Standing.

### French: *see* Romance Languages

#### German

**German 100.** *Elementary German.* Pronunciation, grammar, dictation, conversation, composition. Reading of a book.  
(3-0-6) *Staff*

**German 200.** *Intermediate German.* Reading of two works of literary excellence. Outside reading. Grammar review; discussion and composition in German.  
(3-0-6) *Messrs. Lyle and ———*

**German 210.** *Scientific German.* (The work of the first semester is identical with that in German 200.)  
(3-0-6) *Mr. Louis*

**German 300.** *Classical Literature.* Chiefly Lessing, Goethe, and Schiller.  
(3-0-6) *Mr. Louis*

**German 310.** *Nineteenth Century Literature.*  
(Not offered in 1947-48)

**German 330.** *Advanced Composition.* Phonetics, Gothic script, grammar, reading, writing, and conversation. Excursions into the literature and history of Germany. The work will be carried on mainly in German.  
(3-0-6)

**German 420.** *Goethe*. Including the study of *Faust*.  
(3-0-6) (Not offered in 1947-48)

**German 430.** *Contemporary Literature*. Prerequisite: German 200 or the equivalent.  
(3-0-6) (Not offered in 1947-48)

**German 500.** *Germanic Philology and Middle High German*. History of the German language and survey of medieval German literature. Study of Walther von der Vogelweide's poems and of the *Nibelungenlied*. For undergraduates as well as graduates.  
(Not offered in 1947-48)

**German 510.** *Literature Seminar*.  
(Not offered in 1947-48)

**German 520.** *Philology Seminar*. Any one or two of the following: phonetics; Old High German; Middle High German.  
(Not offered in 1947-48)

The requirements for the honors course in German comprise five advanced courses: four in German, all to be passed with high credit, and one in English. Individual schedules and quality of work must be satisfactory both to the department and to the Committee on Examinations and Standing.

## History

**History 100.** *Foundations of Western Civilization*. This course is intended to provide an historical background for the various humanistic branches of study. It includes a survey of human achievement from prehistoric times through antiquity and the Middle Ages to the eighteenth century. The main emphasis is placed upon those formative influences which constitute the basis of the modern world structure. Much attention is given to historical geography.  
(3-0-6) *Miss Fischer and Mr. Lear*

**History 110.** *American History*. A survey of the growth of the American nation, with considerable attention to its European background. It stresses such major developments as the establishment of the federal republic, westward expansion and the dominance of

frontier attitudes, the growth of democracy, the triumph of nationalism over sectionalism, the transition from agrarianism to industrialism, the emergence of America as a world power, and the present involvement in Europe and Asia. Recommended as fulfilling the requirements of prelegal and premedical students and constituting a basic course in history for academic students.

(3-0-6)

*Miss Fischer, Mr. Lear, and others*

**History 300.** *Social History of the United States.* This course deals with the primary trends in the social and intellectual life of the American people from colonial times to the present, and seeks to interpret them as expressions of the American national spirit. Prerequisite: History 110.

(3-0-6)

*Mr. Lear*

**History 310.** *American Government.* A study of the history and operation of constitutional government in the United States with special emphasis on the historical background of the Federal government, the structure of the government, the formation of public policy, and the conduct of public business. For additional background and for contrast, reference is made to English constitutional history and to the present structure of the English government. This year course in American government, planned for the general student of government, is also designed to enable prospective lawyers, physicians, and teachers to meet the state requirement of a course in "Constitutions."

(3-0-6)

**History 320.** *Trends in European Culture during Antiquity and the Middle Ages.* This course traces selected aspects of European thought from Periclean Athens to the later Middle Ages, with special reference to Greco-Roman influences. Hellenistic, Byzantine, and Mohammedan contributions to the Latin West are considered. Religious, philosophical, and scientific implications are examined in some detail. Recommended: Philosophy 300.

(3-0-6)

*Mr. Lear* (Not offered in 1947-48)

**History 330.** *Topics in Classical and Medieval Letters.* This course deals with selective phases of classical and medieval literature, including satire, chronicles and histories, the romances and

epic cycles, and lyric poetry. Attention is given also to the role of the Latin language in the Middle Ages, the preservation of letters in manuscripts and libraries, and the evolution of the medieval scripts. The subject-matter is considered from the historical point of view.

(3-0-6)

*Mr. Lear* (Not offered in 1947-48)

**History 340.** *Foundations of National Power.* A study of the basic factors in political geography and international politics, stressing such elements of national power as geographical location, population, resources, technology, ideology, military strategy, and geopolitical theory.

(3-0-6)

**History 350.** *Europe Since 1789.* This course emphasizes the revolutions against autocracy, the spread of democracy, the completion of nationalism, and the development of imperialism. Much attention is given to the antecedents of the world wars and revolutions of the present century, the history of this period, and the current situation in Europe.

(3-0-6)

*Mr. Craig*

**History 360.** *English History.* A survey tracing the development of the English people, from their origins to the present, with emphasis upon imperial expansion and upon the evolution of those social, economic, and political forms and concepts which have basically influenced Western civilization. This course is especially recommended to students preparing for the study of law.

(3-0-6)

*Mr. Craig*

**History 370.** *Naval and Military History.* Beginning with a study of the campaigns of World War II, the course includes a survey, from ancient times, of war as an instrument of national policy. Attention is given to the causes of wars, the principles of strategy and tactics, the personalities of great commanders, and Admiral Mahan's doctrine of the influence of sea power upon history.

(3-0-6)

*Mr. Craig*

**History 410.** *Legal History and Political Theory.* A survey of the main trends in politics and law from antiquity into early modern times, with special emphasis upon such important conceptions as

god-kingship, legalized absolutism, the organic state, natural law, personality of law, custom and feudal contract, majesty and sovereignty, allegiance, and constitutionalism.

(3-0-6)

*Mr. Lear*

**History 420.** *Medieval Sources.* Survey and translation of typical medieval Latin sources. The selections are studied from the point of view of historical significance and of literary appreciation. Also intensive reading and reports on special topics in medieval literature and intellectual history. This course is intended for students of history and the modern languages who desire some familiarity with ordinary medieval Latin texts. Open only to advanced students after consultation with the instructor.

(3-0-6)

*Mr. Lear* (Not offered in 1947-48)

**History 500.** *Topics in American History.* Graduate research.  
(3-0-6)

**History 510.** *Topics in Medieval History.* Graduate research.  
(3-0-6)

**History 520.** *Topics in Legal History and Political Theory.* Much attention is given to methods, materials, and the recent literature in this field. Instruction is based on the translation of several primary sources in Roman and Germanic Law, as well as reports on such topics as sovereignty and allegiance. Open to properly qualified students after consultation with the instructor.

(3-0-6)

*Mr. Lear* (Not offered in 1947-48)

**History 550.** *Topics in Modern Imperialism.* Emphasis is placed upon the decades 1894-1914, with especial reference to colonial rivalries in Africa and the Far East, including the part of the United States in world affairs after the Spanish-American War. Students will choose topics for research and reports. Open to properly qualified students after consultation with the instructor.

(3-0-6)

*Mr. Craig*

Requirements for honors course in history: in addition to History 100 and 110, four courses in history; two courses in languages and literature; two courses in philosophy, architecture, or economics; all to be Junior or Senior courses and to be passed with high

grades. Individual schedules and quality of work must be satisfactory both to the department and to the Committee on Examinations and Standing.

**Italian: see Romance Languages**

**Mathematics**

**Mathematics 100.** *Elementary Analysis.* Trigonometry, analytic geometry, and elementary calculus. This course is required for Freshmen because it forms a necessary introduction to work in mathematics and pure and applied science, and assists the students in developing habits of self-criticism in thinking and writing. As one of the most modern of sciences and, at the same time, one of the most ancient of humanities, mathematics is regarded as an integral part of any general education. Engineering sections meet in three two-hour periods.

(3-0-6) or (3-3-6)

Staff

**Mathematics 200.** *Differential and Integral Calculus.* Derivatives, differentials, definite integrals, infinite series, and their applications, especially to mechanics. This course continues the work of Mathematics 100 in calculus and analytic geometry, with applications to Newton's laws of motion and calculation of moments of forces and of inertia, centers of gravity, etc. Prescribed for all science-engineering majors who do not take Mathematics 210. Students who have considerable facility in mathematical reasoning should register for Mathematics 210.

(3-0-6)

Staff

**Mathematics 210.** *Differential and Integral Calculus.* This course covers the ground of Mathematics 200 but is more complete and goes further. It is open to students who obtain high grades in Mathematics 100, or otherwise satisfy the instructor of their fitness to take the course.

(3-0-6)

**Mathematics 230.** *Algebra and Mechanics.* Solutions of equations, vectors, invariants, determinants, and interpolation; systematic statics and parts of dynamics. The second half deals with

statics and parts of dynamics. The algebraic technique necessary for the mechanical applications is provided in the work of the first half.

(3-0-6)

*Mr. Ulrich*

**Mathematics 230a.** *Algebra.* The first half of Mathematics 230. Open to engineering students.

(3-0-3)

*Mr. Ulrich*

**Mathematics 240.** *Algebra and Geometry.* The work of the first half-year is algebra, the same as the work of Mathematics 230a. In the second half-year, general algebraic methods are applied to plane and solid analytic geometry and to the projective study of conics. This course is especially recommended to students who are preparing to teach mathematics in high school.

(3-0-6)

(Not offered in 1947-48)

**Mathematics 300.** *Advanced Calculus and Differential Equations.* Multiple integrals, infinite series, and partial differentiation, with many applications, and the geometry of three dimensions; differential equations. This course, or Mathematics 310, is prescribed for civil, electrical, and mechanical engineering students. Open to those who have passed Mathematics 200 or 210, or otherwise satisfy the instructor of their fitness to take the course.

(3-0-6)

*Messrs. Bray and Calkin*

**Mathematics 310.** *Advanced Calculus and Differential Equations.* Students with considerable facility in mathematical reasoning should take this course rather than Mathematics 300, the ground of which it covers. Such students may take Mathematics 230 during the same year. Opportunity to write theses is given.

(3-0-6)

*Mr. Calkin*

**Mathematics 400.** *Theory of Functions of a Complex Variable.* This course is fundamental in analysis. Besides giving an introduction to basic concepts of analysis, it includes the study of analytic functions of a complex variable, the Cauchy-Riemann equations, Cauchy's Integral Theorem, Taylor's series, calculus of residues, and conformal mapping.

(3-0-6)

*Mr. Ulrich*



**Mathematics 410.** *Differential Geometry.* The properties of general classes of curves and surfaces, the area of a surface, the problem of Plateau.

(3-0-6)

(Not offered in 1947-48)

**Mathematics 420.** *Infinite Processes.* Sequences, series, Stieltjes integrals, summability, and related topics.

(3-0-6)

Mr. Brunk

**Mathematics 430.** *Modern Geometry.* Synthetic and algebraic geometry, theory of groups, invariants, etc.

(3-0-6)

(Not offered in 1947-48)

**Mathematics 440.** *Differential Equations and Introduction to the Calculus of Variations.*

(3-0-6)

(Not offered in 1947-48)

**Mathematics 500.** *Theory of Functions of a Complex Variable.* Normal families of functions; theorems of Montel; theorems of Stieltjes and Vitali; theorems of Picard, Schottky, Landau, and Carathéodory; theorems of Julia and Ostrowski. Quasi-normal families, families of derivatives, conformal mapping, univalent functions. Applications, including the theory of iteration.

(3-0-6)

**Mathematics 510.** *Theory of Functions of a Real Variable.* Theory of real numbers. Summable functions, Lebesgue and Stieltjes integrals, general integrals, functions of point sets and of pluri-segments, Fourier series.

(3-0-6)

Mr. Bray

**Mathematics 520.** *Trigonometric Series and Related Topics.* Series expansions in terms of orthogonal systems of functions. Trigonometric series. Fourier transforms and integrals. The course is based upon Mathematics 510.

(3-0-6)

Mr. Bray

**Mathematics 530.** *Laplace Transforms.* Applications to the solution of differential systems.

(3-0-6)

Mr. Ulrich

**Mathematics 540.** *Introduction to Modern Algebra.* The purpose of this course is to provide the student with a knowledge of the foundations of modern algebra. The topics to be presented will include the theory of sets, groups, rings and fields, Galois theory, polynomials, algebraic numbers and ideals. The course will be open to graduate students and, with the consent of the instructor, to well-qualified Seniors.

(3-0-6)

**Mathematics 540b.** Topics selected from Mathematics 540 covering a half-year's work. (Second half-year.)

(3-0-3)

(Not offered in 1947-48)

**Mathematics 550.** *Advanced Theory of Riemann Surfaces:* topological properties, theory of entire and meromorphic functions, problem of type.

(3-0-6)

Mr. Ulrich

**Mathematics 560.** *Infinitely Differentiable Functions, and Singularities of Analytic Functions.* Regularization of sequences, problem of equivalence of classes, quasi-analyticity, Watson's problem, applications to Fourier series, singularities of Taylor series, relationship between singularities of Taylor series and quasi-analyticity. The course will be based on a general theory of asymptotic series.

(3-0-6)

Mr. Mandelbrojt

**Mathematics 570.** *Analytical Theory of Numbers.* General theory of Dirichlet series. The Riemann zeta function. Study of various functions of number theory, Euler-Mangoldt function, Möbius-Landau functions. Theorems of Hadamard and de la Vallée Poussin on the number of prime numbers less than a given number.

(3-0-6)

(Not offered in 1947-48)

**Mathematics 590.** *Thesis.*

**Applied Mathematics 310.** *Finance, Statistics, and Probability.* Mathematical theory of investment, analysis of statistics as applied to economics and biology, theory of probability.

(3-0-6)

Mr. Brunk

**Applied Mathematics 410.** *Differential Equations of Mathematical Physics.* A study of classical partial differential equations which arise in the flow of heat, in the vibrations of strings and membranes, and in related problems.

(3-0-6)

Mr. Calkin

**Applied Mathematics 420.** *Mechanics.* First half: review of elementary kinematics and dynamics of a particle. Dynamics of systems. Principle of d'Alembert. General equations of analytical dynamics. Principles of Hamilton. Second half: hydrostatics. General theorems on perfect fluids. Theory of elasticity, elastic equilibrium, interior motions. Equations of the motion of a viscous fluid.

(3-0-6)

(Not offered in 1947-48)

**Mathematical Colloquium.** The colloquium usually meets one afternoon every other week in order to allow the exposition of original investigations by its members.

Besides the courses listed above, others will be given from time to time to fit the needs of students. Reading courses are also offered in other fields of analysis in connection with research.

**Philanthropy: see Sociology and Philanthropy**

### Philosophy

**Philosophy 210.** *Introduction to Philosophy.* Ethics: an introductory study of the development of moral ideas and of the problems of morality in our civilization. Logic: the principles according to which evidence is weighed and right conclusions drawn in everyday thought as well as in the systematic thinking of science and philosophy.

(3-0-6)

Mr. Tsanoff (*first semester*) and  
Mr. Fulton (*second semester*)

**Philosophy 220.** *Principles of Philosophy.* Man's search for the universal principles governing his life and giving meaning to it. Topics: human nature, personal ethics, social and political philoso-

phy, the meaning of religion, the nature and value of knowledge, and a total view of things.

(3-0-6)

*Mr. Fulton*

**Philosophy 300.** *History of Philosophy.* An historical survey of the essential features and main currents of philosophical thought, ancient, medieval, and modern.

(3-0-6)

*Mr. Tsanoff*

**Philosophy 340.** *Philosophy of Science.* The nature and development of the modern scientific view of the world. The conditions and limits of scientific knowledge; its meaning and value in man's life and thought.

(3-0-6)

*Mr. Fulton*

**Philosophy 400.** *Philosophy of Religion.* An historical-critical study of the main problems of religion, dealing more especially with the belief in God, the idea of immortality, and the problem of evil.

(3-0-6)

*Mr. Tsanoff*

**Philosophy 420.** *Types of Philosophical Theory.* First semester: the universal significance of Greek thought presented through reading and discussion of selected writings of Plato and Aristotle. Second semester: an examination of some philosophical problems and methods of modern or contemporary thought.

(3-0-6)

*Mr. Fulton (first semester) and*

*Mr. Tsanoff (second semester)*

## Physics

**Physics 100.** *Heat, Light, Mechanics, Sound, Magnetism, and Electricity.* A course of three experimental lectures and three hours of practical work per week. This course is intended for those who wish to obtain some general knowledge of the principles of natural philosophy on which the modern applications of science to human activities are based. The scientific method of dealing with facts and theories is explained and made familiar by numerous experimental demonstrations and laboratory exercises. For the practical work thirty complete sets of apparatus are available. Students taking Physics 100 must have taken or be taking Mathematics 100.

(3-3-8)

*Mr. Heaps*

**Physics 200.** *Electricity and Magnetism.* A course of three lectures and three hours of practical work per week. This course with Physics 100 makes up a complete course on the principles of physics which is required of all students in the science-engineering curriculum other than biology and premedical majors. In this second course the fundamental principles of electrical theory are explained and illustrated, including the elementary theory of direct and alternating currents, electric transmission of power, electronics, and electrical theory of matter. Certain parts of dynamics required for the electrical theory are also included. In the laboratory the students are taught how to make measurements of all the important electrical quantities such as current, resistance, potential, capacity, inductance, magnetic intensity, magnetic properties of iron and steel, electro-chemical equivalents, characteristics of triodes, etc. Thirty complete sets of apparatus are available for this work. Students taking Physics 200 must have completed Mathematics 100 and must take Mathematics 200 or 210 at the same time as Physics 200.

(3-3-8)

*Mr. Bonner*

*Advanced Undergraduate Courses in Physics*

The following five Physics 300 courses consist each of three lectures per week, with laboratory work in certain courses designated by the letters "a" and "b." Either half of each course may be taken separately but two half-year courses must be taken to obtain degree credit. Three of the courses Physics 300, 310, 320, 330, 340, and 400 will normally be given each year.

Students taking the honors course in physics carry at least two advanced physics courses in each semester of their Junior and Senior years. They should also take Mathematics 300 or 310 and another mathematics course or a course in chemistry in these years.

**Physics 300a.** *Electronics.* Electrical measurements. Resistance. Capacity. Inductance. A.C. circuits. Electron tubes. Thermionics.

(3-0-3)

*Mr. Risser*

**Physics 300b.** *Electronics.* Amplifiers. Oscillators. Modulation. Transmission lines. Frequency monitors. Ultrahigh-frequency os-

cillators and detectors. Radio measurements. Electromagnetic waves. Antennæ. Three hours of laboratory work weekly.

(3-3-4)

*Mr. Risser*

**Physics 310a.** *Sound.* Analogy between electrical, mechanical, and acoustical systems. Acoustical impedance. Microphones and loud speakers. Perception of direction of sound. Supersonics. Piezoelectric and magnetostriction oscillators. Three hours of laboratory work weekly.

(3-3-4)

*Mr. Wilson*

**Physics 310b.** *Properties of Matter.* Gravitation. Elasticity. Surface tension. Vapor pressure. Heat conductivity of solids, liquids, and gases. Osmotic pressure. Viscosity. Diffusion. Relations between pressure, volume, and temperature of gases.

(3-0-3)

*Mr. Wilson*

**Physics 320a.** *Geophysical Prospecting.* Theory of waves in solids and fluids. Hydrodynamics. Seismographs, geophones, and hydrophones. Applications to geophysical prospecting.

(3-0-3)

*Mr. Wilson*

**Physics 320b.** *Geophysical Prospecting.* Gravitation. Gravimeters. Applications to geophysical prospecting. Magnetic, electric, and chemical methods of geophysical prospecting.

(3-0-3)

*Mr. Wilson*

**Physics 330a.** *Optics.* Theory of optical instruments. Interference. Diffraction. Polarization. Optical properties of crystals. Heat radiation. Three hours of laboratory work weekly.

(3-3-4)

*Mr. Wilson*

**Physics 330b.** *Thermodynamics.* Free energy and chemical equilibrium. Theory of dilute solutions. Theory of cracking petroleum.

(3-0-3)

*Mr. Wilson*

**Physics 340a.** *Spectra.* Optical spectra. X rays. Quantum theory.

(3-0-3)

*Mr. Risser*

**Physics 340b.** *Nuclear Physics.* Electrical properties of gases. Alpha, beta, and gamma rays. Nuclear reactions. Three hours of laboratory work weekly.

(3-3-4)

*Mr. Risser*

**Physics 360.** Ten lessons on glass blowing of one hour each. This course will be given from time to time as required. No credit is given for this course. Students taking this course must have taken or be taking a Physics 300 course.

*Mr. Wilson*

**Physics 400.** *Introduction to Mathematical Physics.* (a). The application of mathematical methods to particle dynamics including planetary orbits, vibrating systems, and coupled oscillators and to rigid dynamics.

(b). The application of mathematical methods to electrostatics and electrodynamics after a brief review of vector analysis.

(3-0-6)

*Mr. Houston*

**Physics 410.** *Physics Colloquium.* One meeting a week at which present-day researches in physics will be discussed. No credit is given for this course but graduate students and students taking honors courses in physics are expected to attend the course.

#### *Graduate Courses in Physics*

Two or more of the following eight courses for graduate students will be given each year.

**Physics 500.** *Electron Theory and Theory of Optical Spectra.* Two lectures per week.

(2-0-4)

*Mr. Heaps*

**Physics 510.** *Electricity in Gases, X Rays, and Crystal Structure.* Two lectures per week.

(2-0-4)

*Mr. Heaps*

**Physics 520.** *Principles of Quantum Mechanics.* A deductive presentation of the principles of quantum mechanics with some illustrative applications. Two lectures per week.

(2-0-4)

*Mr. Houston*

**Physics 530.** *Statistical Mechanics and General Dynamics.* Two lectures per week.

(2-0-4)

**Physics 540.** *Nuclear Physics.* Two lectures per week.

(2-0-4)

*Mr. Bonner*

**Physics 550.** *Electromagnetic Theory and the Special and General Theories of Relativity.* Two lectures per week.

(2-0-4)

*Mr. Wilson*

**Physics 560.** *Structure of Solids.* Two lectures per week.

(2-0-4)

*Mr. Houston*

**Physics 570.** *Quantum Theory.* Historical introduction. Quantum theory of heat radiation and specific heats. Bohr's quantum theory of spectra. Matrix mechanics. Quantum mechanics. Theory of spectra. Selection rules. Perturbation theory. Theory of collisions. Dirac's theory of electrons. Two lectures per week.

(2-0-4)

*Mr. Wilson*

**Physics 580.** *Research Work.*

Attention is invited to the fact that many opportunities exist at the present time for persons possessing adequate training in physics and mathematics to engage in industrial research. A large number of industrial corporations now maintain research laboratories for the carrying on of such work. Among these may be mentioned the General Electric Company, the Bell Telephone Company, the Eastman Kodak Company, the National Bureau of Standards, and petroleum companies in this vicinity and in other sections of the country. Students desiring to qualify for positions in such establishments should take the honors course in physics and then, if possible, take a graduate course in physics leading to the M.A. or the Ph.D. degree. However, positions in research laboratories, in the exploration work of the oil industry, and at the National Bureau of Standards are open to men who have taken the B.A. degree with honors in physics.



**Portuguese: see Romance Languages****Psychology**

**Psychology 300.** *General Psychology.* An introduction to the study of human behavior and mental processes. The principal topics are: intelligence and its measurement, individual differences, heredity and environment in mental development, thinking, learning, memory and economical methods of study, feeling and emotion, personality and its appraisal, problems of personal adjustment, the nervous system, sensation and perception. Scientific method and the experimental approach to psychological problems will be emphasized. Students taking this course will have the opportunity to take, outside of class hours, several tests of aptitudes, special abilities, and vocational interest, and will be assisted by the instructor in interpreting the results. Lectures and class demonstrations.

(3-0-6)

*Mr. Pattie*

**Psychology 400.** (a). *Abnormal Psychology.* The psychoses and the psychoneuroses and their determinants in the organism and in the life-history of the individual; psychopathic personalities; mental deficiency; psychoanalysis, hypnotism, and other forms of psychotherapy; mental hygiene.

(3-0- )

(b). *Topics in Experimental Psychology.* Visual, tactual, and auditory sensation and perception; attention; learning and memory; feeling and emotion. Laboratory exercises on these topics.

Prerequisite: Psychology 300.

(3-3-7)

*Mr. Pattie*

**Psychology 410.** (a). *Abnormal Psychology.* The first semester of this course is the same as that of Psychology 400.

(b). *Social Psychology.* The original nature of man as revealed by anthropology and psychology; individual and class differences; racial differences and race prejudice; the influence of cultural factors on the personality; social factors in abnormality, delinquency, and crime.

Prerequisite: Psychology 300 or the consent of the instructor.

(3-0-6)

*Mr. Pattie*

### Romance Languages

**French 100.** *First-year French.* Oral exercises, dictation, grammar, composition, and study of French texts.

(3-0-6) *Messrs. Bourgeois, Girard, Oberlé, and Shelton*

**French 200.** *Second-year French.* Oral exercises, dictation, review of grammar, composition, study of representative authors, and supplementary reading under the supervision of the instructor.

(3-0-6) *Messrs. Girard and Shelton*

**French 205.** *French Oral Practice,* for first- and second-year students.

(0-3-2) *Messrs. Bourgeois and Girard*

**French 210.** *Advanced French.* Review of grammar; study of representative texts. Conducted entirely in French, with oral practice emphasized, leading to advanced studies in French. Open to students who have passed French 100 with a grade of I or II, and to students who have had four years of high school French.

(3-0-6) *Mr. Bourgeois*

**French 230.** *Scientific French.* A course in rapid reading for science students.

(3-0-6) *Messrs. Girard and Moraud*

**French 300.** *Third-year French.* Composition and study of modern French texts, with special emphasis on the syntax and the difficulties of the French language. A considerable amount of outside reading will be required. Reports and essays in French.

(3-0-6) *Messrs. Bourgeois, Girard, and Shelton*

**French 310.** *Phonetics and Composition,* with intensive oral practice.

(3-0-6) *Messrs. Girard and Oberlé*

**French 350.** *A Survey of the History of French Literature of the Eighteenth and Nineteenth Centuries.*

(3-0-6) *Mr. Moraud*

**French 380.** *A Survey of the History of French Literature from the Beginning to the Eighteenth Century.*

(3-0-6) (Not offered in 1947-48)

**French 420.** *A Study of French Classicism.*  
(3-0-6) *Messrs. Bourgeois and Girard*

**French 450.** *The French Drama of the Nineteenth Century.*  
(3-0-6) *Mr. Moraud*

**French 550.** *Studies in Comparative Literature of the Nineteenth Century.*  
(3-0-6) *Mr. Moraud*

Requirements for honors course in French: two 300 and two 400 or 500 courses passed with high credit (grades of I or II). Individual schedules and quality of work must be satisfactory both to the department and to the Committee on Examinations and Standing.

---

**Italian 300.** *Elementary Italian.* Open to students who have had at least two years of French, Spanish, or Latin. Oral exercises, grammar, composition, and reading of representative Italian authors.  
(3-0-6) *Mr. Battista*

---

**Portuguese 100.** *Elementary Portuguese.* Grammar, reading, and composition.  
(3-0-6) *Mr. Oberlé*

---

**Spanish 100.** *Beginning Spanish.* Oral exercises, grammar, composition, and study of elementary Spanish texts.  
(3-0-6) *Messrs. Battista and L. Hodges*

**Spanish 200.** *Second-year Spanish.* Oral exercises, dictation, grammar, composition, translation, and study of modern Spanish texts. Open to students who have had two years of high school Spanish or Spanish 100.  
(3-0-6) *Messrs. Battista, L. Hodges, and Oberlé*

**Spanish 300.** *Third-year Spanish.* Open to all students who have completed Spanish 200. Review of grammar, composition, essays, study of representative authors, collateral readings, and reports. Conducted in Spanish.  
(3-0-6) *Messrs. L. Hodges and Shelton*

**Spanish 320.** *A Survey of the History of Spanish Literature.* Open to Juniors and Seniors who have taken Spanish 300 and to Sophomores upon special recommendation.

(3-0-6)

Mr. Battista

**Spanish 410.** *Hispano-American Life, Civilization, and Foreign Relations.* A general survey of the conditions in Spain and in Latin-American countries. Reading of studies, bulletins, and reports. Conducted in Spanish, with intensive oral practice. Open to students who have already taken Spanish 300 or 320.

(3-0-6)

Mr. Oberlé

**Spanish 440.** *Contemporary Spanish Drama.*

(3-0-6)

Mr. Battista

Honors courses in Spanish may be granted to students who have done exceptionally good work in Spanish and whose work in another language has been of high standing. The Spanish courses required are: Spanish 300, 320, 410, and 440. Individual schedules and quality of work must be satisfactory both to the department and to the Committee on Examinations and Standing.

### Sociology and Philanthropy

**Sociology 200.** *An Introduction to Sociology.* The course includes an analysis of the geographical and biological factors in social evolution, social psychology, and a study of the functions of citizenship. There is added a rapid survey of modern social problems such as those of poverty, industry, immigration, public health, and delinquency. Recommended: Biology 100 and Economics 200.

(3-0-6)

---

**Philanthropy 300.** *Social Problems.* An intensive treatment of the following topics: child welfare, immigration, recreation, delinquency and crime, public health, and housing. This course aims to equip the student of social activities as well as the prospective social worker with a knowledge of important types of social maladjustment. Prerequisites: Economics 200 and Sociology 200.

(3-0-6)

**Philanthropy 400.** *Social Forces and Modern Social Trends.* Lectures, readings, essays. Prerequisites: Philanthropy 300 or the equivalent, with adequate preparation in American history, economics, or government. Limited to Seniors.  
(3-0-6)

**Spanish:** *see Romance Languages*

## COURSES IN PHYSICAL TRAINING AND PHYSICAL EDUCATION

THE equipment of the athletic field house not only makes provision for the university athletic teams but also affords opportunity for systematic physical training on the part of other members of the institution. Facilities in or near the field house are available for basketball, football, track and field work, baseball, handball, tennis, golf, and other athletic and recreative games.

### **Physical Training**

All men entering the Institute for the first time are required to take a year's course in physical training. This course, Physical Training 100, is also open to any other male student in the Institute. Students participating in intercollegiate athletics will receive appropriate credit for the duration of their participation. However, the required course offers a program of games and intramural sports for those who are not competing in intercollegiate athletics but for whom the benefits of recreation, exercise, and athletic competition are also desirable.

The certificate of medical examination required of a student on admission will determine in a large measure the character of the work that the individual student is permitted to take, but a supplementary physical examination may be required. In cases where the student is physically or organically unfit for a normal program of physical activity, he will be assigned to a restricted exercise group where special activities will be made to serve his needs. In all cases, the work will be so organized as to eliminate direct competition between the physically weaker and the physically stronger among the students.

A gymnasium fee, payable at registration time, is required, entitling the student during his residence as an undergraduate to the use of the field house and playing fields, to the use of a complete gymnasium uniform (excepting only gymnasium shoes, which are also required) and towels, and to laundry service for the preceding items of equipment.

**Physical Training 100.** This course is designed to teach the student skill in various forms of athletic and recreative games and contests. Required of all men in the Freshman class and transfers who had not had the equivalent elsewhere. Two two-hour periods each week.

(0-4-0)

### Physical Education

The Rice Institute offers a four years' course in health and physical education and recreation leading to the degree of Bachelor of Science in Physical Education, designed to prepare men for careers in health and physical education, including coaching, in high schools and colleges, municipal recreation departments, and other similar organizations. In each of its four years there is at least one required course in physical education, and in the last two years courses are offered in education and government which are necessary for a state teacher's certificate. The required work in biology and chemistry not only serves as a basis for the work in physical education, but also affords further subjects for high school teaching. Considerable emphasis is placed on economics and business administration for the benefit of those who ultimately, if not immediately, go into business. Students looking forward to medicine or law are permitted to make substitutions enabling them to meet the ordinary premedical and prelegal requirements.

The schedule of the four years' course in physical education is as follows:

#### *First Year*

- (1) English 100
- (2) French, German, or Spanish
- (3) Chemistry 110

- (4) Economics 100<sup>1</sup>
- (5) Physical Education 100

*Second Year*

- (1) English 210
- (2) French, German, or Spanish<sup>2</sup>
- (3) Biology 100
- (4) Business Administration 220 and 225
- (5) Physical Education 200

*Third Year*

- (1) Biology 390
- (2) Physical Education 300<sup>3</sup>
- (3) Physical Education 310
- (4-5) Two other subjects<sup>4</sup>

*Fourth Year*

- (1) Physical Education 400<sup>3</sup>
- (2-5) Four other subjects<sup>4</sup>

**Physical Education 100.** *Introduction to Health and Physical Education.* Three lectures and six laboratory hours weekly. An introductory course to the professional study of health and physical education, and recreation and camping, including orientation, vocational analysis, and the educational and scientific background. The laboratory periods will be devoted to intensive instruction in a wide variety of games.

(3-6-10)

*Mr. Hermance*

**Physical Education 200.** *Fundamentals of Health and Physical Education.* Three lectures and six laboratory hours weekly. This course deals with the history, fundamentals, and methods of intra-

<sup>1</sup>Naval R.O.T.C. students take naval science instead of economics. They must also take Mathematics 100 in the first year and Physics 100 in either the first or the second year.

<sup>2</sup>The language begun in the first year should be continued.

<sup>3</sup>Forty-five hours of practice teaching at the high school level must be completed during either the Junior or Senior year.

<sup>4</sup>Students planning to enter public school work should elect education in the third and fourth years and History 310 in the third or fourth year.

mural athletics, medical examinations and physical diagnosis, training room procedure, and playground and community recreation. The laboratory periods will be devoted to intensive instruction in a wide variety of games.

(3-6-10)

*Mr. McDougle*

**Physical Education 300.** *Advanced Fundamentals of Health and Physical Education.* Three lectures and six laboratory hours weekly. This course includes the study of supervision, testing and measuring in health and physical education, kinesiology, and corrective and individual physical education. The laboratory periods will be devoted to instruction in the teaching methods and coaching of games and sports.

(3-6-10)

*Mr. Hermance (first semester) and  
Mr. McDougle (second semester)*

**Physical Education 310.** *General and Educational Psychology.* Three lectures weekly. The first half-year is devoted to a study of general psychology, the history of the development of the various schools of psychological thought, and a consideration of the psychology of childhood and adolescence. The second half-year is devoted to a study of the principles of educational psychology and the educational implications of recent developments in biology and sociology, with special reference to materials and methods in teaching health and physical education and recreation.

(3-0-6)

*Mr. McDougle*

**Physical Education 400.** *Principles and Methods of Health and Physical Education in Elementary and Secondary Schools.* Three lectures and six laboratory hours weekly. This course deals with the principles of organization, administration, methods, and materials of the elementary and secondary school programs of health and physical education and recreation. The laboratory periods will be devoted to intensive instruction in the methods and practice of playing, teaching, coaching, and officiating of games and sports.

(3-6-10)

*Mr. Hermance*

**Physical Education 410.** *Health and Physical Education for Teachers of Elementary and Secondary Schools.* This course is designed for prospective teachers who desire certification in health



and physical education by the Department of Education of the State of Texas. The course includes a study of the purpose, content, and methods of instruction in a program of health and physical education in the elementary and secondary schools. Offered in case of sufficient demand. Laboratory hours to be arranged.

## COURSES IN ENGINEERING

COURSES are offered in chemical, civil, electrical, and mechanical engineering. The new curriculum in each of these branches extends over five years.<sup>1</sup> A student who has successfully completed the work of the first four years will be awarded the degree of Bachelor of Arts. If recommended by his department and approved by the Committee on Graduate Instruction, he may then be admitted to the fifth-year program, on successful completion of which he will be awarded the degree of Bachelor of Science in a specified branch of engineering.

A sixth-year program may lead to the advanced professional degree of Ch.E., C.E., E.E., or M.E.; or, for students with high standing, to the degree of Master of Science in a specified branch of engineering. However, no student will be admitted to a sixth-year schedule without the approval of the head of the department in which he is specializing.

It is intended in the engineering courses to pay special attention to the theoretical side, because experience has shown that theoretical knowledge is difficult to obtain after leaving the university, and without it a rapid rise in the profession of engineering is almost impossible. It is recommended that students obtain employment in engineering work during the summer vacations, for it should be remembered that no amount of university work can take the place of practical experience in engineering establishments and in the field. The courses in engineering are not intended to take the place of learning by practical experience, but are designed to supply a knowledge of the fundamental principles and scientific methods on which the practice of engineering is based and without which it is difficult, if not impossible, to succeed in the profession. The work

<sup>1</sup>Students who matriculated in engineering prior to 1947 should consult the 1946-47 *Announcements*, pages 109-131.

of the first two years is alike for all branches, in order that students may defer choice of a particular engineering course as long as possible. Chemical engineers must make this choice at the beginning of the third year;<sup>1</sup> civil engineers, at the beginning of the fourth; electrical and mechanical engineers, at the beginning of the fifth.

The work of the first three years consists chiefly of courses in pure and applied mathematics, physics, chemistry, and other subjects, an adequate knowledge of which is absolutely necessary before the more technical courses can be pursued with advantage. Technical work is begun in the fourth year with courses of a general character in mechanical engineering, civil engineering, and electrical engineering, all three of these branches to be taken by all engineering students, with certain differences of program for those in chemical engineering. In the fourth year instruction of students in mechanical and electrical engineering is begun in shopwork. The classes in shopwork are intended to give familiarity with workshop methods. The object of these classes is not primarily to train students to become skilled mechanics, but to provide such knowledge of shop methods as is desirable for those who may be expected as engineers to design machinery, to employ mechanics, and to superintend manufacturing processes.

The Southwest affords ample opportunities for the practice of engineering in its several branches, but these opportunities call for well-informed and thoroughly trained scientific workers. It is with such a double object in view that the engineering courses described below have been designed and developed under actual experience of some thirty years. These programs of study and training have justified themselves, for the engineering graduates, chemical, civil, electrical, and mechanical, of this institution are successfully engaged in professional work in many parts of the country, and especially in the Southwest.

In particular, for example, more than half of the Rice Institute graduates in engineering are identified with some phase of the petroleum industry and allied industrial enterprises. Nor is this surprising, and for two reasons: first, the petroleum industry is by far the major industry of this vicinity, and second, the courses in

<sup>1</sup>Naval R.O.T.C. students electing chemical engineering must make the choice at the beginning of the second year, in order to schedule German 100.

science and engineering offered at the Rice Institute have been found to provide first-rate preparation for the practice of petroleum engineering. Such successful application of these courses was to have been anticipated because the petroleum industry's problems of exploration and discovery call for physics and electrical engineering, those of production and manufacture for mechanical engineering, those of transportation and storage for civil engineering, while chemist and chemical engineer man the research laboratories of the industry from which issue its processes of refining and the manufacture of its manifold by-products.

For schedules of the engineering curricula, see pages 44-52.<sup>1</sup>

### Engineering

**Engineering 130.** *Engineering Drawing.* The use of drafting instruments; lettering; freehand sketching; drawing of figures in isometric perspective and cabinet projection.

(1-3-4)

*Mr. Marsh*

**Engineering 230b.** *Engineering Mechanics.* Systems of concurrent and non-concurrent forces. Couples, vectors, and vectorial sums. Center of gravity and moment of inertia of areas and volumes. Friction, work, and energy. Angular movements; momentum and impulse. (Second half-year.) Prerequisites: Engineering 110, Physics 100, and registration in Mathematics 200 or 210.

(3-0-3)

*Mr. Ulrich*

**Engineering 250.** *Plane Surveying.* (Semester course.) The study of the theory of plane surveying and practice in the uses of surveying instruments and of office methods. Problems to familiarize the student with transit, level, tape, compass, and plane table. Plotting of notes and computation of courses, areas, and volumes of earthwork. Prerequisites: Engineering 110 and Mathematics 100.

(3-3-4)

**Engineering 260.** *Kinematics of Machines.* (Semester course.) The study of relative motion of parts of machines, instant centers, velocities, gearing and wrapping connectors. Prerequisites: Engi-

<sup>1</sup>Students who matriculated in engineering prior to 1947 should consult the schedules in the 1946-47 *Announcements*, pages 112-116.

neering 110, Physics 100, and registration in Mathematics 200 or 210 and Engineering 270.

(3-3-4)

*Mr. Chapman*

**Engineering 270.** *Engineering Mechanics.* Statics and dynamics. Concurrent and non-concurrent force systems in a plane and in space, by algebraic and graphical methods. Centroids and moments of inertia of areas and bodies. Friction, work, and energy. Applications of Newton's second law in problems of translation, rotation, and plane motion of rigid bodies. Impulse and momentum. Prerequisites: Engineering 110, Physics 100, and registration in Mathematics 200 or 210 and Engineering 260.

(3-0-6)

*Messrs. Chapman and ———*

**Engineering 280.** *Descriptive Geometry and Engineering Drawing.* Orthographic projections of points, lines, planes, warped surfaces, etc., in the four angles of projection; orthographic projections of objects, intersections, and developments. A continuation of Engineering 130, for Sophomores.

(1-3-4)

*Mr. Marsh* (Not offered in 1947-48)

**Engineering 300.** *Engineering Mechanics.*

(3-0-6)

(Not offered in 1947-48)

**Engineering 400.** *Seminar.* A course devoted to the purpose of training engineering students in collecting and presenting orally formal papers and discussions on topics of general engineering interest. The papers and discussions are given by the students, using acceptable material secured from technical periodicals or transactions. The course meets weekly and is conducted in the form of an engineering society meeting. Required of all civil, electrical, and mechanical engineering students in the year they are candidates for a degree in engineering. Open to others who have the necessary engineering background with permission of the engineering staff. Hours to be arranged.

(1-0-2)

### Chemical Engineering

**Chemical Engineering 305.** *Elements of Chemical Engineering.* First half-year: stoichiometry; fuels and combustion. Second half-

year: chemical engineering mathematics and economics; flow of fluids. Two lectures and three hours of laboratory work weekly. The laboratory work consists of the testing and analysis of gas, oil, coal, and minerals; the measurement of such fundamental quantities as temperature, pressure, viscosity, etc.; and the application of these methods to developing stoichiometric relations, weight balances, and heat balances. Prerequisites: Full Junior standing and Chemistry 220A. Taken with Chemical Engineering 315.

(2-3-6)

*Mr. ten Brink*

**Chemical Engineering 315.** *Industrial Chemistry.* One lecture weekly. The more important industrial chemical processes are considered from the point of view of both the chemical reactions forming the basis of the process and the industrial plant necessary to carry on the reactions. In this way the interrelationship of the different industries as to raw materials, sources of energy, and standard types of apparatus are developed and a general survey of the field is obtained. Problem work is included. Prerequisite: Taken with Chemical Engineering 305.

(1-0-2)

*Mr. ten Brink*

**Chemical Engineering 405.** *Unit Operations.* Three lectures and six hours of laboratory work weekly. This course deals with the principles upon which the mechanical operations involved in the chemical manufacturing industries depend, and with the types of equipment available for such operations and the kind of work for which each is best adapted. The application of the principles is illustrated both by discussion in the classroom and by the solution of typical problems. Among the subjects considered are: heat transmission; evaporation; humidification and dehumidification; air conditioning; drying; distillation and fractionation; filtration; absorption and adsorption; extraction; crystallization; crushing; grinding; separation; agitation; transportation of solids, liquids, and gases; water softening; corrosion and water treatment for boiler use; pyrometry; etc. The laboratory work consists of experimental studies of the various types of unit operations equipment from the standpoint of operation, testing, and theory. Prerequisites: Chemical Engineering 305 and 315.

(3-6-10)

*Mr. Hartsook*

**Chemical Engineering 415.** *Plant Design.* Two lectures and six hours of design weekly during the second half-year. The lectures consider the development of chemical manufacturing processes and the design of chemical manufacturing plants from the point of view of location, building, equipment, economics, and organization. The laboratory work consists of calculating and drawing up fundamental data, qualitative and quantitative flow-sheets, specifications, plant layout, and cost estimates for typical processes. Prerequisite: Chemical Engineering 405 or registration in 405.

(2-6-4)

*Mr. ten Brink*

**Chemical Engineering 425a.** *Chemical Engineering Thermodynamics.* Three hours of lectures weekly during the first half-year. A course in theoretical and applied thermodynamics. Prerequisite: Chemistry 310.

(3-0-3)

*Mr. Garrison*

**Chemical Engineering 425b.** *Chemical Engineering Thermodynamics.* Three hours of lectures weekly during the second half-year. A continuation of theoretical and applied thermodynamics. Prerequisite: Chemical Engineering 425a.

(3-0-3)

*Mr. Garrison*

**Chemical Engineering 445.** *Plant Inspection.* One lecture and one inspection trip weekly during the first half-year. The work consists of: (1) a critical examination, in conference, of processes, equipment, and problems of each industrial plant to be visited; (2) the inspection of the plant supplemented by discussions by plant officials; (3) a comprehensive report, by squads, consisting of flow-sheets, individual unit descriptions, and general specifications of interest. Types of industries inspected are: sewage, sugar, petroleum refining, cement, brewing and malting, steel pouring, plastics, heavy chemicals, fertilizers, etc. Prerequisite: Chemical Engineering 405 or registration in 405.

(1-3-2)

*Mr. ten Brink*

**Chemical Engineering 485.** *Seminar.* One hour weekly during the second half-year. A course for training chemical engineering students in the preparation and oral presentation of formal papers

and discussions on topics of engineering interest. The papers and discussions are given by the students, using acceptable material secured from technical publications. This course is required of all chemical engineers.

(1-0-1)

*Mr. ten Brink*

**Chemical Engineering 505.** *Advanced Topics in Chemical Engineering.* Three lectures weekly on advanced topics in chemical engineering such as advanced unit operations and plant design, petroleum refining, pulp and paper industries, graphical methods of problem solution, plastics, water treatment, and corrosion. Prerequisite: Chemical Engineering 405.

(3-0-6)

*Mr. Hartsook*

**Chemical Engineering 515.** *Experimental Problem and Thesis.* Chemical engineers in their sixth year will be required to devote at least nine hours per week to an experimental problem and to prepare a thesis.

*Mr. Hartsook*

**Chemical Engineering 575.** *Research and Thesis.* At least nine hours of work weekly under the direction of a member of the staff on a problem of chemical engineering importance.

### Civil Engineering

**Civil Engineering 300a.** *Strength of Materials.* Theory of beams, columns, and shafts. Stresses and deformations due to tensile, compressive, and shearing forces; distribution of shears, bending moments, deflections, torsional stresses, and combined stresses. Laboratory physical tests of cast iron, steel, wood, cement, bricks, and concrete. (First half-year.) Prerequisites: Full Junior standing and Physics 100, Mathematics 200 or 210, and Engineering 270. Laboratory fortnightly.

(3-1½-3)

*Messrs. Ryon and Sims*

**Civil Engineering 300b.** *Hydraulics.* Principles of hydrostatics and hydrodynamics; the flow of water through orifices, pipes, nozzles, in open channels, and over weirs. Laboratory tests of weirs, Venturi meters, and simple hydraulic machinery. (Second half-

year.) Prerequisite: Civil Engineering 300a. Laboratory fortnightly.

(3-1½-3)

*Messrs. Ryon and Sims*

**Civil Engineering 320a.** *Advanced Surveying.* Theory and practice of base line and triangulation measurements; determination of meridian, stadia, and plane table. Topography. Simple, compound, reversed, and spiral easement curves for railway and highway use. Mass diagrams and earthwork. (First half-year.) Prerequisites: Full Junior standing and Engineering 250.

(3-6-5)

*Mr. Sims*

**Civil Engineering 320b.** *Graphic Statics and Stresses in Framed Structures.* Algebraic and graphic statics applied to beams and trusses. Fixed and moving loads. Load systems. Influence diagrams. Portals, transverse bents, and determination of maximum and minimum stresses in roof and bridge trusses. (Second half-year, following Civil Engineering 320a.) Prerequisites: Full Junior standing and Engineering 270 and Civil Engineering 300a.

(3-6-5)

*Mr. Sims*

**Civil Engineering 330b.** *Strength of Materials.* For chemical engineering students only. Theory of beams, columns, and shafts. Stresses and deformations due to tensile, compressive, and shearing stresses; distribution of shears, bending moments, deflections, torsion. Laboratory physical tests of various metals and of concrete. (Second half-year.) Prerequisites: Full Junior standing and Physics 100, Engineering 110, Mathematics 200, and Mathematics 220a or 230a. Laboratory fortnightly.

(3-1½-3)

**Civil Engineering 340.** *Strength of Materials.*

(3-1½-7)

(Not offered in 1947-48)

**Civil Engineering 350.** *Fluid Mechanics.* (First half-year.)

(3-0-3)

(Not offered in 1947-48)

**Civil Engineering 420.** *Municipal Engineering.* The course covers three subjects. Highways: design, construction, and maintenance of earth, sand-clay, macadam, bituminous macadam, asphaltic concrete, brick, wood-block, stone-block, and cement concrete roads. Legislation and methods of financing. Water supply:



a study of rainfall, evaporation, yield, water-bearing strata, etc. Water analysis and stream pollution. Design, construction, operation, and maintenance of purification systems, storage facilities, and distribution systems. Sewerage: a study of storm flow, modern methods of sanitation, disease epidemics, etc. Water carriage systems, separate and combined. Design, construction, and maintenance of sewers and sewage disposal plants. Prerequisites: Civil Engineering 300a and b.

(3-3-8)

**Civil Engineering 425.** *Highways; Soil Mechanics; Foundations.*

(3-3-8)

(Not offered in 1947-48)

**Civil Engineering 435.** *Water Supply, Hydrology, Sewage, and Sanitation.*

(3-3-8)

(Not offered in 1947-48)

**Civil Engineering 440.** *Concrete Structures.* A study of concrete and concrete aggregates. Theory and design of reinforced concrete slabs, beams, and columns. A study of foundations. Theory, investigation, and design of retaining walls, dams, and arches. Design of typical parts of buildings and beam and girder bridges. Prerequisites: Civil Engineering 300a and b and registration in Civil Engineering 460.

(3-3-8)

*Mr. Sims*

**Civil Engineering 460.** *Steel and Timber Structures.* Design of tension and compression members and of riveted and welded connections. Design of roof trusses, simple bridge trusses, plate girders, and tall office frames. Detailed drawings and estimates of cost and weight. Deflection diagrams for trusses. Three lectures and two three-hour laboratory periods per week throughout the year. Prerequisites: Civil Engineering 300a and b and 320b and registration in Civil Engineering 440.

(3-6-10)

*Mr. Ryon*

**Civil Engineering 490.** *Civil Engineering Problems.* Under certain favorable conditions civil engineering students may elect an approved investigation of some civil engineering problem under the direction of a member of the civil engineering staff.

(Not offered in 1947-48)

**Civil Engineering 500.** *Structural Design.* Design of steel office and mill buildings. Analysis of stresses in statically indeterminate structures such as swing, cantilever, arch, and suspension bridges. A study of secondary stresses. Two lectures and one design period a week. Prerequisite: Civil Engineering 460 or the equivalent.

(Not offered in 1947-48)

**Civil Engineering 510.** *Hydraulic and Sanitary Engineering.* Investigation and development of water power. Design of dams and irrigating systems. Hydraulic turbines and pumps. Preliminary design for a water supply and sewerage system for a small city. Study of general sanitary problems such as garbage disposal, public health, street cleaning. Three lectures and one design period a week. Prerequisite: Civil Engineering 420 or the equivalent.

(Not offered in 1947-48)

**Civil Engineering 530.** *Thesis.* This will consist of an original investigation along some approved line of civil engineering work, an original design, or a critical review of existing work. In every case two complete typewritten or printed reports will be required for deposit in the Institute library.

(Not offered in 1947-48)

### Electrical Engineering

**Electrical Engineering 300.** *Introduction to Direct and Alternating Current Machinery and Circuits.* The fundamental principles of electrical engineering for electrical, civil, and mechanical engineering students. Prerequisites: Full fourth-year standing, Physics 200, and Mathematics 200 or 210. Laboratory fortnightly. Two semesters.

(3-1½-7)

*Messrs. McEnany and Waters*

**Electrical Engineering 330.** *Introduction to Direct and Alternating Current Machinery and Circuits.* The fundamental principles of electrical engineering designed to meet the needs of chemical engineering students. Prerequisites: Physics 200 and Mathematics 200 or 210. Laboratory fortnightly. Two semesters.

(3-1½-7)

*Mr. McEnany*

**Electrical Engineering 340.** *Elementary Electronics.* The fundamental principles of vacuum tubes, gaseous conduction tubes, and their associated circuits, together with the common applications of this apparatus. Prerequisites: Physics 200 and Mathematics 200 or 210. Laboratory weekly. One semester.

(3-3-4)

*Mr. McEnany*

**Electrical Engineering 400.** *Advanced Electrical Circuits and Transmission Lines.* Circuit theory applied to lumped and distributed constant circuits; the generalized four-terminal network; transmission lines; filter circuits; transient analysis; symmetrical components. Prerequisites: Electrical Engineering 300 and Mathematics 300 or 310. Two semesters.

(3-0-6)

*Mr. Wischmeyer*

**Electrical Engineering 410.** *Advanced Electrical Machinery.* Theory of electrical machinery and controls; calculation of characteristics; application of electronic and magnetic controls and circuits; servo-mechanisms; power rectifiers. Must be accompanied or preceded by Electrical Engineering 400 or 430 and accompanied by Electrical Engineering 450. Two semesters.

(3-0-6)

*Mr. Waters*

**Electrical Engineering 420.** *Electrical Design.* The application of magnetic, electrostatic, and heat transmission theory to the design of electrical apparatus. Illumination. Must be accompanied or preceded by Electrical Engineering 400 or 430 and Electrical Engineering 410. Two semesters.

(3-3-8)

**Electrical Engineering 430.** *Advanced Electrical Circuits and Transmission Lines.* A more complete mathematical treatment of the electrical phenomena than is given in Electrical Engineering 400; open to students who show capacity in mathematics and electrical theory. Prerequisites: Electrical Engineering 300 and Mathematics 310. Two semesters.

(3-0-6)

**Electrical Engineering 440.** *Advanced Electronics.* Electronic tubes, their theory, circuits, and applications in the wire communication, radio, high- and ultrahigh-frequency fields. Antennæ,

radiation, wave guides, and measurements. Must be accompanied or preceded by Electrical Engineering 400 and 410. Two semesters.  
(3-3-8) *Mr. Wischmeyer*

**Electrical Engineering 450.** *Advanced Laboratory Measurements.* Laboratory studies of direct and alternating current machinery and power rectifiers, electronic and magnetic control devices and circuits, and servo-mechanisms; electrical measurements in the power field. Prerequisite: Registration in Electrical Engineering 410. Two semesters.  
(1-8-7) *Mr. Waters*

**Electrical Engineering 490.** *Electrical Engineering Problems.* If conditions are favorable and his schedule will permit, a student of electrical engineering, in the year in which he is a candidate for the degree of Bachelor of Science in Electrical Engineering, may elect at least nine hours in approved investigations, usually experimental, under the direction of a member of the electrical engineering staff. Two semesters.  
(0-9-6)

**Electrical Engineering 500.** *Advanced Circuit Analysis.* Non-linear circuits; three- and four-winding transformer theory; transmission networks; machine and circuit transients; transient stability; Heaviside's operational calculus. Two semesters.  
(3-3-8)

**Electrical Engineering 510.** *Thesis.* A thorough report on an electrical engineering investigation selected and carried out by the individual student. Two copies of the accepted report will be required for deposit in the Institute library. Two semesters.  
(0-9-6)

**Electrical Engineering 520.** *Advanced Electrical Power Engineering.* Power plants and substations; transmission and distribution systems; illumination; industrial electronics. Two semesters.  
(3-3-8)

**Electrical Engineering 540.** *Advanced Communications Engineering.* Electromagnetic theory and wave propagation; microwaves; electro-acoustical systems. Two semesters.  
(3-3-8)

### Mechanical Engineering

**Mechanical Engineering 300.** *Thermodynamics and Heat Engines.* A general course of lectures, recitations from text, and laboratory covering the characteristics, fields of usefulness, operation, and tests of fuels, steam engines and turbines, boilers, pumps, condensers, and auxiliaries; properties of steam; valve gears; simple internal-combustion engines and accessories. Numerous problems illustrate the theory discussed. Prerequisites: Full Junior standing and Physics 100, Chemistry 100, and Kinematics. One laboratory fortnightly.

(3-1½-7)

*Messrs. Cameron and Russell*

**Mechanical Engineering 310.** *Mechanical Processes.* Textbook and lectures dealing with metallurgy, general forge, foundry, welding, heat-treating, and machine-shop practice, and their effects on machine design and manufacturing. Practice with a variety of bench and machine tools, carefully selected for their fitness in illustrating the principles studied, for affording actual contact with machine work, and for developing a certain degree of skill and resourcefulness in the student. Plant inspection trips. Prerequisites: Full Junior standing in engineering and Engineering 260 and 270.

(3-6-10)

**Mechanical Engineering 330a.** *Heat Machinery.* A half-year course for chemical engineering students only. Elementary thermodynamics of vapors; characteristics and operation of power plant equipment. (First half-year.) Prerequisites: Full Junior standing and Physics 100. One laboratory fortnightly.

(3-1½-3)

**Mechanical Engineering 410.** *Mechanical and Machine Design.* Recitations from text and references; also calculations and drafting involved in the design of machine parts, considering both the theory and its modifications due to shop practice and financial limitations. Design of several complete assemblies, such as crown blocks, brakes, or transmission units used in the oil fields. Prerequisites: Engineering 260 and 270, Mechanical Engineering 310, and Civil Engineering 300a and b.

(3-6-10)

*Mr. Doggett*

**Mechanical Engineering 420.** *Power Plants; Heating; Ventilation; Air Conditioning.* General thermodynamics; applications of thermodynamics to the design and operation of air compressors, and of steam engines and turbines; commercial forms of such machines; principles of air conditioning and refrigeration. Lectures, text, and problems. Prerequisite: Mechanical Engineering 300. Three lectures and two three-hour laboratory periods per week.

(3-6-10)

Mr. Russell

**Mechanical Engineering 440.** *Materials; Metallurgy; Internal-combustion Engines.* Engineering materials: a brief study from current references of the metallurgy, physical properties, applications, and commercial forms of metals, alloys, protective coatings, and important non-metallic materials, emphasizing those features most interesting to the design and application engineer. Internal-combustion engines and fuels: a study of the theory, design, and operation of gasoline, gas, and oil-burning engines for automotive, stationary, and marine service, including the production and characteristics of the fuels used. Must be accompanied or preceded by Mechanical Engineering 420 and Civil Engineering 300a and b. Three lectures and one three-hour laboratory period per week.

(3-3-8)

Mr. Doggett (first semester) and  
Mr. Cameron (second semester)

**Mechanical Engineering 460.** *Contracts and Specifications; Industrial Management.* Typical organizations of manufacturing plants; location and layout of works; the selection of equipment for such plants, including tools and material-conveying equipment; building types and service equipment; production control methods; personnel activities; wage systems; labor laws. Contracts; specifications. Prerequisites: Mechanical Engineering 310 and Business Administration 200 or 220. Two recitations a week. Senior elective.

(2-0-4)

**Mechanical Engineering 490.** *Mechanical Engineering Problems.* If conditions are favorable, mechanical engineering students may elect at least nine hours a week in approved investigations or designs under the direction of a member of the staff.

**Mechanical Engineering 500.** *Fundamental Principles in Advanced Strength of Materials, Kinematics, and Machine Design.* Analytical and graphical analyses are applied to problems of stress concentrations, of balance and vibration, and of stress due to dynamical causes. Comparison is made with experimental results. The mechanical properties of metals are emphasized in problems involving fatigue, high temperatures, strain, hardening, etc. Prerequisite: Mechanical Engineering 410.

(Not offered in 1947-48)

**Mechanical Engineering 510.** *Mechanical Plants and Processes.* A general course dealing with special plants and processes, such as oil production, transportation, and refining, textiles, metal products, material handling, refrigeration, not covered thoroughly in other courses. Details of design and operation of special power and heating plants. Prerequisite: Mechanical Engineering 420.

(Not offered in 1947-48)

**Mechanical Engineering 530.** *Thesis.* The investigation, under direction of the staff, of some undeveloped engineering problem, through either experiment, design, or compilation of available information. The time required will be at least that necessary for a standard advanced course. Two copies of the accepted report will be required for deposit in the Institute library.

(Not offered in 1947-48)

## COURSES IN ARCHITECTURE

To students of architecture the Institute offers a course leading to a Bachelor of Arts degree at the end of the fourth year and to the professional degree of Bachelor of Science in Architecture at the end of the fifth year. It is the purpose of the course to lead students during their residence to an understanding of the art of modern building. It seeks to acquaint them with the history of architecture and to develop within them an appreciation of those conceptions of beauty and utility which are fundamental in the art of design.

In the arrangement of courses, it will be observed that there are included certain indispensable elements of a liberal education as well as such technical subjects as are necessary to the general

education of a practicing architect. Of the strictly architectural subjects, design and construction are given the largest place. The courses in history and those in freehand drawing and water color seek to create in the student an appreciation of architectural refinement and to increase his ability to express architectural form.

Particular emphasis is being given to the continuity of instruction in construction and structural engineering, in an effort to prepare the student for the practice of his profession.

To be admitted to candidacy for the master's degree in architecture, a candidate must have completed the work required for the professional degree and have a high scholastic record.

For schedules of the curriculum in architecture, see pages 44-52.

**Architecture 100.** *Architectural Drawing*, including shades and shadows and perspective, with instruction in basic composition and sketching.

(1-5-5)

*Messrs. Leifeste and Morehead*

**Architecture 200.** *Design*. Problems embracing the design and construction of small buildings, with drafting room practice and working drawings pertinent to small structures.

(1-12-10)

*Messrs. Dunaway and Leifeste*

**Architecture 210.** *A History of Architecture, Sculpture, and Painting of the Ancient World*, with studio hours in freehand drawing and water color. Emphasis is placed upon the correlation of the arts and their reflection in Renaissance and contemporary developments.

(3-4-8)

*Messrs. Chillman and Dunaway*

**Architecture 220b.** *Theoretical Mechanics*.

(3-0-3)

*Mr. Morehead*

**Architecture 300.** *Design*. Buildings of moderate requirements and dimensions. Problems averaging five weeks in duration, with sketch problems between major problems.

(0-14-9)

*Mr. DeZurko*

**Architecture 310.** *A History of the Architecture, Sculpture, and Painting of the Middle Ages*, with studio work in freehand and water color. During the first term the emphasis will be placed upon the



architectural monuments of the middle ages and the development of their structural systems. The second term will stress the development of painting, sculpture, and the decorative arts of the same period.

(3-4-8)

*Mr. Watkin (first semester) and  
Mr. Chillman (second semester)*

**Architecture 330.** *Strength and Properties of Materials.* Theory of beams, columns, and other structural elements.

(3-2-7)

*Mr. Morehead*

**Architecture 400.** *Design.* Problems averaging six weeks in duration of commercial and public buildings or groups of buildings, with sketch problems between major problems.

(0-16-10)

*Messrs. Chillman and DeZurko*

**Architecture 410.** *A History of the Architecture, Painting, and Sculpture of the Renaissance and Their Subsequent Developments to the Present Time.* Contemporary trends in the three arts will be stressed during the second term.

(3-0-6)

*Mr. DeZurko*

**Architecture 420.** (a). *Materials and Methods of Construction,* with assigned construction details.

(b). *Organization and Preparation of Architectural Specifications.*

Laboratory hours devoted to problems in architectural details.

(3-4-8)

*Mr. Watkin*

**Architecture 430.** (a). *Practical Construction Design in Steel* covering beams, connections, plates, girders, columns, trusses, steel joists. A study of steel structural systems, including a major problem to be solved by the use of steel, with appropriate construction drawings.

(b). *Practical Construction Design in Reinforced Concrete* of beams, slabs, columns, footings. A study of reinforced concrete systems, including a major problem to be solved in reinforced concrete with appropriate construction drawings.

(3-0-6)

*Mr. Morehead*

**Architecture 440.** *Contemporary Principles of City Planning.*

(2-4-6)

*Mr. Dunaway*

**Architecture 500a. *Advanced Design.*** Problems of major proportions of five to eight weeks' duration.

(0-15-5)

*Messrs. Calhoun and Watkin*

**Architecture 510b. *Thesis Design.*** The problem for the architectural thesis shall be chosen by the student with the approval of the faculty. Presentation shall consist of a written program and complete presentation drawing with written analysis of the solution, accompanied by explanatory working drawings of important construction details.

(0-12-4)

*Messrs. Morehead and Watkin*

**Architecture 520a. *Contemporary Housing,*** including problems with study of appropriate sites and types.

(3-6-5)

*Mr. Dunaway*

**Architecture 530. *Mechanical and Electrical Equipment.*** Plumbing, heating, electric work, and acoustics, with laboratory hours in preparation of complete working drawings.

(3-4-8)

*Messrs. Leifeste and Morehead*

**Architecture 540b. *Contracts and Professional Practice.*** Legal and ethical phases of architecture.

(3-0-3)

*Mr. Watkin*

**Architecture 550. *Seminar.*** A course devoted to the purpose of training architects in collecting and presenting formal papers and conducting discussions on topics of architectural interest.

(1-0-2)

*Staff*

**Architecture 600. *Postgraduate Design.*** A course for students who have received the degree of Bachelor of Science in Architecture and who can qualify for the requirements of the master's degree. Research with weekly conferences upon a written thesis chosen with the approval of a member of the faculty, and subject to a public oral examination at completion.

(1-16-12)

*Mr. Watkin*

**Architecture 630. *Postgraduate Construction.*** A course of study and research in structural fields open to students who have received the degree of Bachelor of Science in Architecture and who can qualify for the requirements of the master's degree.

(1-6-6)

*Mr. Morehead*

## COURSES IN NAVAL SCIENCE

THE Naval Reserve Officers' Training Corps Program was inaugurated by the U. S. Navy in the fall of 1926 with the establishment of six units at selected schools and colleges. Today there are fifty-two such units with departments of naval science at institutions of higher learning throughout the country.

The department of naval science at the Rice Institute was established in the fall of 1941 and is an integral part of the organization of the Institute. It is administered by a U. S. Naval Officer designated as the Professor of Naval Science. He is assisted in his administration and instructional duties by officers and men of the U. S. Navy and Marine Corps.

The mission of the Naval Reserve Officers' Training Corps is to provide, by a permanent system of training and instruction in essential naval subjects at civil educational institutions, a source from which qualified officers may be obtained for the U. S. Navy and the U. S. Marine Corps, and the U. S. Naval Reserve and U. S. Marine Corps Reserve.

The N.R.O.T.C. program provides opportunities for fully qualified and selected young men within prescribed quotas to obtain commissions in either the Navy or Marine Corps for active or inactive duty upon graduation from college. There are two categories of N.R.O.T.C. Students: (1) Regular; (2) Contract.

### Regular Students

A Regular N.R.O.T.C. Student is appointed a Midshipman, U. S. Naval Reserve, and receives retainer pay at the rate of six hundred dollars per year for a maximum of four years, with all fees, books, supplies, and equipment paid for by the government. Required uniforms are furnished. He is required to complete twenty-four semester hours of naval science subjects (one course per term) and other training prescribed during the summer months, and upon graduation with a baccalaureate degree to accept a commission as Ensign in the U. S. Navy or Second Lieutenant in the U. S. Marine Corps and serve on active duty for a period of two years unless sooner released by the Secretary of the Navy. He may remain as a career officer in the Regular Navy or Marine Corps.

Appointments as Midshipman, U. S. Naval Reserve, are being made on a nation-wide competitive basis. Information bulletins and application blanks concerning this part of the N.R.O.T.C. program were distributed in the fall to the deans of all accredited colleges and universities, principals of high schools, professors of naval science, and offices of naval officer procurement throughout the United States. A competitive aptitude test was scheduled on January 18, 1947, for all eligible candidates who had submitted their applications in time to be received by the U. S. Navy College Entrance Examination Section, Princeton, New Jersey, by December 17, 1946. Candidates for selection as Regular N.R.O.T.C. Students are to be notified of their status by the Bureau of Personnel of the Navy Department in the spring. Similar procedures will be followed in each future year.

Students certified by the Navy Department as fulfilling all the requirements for appointment as Midshipman, U. S. Naval Reserve, will be considered for admission to the Rice Institute in accordance with established policies and procedures which are applicable to other students on the same competitive basis. Those admitted will be within quotas of students as may be prescribed for the Rice Institute and the N.R.O.T.C. Units.

Selection by the Navy as a Regular N.R.O.T.C. Student does not give any special rights or privileges to the selectee not common to any other student applying for admission to the institution. It is the responsibility of the selectee to apply for and gain admission to the school of his choice.

### **Contract Students**

A Contract N.R.O.T.C. Student is one who is regularly enrolled at an N.R.O.T.C. institution in the Freshman Class, and who applies for and is accepted by the Navy in the N.R.O.T.C. program. A Contract Student is not entitled to the compensation and benefits paid Regular N.R.O.T.C. Students except that necessary uniforms are issued and naval science textbooks are provided. During the final two years of college, commutation of subsistence is furnished, currently at the rate of sixty-five cents per day.

The Contract Student is required to complete twenty-four semes-

ter hours of naval science subjects (one course per term) and to participate in only one summer training period of about three weeks' duration. Upon graduation with a baccalaureate degree and satisfaction of the Naval Training requirements, he is required to accept a commission in the U. S. Naval Reserve or Marine Corps Reserve for inactive duty. Active duty is not required except in case of a national emergency. However, if he desires, and if his services are needed, he may go on active duty for two years, and apply for retention in the service as a career officer the same as a Regular Student.

Applications for enrollment as Contract Students and additional information may be obtained upon request from the Professor of Naval Science at the Rice Institute.

### **U.S. Marine Corps**

N.R.O.T.C. Students, either Regular or Contract, may apply for transfer to the Marine Corps during the first term of the Junior year. Those selected will complete nine semester hours of the Marine Corps Curriculum in lieu of the naval science courses prescribed for Navy officer candidates.

### **Aviation**

After two years of college work, N.R.O.T.C. Students are eligible to apply for flight training in order to become Navy or Marine aviators.

### **Other Pertinent Information**

Students enrolled in the N.R.O.T.C. are required to provide their own board and lodging and may live wherever they choose.

Uniforms are worn regularly one day a week and at such other times as may be prescribed. At all other times civilian clothing is worn.

Military control over N.R.O.T.C. Students is limited to the time that the students are under Navy instruction. This is less than one hour per day during the college year.

Any student dropped by the Rice Institute for academic failure

or other cause shall be immediately disenrolled from the N.R.O.T.C. Any student performing unsatisfactory work in naval science courses, or who possesses unsatisfactory officer-like qualities, may be disenrolled from the N.R.O.T.C. regardless of the quality of his academic work.

Any undergraduate course leading to a first baccalaureate degree is considered suitable for N.R.O.T.C. Students.

Students taking five-year courses are considered eligible for enrollment at the beginning of either their first or second year.

Students who have completed one year of college work are eligible, provided that they agree to take subjects that will require four years to complete from date of enrollment in the N.R.O.T.C.

Enrollment in the N.R.O.T.C. Program at the Rice Institute is made at the beginning of the fall term only.

A Regular N.R.O.T.C. Student is exempt from Selective Service as long as he remains in the program.

A Contract N.R.O.T.C. Student is exempt from Selective Service during the last two college years only.

### Eligibility Requirements

To be eligible for either category of N.R.O.T.C. Students (Regular or Contract), a candidate must:

- (a) Be a male citizen of the United States.
- (b) Be not less than seventeen nor more than twenty-one years of age on July 1, 1947.
- (c) Be eligible for admission to the N.R.O.T.C. college of his choice in accordance with its entrance requirements.
- (d) If a minor, have the consent of his parents or guardian at the time of his enrollment.
- (e) Agree to accept a commission in the United States Navy or Marine Corps or the Reserves thereof, if offered; and if the commission is in the regular Navy or Marine Corps and is terminated after two years of active duty, to accept a commission in the Reserves and thereafter not to resign before the sixth anniversary of the date of rank of his original commission.
- (f) Be unmarried and agree to remain unmarried until commissioned.
- (g) Be physically qualified:
  - (1) Be physically sound and well formed, and have a robust constitution.
  - (2) Vision, 20-20 each eye uncorrected.
  - (3) Heart, lungs, hearing normal.
  - (4) Height 65½ to 76 inches.
  - (5) Weight in proportion to height.
  - (6) Twenty vital serviceable teeth meeting definite specifications.

### Course of Training

The N.R.O.T.C. course of training consists of those courses, practice periods, and exercises prescribed by the Navy Standardized Curriculum currently in effect, together with such training duty or training cruises as may be prescribed. A Midshipman (Regular or Contract N.R.O.T.C. Student) pursuing a normal four-year college course will be required to carry a minimum of one naval science course per semester unless otherwise authorized by the Professor of Naval Science.

Naval science courses as described below will be taken in succession in order listed:

**Naval Science 101** (first half-year). *Introduction to Naval Science*, presenting a brief description of the historical background, traditions, customs, mission, and organization of the Navy. Elements of naval law. Basic seamanship.

(3-2-3)

*Lieut. Tatone*

**Naval Science 102** (second half-year). *Communications and Ship Control*. Types and means of communications. Communications security. Radio wave propagation. Correspondence. Codes and ciphers. Radio tracking and navigation. Shiphandling. Manuevers in formation. Amphibious operations.

(3-2-3)

*Lieut. Tatone*

**Naval Science 201** (first half-year). *Ordnance and Fire Control*. Introduction to naval weapons. Ammunition. Gun construction. Major caliber installations. Semi-automatic guns. Small arms. Miscellaneous ordnance equipment. Gun sights. Surface firing. Shore bombardment.

(3-2-3)

*Comdr. Boorman*

**Naval Science 202** (second half-year). *Fire Control and Electronics*. The anti-aircraft problem. Director control. Machine gun control. Main battery control. Sonar systems. Loran equipment. Basic principles of radar. Cathode ray tubes. Operation of major types of radar.

(3-2-3)

*Comdr. Boorman*

**Naval Science 301** (first half-year). *Piloting and Navigation*. Introduction, definitions, and orientation. Magnetic and gyrocompasses. Piloting. Motion of celestial bodies. Lines of positions. Time. The sextant. Observations for latitude. Running fix.

(3-2-3)

Comdr. Boorman

**Naval Science 302** (second half-year). *Advanced Navigation and Tactics*. The navigator's work at sea. Basic aerial navigation. Scouting, patrol, interception, and search. Maneuvering problems. Tactical publications. Rules of the road. Collision and grounding cases. Weather.

(3-2-3)

Comdr. Boorman

**Naval Science 401** (first half-year). *Naval Engineering*. Naval boilers. Feed water systems. Boiler fittings. Pumps. Heat exchange equipment. Distilling plants. Auxiliary machinery. Turbines. Lubrication. Main propulsion.

(3-2-3)

Lieut. Tatone

**Naval Science 402** (second half-year). *Internal-combustion Engines and Ship Construction and Stability*. Diesel engine construction and principles. Aircraft engines. Engine mechanics and vibration. Hull design and warship construction. Piping systems. Stability characteristics. Effect of weight shifts and flooding. Repair of damage.

(3-2-3)

Lieut. Tatone

---

N.R.O.T.C. Students who desire to be commissioned as Second Lieutenants in the U. S. Marine Corps or Marine Corps Reserve, and whose applications for transfer are accepted, will substitute the following courses during the final three terms:

**Naval Science 302M** (second half-year). *Military History, Principles of War, and Basic Military Training*. Introduction to military power. Combat doctrines. History of previous wars, stressing correct and incorrect applications of combat doctrines. Map and aerial photograph reading. Small arms. Combat orders.

(3-2-3)

Maj. Early



**Naval Science 401M** (first half-year). *Tactics and Technique*. Machine gun platoon tactics. Rifle company tactics. Mortar tactics. Staff organization. Intelligence. Logistics. Evacuation of wounded. Retrograde movements.

(3-2-3)

*Maj. Early*

**Naval Science 402M** (second half-year). *Amphibious Operations*. History of amphibious warfare. Types of ships and landing craft. The landing team. Ship-to-shore movements. Communications. Gunfire support. Planning. Logistics. Administration.

(3-2-3)

*Maj. Early*

---

The Navy Standardized Curriculum presently in effect prescribes additional course requirements for N.R.O.T.C. Students as follows:

1. By the end of the Sophomore year every student must have satisfactorily completed one year of college physics.
2. By the end of the Sophomore year every student must have satisfactorily completed mathematics courses through trigonometry.
3. Every student must achieve proficiency in written and oral expression. The Rice Institute will prescribe standards of proficiency and determine procedures necessary to achieve them.
4. Physical training and swimming requirements also are prescribed.

Special arrangements can be made for necessary modifications of any curriculum leading to a bachelor's degree, in order that the required courses in naval science and other subjects may be taken.



## INDEX

- Academic Calendar, v  
Administration, Officers of, vi  
Admission  
    Undergraduate, 19  
    Graduate, 26  
Adviser to Women, 30  
Applied Mathematics, 96  
Architecture  
    Admission, 19  
    Courses, 44, 125  
    Equipment, 62  
Architecture of the Institute, 2  
Arts and Sciences, 69  
Assistants and Fellows, 14  
Athletics, 107  
Autry House, 67
- Biology  
    Courses, 69  
    Laboratories, 59  
Board and Room, 30  
Buildings, 2, 58  
Business Administration and Economics, 74  
Business Law, 75
- Calendar, Academic, v  
Certificate  
    Admission by, 21  
    Teachers', 84  
Chemical Engineering  
    Admission, 19  
    Courses, 44, 114  
    Laboratories, 60  
Chemistry  
    Courses, 77  
    Laboratories, 60  
Civil Engineering  
    Admission, 19  
    Courses, 44, 117  
    Laboratories, 63
- Cohen House, Robert and Agnes, 4  
Commemorative Volumes, 4  
Committees, Faculty, 17  
Courses: *see* Subjects of Instruction  
Credit in Semester Hours, 69  
Curricula and Degrees, 44, 108
- Degrees, 44, 108, 111, 125  
Dormitories, 3, 30
- Economics, 76  
Education, 83  
Electrical Engineering  
    Admission, 19  
    Courses, 44, 120  
    Laboratories, 64  
Endowment, 1  
Engineering, 111, 113  
English, 85  
Entrance Requirements, 19  
Ethics, 97  
Examinations  
    Entrance, 21, 23, 25  
    Physical, 20, 107  
    Scholastic, 53  
Expenses, 28
- Faculty, 6  
Faculty Committees, 17  
Fees, 28  
Fellows, 14  
Fellowships  
    Ora N. Arnold, 32  
    Baker, 33  
    Samuel Fain Carter, 32  
    Dow Chemical Company, 34  
    Eastman Kodak Company, 34  
    Humble Oil and Refining Company, 34  
    Roper, 33  
    Walter B. Sharp, 31

- Fellowships (*Continued*)  
 Socony Vacuum, 34  
 Traveling, in Architecture, 33  
 Formal Opening, 4  
 Founder, 1  
 French, 104  
 Funds  
 Ora N. Arnold, 32  
 Baker, 33  
 College Women's Club, 41  
 Mary Alice Elliott Loan, 43  
 Jordan, 42  
 Loan, 43  
 Owen Wister Literary Society, 42  
 Richardson, 42  
 Roper, 33  
 Walter B. Sharp, 31  
 Sara Stratford, 42  
 German, 88  
 Grades, Meaning of, 54  
 Graduate Courses, 26, 49  
 Groups (of courses) A, B, and C, 44  
 Hall Committee, 30  
 Health Service, 30  
 Historical Sketch, 1  
 History, 89  
 Honor Societies  
 Phi Beta Kappa, 68  
 Sigma Xi, 68  
 Tau Beta Pi, 68  
 Honor System, 68  
 Honor Courses, 47  
 Inaugural Lectures, 4  
 Instructional Staff, 6  
 Italian, 105  
 Kinematics, 97, 113, 125  
 Laboratories  
 Architecture, 62  
 Biology, 59  
 Chemistry and Chemical Engineering, 60  
 Laboratories (*Continued*)  
 Civil Engineering, 63  
 Electrical Engineering, 64  
 Engineering Drawing, 63  
 Mechanical Engineering, 65  
 Physics, 59  
 Psychology, 62  
 Lectures, Public  
 Faculty, 55  
 Godwin, 55  
 Music, 56  
 Rice Institute, 56  
 Rockwell, 56  
 Sharp, 55  
 Library, 58  
 Logic, 97  
 Mathematics  
 Applied, 96  
 Pure, 93  
 Mechanical Engineering  
 Admission, 19  
 Courses, 44, 123  
 Laboratories, 65  
 Mechanics, 93, 97, 113, 114, 118  
 Music Lectures, 56  
 Name, The, 1  
 Naval Science, 129  
 Nursing, Preparatory Course, 74  
 Organizations, 67  
 PAMPHLET, 57  
 Petroleum Engineering, 112  
 Phi Beta Kappa, 68  
 Philanthropy  
 Courses, 106  
 Sharp Lectures, 55  
 Philosophy, 97  
 Physical Education, 108  
 Physical Training, 107  
 Physics  
 Courses, 98  
 Laboratories, 59  
 Portuguese, 105

- Premedical and Pre dental Course, 73
- Prizes  
 Edward Bowers Arrants Award, 43  
 Lady Geddes Prize in Writing, 41  
 Robert Pilcher Quin Award, 43
- Probation, 54
- Promotion, 54
- Psychology  
 Courses, 103  
 Laboratories, 62
- Publications, 4, 57, 67
- Public Lectures, 55
- Religious Organizations, 67
- Requirements for Admission, 19
- Residence Expenses, 30
- Residential Halls, 3, 30
- Romance Languages  
 French, 104  
 Italian, 105  
 Portuguese, 105  
 Spanish, 105
- R.O.T.C., Naval, 129
- Schedules, 44
- Scholarship, Standing in, 53
- Scholarships  
 American Petroleum Institute, 41  
 Samuel S. Ashe, 39  
 Max Autrey, 40  
 Graham Baker Studentship, 35  
 Chapman-Bryan, 38  
 College Women's Club, 41  
 Daughters of the American Revolution, 35  
 Dickson, 38  
 Dow Chemical Company, 34  
 Elizabeth Baldwin Literary Society, 36  
 Engineering Alumni, 39
- Scholarships (*Continued*)  
 Franklin, 39  
 Mary Parker Gieseke, 37  
 Hohenthal, 35  
 Katie B. Howard, 38  
 Junior Engineering, 37  
 Lady Washington Texas Centennial Award, 38  
 Pallas Athene Literary Society, 36  
 Premedical Society, 40  
 R Association, 40  
 Daniel Ripley, 36  
 Edith Ripley, 37  
 Walsh, in Architecture, 40  
 Ellen Axson Wilson, 36
- Self-help, 43
- Shopwork, 112, 123
- Sigma Xi, 68
- Societies, 67, 68
- Sociology, 106
- Spanish, 105
- Stipends and Funds, 31
- Student Activities  
 Publications and Organizations, 67  
 Honor System, 68  
 Honor Societies, 68
- Student Association and Student Council, 67
- Subjects of Instruction  
 Architecture, 125  
 Arts and Sciences, 69  
 Engineering, 111  
 Naval Science, 129  
 Physical Training and Physical Education, 107
- Surveying, 113, 118
- Tau Beta Pi, 68
- Teachers' Certificates, 84
- Trustees, 1, 1













