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INDUSTRIAL EDUCATION IN EUROPE.

DEPARTMENT OF THE INTERIOR,
BUREAU OF EDUCATION,
Washington, October 20, 1880.

The accompanying papers respecting the Higher Commercial Institute of Antwerp, Belgium, the Federal Polytechnic School at Zürich, Switzerland, the Higher Commercial and Silk Weaving School, at Lyons, France, and the Higher Commercial School of Marseilles, France, exhibit the ways in which Europeans deal with the demand for a practical business education.

JOHN EATON,
Commissioner.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1880.

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INDUSTRIAL EDUCATION IN EUROPE.

I. HIGHER COMMERCIAL INSTITUTE, ANTWERP, BELGIUM.

The Institut supérieur de commerce was established by royal decree of October 29, 1852, at the expense of the Belgian government and of the city of Antwerp.

The course of study lasts two years. The age of the pupils ranges from 18 to 20. Each student pays 25 francs matriculation fee. The tuition fees are 200 francs for the first and 250 francs for the second year. A special fee of 100 francs is charged for a course in the commercial office.

The examination for admission is held annually before a commission appointed by the government and presided over by the director of the institution. The subjects of examination are: A French composition and a translation from French into German and English; physical geography; commercial arithmetic; elements of algebra and geometry; book-keeping; rudiments of natural philosophy and chemistry; rudiments of universal history. A preparatory course of instruction is given by the professors of the institution. It lasts from Easter until August 15. The fee for this preparatory course is 100 francs. In this course special attention is paid to foreign students. Pupils who have completed their collegiate education are admitted without examination. The examination at the end of the first year for admission to the course of the second year takes place at the close of the annual session. The director, the professors, and the government inspector are the examiners. At the end of the second year a special examining board appointed by the government confers the degree of licentiate in commercial sciences upon such students as pass the requisite examination. Belgian students who have displayed special proficiency may obtain government aid which will enable them to travel abroad for several years. A sum of 40,000 francs is annually appropriated for this purpose in the budget of the minister of foreign affairs. All the examinations are free of expense to the students.

The lectures commence in the second week of October. Being delivered in French, foreign pupils must have previously acquired some knowledge of that language. The transactions in the commercial office are carried on in the languages generally used in commerce.

A library composed of commercial works and an extensive museum of mercantile products are connected with the institution.

The institution is placed under the control of a committee of seven members, the burgomaster of the city of Antwerp being ex officio president. The other six members are appointed three by the government and three by the municipal council of Antwerp.

PROGRAMME OF THE COURSE.

PREPARATORY COURSE.

French, German, English, history, geography, book-keeping, arithmetic, algebra, geometry, natural history, chemistry.

The foregoing branches are the subjects of examination for admission to the first year class.

FIRST YEAR.

I. *Mercantile office* (three hours every day): Transactions of a general business house; practical demonstration and application of commercial arithmetic; invoices;

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account sales; account of charges; accounts current; commercial calculations and valuations; exchange operations; public funds; book-keeping; commercial contracts; arbitration of exchanges; bills of lading; insurance; weights and measures. Every operation is entered in books kept by single and double entry; these books are balanced, stock is taken, and the affairs of the house liquidated at the end of the year. Correspondence is carried on in French, German, English, and Dutch.

II. *Description of the following commercial articles* (three hours a week): Sulphur, phosphorus, iodine, carbon, ammonia, arsenic, metals, potash, soda, lime, magnesia, aluminium, barium, manganese, iron, steel, cast iron, oxide, sulphate and cyanide of iron, chromium and chromates, cobalt, smalt, zinc and its compounds, tin, lead and its compounds, bismuth, antimony, copper and its compounds, mercury, gold, silver, platinum, aromatic roots, timber, dye woods, barks and cinnamon, laurel, senna, sumac, tea, tobacco, flowers and fruits of all kinds, hemp, clover, wheat, rye, barley, oats, buckwheat, rice, flour, coffee, cotton, flax, vegetables, raw and refined sugars.

III. *Political economy and statistics* (two hours a week): Object of political economy; nature and utility of this science; causes which have impeded its progress; analysis of the elements of production; labor, natural agents; capital, of what it consists and what part it is acting in production; classification of capital; how capital is created and increased; importance of increase; inquiry into the causes of the greater and smaller productiveness of the producing powers in different countries; property; division of labor: ideas of Adam Smith on this subject; values: their definition; the laws which regulate them; supply and demand; the expenses of production; prices; money; the value of money; variation in the value of precious metals and the consequences resulting from it to economy and society in general; credit: general notions of credit; its importance in production; institutions of credit, or banks; various descriptions of banks; banks of deposit, commercial banks, banks of circulation; circulation of irredeemable paper or paper money; credit on land; credit as a means of rendering the use of money less frequent; influence of credit on prices; commercial crises; equilibrium between production and consumption; international trade: necessity and advantages thereof; free trade between the different nations; the system of protection; influence of money on international exchanges; the forms of production; the principle of association; commercial companies; production on a large and on a small scale; distribution of wealth; wages: in what manner wages are regulated; population: the opinions of Malthus on this subject; how the condition of those who receive wages may be improved; profits: analysis of the elements which constitute them; in what manner they are regulated; the rate of interest; rent of land; theory of Ricardo; in what manner governments procure the necessary resources to provide for the public service; taxes: their influence on the development of wealth; necessity of taxes; progressive tax and proportional tax; income tax; imposition of taxes; public credit; state loans; annuities; redemption; whether loans are preferable to taxes to meet extraordinary exigencies; statistics: their object, utility, character, division, &c.

IV. *Commercial and industrial geography* (three hours a week): Topographical and statistical information on the different countries of the world. This information, which is derived from the latest consular reports and the most recent communications, refers to the following points: Topographical situation; constitution of the soil; mineral, vegetable, and animal kingdoms; political and social condition of countries; financial condition; national wealth; prosperity and decline: their causes; principal productions of each country; commodities which can be procured from various countries with advantage; exports of various countries; principal products for which there is demand in different countries; countries particularly supplied by Belgium; statistics of imports; the character of the economical and tariff legislation of each country; hindrances and facilities in the way of trade; tastes and habits of the population relative to trade; origin and causes of commercial relations between the various countries.

V. *Law* (one hour a week): Preparatory instruction for the study of commercial law; general remarks on the matter contained in the first two books of the civil code;

examination of the general principles of obligation; contracts; sales; partnerships; loans; securities, &c.

VI. *Spanish* (three hours a week): Pronunciation, reading, grammar, dictation, translations, correspondence.

VII. *Italian* (three hours a week): Pronunciation, reading, grammar, dictation, translations, correspondence.

VIII. *German* (three hours a week): Reading, correspondence, grammar, translations.

IX. *English* (three hours a week): Reading, grammar, correspondence.

X. *Dutch* (two hours a week): Pronunciation, grammar, exercises, composition, correspondence, conversation.

SECOND YEAR.

I. *Mercantile office* (three hours a week): Conditions of sales and purchases; general usages in the commercial markets of the different parts of the world; commission business; the fitting out of vessels; insurance; banking; imports and exports; practice in book-keeping; making out bills; exchange; reports relating to commerce; finances and industry in various countries; correspondence in French, Dutch, English, German, Spanish, and Italian. The mercantile office keeps commercial newspapers from London, Liverpool, Amsterdam, Hamburg, Havre, New York, Havana, Rio de Janeiro, Buenos Ayres, Valparaiso, Sydney, East India, and China. All these papers are at the disposal of the students.

II. *Description of mercantile articles and products* (two hours a week): The course includes the study of gum, India rubber, balsam, turpentine, tar, oils, oilcakes, fermented products, salts, bones, glue, rawhides, skins, hair, feathers, wool, grease, tallow, honey, guano, meat, fish, &c., cast and wrought iron, wire, needles, nails, cutlery, sheet iron, tin plates, wire gauze, metal utensils and apparatus, beaten gold and silver, armory, printing types, artificial cement, bricks, tiles, pipes, crockery, porcelain, glass, bottles, soap, wax, varnish, ink, oil cloth, colors and paints, spun flax, spinning mills, cloths, flannels, blankets, merinos, carpets, yarn, velvets, silks, hosiery, ribbons, lace, gloves, hats, leather, morocco, paper, pasteboard, cigars, tobacco, tools.

III. *General history of commerce and industry* (two hours a week): History of commerce and industry from the earliest times to the fall of the Roman empire; first rise of industry and commerce; the first arts and their inventors; industry and trade in Phœnicia, Egypt, Palestine, and India; trade of Carthage; industry and trade of the Greeks and Romans; slavery in ancient times; its organization and influence on the development of trade and industry; condition of industry and trade and social condition of the people at the period of the Roman empire; reorganization of industry after the invasion of the barbarians; systems of corporation; hindrances which the feudal system opposed to the development of industry and commerce; to what causes the Italian republics and the towns of the Hanseatic league owed their commercial prosperity; cursory view of trade and industry in Flanders; to what particular causes the prosperity of Belgium from the earliest period of the middle ages is to be ascribed; condition of industry and commerce of the world at the period of the discovery of America; from the discovery of America up to the invention of the steam engine; influence of the discovery of the new world on trade and industry; new colonies and colonial systems; effects of these systems; commercial prosperity of Holland and its causes; decline of the industry and trade of Belgium after the treaty of Münster; manufacturing system of Colbert and its influence on the development of French industry; the edict of Nantes and the pernicious effects of religious persecution on industry and trade; Cromwell's navigation act; the creation of the banks of England and Scotland; Law's system and the evils to which it gave rise; origin of economical science; history of the first progress of political economy and the authors who began to pursue it; sketch of the condition of trade and industry at the period of the invention of the steam engine; inventions of Watt, Arkwright, Hargreaves, Crompton, &c., and their influence on production; character of the vast industry to which these inven-

tions gave rise; the impetus they gave to the industry and commerce of England; the French revolution and its influence on the trade and industry of the world; the industrial and commercial progress realized by the principal nations from the peace of 1815 to the present time; ways of communication: railroads; steamboats; telegraphs; economical reforms of England and their influence; general condition of commerce and industry at the present time; the monetary question; emigration: its causes and influence; recapitulation; progress made by society; in what manner civilization, which was at first local, became afterwards universal.

IV. *Commercial and maritime legislation compared. Principles of international law* (two hours a week): Complete study of commercial law and the modifications introduced up to the present time; associations and companies; bills of exchange; failures and bankruptcies; maritime law; theory of insurances, &c.; laws concerning consulates, pilotage, and maritime police, and passes; disciplinary and penal code for the mercantile navy and sea fishery; laws on licenses, letters patent, weights and measures, arbitration; general remarks on commercial and maritime legislation of the principal countries; principles of international law in their relation to commerce; definition and object of international law; origin, character, guarantees, sanction, and sources of this law; European equilibrium; progress of this law; public treaties; rights of neutral parties in time of war; importance of the flag, &c.

V. *Customs legislation* (one hour a week): Importance of this subject; relation between political economy and the legislation of customs and tariffs; what is understood by protection; comparison of free trade and protective systems; different kinds of duties; duties on imports; duties on exports; duties on transits; duties on navigation; different modes of applying and collecting duties; duties ad valorem; duties on weight; bonded warehouses, docks, free ports, &c.; the administration of customs; relations between the customs and the navy; smuggling; the colonial system of Europe, its effects upon political economy; modern tendency to substitute freedom for restrictions; colonial system of Holland; modifications which the colonial system underwent in England in 1833 and 1834; emancipation of the slaves; general survey of the Belgian tariff; the German Zollverein; tariffs of France, the United States of America, and other countries.

VI. *Ship building and fitting out* (one hour a week): Nomenclature and description of the different parts of the hull, spars, and rigging of a merchant ship; calculations of the tonnage according to the laws of different countries; maintenance and repair of wooden and iron vessels; materials used in ship building; visits to the ship yards at Antwerp; modes of loading and unloading; regulations relative to the transport of emigrants.

VII. *Commercial and industrial geography* (three hours a week): Review of the first year's course.

VIII. *Political economy and statistics* (two hours a week): Review of the last year's course.

IX. *German* (three hours a week): Conversation, commercial correspondence, invoices, accounts, bills of exchange, bills of lading, manifests, &c.

X. *English* (three hours a week): Conversation, English commercial law, bills of exchange, and other commercial writings.

XI. *Italian* (three hours a week): Exercises, translations, conversation; review of the first year's course.

XII. *Spanish* (three hours a week): Mercantile letters, conversation, translations.

XIII. *Dutch*: Review of the first year's course, correspondence, reading of classical authors, conversation.

II. HIGHER COMMERCIAL AND SILK-WEAVING SCHOOL, LYONS, FRANCE.

The École supérieure de commerce et de tissage, founded by a stock company, with a capital of 1,200,000 francs, is under the special patronage of the chamber of commerce of Lyons.

The school admits boarders and day scholars. There are two sections, the commercial and the weaving section.

In the commercial section, the subjects taught are book-keeping, trade and banking operations, penmanship, commercial geography, study of various raw materials, modern languages, commercial law, political economy, the moral duties of the business man, drawing, and sketching. The course of the commercial section lasts two years. Pupils who pass a satisfactory examination at the end of the second year receive a diploma.

In the weaving section the course of studies lasts one year. The pupils attend a course of lectures on the theory of cloth weaving, and spend several hours every day in working at the different looms. The workshops of the different schools contain fourteen looms of various description, including steam power looms. After a satisfactory examination, the pupils receive a diploma of capacity.

III. FEDERAL POLYTECHNIC SCHOOL, ZÜRICH.

The Eidgenossische Polytechnicum had 564 regular students and 223 hearers in 1878–'79, against 640 regular students and 263 hearers in 1877–'78. There was, therefore, a decrease of 76 in the number of regular students and of 40 in the number of hearers. Of the 564 regular students, 300 were Swiss and 264 foreigners; in 1877–'78, there were 331 Swiss and 309 foreigners. Of the 264 foreigners in 1878–'79, 94 were from Austria-Hungary, 44 from Germany, 34 from Italy, 2 from America, 18 from Roumania and Servia, 14 from Russia, 10 from Sweden and Norway, 7 from Great Britain, 5 from Denmark, 4 from Holland, 4 from France, 2 from Turkey, 2 from Greece, and 1 from Egypt.

Of 51 candidates, 47 successfully passed the examination for a diploma. Since the establishment of the school 979 diplomas have been conferred, viz: 79 to architects, 309 to civil engineers, 241 to mechanical engineers, 139 to chemists, 115 to students of forestry and agriculture, and 96 to special teachers who had completed their courses in the normal section.

The library of the school has been increased by 1,077 volumes; the total number of volumes is now 21,561. The school takes 120 periodical publications.

IV. THE HIGHER COMMERCIAL SCHOOL OF MARSEILLES, FRANCE.

The École supérieure de commerce of Marseilles, which is under the patronage of the Chamber of Commerce, provides a good scientific and commercial education for young men who are to become clerks, book-keepers, merchants, managers of commercial and industrial establishments, &c., and enables them not only to direct the inland trade of France, but also to enlarge the mercantile relations of France with foreign countries.

No pupil is admitted unless he has completed his fourteenth year.

The total duration of studies is three years. The first year's studies are purposely adapted to prepare native and foreign pupils to the technical courses of the second and third year. They include mathematics and natural sciences, as well as the study of French and English. It is an excellent preliminary course, suited to a large number of French pupils and indispensable to almost all foreign pupils.

The classes for modern languages correspond in the second year to the hours of free study in the first, so that the pupils of the latter may, with the consent of their parents or guardians, learn these languages from the very beginning of their admission.

In the second and third years the pupils are taught trade and commerce in general. The courses of these two years are to initiate them into the practice of business and give them a sufficient knowledge of the laws which govern public wealth. They are also taught to speak and write with propriety and ease the language used in business, either French or any other tongue.

The course of study in the first year being essentially preliminary, pupils are admitted without any previous examination. Nevertheless they must write legibly and possess a knowledge of orthography and composition, arithmetic, simple and compound rules, tables of weights and measures, proportion, and fractions. They must

further be able to answer questions on the principal divisions of the earth and on the leading events in the history of their country.

During the first year great care is taken in the teaching of French to foreign pupils.

The courses of the second and third years continue the scientific and commercial instruction. Students who wish to pass from the first course to the second have to undergo a thorough examination on all branches taught during the first year. If they fail in the examination, they have to resume their studies in the preliminary class.

Graduates of universities may dispense with the examination; they are, however, required to write a good hand and to possess a rudimentary knowledge of French and English. Any other young man, to be admitted directly, has to pass an examination on the scientific part of the programme.

Are admitted to the course of the third year:

1. Pupils of the second year who pass the examination at the end of that year;

2. Students who, without having followed the courses of the first and second years, prove in an examination that they possess a complete knowledge of the branches forming the courses of the preceding years.

PRELIMINARY INSTRUCTION.

FIRST YEAR.

Writing (4 hours): Neat, clear, and legible hand. Letter writing.

French (5 hours): Grammar, spelling, and composition.

Arithmetic (6 hours): Leading rules; decimals; fractions; square root; proportion and progression; simple and compound interest; discount; French and foreign weights and measures; logarithms; mental arithmetic.

Mathematics and natural sciences (3 hours): First steps in algebra; elementary geometry; mensuration; solid measures; first steps in mechanics; elementary zoölogy, botany, and geology.

Chemistry and physics (3 hours).

Cosmography and geography (3 hours).

Book-keeping (1 hour).

English (5 hours).

This makes 30 hours of lessons a week.

TECHNICAL INSTRUCTION.

SECOND AND THIRD YEARS.

French (3 hours): Grammatical difficulties and peculiarities of the language; commercial correspondence; reports; drawing up of commercial documents.

Commercial office (second year, 9 hours; third year, 12 hours): Arithmetic; purchases and sales in varies countries: account current; account sales; book-keeping; joint accounts; consignments; coins and paper money; weights and measures; commercial usages and conditions of foreign markets; arbitration of exchanges; public funds; shares and bonds; inventory; dissolution of partnership.

The pupils of the third year are divided into several offices and firms. These firms keep up a regular correspondence with one another in the language of the country to which the office is supposed to belong. They solicit or open credit, and they purchase and sell to one another all kinds of goods.

Special study of merchandise (3 hours): Agricultural and colonial products; raw materials; textiles; dyes and drugs; fabrics; ores and minerals; assaying and analysis of goods; study of the most important chemical principles of agriculture and the leading manufactures.

In this course the pupils are taught how to distinguish the staple articles of every country. The school possesses a collection of samples and a laboratory for chemical analysis.

The pupils, under the direction of the professor, visit as often as necessary manu-

factories, warehouses, building yards, &c., where they acquire the practical knowledge of things taught in school.

Commercial geography (3 hours): Commercial geography of the globe; map drawing; marketable products; area, population, climate; condition of the soil; manners and customs of the inhabitants of the various parts of the world; languages used in business; commercial companies and institutions; emigration and immigration; description of ports and harbors; commercial centres; conveyances; telegraphic lines; imports and exports; hygiene in hot climates.

Legislation and political economy (3 hours): Fundamental principles of morality and political economy; lectures on the civil, commercial, and maritime laws; maritime insurance; international law; commercial legislation in various countries; history of commercial treaties.

Ship outfit (2 hours).

Conferences in French (2 hours): In these conferences the pupils have to treat, each in his turn, in the presence of their professors and comrades, various questions of book-keeping, commercial geography, merchandise, legislation, and political economy.

Penmanship (3 hours).

English (5 hours): Grammatical studies, commercial correspondence, conferences.

Optional languages (3 hours): Arabic, modern Greek, German, Italian, and Spanish.

The school is a day school, receiving the pupils at 8 A. M. and dismissing them at 6 P. M. Foreign pupils board in private houses in the city.

Besides the weekly examinations, general examinations are held every three months in all the subjects taught in school. Accounts of the results of the examinations are sent to the parents or guardians.

The examinations at the end of the year decide whether a pupil may go into a higher course or not.

Diplomas of merit and certificates of studies are given to pupils leaving at the end of the third year, according to the notes obtained and the result of the final examination.

The council of administration does not lose sight of the former pupils of the school. A register of offers and demands of employment is opened in the director's office, and facilitates the placing of pupils who are without situations after they have left school.

The school recognizes as former pupils only those who have obtained either a diploma or a certificate of studies.

The school year begins on the 15th of October and ends on the 15th of August.

The school fees are 400 francs for the first year, 600 francs for the second year, and 800 francs for the third year. They are payable in advance.

The greatest care is taken to foster a spirit of manliness and truthfulness and a high sense of duty among the pupils, and the discipline is administered only by an appeal to these noble feelings. No pupil of bad habits is allowed to remain in the school. Punctuality of attendance is rigorously enforced. Notes of inquiry are sent when a pupil is absent, and no pupil can reënter his class without showing a written excuse from his parents or guardians.

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