UNIVERSITY of Illinois

1893-94



Then let us not leave the meaning of education ambiguous or illdefined. At present, when we speak in terms of praise or blame about the bringing-up of each person, we call one man educated and another uneducated, although the uneducated man may be sometimes very well educated for the calling of a retail trader, or of a captain of a ship, and the like. For we are not speaking of an education in this narrower sense, but of that other education in virtue from youth upwards, which makes a man eagerly pursue the ideal perfection of citizenship, and teaches him how rightly to rule and how to obey. This is the only education which, upon our view, deserves the name; that other sort of training, which aims at the acquisition of wealth or bodily strength, or mere cleverness, apart from intelligence and justice, is mean and illiberal, and is not worthy to be called education at all. But let us not quarrel with one another about a word, provided that the proposition which has been granted hold good, to-wit: That those who are rightly educated generally become good men. Neither must we cast a slight upon education, which is the first and fairest thing that the best of men can ever have, and which, though liable to take a wrong direction, is capable of reformation. And this work of reformation is the great business of every man while he lives --- Plato, Laws, iv. 173.



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UNIVERSITY OF ILLINOIS

(Post Office, Champaign, or Urbana, Ill.)

1893-94

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UNIVERSITY OF ILLINOIS.

The University of Illinois has its seat in Champaign county, in the eastern central part of the state, between the twin cities of Champaign and Urbana, within the corporate limits of the latter. It is one hundred and twenty-eight miles southward from Chicago, at the junction of the Illinois Central, the Cleveland, Cincinnati, Chicago and St. Louis, and the Wabash railways. The situation is a beautiful one, and the "art that doth mend nature" has added rare charms to the grounds and surroundings. The country around is one of the richest and most prosperous agricultural regions of the world, and the local municipalities, with a combined population of 11,000, are noted for public spirit and high moral tone.

HISTORY.

In 1862 the national government donated to each state in the Union public land scrip apportioned in quantity equal to 30,000 acres for each senator and representative in congress, "for the endowment, support and maintenance of at least one college, whose leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, * * * * * in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

Under this act Illinois received scrip for 480,000 acres of land subject to location in any surveyed but unoccupied part of the public domain, and 25,000 acres were thus located in Nebraska and Minnesota, while the remainder of the scrip was sold for what could be obtained. Of the land, about 14,000 acres have been sold at from \$10.00 to \$15.00 an acre. In compensation for waiting something more than a quarter of a century, the land thus secured has added and willadd to the endowment fund nearly as much as was obtained for the vastly greater proportion of the scrip originally sold. The entire principal sum received from the sale of scrip and of land is held inviolate as endowment, the income only being available for current expenditures.

To secure the location of the University several counties entered into sharp competition by proposing to donate to its use named sums of money, or its equivalent. Champaign county offered a large brick building, erected for a seminary and nearly completed, about 1,000 acres of land for a campus and adjoining farms, and \$100.000 in county bonds. To this the Illinois Central railroad added \$50,000 in freight.

The state legislature has from time to time appropriated various sums for permanent improvements, as well as for maintenance. The present value of the entire property and assets is estimated at \$1,375,000.

The institution was incorporated under the name of the Illinois Industrial University the last day of February, 1867, and placed under the control of a board of trustees constituted of the governor, the superintendent of public instruction, and the president of the state board of agriculture, as *ex-officio* members, and twenty-eight citizens appointed by the governor. The chief executive officer, usually called president, was styled Regent, and he was made, *ex-officio*, a member of the board and presiding officer both of the board of trustees and of the faculty.

In 1873 the board of trustees was reorganized by the reduction of the number of members by appointment to nine and ex-officio to two, the governor and the president of the state board of agriculture. In 1887 a law was passed making membership elective at a general state election and restoring the superintendent of public instruction as an ex-officio member. There are, therefore, now three ex-officio members and nine by public suffrage. Since 1873 the president of the board has been chosen by the members thereof from among their own number, for a term of one year.

In consideration of the offer of Champaign county the institution was located, May 8, 1867, in the suburbs of Urbana, adjoining those of Champaign. For greater convenience most use has been made of the postoffice of the latter place. The University was open to students March 2, 1868, at which time there were present, beside the Regent, three professors, and about fifty students, mostly from the vicinity. During the first term another instructor was added, and there was a total enrollment of 77 students, all young men.

During the first term classes were instructed in algebra, geometry, natural philosophy, history, rhetoric, and Latin. Along with this, work on the farm and gardens or around the buildings was compulsory for all students. But in March of the next year compulsory labor was discontinued, save when it was made to serve as a part of class instruction. A chemical laboratory was fitted up during the autumn of 1868, and students then began practical work in the department. Botanical laboratory

HISTORY.

work was commenced the following year. In January, 1870, a temporary mechanical shop was fitted up with tools and machinery, and in this little wooden building, originally constructed for a carpenter shop, was begun the *first shop-instruction* in American universities. During the summer of 1871, a large brick structure, the present Machinery Hall, was erected and equipped for students' shop work in both wood and iron, and in 1876 a diploma of merit was awarded for the exhibition in this line made at the Centennial Exposition.

By vote, March 9, 1870, the trustees admitted women as students, and during the year 1870-71, twenty-four availed themselves of the privilege. Since that time they have constituted about one-sixth to one-fifth of the total number of students. In 1875 a course in domestic science and art was organized. This was maintained five years, when, upon the withdrawal of the professor in charge, it was abandoned.

By the original state law certificates showing the studies pursued and the attainments in each were substituted for the usual diplomas and degrees. The certificates not proving satisfactory to the holders, the alumni petitioned the legislature in 1877 to give the University authority to confer degrees, and such authority was granted.

Again, upon motion of members of the alumni, seconded by trustees and faculty, the legislature was asked in 1885 to change a former action by that body. The word *industrial*, as used in connection with public institutions, had become associated with those of a penal or reformatory kind, and, in consequence, many ludicrous and sometimes embarrassing mistakes were made as to the character and purpose of the University. Instead of the splendid conception of high, collegiate education, preparatory to and in aid of the great industries of the age, people were too often led to suppose the state had provided a place for destitute children or for young culprits. From the beginning the institution had been recognized as the state University, and all the discussion leading to its establishment was based upon this idea. No change was now sought in its character or in its relations, but a name better expressive to the public mind of that character and relation was desired. The industrial University became the University of Illinois.

During the same session of the legislature a bill was passed transferring the State Laboratory of Natural History from the Illinois State Normal University to the University of Illinois. This laboratory was created by law for the purpose of making a natural history survey of the state, with the publication of the results in series of bulletins and reports, and for the allied purpose of furnishing specimens illustrative of the flora and fauna of the state to the public schools, and to the state museum. For these purposes direct appropriations are made by the legislature from session to session. A large amount of material has been collected and extended publications have been made in both the forms above mentioned.

By an act approved March 2, 1887, the national government appropriated \$15,000 per annum to each state for the purpose of establishing and maintaining, in connection with the colleges founded upon the congressional act of 1862, an agricultural experiment station, "to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science." Under this provision the station for Illinois was placed under the direction of the trustees of the University and its grounds were located on the University farm. At least one bulletin of results is published every three months, and they are for gratuitous distribution. Editions of 14,000 copies are now issued.

For the more complete endowment of the state institutions founded upon the act of 1862, the congress of the United States made further appropriations by a supplementary law passed in 1890. Under this enactment each such college or university received the first year \$15,000, the second \$16,000, and likewise thereafter \$1,000 per annum additional to the amount of the preceding year. The annual increase is to continue until the amount reaches \$25,000, which sum is then to be paid yearly thereafter. Putting the congressional aids together there is made an exceedingly encouraging example for the state authorities to imitate. It cannot be said that the Illinois legislature has in the past contributed liberally to the University, but a disposition to do so has been much more manifest in recent sessions of that body. Besides \$70,000 for a science building, the 37th General Assembly (1891) appropriated for the use of the University for two years the sum of 565, 044.23, and the 38th (1893) passed appropriations for an engineers' building, \$160,000, and for other purposes for two years \$135,700. To date the total appropriations by the state to the University for all purposes whatsoever amount to \$879,900.

It has been mentioned that 77 students attended the first term in 1868. The total enrollments for the succeeding years to the present are as follows: 128, 180, 274, 381, 400, 405, 368, 370, 388, 387, 399, 414, 382, 352, 382, 330, 332, 362, 343, 377, 417, 469, 519, 583, 714, 743.

It will be noted that for the last ten years each year, with a single exception, shows a gain over that preceding. The year's gain for 1892-93 was much the greatest, reaching 21 per cent over the attendance

HISTORY.

for 1892 and nearly 40 per cent over that for 1891. Financial difficulties materially affected the enrollment this year (1893-94). The following table gives details of attendance since 1881-82:

ATTENDANCE OF	F STUDENTS IN	THE S	EVERAL	DEPARTMENTS	OF	THE	UNIVERSITY,	FOR
	тн	E YEAR	s 1881-8	32 TO 1893-94.				

Year.	Agriculture	Mechanical Engineering	*Electrical Engineering	Civil Engineering	†Municipal and Sanitary Engineering.	Mining Engineeriug	Architecture	†Architectural Engineering.	Chemistry	‡Pharmacy:	Natural History	Art and Design	English and Modern Lan- guages	Ancient Languages	Unclassified	Men	Women	Total
1881-82						 ,			- 10	-								352
1882-83.	28	39		52		3	18		44		11	2	117	15	47	289	93	382
1883-84.	24	45		51		2	21		26		17	6	94	8	43	26T	69	330
1884-85.	21	56		58		I	26	• •	23	• •	20	11	102	4	34	292	70	362
1885-86.	25	53	•••••	43		3	24	••	27		18	8	102	7	19	269	63	332
1886-87.	29	65		45		4	28	•	25	••	21	5	84	6	31	289	54	343
1007-00.	23	57	••••	53		4	40	••	15		34	14	85	ð	39	305	72	377
1000-09	10	74	• • • • •	02		0	59	•••	20	••	54	9	85	14	19	340	71	417
1809-90.	14	70	••••	71		0	01	•••	40		53	3	101	15	27	392	77	409
1801-02	22	20	1	95		5	- 73	i · · i	51		51	4	95	17	27	444	20	519 582
1802-02	10	82	87	02		7	08	15	40	••	25	10	104	26	44	494	104	714
1803-04	33	68	123	86		2	101	14	34	10	74	10	110	54	4	634	100	743
25 941	551	007	-~3		1 2	~	-01		44			- 4	110	J4		~		<u>, +5</u>

*Not separately classified until 1890-91. †Not separately classified until 1892. ‡Not separately classified until 1893.

This shows that the marked increase has been in certain of the courses of engineering. The number of students pursuing architectural studies is greater than at any other collegiate institution in this country.

BUILDINGS AND GROUNDS.

The land occupied by the University and its several departments embraces about 210 acres, including experimental farm, orchards, forest plantation, arboretum, ornamental grounds, and military parade grounds.

University Hall, designed wholly for public uses, cccupies three sides of a quadrangle, measuring 214 feet in front and 122 feet upon the wings. The library wing contains in spacious halls the museum of natural history, the library, the art gallery, and the museum of industrialart. The chapel wing contains the chapel, the physical laboratory

and lecture room, and rooms occupied by the department of architecture, and of art and design. In the main front are convenient class rooms, and on the upper floor elegant halls for literary societies.

The Chemical Laboratory is a building 75 by 120 feet, and two stories high, besides well-lighted basement and mansard stories. It contains the general laboratories for students, instructors' laboratories, lecture rooms, store rooms, scale rooms, and various apartments for special purposes.

Machinery Hall is of brick, two stories high, 126 feet in length, and 88 feet in width. It contains the machine shop and mechanical wood shop on the second floor, together with tool rooms, pattern room and stock room. On the first floor is found the forge shop, foundry, wash room; architectural shops for carpentry and cabinet work, furnished with wood working machinery, stock rooms, as well as the Laboratory of Applied Mechanics and Hydraulics.

Natural History Hall is a handsome building, 134 by 94 feet, with basement, two main stories, and an attic. It is occupied by the departments of botany, zoölogy, physiology, mineralogy, and geology, for each of which there are laboratories, lecture rooms, and offices.

Military Hall, 100 by 150 feet in one grand hall, gives ample space for company and battalion maneuvers and for large audiences upon special occasions. It is also used as a gymnasium, for which there are dressing rooms with lockers. A bath room is provided.

Engineering Hall.—The new engineering building in process of erection will, it is hoped, be ready for occupancy at the opening of the fall term. The last legislature made an appropriation of \$160,000 for this building, and it promises to be the handsomest structure on the campus. The trustees asked for competitive plans from the architectural graduates of this University, and awarded the first prize to George W. Bullard, Tacoma, Wash., of the class of 1882, who was made architect of the building.

The new building stands on the north side of Green street, midway between the north and south groups of buildings, facing the latter. It has a frontage of 200 feet, a depth on the wings of 76 feet and 138 feet in the center. The middle wing is 72 feet wide. The first story is of drab sandstone in twelve inch courses, having a tooth-chiseled finish and deeply chamfered horizontal joints. The three upper stories are of buff pressed brick with terra cotta trimmings to match. The interior is slow burning mill construction. The ceiling is paneled Washington fir, and the remainder of the interior fluish is oak with bronze trimmings. The first story of the west and central wings contains the laboratories of the department of electrical engineering, while the east wing is devoted to masonry, laboratories and instrument rooms of the department of civil engineering. The central wing of the second story contains the lecture room and the preparation rooms of the department of physics, and the remainder of the floor is used by the departments of civil and municipal engineering, for recitation and drawing rooms, cabinets and studies. The middle wing of the third story contains the laboratories of the department of physics, and the side wings the drawing rooms, lecture rooms, cabinets, and studies of the mechanical department. The center portion contains the library, the office, and the faculty parlor. The fourth story is devoted entirely to the department of architecture, and contains drawing and lecture rooms, cabinets, photo studio, and blue print laboratory.

There are, in addition to these buildings, a veterinary hall, a small astronomical observatory, three dwellings, two large barns, and a green house.

MUSEUMS AND COLLECTIONS.

The museum of zoölogy and geology occupies a hall 61 by 79 feet, with a gallery on three sides, and is completely furnished with wall, table, and alcove cases. It contains interesting and important collections, equaled at few, if any, of the colleges of the west. They have been specially selected and prepared to illustrate the courses of study in the school of natural history, and to present a synoptical view of the zoölogy of the state.

Zoölogy.—The mounted mammals comprise an unusually large and instructive collection of the ruminants of our country, including male and female moose, elk, bison, deer, antelope, etc., and also several quadrumana, large carnivora and fur-bearing animals, numerous rodents, good representative marsupials, cetaceans, edentates, and monotremes. Fifty species of this class are represented by eighty specimens.

The collection of mounted birds (about five hundred and fifty specimens of three hundred species) includes representatives of all the orders and families of North America, together with a number of characteristic tropical forms. Many of these specimens are excellent examples of artistic taxidermy. A series of several hundred unmounted skins is available for the practical study of species.

The set of skeletons contains examples of all the orders of mammals and birds except the Proboscidea, together with typical representatives of the principle groups of reptiles, amphibians, and fishes. The cold-blooded vertebrates are also represented by a very useful collection of alcoholic specimens, plaster casts, and mounted skins of the larger species, both terrestrial and marine.

Embryology is illustrated by a set of Ziegler wax models, and several series of slides, sections, and other preparations.

Conchology is illustrated by several thousand shells belonging to seventeen hundred species; together with alcoholic specimens of all classes and orders. The collection of Illinois shells is fair, but incomplete.

The entomological cabinet contains about three thousand species (principally American), named, labeled, and systematically arranged.

The lower invertebrates are represented by several hundred dried specimens and alcoholics, and by a large series of the famous Blaschka glass models.

Botany.—The herbarium contains nearly all the species of flowering plants indigenous to Illinois, including a complete set of grasses and sedges. The flora of North America is fairly well represented, and a considerable collection of foreign species has been made. A collection of fungi includes a very full set of those most injurious to other plants, causing rusts, smuts, moulds, etc. A collection of wood specimens from two hundred species of North American trees well illustrates the varieties of native wood.

Plaster casts represent fruits of many of the leading varieties, as well as interesting specimens of morphology, showing peculiarities of growth, effects of cross-fertilization, etc.

Geology — The geological collection comprises many of the largest and most remarkable fossils hitherto discovered in the various geological formations, illustrating the general progress of life in the mollusks, fishes, reptiles, and mammals, from the oldest paleozoic time to the present. A fine set of fossils from Germany, and collections suitably arranged for practical study, from this and other states, illustrate the different formations. There is a good collection of foot-prints from the Connecticut river sandstones.

Lithology.—This collection embraces the principal kinds of metamorphic and volcanic rocks; examples of stratification in the limestone and fragmental kinds, with many samples of such rocks as are found most valuable for building purposes.

Mineralogy.—The specimens of minerals show all the groups, and all the important and typical species. All the metals are represented: also many of their most important combinations. Many of the specimens are finely crystalized; these, with a complete set of imported models, fully illustrate crystallography. Agriculture.—A collection of soils from different portions of Illinois and other states; many varieties of corn, wheat, and other cereals and seeds; specimens illustrating the official state inspection of grains at Chicago, showing the quality of the different grades recognized; models of agricultural inventions; models illustrating modes and materials for drains; casts of ancient plows; engravings, lithographs, and photographs of typical animals of noted breeds.

The farm gives good illustrations of farm buildings, implements, machinery, modes of culture, and of domestic animals of various classes.

Physics.—The cabinets of the physical laboratory contain a collection of apparatus from the most celebrated European and American makers, illustrating the subjects of mechanics, pneumatics, optics, and electricity.

A series of standard weights and measures from the office of the Coast and Geodetic Survey of the United States may be consulted at the physical laboratory.

MUSEUM OF INDUSTRIAL ARTS.

A large room is devoted to a museum of practical art, the materials for which are constantly accumulating in the various scientific departments. Prominent among the agricultural specimens here exhibited is an excellent collection of the sub-species and varieties of Indian corn, including the best of their kinds; a considerable collection of small grains and of grasses; a collection of fibres in various states of manufacture, and a series of analyses of grains, showing at a glance the elements and proportion of structure. The museum contains full lines of illustrations of the work of the shops; models made at the University or purchased abroad; drawings in all departments; Patent Office models, etc ; samples of building materials, natural and artificial; a large collection illustrating the forestry of Illinois, Florida, and California; with whatever may be secured that will teach or illustrate in this most important phase of university work. The exhibit made by the University at the Centennial and Cotton Exposition at New Orleans, finds a permanent abode in this apartment, and very large additions have been made of materials received from the Columbian Exposition of 1893.

A notable feature of this collection is the gift of Henry Lord Gay, architect, of Chicago. It consists of a model in plaster and a complete set of drawings of a competitive design for a monument to be erected in Rome, commemorative of Victor Emanuel, first king of Italy. The monument was to be of white marble, an elaborate Gothic structure, beautifully ornamented, and 300 feet high. Its estimated cost was to have been seven and a quarter millions of francs. The design was placed by the art committee second on a list of 289 competitors. Mr. Gay's generous gift occupies the place of honor in the museum of industrial arts.

ART AND DESIGN.

The University art gallery was the gift of citizens of Champaign and Urbana. It occupies a beautiful hall, 61 by 79 feet, and the large display of art objects has surprised and delighted all visitors. In sculpture it embraces thirteen full size casts of celebrated statues, including the Laocoön group, the Venus of Milo, etc., forty statues of reduced size, and a large number of busts, ancient and modern, bas reliefs, etc., making over four hundred pieces. It includes also hundreds of large autotypes, photographs, and fine engravings, representing many of the great masterpieces of painting of nearly all the modern schools. Also a gallery of historical portraits, mostly large French lithographs of peculiar fineness, copied from the great national portrait galleries of France.

Other collections of special value to art students embrace a large number of casts of ornament from the Alhambra and other Spanish buildings, presented by the Spanish government; a set of casts from Germany illustrating German Renaissance ornament; series of art works from the Columbian Exposition, and large numbers of miscellaneous casts, models, prints, drawings, etc., such as are usually found in the best art schools.

LIBRARY.

The library, selected with reference to the literary and scientific studies required in the several courses, had, May 5, 1893, 25,500 volumes.

The large library hall, fitted up as a reading-room, is open throughout the day for study, reading and consulting authorities. It is intended that the use of the library shall largely supplement the class room instruction in all departments. Constant reference is made in classes to works contained in the library, and their study is encouraged or required. The reading room is well provided with American, English, French, and German papers and periodicals, embracing some of the most important publications in science and art.

The library of the State Laboratory of Natural History is rich in the world's best literature upon biological sciences, and affords advanced students excellent opportunities for work in this line. The library of the Agricultural Experiment Station has 3,800 volumes and 2,200 pamphlets. This is also accessible to students.

LABORATORIES.

These essential facilities for modern educational work have been provided at the cost of large sums of money, and of much care to have them best suited for their various purposes. They are thoroughly well equipped.

The chemical laboratories occupy a building 75 by 120 feet, four stories high, including basement and mansard. The basement is used for storage, and for work in mining and metallurgy; the first floor has a lecture room, a laboratory for quantitative work for one hundred and fifty students, and several subsidiary rooms; the second floor, its laboratories for qualitative analysis, private work, lecture room, store room, etc.; and on the uppermost floor is the laboratory of the Agricultural Experiment Station, and apartments for photography.

Natural History Hall is occupied with the laboratories and lecture rooms for the work and instruction in botany, zoölogy, physiology, mineralogy, and geology; it also contains the office and equipments of the State Laboratory of Natural history, and of the State Entomologist, as well as the office and library of the Agricultural Experiment Station. There are six laboratory rooms on each of the main floors—sufficient altogether to accommodate two hundred students, besides offering abundant facilities for the private work of the instructors. The laboratory work in these departments constitutes a very large part of the instruction.

The psychological laboratory in Natural History Hall is well provided with apparatus of many different kinds for use in experimental study and research, and with charts and models to aid in instruction. This laboratory is a new one, but has already attracted wide attention and has awakened special interest in the science to which it is devoted.

The physical laboratory and lecture room are in University Hall, occupying large, well lighted and well arranged apartments. Still better rooms in the Engineering Hall will be occupied next year. Students have ample facilities for experimental work and opportunity to prosecute it under the guidance of the instructors.

The electrical laboratory is also in University Hall. It has five rooms, each especially adapted to its distinct purpose, and equipped for work in experiment and research. The laboratory has its own power from a steam engine. The testing laboratory, located in Machinery Hall, gives opportunity to students of the College of Engineering to make various practical experiments and tests, and to prosecute original investigations in the lines of their specialties.

The mechanical laboratory occupies a large part of both floors of Machinery Hall, and each of its departments is equipped for practical work by students. There is a large machine shop with hand and machine tools for all the required operations; a pattern shop, a blacksmith shop, a foundry, a boiler room, etc.

The architectural workshops, in the same building with the mechanical laboratory, are fully equipped for bench and lathe work, and are supplied with all essential machine tools. Students become familiar with the tools and the work of the carpenter and cabinet maker, as well as with the draughting operations of the architect's office.

The farms, fruit and forestry plantations, and gardens offer abundant illustrations of the work associated with the courses of instruction in agriculture and horticulture. The varied and carefully conducted operations of the Agricultural Experiment Station afford excellent aids to students in these departments. For its specific purposes there are used about one hundred and seventy acres.

COLLEGE OF AGRICULTURE.

FACULTY.

THOMAS J. BURRILL, PH.D., LL.D., ACTING REGENT, BOTANY.

GEORGE E MORROW, A.M., Lean, Agriculture.

DONALD MCINTOSH, V.S., Veterinary Science.

ARTHUR W. PALMER, Sc.D., Chemistry.

ELBRIDGE R. HILLS, CAPTAIN 5TH ARTILLERY, U. S. A., Military Science.

SAMUEL W. PARR, M.S., Analytical Chemistry.

DANIEL W. SHEA, PH.D., Physics.

GEORGE W. MYERS, M.L., Mathematics.

KATHARINE MERRILL, A.B., English Language and Literature.

EDGAR J TOWNSEND, PH.M., Mathematics.

GEORGE P. CLINTON, B.S., Botany.

THOMAS A. CLARK, B.L., English.

FRANK D. GARDNER, B.S., Agriculture.

ALICE M. BARBER, M S., Botany.

ALFRED H. WHITE, A.B., Chemistry.

BERNARD V. SWENSON, B.S., Physics.

GEORGE W. MCCLUER, M.S., Horticulture.

WILLIAM D. GIBBS, B S., Agriculture.

CLENDON V. MILLAR, B S., Chemistry.

HARLEY E. REEVES, Military Science.

COLLEGE OF AGRICULTURE.

The College of Agriculture aims to give a liberal and practical edu cation, based largely on the natural and physical sciences, but supplementing these with technical or professional studies in which the application of science to the best modern practice of agriculture is carefully considered. The purpose is to prepare its students to be intelligent and successful farmers or horticulturists; teachers of agriculture in schools or colleges, or through the agricultural press, or to be investigators in the agricultural experiment stations of the country. It also gives a good foundation in the study of veterinary science. Shorter courses are provided for those who already have a good scientific education, and for those who desire to pursue the technical studies with special reference to their practical applications.

This college has the advantage of a close connection with the other colleges of the University, especially with the College of Science. The libraries, laboratories, museums, and collections of the University are a part of its equipment.

METHODS OF INSTRUCTION.

So far as is practicable, the professional studies are taught after a study of the sciences with which agriculture is most closely related. They are taught mainly by lectures, with use of text-books, where suitable ones are available. Readings are prescribed in standard agricultural books and periodicals. Large use is made of the publications of agricultural experiment stations. Frequent written or oral discussions of the principles taught are required of the student. Principles are also illustrated by observations in the fields, stables, orchards, gardens, etc., of the University, or in the vicinity.

The constant aim is to aid the student in forming habits of careful and accurate observation and investigation; to lead him to seek the reasons for agricultural methods, as well as to learn rules of practice; to teach him how to use the sources of knowledge concerning agriculture; and to help him to become an intelligent, progressive citizen and business man.

The Agricultural Experiment Station, with a farm of 170 acres and suitable buildings, exhibits field experiments in testing the different varieties and modes of culture of field crops, and in the comparison and treatment of soils. It carries on experiments in agriculture, horticulture, dairying, and in feeding animals of different ages and development upon the various kinds of food. In common with similar departments in the several agricultural colleges of the country, it attempts to create positive knowledge towards the development of an agricultural science. A dairy house, fitted with a cream separator, apparatus for deep and shallow setting of milk, churns, etc., is used in illustration of dairy processes.

Surveying and drainage are illustrated by field practice, with instruments, and by models. Agricultural chemistry is pursued, in connection with laboratory practice, in the analysis of soils, fertilizers, foods, etc. The College has fine collections of soils, seeds, plants, implements, models, and skeletons of domestic animals, charts, and other apparatus, including a large number of models of agricultural machinery. Upon the grounds devoted to the use of the College are: an orchard containing numerous varieties of apples, pears, cherries, grapes, and small fruits; a forest tree plantation, embracing the most useful kinds of timber; an arboretum, in which all hardy, indigenous, and exotic trees are planted as fast as they can be secured, and which now contains nearly one hundred varieties.

The ornamental grounds which surround the University buildings contain about twenty acres, and are kept in neat and attractive style. These, with all the adjuncts of trees and flowering shrubs, lawns, beds of flowers and foliage plants, walks of different materials and styles of laying out, give illustrations to the class room work in landscape gardening. A greenhouse contains a collection of plants of great value for the classes in floriculture and landscape gardening, besides furnishing students with practice in greenhouse management.

The extensive fruit plantations of the Agricultural Experiment Station give abundant opportunity for studies and illustrations in many horticultural lines, and add greatly to the effectiveness of class room work.

The cabinet contains a series of colored casts of fruits, enlarged models of fruits and flowers, collections of seeds of native and exotic plants, of specimens of native and foreign woods, of beneficial and injurious insects, and of specimens showing their work; numerous dry and alcoholic specimens and preparations; maps, charts, diagrams, drawings, etc.

The College has a supply of compound microscopes and apparatus, and students have opportunity to learn their use and to make practical investigations with them. The herbarium is rich in specimens of useful and noxious plants, including many of the fungus parasites which cause disease to cultivated crops.

CLASSIFICATION OF STUDIES.

For the degree of Bachelor of Science in the College of Agriculture 40 full term credits are required. Of these credits, 16 must be obtained by pursuing the required studies, each for the time named below. The other 24 credits may be obtained by pursuing further required studies or by the prosecution of elective studies. Two term credits may be obtained upon special work in senior year in lines of any of the required sciences in the preparation of a thesis.

Students who have completed a four years' course of study in the College of Science may take the professional agricultural studies in one

year; and those who have followed a course for two years may take the professional studies, and other scientific or general studies, in the last two years of their course.

It should be understood that much liberty in choice of studies is permitted. Students particularly interested in animal husbandry or veterinary science may specialize in these branches and take other subjects most nearly related thereto, while those so desiring may make most prominent the horticultural subjects. Chemistry may be taken as the chief scientific subject, or with a minimum of this, the biological sciences may be selected as specialties. It will be noticed that very full courses may be chosen in any of the following: Botany, Chemistry, Economics, Geology, Physics, Zoölogy. During the first two years a course may be identical with one chosen in the College of Science. The special professional subjects occur in the third and fourth years, or may all be taken in the fourth year.

REQUIRED STUDIES.

Agriculture (1, 3, 4, 5), 3 credits.	Physics (1 and 3, or 2), 1 or 3 credits.
Horticulture (1 or 5), 1 credit.	Mathematics (1, 3), 2 credits.
Veterinary (2), 1 credit.	English (8), 2 credits.
Botany (1 or 6), 1 or 3 credits.	Military (1, 2), 2 credits.
Chemistry (1, 3a, 4), 3 credits.	

ELECTIVE STUDIES.

Zoölogy (1, 2, 3, 4, 5, 6, 8), 9 credits.
Anthropology (1, 2), 1 credit.
Economics (1, 2, 3, 4, 5), 5 credits.
Psychology (1), 1 credit.
Art and Design (4), 3 credits.
English (7), 3 credits.
French (5), 3 credits.
German (1 or 5, 2, 6), 6 credits.
History (—), 4 credits
Shop Practice (D), 3 credits.

COURSES OF INSTRUCTION BY YEARS AND TERMS.

The following list shows the terms of the year when the various subjects are taught, and the order in years in which they should be pursued. The figures at the left refer to the terms or divisions of the year; those following the names of subjects indicate the special part or parts of these subjects to be taken, of which a full description may be found in the latter part of this book, or by means of the index.

FIRST YEAR.

- Mathematics 1; Art and Design 4; Chemistry 1; English 7; French 5; Military 1, 2.
- 2. Art and Design 4; Chemistry 3a; English 7; French 5; Military 1, 2; Mathematics 3, Zoölogy 1, 2, 3, or 8.
- 3. Art and Design 4; Botany 6; Chemistry 3b, 4; English 7; French 5; Military 2; Zoölogy I, 2.

SECOND YEAR.

- Botany 1; Chemistry 52; German 1 or 5; Military 2; Mineralogy 1; Physics 1 and 3, or 2; Physiology 4; Zoölogy 1, 3.
- Botany 1; Chemistry 7, 9, 13; Geology 1a, 4; German 1 or 5; Military 2; Physics 1 and 3, or 2; Physiology 1; Zoölogy 4 (Entomology).
- Botany I (Vegetable Physiology) or 6; Chemistry 5c, 7, 9, 13; Geology 1b; German I or 5; Military 2; Physics I and 3, or 2; Physiology 1; Zoölogy 4 (Entomology).

THIRD YEAR.

- Anthropology 2; Botany 2 (Bacteriology); Economics 1; Geology 1c; German 2; History —; Meteorology 1; Philosophy 1; Physiology 2; Psychology 1; English 8; Zoölogy 6.
- 2. Botany 3; Economics 2; German 6; History —; Physiology 2; English 8; Zoölogy 5, 6.
- Botany 4; Economics 5; General Biology 4, German 6; History —; Physiology 2; English 8; Zoölogy 6.

FOURTH YEAR.

- Agriculture 1; History —; Horticulture 1; Thesis —; Veterinary Science 1, 4.
- 2. Agriculture 2, 3; Economics 3; Horticulture 2, 3, 5; Thesis —; Veterinary Science 2, 4.
- 3. Agriculture 4, 5; Economics 3, 4; Horticulture 4; Thesis —; Veterinary Science 2, 4.

JUNIOR COURSE IN AGRICULTURE.

A two years' course has been arranged for those who desire some knowledge of the physical and natural sciences, as well as the professional agricultural studies. For admission to this course students should not be less than eighteen years of age, and if under twenty-one years must pass the examinations in the common branches as required for entrance to the Preparatory School. The studies of the first year, except chemistry, and also the botany of the second year will be taken in the Preparatory School.

Students of sufficient age and attainments may take the professional studies of this course in one year. Horticultural studies may be substituted for veterinary science if desired.

The two years' course is arranged as follows:

JUNIOR COURSE IN AGRICULTURE.

FIRST YEAR.

- 1. Chemistry; Physiology; Accounts; English.
- 2. Chemistry; Physics; Zoölogy; English.
- 3. Chemistry; Physics; Botany; English.

SECOND YEAR.

- 1. Farm Equipment; Animal Anatomy; Botany; Economics.
- Rural Economy; Veterinary Science; Animal Husbandry, Entomology or Horticulture.
- History of Agriculture; Rural Law; Veterinary Science; Entomology; Special Investigations.

FREE SHORT COURSE.

For the winter term students are admitted without entrance examination or payment of any fee to a special short course in which there are daily lectures and class exercises concerning some of the most important practical branches of agriculture, horticulture, and veterinary science. This course is designed for young men already engaged in agricultural pursuits who cannot spend a long time in college, and yet are anxious to make the most of themselves and of their vocation. Such students have access to the library and museum collections of the University, and have admission to the courses of general lectures.

The details of this course vary from year to year. A special circular giving full information concerning it will be issued each year several weeks before the opening of the term the first of January.

COLLEGE OF ENGINEERING.

FACULTY.

THOMAS J. BURRILL, PH.D., LL.D., ACTING REGENT, BOTANY.

SAMUEL W, SHATTUCK, C.E., Mathematics.

N. CLIFFORD RICKER, M.ARCH., Dean, Architecture.

IRA O. BAKER, C.E., Civil Engineering.

ARTHUR N. TALBOT, C.E., Municipal and Sanitary Engineering.

ARTHUR W. PALMER, Sc.D., Chemistry.

FRANK F. FREDERICK, Art and Design.

ELBRIDGE R. HILLS, CAPTAIN 5TH ARTILLERY, U.S. A, Military Science.

SAMUEL W. PARR, M.S., Analytical Chemistry.

LESTER P. BRECKENRIDGE, PH.B., Mechanical Engineering.

DANIEL W. SHEA, PH.D., Physics.

GEORGE W. MYERS, M.L., SECRETARY, Mathematics.

KATHARINE MERRILL, A.B., English.

JAMES M. WHITE, B.S., Architecture.

EDGAR J TOWNSEND, PH.M., Mathematics.

WILLIAM H. VANDERVOORT, M.S., Mechanical Engineering.

WILLIAM D. PENCE, B.S., Civil Engineering.

GEORGE W. PARKER, Wood Work.

EDITH A SHATTUCK, Drawing.

THOMAS A. CLARK, B.L., English.

CYRUS D. MCLANE, B.S., General Engineering Drawing.

CYRIL B. CLARK, Machine Shops.

HERVEY E. PARKER, Architectural Shops.

JAMES D. PHILLIPS, B S., General Engineering Drawing.

CHARLES A GUNN, B.S., Architecture.

WILLIAM ESTY, A.M., Electrical Engineering.

BERNARD V. SWENSON, B.S., Physics.

ALBERT R. CURTISS, Machine Shops.

LORIN W. PEABODY, B.S., Testing Laboratory.

HENRY JONES, Blacksmith Shop.

HARLEY E. REEVES, Military Science.

COLLEGE OF ENGINEERING.

The purpose of the College of Engineering is thoroughly to educate and prepare engineers and architects for their future professional courses. Its aim must therefore be twofold—general and technical. A considerable proportion of the course of study must be devoted to general and literary work, since a graduate is expected now to arrange his ideas in clear order, and to write or speak effectively, whenever it becomes necessary. Professional success frequently depends upon this power far more than is commonly supposed.

Moreover there is an ever-increasing fund of general and scientific knowledge with which any educated man is expected to be conversant, if he desires to retain the esteem of his associates and clients. Much of the most valuable material is yet locked up in foreign languages, and their keys must be acquired by patient study and practice. Scarcely a single science is not at some time useful to the professional man, and some of them, like mathematics or physics, are so intimately interwoven with the different branches of technical knowledge, as to be practically indispensable, and so require a more thorough mastery than is necessary to the literary man. It might appear that this general training would alone be sufficient to absorb the entire attention of the student during his whole course, but not less than one-half his time must be given to purely technical training, and the acquiring of a professional capital, or stock of information and knowledge of details, which is almost limitless in its demands and possibilities.

The methods employed for embodying new ideas in drawings, intelligible to other professional men and to mechanics, must likewise⁷be acquired.

A knowledge of the latest results of scientific experiments is likewise essential, requiring wide reading by some one, either student or professor. Engineering knowledge must be fresh to be valuable, since ideas and methods are quickly supplanted by improved ones, and become useless except as mile-stones of progress. Consequently the most valuable part of this professional knowledge can never be crystalized in text-books, but must be drawn from the mental stores of the teacher.

GENERAL METHODS OF INSTRUCTION.

Whenever suitable text-books can be found they are employed, because saving much time in acquiring facts and data, and because such books become doubly valuable for later reference when enriched by notes and additions. But to arouse and awaken the enthusiasm of the student, occasional or stated lectures are necessary, and these are fully illustrated by sketches, diagrams, drawings, and photographs of executed work. They are frequently used in the advanced classes, partly because the deficiency of text-books is there most apparent. Additional courses of extended reading are marked out by references to the University library, so that each student may enjoy the greatest possible benefit from the course of instruction. In all courses of study offered by the College, drawing in its manifold forms and uses is made of especial importance both in its use and and its modes of execution.

LABORATORY OF APPLIED MECHANICS.

The laboratory has an Olsen testing machine of 200,000 and a Riehle testing machine of 100,000 pounds capacity, a smaller apparatus for testing beams, Riehle and Olsen cement testing machines, a Riehle wire testing machine, extensometers and deflectometers, a stone grinding machine, a rattler for abrasion tests of stone and brick, with other apparatus for making all necessary measurements and observations, molds, standard sieves for cement, etc. The laboratory is fitted up as a working laboratory where students may acquire such practice in experimental work as engineers are called upon to perform, as well for the purpose of illustrating principles as for use in original investigation. The ordinary work includes testing metals, wooden beams, cement briquettes, and stone and brick.

The hydraulic laboratory includes elevated tank and stand-pipe, steam pumps for giving high pressure, tanks for measuring flow of water, pressure gauges, meters, water motor, turbine, and other apparatus for experiments with orifices, weirs, etc. The experiments are made in connection with the regular class instruction.

COMPUTING APPARATUS.

A collection of machines and apparatus for abbreviating computations and especially for use in the calculation of tables, includes the following instruments:

A Thomas's 10-place arithmometer, giving products of numbers to 20 places. This is the largest size manufactured and was imported especially for the University. It is probably as convenient and accurate as any computing machine yet invented. It performs addition, subtraction multiplication, and division, and is particularly useful in calculating or verifying numerical tables. Two Thacher's computing scales, for performing multiplication, division, squaring, and extraction of square root. This instrument is sufficiently accurate for almost all purposes, and can be used more rapidly than the former. An Amsler's polar planimeter for measuring the area of figures of any form, and principally employed in graphic statics, or by mechanical engineers for measuring indicator diagrams.

A Coradi's rolling planimeter of largest size, and a Coradi's polar planimeter, for the same purposes, but much more accurate in use. An Amsler's integrator for obtaining area, static moment and moment of inertia of plane figures, especially of sections of columns, beams, etc. A Coradi's pantagraph of best construction for reduction of drawings and maps. Boucher's calculator, Ram's slide rules, duplex slide rule, Webb's adders, etc.

DESCRIPTION OF DEPARTMENTS.

PHYSICS.

The courses in Physics are designed to furnish a thorough scientific training for those students who intend to devote their lives to the profession of engineering, scientific research, or teaching.

INSTRUCTION.

The instruction is given by means of lectures and by practice in the laboratory. The work in the laboratory consists almost entirely of quantitative measurements made under the personal supervision of the instructors, with instruments of precision. An effort is made to have each student determine for himself the relations existing between the facts which he has observed, in order to stimulate him to the formation of habits of sound thinking. The instruction in the advanced courses is mainly by lectures and by seminary work. Ample opportunity for advanced laboratory work will be given those who desire it.

EQUIPMENT.

The department of physics has for its quarters a large lecture room provided with conveniences for lecture illustrations, such as projecting lantern, switch board, resistances, motors, etc.; also a laboratory for experimental work, a photometry room, and a photographic dark room. This department will have quarters next year in Engineering Hall.

The equipment consists of a line of apparatus selected from the best makers with special reference to lecture illustrations and quantitative
laboratory work. Large additions have lately been made to the apparatus in this department. The equipment of the electrical laboratory adds greatly to the facilities for the treatment of electricity in general physics.

MECHANICAL ENGINEERING.

It is the object of this course to give the student a thorough training in the theoretical principles underlying the science of machines and mechanics, and at the same time to enable him to become practically familiar with some of the numerous applications of these principles which have become of such inestimable value to the human race.

INSTRUCTION.

The methods of instruction vary with the subjects under consideration Text-books, lectures, examples, drawing room work, technical readings, models, reports, laboratory and shop practice—all have important places.

It is the aim to keep the student interested in his work, with the belief that it is only under such a condition that he will receive the maximum benefit from his work.

A practical course in drawing and designing extends through the entire course.

Shop or laboratory practice is also a part of each term's work.

EQUIPMENT.

In addition to recitation and drawing room facilities, which will be unexcelled upon the completion of the new Engineering Hall, the department has a Mechanical Engineering Laboratory, described under the head "Laboratories," as well as a machine shop, wood shop, forge shop, and foundry, whose equipment is described below.

Machine Shop.—Twelve engine lathes of from twelve to twenty inches swing; two ten-inch speed lathes; one centering lathe; one fifteeninch Gould and Eberhardt shaper; one twelve-inch Hendy shaper; one Brainard universal milling machine; one milling machine, made in the shop; one twenty-four by twenty-inch by five foot Putnam planer; one thirty by thirty-inch by eight foot Gray planer; two drill presses; one sensitive drill press; one three-spindle drill press; one No. 2 improved Brown and Sharpe universal grinding machine; one center grinding machine; one Stover power hack saw; complete sets of U.S. standard taps and dies; drills, arbors, reamers, gear and milling cutters, caliper gauges, calipers, scales, and other small tools.

Wood Shop.—Eight ten-inch wood lathes; one eighteen-inch pattern maker's lathe; one No. 4 E. Fox trimmer; complete equipment of small tools.

Twenty new work benches now under construction will be ready for use by the opening of the fall term, 1894. These benches will be complete with tail screws and Wyman & Gordon patent vises.

Foundry.—The foundry is equipped with a small cupola, the necessary sand, ladles, and flasks for making castings.

Forge Shop.—The forge shop contains sixteen forges fitted with power blast, exhaust fan, and the necessary small tools.

Power is furnished to the shops by an 8x10 Ball engine running at 275 R. P. M. Six boilers used for heating purposes, as well as engines and pumps used by other departments, furnish the students of this department additional opportunities for observation and testing.

COURSE IN MECHANICAL ENGINEERING.

FIRST YEAR.

- 1. Advanced Algebra; Elements of Draughting; French, German or English; Shop Practice A; Military.
- 2 Trigonometry; Descriptive Geometry and Lettering; French, German or English; Shop Practice A; Military.
- 3. Analytical Geometry; Advanced Descriptive Geometry; French, German or English; Shop Practice A; Military.

SECOND YEAR.

- Differential Calculus; Elements of Machine Design; Shop Practice B; Physics 1 and 3; Rhetoric and Themes (English 8); Military.
- Advanced Analytical Geometry; Elements of Machine Design; Shop Practice B; Physics 1 and 3; Rhetoric and Themes (English 8); Military.
- Integral Calculus; Elements of Machine Design; Shop Practice B; Physics 1 and 3; Rhetoric and Themes (English 8); Military.

THIRD YEAR.

- 1. Analytical Mechanics; Mechanism; Shop Practice C; Chemistry.
- 2. Resistance of Materials; Steam Engines and Boilers; Shop Practice C; Chemistry.
- Hydraulics; Dynamo Electric Machines; Surveying; Mechanical Laboratory.

FOURTH YEAR.

- Thermo-Dynamics; Steam Engine Design; Mechanical Laboratory; Thesis.
- Mechanics of Machinery; Advanced Machine Design; Mechanical Laboratory; Thesis.
- 3. Mechanics of Machinery; Original Designs; Estimates; Thesis.

ELECTRICAL ENGINEERING.

This course is intended to give to young men the best possible preparation for work in the practical applications of electricity. The instruction is given by lecture, laboratory practice, designing, and draughting. The student is encouraged to add to his general intellectual culture by systematic reading of the best periodical literature in theoretical and applied electricity. By keeping himself informed about the best efforts of others in every department of his profession, it is hoped that he may be stimulated to independent thought and original investigation in his own field. To this end, a department reading room, at all times accessible to students in this course, has been recently established, where the leading American, English, French and German journals of general physics and applied electricity are kept on file. The instructors and students meet weekly to discuss the leading articles in current numbers of these journals. A critical discussion of one or more papers is required of each senior twice a month.

This department has quarters, at present, in the basement of University Hall. Next year all the work of the department, excepting that of the dynamo laboratory, will be carried on in the new Engineering Hall. The rooms devoted to laboratory practice are the electrical measurement laboratory, the dynamo laboratory, the battery room, the photometry room, and the work shop.

The electrical measurements laboratory has masonry piers for the more sensitive instruments, and numerous conveniences indispensable to rapid and accurate measurements. In this laboratory the work relating to the measurement of current, resistance, electromotive force, the standardizing of measuring apparatus, etc., is carried on. This laboratory has been supplied with apparatus from the leading makers at home and abroad. There are several forms of bridges, resistance boxes, testing sets, non-inductive and continuously variable rheostats, and certified standards of resistance; the leading forms of galvanometers and reading devices; single and subdivided condensers, standard cells and electrostatic voltmeters; hot wire instruments; electrodynamometers; current balances; watt-meters; ammeters and voltmeters for direct and alternating currents. Current is brought to this laboratory from the battery room and from the dynamo laboratory.

The dynamo laboratory is supplied with power from a sixty-horsepower steam engine, which is used exclusively for the experimental work of this department. In this laboratory are to be found the leading types of direct and alternating current dynamos and motors, with conveniences for making complete tests. The equipment includes a complete Thomson-Houston 300-light alternating current lighting plant, a complete Thomson-Houston 3-light arc lighting plant, a complete Brush 10-light arc lighting plant, a complete Edison 100-light incandescent plant, a small 500 volt direct current power plant, and a small single phase alternating current power plant.

The photometry room is fitted out with a complete electric light photometer, numerous types of direct and alternating current incandescent and arc lamps, and conveniences necessary for making complete tests.

The battery room contains a large collection of primary cells, and several large batteries of the more important kinds of accumulators with arrangements for efficiency tests.

The work shop is supplied with an engine, a speed lathe, grinder, etc., and a line of fine tools suited to the manufacture of special apparatus. An electric motor furnishes power for this room. Large additions to the equipment of this department are now making.

COURSE IN ELECTRICAL ENGINEERING.

FIRST YEAR.

- Advanced Algebra; Elements of Draughting; French, German, or English; Shop Practice A; Military.
- 2. Trigonometry; Descriptive Geometry and Lettering; French, German, or English; Shop Practice A; Military.
- 3. Analytical Geometry; Advanced Descriptive Geometry; Free Hand Drawing; Shop Practice A; Military.

SECOND YEAR.

- Differential Calculus; Elements of Machine Design; Shop Practice B; Physics r and 3; Rhetoric and Themes (English 8); Military.
- Advanced Analytical Geometry; Elements of Machine Design; Shop Practice B; Physics 1 and 3; Rhetoric and Themes (English 8); Military.
- Integral Calculus; Elements of Machine Design; Shop Practice B; Physics 1 and 3; Rhetoric and Themes (English 8); Military.

THIRD YEAR.

- Analytical Mechanics; Mechanism; Chemistry; Electrical Measurements.
- 2. Resistance of Materials; Engines and Boilers; Chemistry; Electrical Measurements.
- 3. Hydraulics; Chemistry or Surveying; Engineering Laboratory; Electro-Magnetism; Dynamo Electric Machinery.

FOURTH YEAR.

- 1. Thermodynamics; Steam Engine Design and Valve Gears; Dynamo-Electric Machinery; Thesis; Seminary.
- Alternating Currents and Alternating Current Machinery; Photometry; Telephony; Telegraphy and Electric Signaling; Electro-Metallurgy; Thesis; Seminary.
- Alternating Currents and Alternating Current Machinery; Lighting Plants; Electrical Transmission of Power; Thesis; Seminary.

CIVIL ENGINEERING.

The design is to furnish a course of theoretical instruction, accompanied and illustrated by a large amount of practice, which will enable the student to enter intelligently upon the various and important duties of the civil engineer.

INSTRUCTION.

While the instruction aims to be practical by giving the student information and practice directly applicable in his future professional work, the prime object is the development of the mental faculties. The power to acquire information and the ability to use it, is held to be of far greater value than any amount of so called practical acquirements. The method of instruction consists in coupling the development of intellectual power with the acquisition of information directly useful to the civil engineer in his profession.

The instruction is given by lectures, text books, and reading, to which are added numerous problems and practical exercises, as will serve best to explain principles completely and fix them in the mind. Models and instruments are continually used, both in lectures and by the students.

COURSE OF STUDY.

The complete course occupies four years. The several subjects included therein are shown in the list below. Each study requires five recitations per week, and should receive daily from three to four hours of the student's time. Some of the class exercises occupy one hour daily, while others require two hours; as a rule the latter require less time for preparation. The order of studies as given by the year and term in the tabular view of the course, should be closely followed to avoid interference in hours of recitation, and because the studies are there given in the order which best meets the preparation of the student.

COURSE IN CIVIL ENGINEERING.

FIRST YEAR.

- 1. Advanced Algebra; Elements of Draughting; Shop Practice A; French, German, or English; Military.
- 2. Trigonometry; Descriptive Geometry and Lettering; Shop Practice A; French, German, or English; Military.
- 3. Analytical Geometry; Advanced Descriptive Geometry; Shop Practice A; French, German, or English; Military.

SECOND YEAR.

- I. Differential Calculus; Land Surveying; Physics I and 3; Rhetoric and Themes (English 8); Military.
- Advanced Analytical Geometry; Topographical Drawing and Transit Surveying and Leveling; Physics 1 and 3; Rhetoric and Themes (English 8); Military.
- 3. Integral Calculus; Topographical Surveying; Physics 1 and 3; Rhetoric and Themes (English 8); Military.

THIRD YEAR.

- 1. Analytical Mechanics; Railroad Engineering; Chemistry.
- 2. Resistance of Materials; Railroad and Road Engineering; Engineering Materials.
- 3. Hydraulics; Astronomy; Roofs.

FOURTH YEAR.

- I. Masonry Construction; Geodesy and Practical Astronomy; Water Supply Engineering; Thesis.
- 2. Bridge Analysis: Sewerage; Structural Details; Thesis.
- 3. Bridge Designing; Tunneling; Geology; Thesis.

MUNICIPAL AND SANITARY ENGINEERING.

This course is a modification of the civil engineering course, and is designed for students intending to make a specialty of city engineering work. It includes the study of chemistry and bacteriology, necessary to a comprehension of the questions involved in water supply and sewage disposal.

COURSE IN MUNICIPAL AND SANITARY ENGINEERING.

FIRST YEAR.

- Advanced Algebra; Elements of Draughting; Shop Practice A; French, German, or English; Military.
- 2. Trigonometry; Descriptive Geometry and Lettering; Shop Practice A; French, German, or English; Military.
- 3. Analytical Geometry; Advanced Descriptive Geometry; Shop Practice A; French, German, or English; Military.

SECOND YEAR.

- 1. Differential Calculus; Land Surveying; Physics 1 and 3; Rhetoric and Themes (English 8); Military.
- Advanced Analytical Geometry; Topographical Drawing, and Transit Surveying and Leveling; Physics 1 and 3; Rhetoric and Themes (English 8); Military.
- 3. Integral Calculus; Topographical Surveying; Physics 1 and 3; Rhetoric and Themes (English 8); Military.

THIRD YEAR.

- 1. Railroad Engineering; Analytical Mechanics; Chemistry.
- 2. Railroad and Road Engineering; Resistance of Materials; Botany.
- 3. Roofs; Hydraulics; Electrical Measurements.

FOURTH YEAR.

- I. Water Supply Engineering; Masonry Construction; Bacteriology; Thesis.
- 2. Sewerage; Bridge Analysis; Chemistry; Thesis.
- 3. Tunneling; Bridge Designing; Chemistry; Thesis.

ARCHITECTURE.

The object of this course of study is to prepare graduates for the profession of architecture, as architects, draughtsmen, and superintendents of construction. A thorough knowledge of scientific principles applied to construction, and of drawing in its various developments, a practical acquaintance with the methods and processes of the various building trades, as well as a considerable degree of skill in the use of tools, are all essential to the fulfillment of this purpose, and are therefore made prominent in the course of instruction.

METHODS OF INSTRUCTION.

The principal lines of technical study take up the theory and practice of construction, the history and esthetics of architecture, architectural drawing as now practiced in offices, as well as the various modes of finishing drawings, the use of the architectural orders, and the usual routine and methods of office practice, so far as this can be successfully taught in a professional school.

This instruction is imparted by the study of text books, with recitations and the solution of numerous special problems, also by lectures, as well as by the use of syllabuses instead of text books, where suitable works do not yet exist. Engravings, photographs, models and sketches are employed as illustrations.

Drawing is practiced during the entire course, and whenever possible, the student is required or encouraged to produce original designs. Opportunity is also afforded for two years' instruction in free hand drawing, modeling, water colors, designing, and sketching from nature.

Shop practice commences with the production of true plane surfaces in wood, and extends through joinery, cabinet work, turning, and veneering, to the making of models of architectural constructions to scale from drawings.

APPARATUS.

A collection of casts donated by the Spanish government, and another of casts of various architectural details from Lehr, of Berlin, belong to the departments of architecture and of design; models of ceilings, roof trusses, stairs and Schroeder's models of joints in wood work and of construction in cut stone work, in the engineering museum.

A collection of Japanese, Norwegian, and Indian work in industrial art from the Columbian Fair.

The department of architecture also possesses a large and rapidly increasing collection of engravings and photographs illustrating the history of architecture and art, and their practical applications in allages. The collection is mounted on about 12,000 cards, 11x14 inches, and is classified in two parts, one for the use of the class in history of architecture, the other for use by the various classes in designing; both series are minutely subdivided to facilitate easy reference, and are always open for free use, thus forming a most valuable working library. The plates issued by the most important American architectural journals are to be found here. This collection is placed in one of the architectural drawing rooms. An electric arc lantern of best make for use in illustrating lectures, and 700 lantern slides of the most important architectural monuments of all historical styles.

The casts, photographs, etc., of the art gallery. In the University Library are many of the best English, German, French, and American architectural works and periodicals.

Apparatus for experimental work in heating and ventilation.

A large and well equipped carpenter and cabinet shop containing cabinet benches and sets of fine tools for classes in shop practice; foot and power lathes; machine saws, planers, molder, tenoner, shaper, jig saw, mortiser, boring machine, etc.

An architect's level, rod, and 100-foot steel tape.

A 5x7 folding kodak of latest pattern, fitted with roll holder, plate holders, and film carriers. An 8x10 camera, with a Steinbeil aplanatic, wide angle lens, for copying architectural views and interiors.

ARCHITECTURAL COURSE.

FIRST YEAR.

- Advanced Algebra, Elements of Draughting; Shop Practice D; French, German, or English; Military.
- 2. Trigonometry; Descriptive Geometry and Lettering; Shop Practice D; French, German, or English; Military.
- AnalyticGeometry; Advanced DescriptiveGeometry; Shop Practice D; French, German, or English; Military.

SECOND YEAR.

- r. Differential Calculus; Wood Construction; Physics 1 and 3; Military; Rhetoric and Themes (English 8).
- Advanced Analytical Geometry; Stone, Brick, and Metal Construction; Physics 1 and 3; Military; Rhetoric and Themes (English 8).
- 3. Integral Calculus; Sanitary Construction; Physics 1 and 3; Military; Rhetoric and Themes (English 8).

CORRECTIONS—The courses in Abchitecture (pp. 43, 44) and in Architectural Engineering (pp. 44, 45) should read as follows:

ARCHITECTURAL COURSE.

SECOND YEAR.

- 1. Applied Mechanics; Wood Construction; Physics 1 and 3; Military; Rhetoric and Themes (English 8).
- 2. Strength of Materials: Stone, Brick, and Metal Construction; Physics 1 and 3; Military; Rhetoric and Themes (English 8).
- 3. Roofs; Sanitary Construction; Physics 1 and 3; Military; Rhetoric and Themes (English 8).

THIRD YEAR.

- 1. History of Architecture; Architectural Drawing (the Orders); Free Hand Drawing or Modeling; Architectural Seminary.
- History of Architecture; Architectural Drawing (methods of finishing); Free Hand Drawing or Water Coloring; Architectural Seminary.
- 3. History of Architecture (details); Architectural Drawing (office work; Free Hand Drawing or Sketching; Architectural Seminary.

FOURTH YEAR.

- 1. Superintendence, Estimates, and Specifications; Heating and Ventilation; Chemistry; Thesis.
- 2. Architectural Perspective; Architectural Design (residences); Requirements and Planning of Buildings; Thesis.
- 3. Esthetics of Architecture; Architectural Design (problems); Surveying; Thesis.

ARCHITECTURAL ENGINEERING COURSE.

THIRD YEAR.

- 1. Analytical Mechanics; History of Architecture; Chemistry; Architectural Seminary.
- 2. Resistance of Materials; History of Architecture; Architectural Drawing (methods of finishing); Architectural Seminary.
- 3. Roofs; Hydraulics; Architectural Drawing (office work); Architectural Seminary.

FOURTH YEAR.

- 1. Masonry Construction; Superintendence, Estimates, and Specifications; Heating and Ventilation; Thesis.
- 2. Bridge Analysis; Architectural Perspective or Advanced Graphics; Architectural Design (residences); Thesis.
- 3. Bridge Design; Surveying; Architectural Design (problems); Thesis.

THIRD YEAR.

- Analytical Mechanics; Architectural Drawing (The Orders); Chemτ. istry; Architectural Seminary.
- Resistance of Materials; History of Architecture; Architectural 2. Drawing; Architectural Seminary.
- Roofs: History of Architecture: Surveying: Architectural Seminary. 3.

FOURTH YEAR.

- Ι. Superintendence, Estimates, and Specifications; Heating and Ventilation; Free Hand Drawing, or Modeling Architectural Perspective; Architectural Design; Free Hand Draw-
- 2. ing, or Water Colors; Thesis.
- Esthetics of Architecture: Architectural Design: Free Hand Draw-3. ing, or Sketching; Thesis.

ARCHITECTURAL ENGINEERING.

The especial purpose of this course of study is to qualify graduates for the profession of architecture, and particularly as architects, structural draughtsmen, and computers, as well as superintendents of construction. It is intended for those students preferring the mathematical and structural side of architecture to its artistic side, and for those who wish to acquire a thorough knowledge of iron and steel construction as it is now executed in architectural structures.

The course of study differs from that in architecture in the following particulars: Hydraulics is required. Masonry construction, bridge analysis, and bridge designing, as taught to civil engineers, are taken instead of the year of work in free hand drawing. The orders and history of architecture (details) are omitted. A term of work in advanced graphics is also offered in lieu of architectural perspective. The remainder of the course of study is identical with that in architecture. The methods of imparting instruction are also similar, and are fully described elsewhere.

ARCHITECTURAL ENGINEERING COURSE.

FIRST YEAR.

- Advanced Algebra; Elements of Draughting; Shop Practice D; French, τ. German, or English; Military.
- Trigonometry; Descriptive Geometry and Lettering; Shop Practice D; 2. French, German, or English; Military.
- Analytical Geometry; Advanced Descriptive Geometry; Shop Prac-3. tice D; French, German, or English; Military.

SECOND YEAR.

- 1. Differential Calculus; Wood Construction; Physics 1 and 3; Military; Rhetoric and Themes (English 8).
- Advanced Analytical Geometry; Stone, Brick, and Metal Construction; Physics 1 and 3; Military; Rhetoric and Themes (English 8).
- 3. Integral Calculus; Sanitary Construction; Physics 1 and 3; Military; Rhetoric and Themes (English 8).

THIRD YEAR.

- Analytical Mechanics; Architectural Drawing; Chemistry; Architectural Seminary.
- 2. Resistance of Materials; History of Architecture, Architectural Drawing; Architectural Seminary.
- 3. Roofs; History of Architecture, Hydraulics; Architectural Seminary.

FOURTH YEAR.

- 1. Masonry Construction; Superintendence, Estimates, and Specifications; Heating and Ventilation.
- 2. Bridge Analysis; Architectural Perspective, or Advanced Graphics; Architectural Design; Thesis.
- 3. Bridge Design; Surveying; Architectural Design; Thesis.

COLLEGE OF SCIENCE.

FACULTY.

THOMAS J. BURRILL, PH.D., LL.D., ACTING REGENT, Botany.

SAMUEL W. SHATTUCK, C.E., Mathematics.

EDWARD SNYDER, A.M., German.

STEPHEN A. FORBES, PH.D., Dean, Zoölogy.

CHARLES W. ROLFE, M.S., Geology.

ARTHUR W. PALMER, Sc.D., Chemistry.

FRANK F. FREDERICK, Art and Design.

ELBRIDGE R. HILLS, CAPTAIN 5TH ARTILLERY, U. S. A., Military Science-

SAMUEL W. PARR, M.S., Analytical Chemistry.

FRANK M. MCMURRY, PH D., Pedagogics.

DANIEL W. SHEA, A.M., Physics.

DAVID KINLEY, PH.D., Political Economy and Social Science.

GEORGE W. MYERS, M.L., Mathematics.

KATHARINE MERRILL, A B, English Language and Literature.

WILLIAM O. KROHN, PH D., Psychology.

ELIZABETH C. COOLEY, A.B., German Language and Literature.

HENRY E. SUMMERS, B.S., Human Physiology and Vertebrate Anatomy.

EDGAR J TOWNSEND, PH.M., Mathematics.

ARTHUR H. DANIELS, PH.D., Philosophy.

EDITH A. SHATTUCK, Drawing.

GEORGE P. CLINTON, B.S., Botany.

THOMAS A. CLARK, B.L., English.

WILLIAM E SANDFORD, PH.C., Secretary, Pharmacy.

ALICE M. BARBER, M S., Botany.

HERMAN S PIATT, A B., French.

ALFRED H. WHITE, A.B, Chemistry.

BERNARD V. SWENSON, B S , Physics.

FRANK SMITH, A.M., Zoölogy.

CLENDON V. MILLAR, B.S., Chemistry.

CHARLES W. CARTER, B.L., German.

HARLEY E. REEVES, Military Science.

COLLEGE OF SCIENCE.

The College of Science affords an opportunity for the study of the natural, physical and mathematical sciences, and of the philosophical subjects, either as specialties or as the substance of a liberal education. The candidate for graduation may take a year each in any four of the principal subjects of this college, with a considerable amount of language, literature, and general study; he may concentrate his major work on any one of the several subjects in which major courses are offered taking, for example, four years in the chemical courses, three years in botany or zoölogy, or two years in physiology, geology, psychology, pedagogics, economics, or philosophy; or he may adopt any program of concentration of his major work intermediate between these extremes.

The subjects presented in this College are acordingly arranged in four groups—natural science, chemical, mathematical, and philosophical—each characterized by the predominant importance and development of the subjects indicated by its name. The studies of each group are again divided into required and elective subjects, and the latter are further subdivided into three lists, A, B, and C. All those of the required list are necessary to graduation in the group of studies specified; those of the elective lists A and B are open to election, restricted only by certain general requirements, varying in the different groups, regarding the amount and distribution of the work to be done on them; and those of list C are open to election unconditionally.

It is the purpose of this system of classification and requirements to permit large liberty of choice with respect both to main lines of study and to associated or secondary subjects, and at the same time so to guide the student's elections that his course of study shall always contain a central core or axis of closely articulated major work. Preference is further given to those minor subjects most important because of their relations to the major work elected.

The only undergraduate degree given in this College is that of Bachelor of Science. Forty* full term credits for University studies are required for graduation, two of which must be earned by investigation work, the results of which are to be presented in the final thesis. Credit will be given for fractions of courses of instructions only in exceptional cases, by vote of the College faculty.

^{*}Forty-one in the chemical group.

THE NATURAL SCIENCE GROUP.

The courses of the natural science group are especially intended to afford a general preparation for professional and business pursuits requiring more of an acquaintance with the methods and facts of science than with those of literature. More specifically they are designed:

(1.) To afford a thorough liberal education with a basis in science and the modern languages.

(z.) To prepare for the pursuit of specialties in zoölogy, entomology, physiology, botany, or geology, as a scientific career.

(3.) To lay a liberal foundation in biological work and study for a course in medicine.

(4.) To prepare for the teaching of the natural and physical sciences either in the higher schools or as a professional specialty.

The recent establishment, by the University, of a biological station for a continuous investigation of the aquatic life of the Illinois River and adjacent waters, affords an extraordinary opportunity for advanced students in the zoölogical and botanical courses. Provision will be made for postgraduate investigation at this station by students working for advanced degrees.

CLASSIFICATION OF SUBJECTS.

REQUIRED.

German (1, 2), 5 credits.	Rhetoric and Themes (English 8),
Mathematics (1, 3), 2 credits.	2 credits.
Art and Design (4), 2 credits.	Chemistry (1, 3a, 3b, or 4), 3 credits.
	Military Science (1, 2), 2 credits.

ELECTIVES.

List B* (Minor Courses).

Botany (1 to 5), 3, 4, 6, or 9 credits.	Botany (6), 1 credit.
Zoölogy (1, +2, +3), +2, +3, 6, 8, or	Zoölogy (8), 1 crèdit.
9 credits,	Physiology (4), 1 credit.
General Biology, 1 credit.	Geology (4), 1 credit.
Mineralogy (1, 2), 1 or 3 credits.	Physics (2), 1 credit.
Geology (1, 2), 3 or 5 credits.	

Physics (1, 3), 3 credits.

Physiology (1, 2, 3), 2, 5 or 7 credits.

List A* (Major Courses).

^{*}No number of credits in any subject will be accepted as major work, other than the numbers specified against that subject in list A. Credit will not be given for both major and minor work in the same subject.

[†]Credited as major work only when followed by zoölogy 4.

[‡]Credited as major work only when followed by physiology 1.

List C (Miscellaneous).

French (1, 2, 4), 3 or 6 credits.	Descriptive Astronomy (4), 1 credit.
English (1), 3 credits.	Meteorology (1), 1/2 credit.
German (6), 1 credit.	Mathematics (5 or 6), 1 credit.
Greek (9), ½ credit.	Psychology (1 to 8), 1 to 9 credits.
History (1), 3 credits.	Pedagogy (1 to 8), 2 to 10 credits.
Anthropology (2), 1/2 credit.	Economics (1 to 8), 1 to 8 credits.
Chemistry (5, 7, 9), 3 credits.	Philosophy (1 to 8), 1 to 7 credits.
Materia Medica, 3 credits.	

The major and minor courses in the lists A and B in this group are respectively the maximum offerings and the minimum requirements in the various subjects of these lists.

REQUIREMENTS FOR GRADUATION.

No student may graduate in natural science until he has completed all the required courses of the first list, has done at least nine terms' work on one major subject, or twelve terms work on more than one major, from lists A and B of electives, has taken at least minor courses in all the other subjects of these lists in which such courses are offered, and has prepared and handed in a thesis acceptable to the faculty of the College and of the University. The necessary number of forty full term credits for University studies may be made up by additional elections from the three lists of electives.

COURSES OF INSTRUCTION BY YEARS AND TERMS.

The courses mentioned in the following list may be taken in the indicated term only. Those whose names are italicized, if taken at all, must be taken also in the designated year, and all the others should be so taken if practicable.

FIRST YEAR.

- I. Mathematics I, 2; Chemistry I; Art and Design 4; French I, 4; Military I, 2.
- 2. Chemistry 3a; French 1, 4; Military 1, 2; Mathematics 3, 4; Zoölogy 1, 2, 3, 8.
- 3. Mathematics 5, 6; Astronomy 4; Botany 6; Chemistry 3b, 4; Art and Design 4; French 1, 4; Military 2, 3; Zoölogy 1, 2.

SECOND YEAR.

- 1. Botany 1; Chemistry 5a; German 1, 4; Military 2, 3; Mineralogy 1; Physics 1, 3; Physiology 4; Zoölogy 1, 3.
- Botany 1; Chemistry 5b, 7, 9; Geology 1a; German 1, 4; Military 2, 3; Mineralogy 2; Physics 1, 3, 2; Physiology 1; Zoölogy 4.
- Botany I (Vegetable Physiology) 6; Chemistry 5c, 7, 9; Geology 1b; German I, 4; Military 2, 3; Mineralogy 2; Physics I, 3; Physiology 1; Zoölogy 4.

THIRD YEAR.

- Botany 2 (Bacteriology); Economics 1; Geology 1c; German 2; History, 1; Meteorology 1; Mineralogy 1; Pedagogy 1, 2, 3; Philosophy 1, 2, 8; Physiology 2; Psychology 4; Rhetoric and Themes (English 8); Zoölogy 6.
- Botany 3 (Systematic); Economics 2; Geology 1a, 4; German; History 1, 4; Pedagogy 1, 2, 3; Philosophy 3, 4; Physiology 2; Psychology 2; Rhetoric and Themes (English 8); Zoölogy 5; (Embryology) 6; Mineralogy 2.
- Botany 4; Economics 7; General Biology; Geology 1b, 3; German; History 1; Mineralogy 2; Pedagogy 2, 3; Philosophy 3, 5; Physiology 2; Psychology 2; Rhetoric and Themes (English 8); Zoölogy 3 (Embryology) 6.

FOURTH YEAR.

- Anthropology 2; Economics 1, 3, 5; Geology 1c; History 2; Pedagogy 1, 2, 3, 7, 8; Philosophy 1, 2, 7, 8; Psychology 1, 4, 7.
- 2. Botany 5 (Thesis); History 3; Economics 2, 3, 5; Geology 2 (Thesis); Pedagogy 1, 2, 3, 7, 8; Philosophy 3, 6, 7, 8; Physiology 3 (Thesis); Psychology 2, 3, 6, 7; Zoölogy 7 (Thesis).
- Botany 5 (Thesis); Economics 4, 6, 7; General Biology; Geology 2 (Thesis); History 4; Pedagogy 2, 3, 4, 8; Philosophy 3, 5, 6, 7; Physiology 3 (Thesis); Psychology 2, 7; Zoölogy 7 (Thesis).

SUGGESTIONS CONCERNING COURSES OF STUDY.

On account of the numerous and extensive changes made in the contents and arrangement of the natural science group of studies since the publication of the last catalogue, the following suggestions concerning courses of study are made as an aid to an intelligent election:

Students desiring major courses in the biological subjects and the related sciences, as a preparation for medical study, may take with advantage, in addition to the subjects required, zoölogy 3; botany 6; the physics, physiology, and German of the second year; mineralogy, embryology, bacteriology, and geology 4 in the third year; and anthropology and ethnology, ethics, general biology, and thesis work in the fourth year.

Those wishing to concentrate their major work in zoölogy only, may take courses 1 and 4 to 7 in zoölogy, beginning with the second term of the freshman year, and minor courses in physiology, physics, and botany in the second year, meteorology or mineralogy 1 and geology 4 in the third year, and anthropology, general biology, and thesis investigation during the senior year.

For a zoölogical course with principal reference to entomology, zoölogy 2 may be taken instead of 1, and course 5 omitted from the above list.

The student desiring to specialize in physiology should take zoölogy 3 and follow it with all the physiology offered, except course 4. His work may be otherwise like that suggested above for the zcölogical specialist, with the omission of minor physiology.

A special course in botany may be made up on similar lines to those of the special zoölogical course by taking, instead of major zoölogy, the botanical courses 1 to 4 in the second and third years, preceded by zoölogy 8 in the freshman year, and followed by botany 5 (thesis work).

Students who desire to make the most of the offerings in geology are advised to begin their mineralogy in the fall term of the sophomore year; to take geology in the winter term and spring terms of that year, and the fall term of the junior year; and to finish their mineralogy during the winter and spring terms of the junior year, and thesis work in the senior year.

DESCRIPTIONS OF DEPARTMENTS.

BOTANY.

Six courses of instruction are offered in this subject—five primarily intended to meet the wants of students making botanical work more or less a specialty, and the sixth occupying a single term, complete in itself, for students whose chief attention is given to other branches. Three to eight terms' work constitutes a major course; that of the single term, course 6, a minor course. To a very large extent natural objects are studied rather than books, but constant endeavor is made to introduce students to pertinent existing literature. In the laboratory much use is made of the compound microscope, and special attention is given to its manipulation for best results, and to the preparation of objects.

GEOLOGY AND MINERALOGY.

In this department four courses are offered in geology and two in mineralogy. For those students who wish more than a general acquaintance with these subjects a major course covering thirty-six weeks (360 hours) of class room and laboratory instruction has been arranged in each, and a supplementary course of twenty-two weeks (220 hours) is offered to those who select a geological subject for a thesis.

Engineers who wish an acquaintance with those portions only of geology which bear most strictly on their future work are offered a minor course of eleven weeks (110 hours.)

A minor course of eleven weeks (110 hours) is offered to those desiring merely an outline of the most prominent facts and theories of geology with some idea of the methods by which the geologist arrives at his conclusions. In mineralogy one term's work may be taken for a similar purpose.

Zoölogy.

Zoölogy is taught in eight courses: Three terms of major work, variously combined to form three courses, primarily for students in the school of natural science; a term of embryology for those who have taken one of the preceding courses; two terms in entomology to follow upon two terms of the major work above mentioned; a year's work in comparative anatomy, zoölogical œcology, or systematic zoölogy (including palæontology), for advanced students only; a year's work in independent investigation (senior) for those who select a zoölogical subject for the graduating thesis: and a general course of a single term, offered as a minor in the school of natural science and as an elective to the students of the University at large. The leading objects of these courses in zoölogy are thus seen to be manifold-partly general and partly special. Only the first term's work is necessarily common to all students in the college who desire to make zoölogical study a prominent feature of their course. At the end of this term three divergent lines of work are open, one leading mainly towards entomology, a second towards physiology and medical study, and a third towards advanced zoölogyanatomical, systematic, or œcological.

The department is amply supplied with excellent laboratories, thoroughly furnished and equipped, and with the apparatus of instruction and investigation.

PHYSIOLOGY.

The main special objects of the courses in human physiology are as follows: (1) to give to prospective students of medicine a detailed practical

knowledge of the normal histological structure and vital processes of the body and a working familiarity with the instruments of precision of use in the investigation of disease. (2) To give to students of all branches of biology a training in deducting logically necessary conclusions from data obtained by their own observations. (3) To furnish such a knowledge of physiology as will serve as a basis for future studies in hygiene.

The laboratory method of instruction is chiefly followed, supplemented, when desirable, by lectures, demonstrations, references to standard literature, and recitations. The laboratory work predominates in the major and advanced courses; the lectures, demonstrations, and recitations in the minor course. In the more advanced courses each subject is treated, so far as time will permit, as if it were an original investigation. The student is guided to the best methods to be pursued, but the results are left for him to discover. At frequent intervals the results obtained are reviewed by the instructor, and, when necessary, completed, unified, and correlated with the facts learned from previous investigations, care being taken to show the student wherein and why he failed to obtain a full knowledge of the subject.

THE CHEMICAL GROUP.

The instruction in the subjects of the chemical group has a twofold object. On the one hand it is directed by the purpose of imparting such a knowledge of chemistry and the allied branches as shall best enable the student to apply the principles of the science to the practical work of the analytical and technical chemist, or to that of the pharmacist and druggist. On the other hand, opportunities are provided for such students as desire to direct their energies to the purely scientific side of the subject with the view to preparing themselves to become teachers of chemistry or investigators in the various branches of pure chemistry. Certain specified courses are required of all candidates for graduation in chemistry, but by means of the options in chemical subjects the scope of the work is made sufficiently broad to enable the student to specialize in the various lines open to the chemist or the pharmacist. The fourth year is mainly devoted to the investigation of some chemical problem, the subject being chosen and the research prosecuted under the direction and with the advice of the professor in charge. and with particular reference to the student's aims.

Students not members of the College of Science, who desire to pursue studies in the chemistry of agriculture or in metallurgy, may have ample opportunity for such work on consultation with the professors in charge.

CLASSIFICATION OF SUBJECTS.

REQUIRED.

Chemistry 1 (G	eneral introductory),	Chemistry of) (Organic chemistry) 2
r credit.		credits.	

Chemistry 2 (Descriptive inorganic), Mathematics (1, 3), 2 credits. 1 credit. Physics (1, 3), 3 credits.

Chemistry 3a, 3b, (Qualitative an- German (1, 2, 4), 5 credits. alysis), 2 credits. Military (1, 2), 2 credits.

Chemistry 4 (Elements of organic English (8), 2 credits. chemistry), 1 credit.

Chemistry 5a, 5b, (Quantitative analysis), 2 credits.

ELECTIVES.

List A. (Chemical.) Theoretical Chemistry (12), 1 credit. Botany (6 or 1), 1 or 3 credits. Advanced General Chemistry (7), 1,

2 or 3 credits.	Mineralogy (1, 2), 1 or 3 credits.
Chemical Technology (6), 1 credit.	Physiology (4 or 1), 1 or 2 credits.
Toxicology (12), 1 credit.	Zoölogy (8 or 1), 1 or 3 credits.
Iron and Steel (8), 1 credit.	Geology (4 or 1), 1 or 3 credits.
Agricultural (13), 2 credits.	Mathematics (5, 6, 7), 4 credits.
Sanitary and Hygienic (10), 1 credit.	English (7), 3 credits.
Proximate Organic (15), 1 credit.	
Investigations and Thesis (11), 2	

credits.

Metallurgy and Assaying (14), 1 credit.

List C.

French (1, 2, 5), 3 or 6 credits.	Meteorology (1), $\frac{1}{2}$ credit.
German (6), 1 credit.	Anthropology (1, 2), 1 credit.
History (1 or 4), 1 to 3 credits.	Astronomy (4), 1 credit.
Chemistry (advanced work), 1 to 3	Botany (2), 1 credit.
credits.	Materia Medica, 2 credits.
Psychology (1 to 8), 1 to 9 credits.	Art and Design (5), 1 credit.
Philosophy (1 to 8), 1 to 8 credits.	Electrical Engineering (1), 1 credit.
Economics (1 to 8), 1 to 7 credits.	Military (3).
Pedagogy (1 to 8), 3 credits.	

REQUIREMENTS FOR GRADUATION.

In order to graduate from the course in chemistry, the candidate must have completed all of the required courses (23 credits), and must have at least six credits additional for subjects to be chosen from the chemical list A, of electives. For the twelve remaining credits he must choose six subjects from list B and six from lists B and C. He must have received, in all, forty-one full term credits, and presented an acceptable thesis.

COURSES OF INSTRUCTION BY YEARS AND TERMS.

The courses mentioned in the following list may be taken only in the term indicated; those whose names are italicized, if taken at all, must be taken in the designated year; and all the others should be so taken if practicable.

FIRST YEAR.

- I. General Chemistry (I); German 4; Mathematics I; Military I, 2.
- 2. Descriptive Inorganic Chemistry (2); Qualitative Analysis (32); German 4; Mathematics 3; Military 1, 2.
- 3. Descriptive Inorganic Chemistry (2); Qualitative Analysis (3b); Elements of Organic Chemistry (4); German 1, 4; Conic Sections; Military 1, 2.

SECOND YEAR.

- 1. Quantitative Analysis (5a); Mineralogy I; German 2; Physics I and 3; Mathematics 7.
- Quantitative Analysis (5b); Advanced General Chemistry (7); Agricultural Chemistry (13); Chemical Technology (6); Geology 1; German 6; Physics 1 and 3; Mathematics 8.
- Quantitative Analysis (5c): Advanced General Chemistry (7); Agricultural Chemistry (13); Chemical Technology (6); Geology 1; German 6; Physics 1 and 3; Mathematics 9.

THIRD YEAR.

- Advanced General Chemistry (7); Metallurgy and Assaying (14); Iron and Steel Analysis (8); Botany 1; Geology 1; Mineralogy 1; Pedagogy 1; Philosophy 1, 2; *Rhetoric and Themes* (English 8); Materia Medica 1; Psychology 1; History 1; French 1, 5; Pharmacy 1, 3.
- Advanced General Chemistry (7); Organic Chemistry (9); Theoretical Chemistry (12); Botany 1; Physiology 1; Zoölogy 1, 8; Mineralogy 2; Pedagogy; Philosophy 3, 6, 8; Rhetoric and Themes (English 8); Materia Medica 1; Psychology 2, 3; History 1; French 1, 5; Pharmacy 2.

 Advanced General Chemistry (7); Organic Chemistry (9); Theoretical Chemistry (12); Botany I, 6. Physiology I; Zoölogy I; Geology 4; Mineralogy 2; Pedagogy; Philosophy 3, 7; Rhetoric and Themes (English 8); Materia Medica I; Psychology 2; History I; French I, 5; Pharmacy 2.

FOURTH YEAR.

- Sanitary Analysis (10); Advanced Quantitative Analysis (18); Advanced General Chemistry (7); Zoölogy 1; Meteorology 1; Pedagogy; English; Materia Medica; Psychology 4, 7, 8; History 1; French 2; Pharmacy 4.
- Investigation (11); Advanced Quantitative Analysis (18); Advanced General Chemistry (7); Physiology 1; Zoölogy 8; Pedagogy; Philosophy 5. English; Materia Medica; Psychology 6, 7, 8; History 1, 4; French 4; Pharmacy 4.
- Investigation (11); Proximate Organic Analysis (15); Advanced General Chemistry (7); Physiology 1; Pedagogy; Philosophy 4; English; Materia Medica; Psychology 5, 7, 8; History 1; French 2; Pharmacy 3, 5.

PHARMACY.

Courses in Chemistry and Pharmacy are offered leading to the degree of Bachelor of Science.

The general requirements are the same as in the chemical course proper; more specifically there are required:

Chemistry (1, 2, 3a, 3b, 4, 5a, 9), 8 credits.	Pharmacy 3 (Pharmacognosy), 2 credits.
Mathematics (1, 3), 2 credits.	Pharmacy 4 (Pharmaceutical Tech-
German (1, 2, 4), 5 credits.	nology), 2 credits.
English (8), 2 credits.	Pharmacy 5 (Pharmaceutical Assay-
Physics, 3 credits.	ing), 1 credit.
Military, 2 credits.	Materia Medica, 2 credits.
Investigation and Thesis, 2 credits.	Botany (1), 3 credits.
Pharmacy (1), 1 credit.	

Pharmacy 2 (Pharmaceutical Prep-

arations), 2 credits.

The subjects of the four remaining credits which are required for graduation may be selected from chemical electives lists A, B, and C.

COURSES OF INSTRUCTION BY YEARS AND TERMS.

The courses mentioned in the following list must be taken in the indicated year and term:

FIRST YEAR.

- 1. General Chemistry 1; Mathematics 1; German 5; Military 1, 2.
- 2. Descriptive Inorganic Chemistry 2; Qualitative Analysis 3a; Mathematics 3; German 5; Military 1, 2.
- 3. Descriptive Inorganic Chemistry 2; Qualitative Analysis 3c; Elements of Organic Chemistry 4; German 5; Military 2.

SECOND YEAR.

- 1. Quantitative Analysis 5a; Pharmacy 1; Botany 1.
- 2. Pharmaceutical Preparations; German 6; Botany 1.
- 3. Pharmaceutical Preparations; German 6; Botany 1.

THIRD YEAR.

- 1. Physics 1 and 3; Pharmacognosy 3; Materia Medica.
- 2, Physics 1 and 3; Chemistry 9; Materia Medica.
- 3. Physics 1 and 3; Chemistry 9; Pharmaceutical Assaying.

FOURTH YEAR.

- 1. Pharmaceutical Technology; Elective; Elective.
- 2. Pharmaceutical Technology; Investigation and Thesis; Elective.
- 3. Pharmacognosy 3b; Investigation and Thesis; Elective.

SHORT COURSE IN PHARMACY.

A briefer course in pharmacy is offered, covering two years, as follows:

FIRST YEAR.

- 1. Pharmacy 1; Pharmacognosy; Botany 1; General Chemistry.
- Pharmaceutical Preparations; Pharmaceutical Botany; Descriptive Inorganic Chemistry 2; Qualitative Analysis 3a; Military 1, 2.
- Pharmaceutical Preparations; Pharmaceutical Botany; Descriptive Inorganic Chemistry 2; Qualitative Analysis 3b; Military 2.

SECOND YEAR.

- Pharmaceutical Technology; Materia Medica; Quantitative Analysis 5a; Military 2; Advanced work in Chemistry or Pharmacy.
- Pharmaceutical Technology; Materia Medica; Quantitative Analysis 5b; Advanced work in Chemistry or Pharmacy.
- 3. Prescription work and Pharmacognosy; Pharmaceutical Assaying; Organic Chemistry 9; Advanced work in Chemistry or Pharmacy.

By an earnest prosecution of the studies laid out in this course the student may thoroughly prepare himself for the examinations required by the State Board of Pharmacy for registration as pharmacists.

The work outlined above leaves no time during the college year for the drug store practice required by law for a registered pharmacist. This practice must therefore be had at other times.

THE MATHEMATICAL GROUP,

The mathematical group of studies includes the entire offering of the University courses in pure mathematics, physics, and astronomy.

The instruction in pure mathematics comprises three distinct lines of study differing in extent, in subject matter, and in the method of presentation. The first is for students in the Colleges of Agriculture, Science, and Literature, and occupies two terms, beginning in the fall. It has for its object to promote habits of mental concentration and continuity of thought, to develop the capacity to form and combine abstract conceptions and to cultivate deductive reasoning. The second is primarily offered to students in the College of Engineering and occupies two years, also beginning in the fall. In addition to the educational object just given, the purpose is to enable the student to meet the requirements of his engineering studies. The greater part of the time is necessarily taken up with the theory and its applications to geometrical magnitudes. The third is presented for students who wish to advance further in their mathematical work than the engineering student has the time for. It is hoped that this will meet the requirements of those who wish to fit themselvs for instructors, and of those who study the science for the love of it.

Parallel with the pure mathematics of the junior and senior years, two lines of associated work in applied mathematics—physical and astronomical—are offered, either of which may be, and one of which must be, taken by the student wishing to graduate in the studies of the mathematical group. One of these lines leads from the physics of the sophomore year through the mathematical theory of electricity and magnetism, heat, light, and sound; and the other through surveying and mechanics to celestial mechanics and to general and mathematical astronomy.

CLASSIFICATION OF SUBJECTS REQUIRED.

Mathematics 2 (College Algebra), 1 credit. Mathematics 4 (Trigonometry) 1 credit. Mathematics 6 (Analytical Geometry), 1 credit. Engineering Drawing (1), 1 credit. Engineering Drawing 2 and 3 (Descriptive Geometry and Lettering), 2 credits. Mathematics 7 (Differential Calculus), 1 credit. Mathematics 8 (Advanced Analytical Geometry), 1 credit. Mathematics 9 (Integral Calculus), 1 credit. Mathematics 10 (Theory of Equations), 1 credit. Mathematics 11 (Theory of Determinants), 1 credit. Mathematics 12 (Theory of Invariants), 1 credit. Mathematics 13 (Theory of Functions), 1 credit. Mathematics 14 (Method of Least Squares), 1/2 credit. Mathematics 15 (Seminary and Thesis), 11/2 credits. Mathematics 16 (Differential Equations), 2 credits. Mathematics 17 (Geometry of Space) 1 credit. Mathematics 18 (Higher Plane Curves), 1 credit. English (8), 2 credits. Military Science (1, 2), 2 credits. German (1, 2, 6), or French (1, 2), 6 credits. Physics (1), 2 credits.

ELECTIVES.

List A. (Astronomical.)List B. (Physical.)Civil Engineering (10), 1 credit.Physics (1, 3), 3 credits.Theoretical and Applied MechanicsPhysics 5 (Theory of Electricity and
(1), 1 credit.(1), 1 credit.Magnetism), 3 credits.Celestial Mechanics, 1 credit.Physics 6 (Theory of Light, Heat,
and Sound), 3 credits.Mathematical Astronomy, 1½ cred-
its.Image: Celestial Mechanicy, 1½ cred-
its.

List C.

French (1, 2), or German (1, 2, 6), 6	Geology (1, 3, 4), 1 or 3 credits.
credits.	Botany (1 or 6), 1 or 3 credits.
Latin (1, 2, 3), 3 credits.	Zoölogy (1 or 8), 1 or 3 credits.
English (1), 3 credits.	General Biology (1), 1 credit.
History (I or 4), I or 3 credits	Physiology (1 or 4), 1 or 3 credits.
Anthropology (1, 2), 1 credit.	Psychology (I to 8), I to 4 credits.
Chemistry (1, 3a, 3b, or 4), 1 or 3	Pedagogy (1 to 8), 1 to 4 credits.
credits.	Economics (1 to 8), 1 to 4 credits.
Meteorology (1), $\frac{1}{2}$ credit.	Philosophy (I to 8), I to 4 credits,
Mineralogy (1, 2), 1 or 3 credits.	

REQUIREMENTS FOR GRADUATION.

To graduate as a Bachelor of Science in the mathematical studies, it will be necessary for the student to complete the required subjects of this group, together with those of either the astronomical or the physical list |(A or B) of electives. The necessary number of forty full-term credits for University studies may be made up by elections from lists A, B, and C.

COURSES OF INSTRUCTION BY YEARS AND TERMS.

The subjects of the mathematical group will be taught at present according to the following tabular arrangement. Subjects whose names are italicized must be taken in the year indicated.

FIRST YEAR.

- 1. Engineering Drawing 1; English 1, French 1, or German 1; Mathematics 2; Military 1, 2.
- 2. Engineering Drawing 2, 3; English 1, French 1, or German 1; Mathematics 4; Military 1, 2.
- 3. Engineering Drawing 2; English 1, French 1, or German 1; Mathematics 6; Military 2.

SECOND YEAR.

- 1. French 2, German 2; Mathematics 7; Military 2, 3; Physics 1, 3.
- 2. French 2, German 2; Mathematics 8; Military 2, 3; Physics 1, 3.
- 3. French 2, German 2; Mathematics 9; Military 2, 3; Physics 1, 3; (ivil Engineering 10.

THIRD YEAR.

- Botany I; Chemistry I; Economics I; English 8; History 1; Latin
 I; Mathematics IO; Theoretical and Applied Mechanics I; Meteorology; Mineralogy I; Pedagogy I, 2, 3; Philosophy
 I, 2; Physics 5; Physiology 4; Psychology I, 4.
- Astronomy 1; Botany 1; Chemistry 3a; Économics 2; English 8; Geology 1a; History 1, 4; Latin 2; Mathematics 11; Mineralcgy 2; Pedagogy 1, 2, 3; Philosophy 3, 6, 8; Physics 5; Physiology 1; Psychology 2, 3; Zoölogy 1, 2, 3, 6.
- Botany I; Chemistry 3b, 4; Economics 7; English 8; Astronomy 2; Geology 1b; History 1; Latin 3; Mathematics 12; Mineralogy 2; Pedagogy 2, 3; Philosophy 3, 7; Physics 5; Physiology 1; Psychology 2, 5; Zoölogy 1, 2.

FOURTH YEAR.

 Anthropology I, 2; Astronomy 3; Botany I, 2; Chemistry I; Economics I, 3, 6; Geology IC; History I, 2; Mathematics 13, 14, 15; Pedagogy I, 2, 3, 7, 8; Philosophy I, 2; Physics 6; Physiology 2, 4; Psychology I, 4, 7; Zoölogy I, 3, 6.

- Astronomy 3; Botany 1, 3; Chemistry 3a; Economics 2, 3, 6; History 1, 3, 4; Mathematics 15, 16, 17; Pedagogy 1, 2, 3; 6, 7, 8; Philosophy 3, 5, 6, 8; Physics 6; Physiology 2; Psychology 2, 3, 6, 7; Zoölogy 4, 5, 6.
 Astronomy 3; Botany 1, 4; Chemistry 3b, 4; Economics 4, 5, 7;
- Astronomy 3; Botany I, 4; Chemistry 3b, 4; Economics 4, 5, 7; General Biology 1; History 1, 3; *Mathematics* 15, 16, 18; Pedagogy 2, 3, 4, 5, 8; Philosophy 3, 4, 5, 7; Physics 6; Physiology 2; Psychology 2, 5, 7; Zoölogy 4, 6.

SUGGESTIONS CONCERNING COURSES OF STUDY.

The studies of the mathematical group may best be taken according to the following outlines of courses in mathematics and physics, and in mathematics and astronomy respectively.* The electives provided for in the junior and senior years may be readily chosen by a reference to the preceding lists of electives and to the scheme or table of subjects by years and terms.

COURSE IN MATHEMATICS AND PHYSICS.

FIRST YEAR.

- 1. College Algebra; Engineering Drawing; German or French; English; Military.
- 2. Trigonometry; Descriptive Geometry and Lettering; German or French; English; Military.
- 3. Analytical Geometry; Descriptive Geometry; German or French; English; Military.

SECOND YEAR.

- 1. Differential Calculus; Physics 1, 3; German or French; Military.
- Advanced Analytical Geometry; Physics 1, 3; German or French; Military.
- 3. Integral Calculus; Physics 1, 3, or Surveying; German or French; Military.

THIRD YEAR.

- 1. Theory of Equations; Physics 5; Electives; English 8.
- 2. Theory of Determinants; Physics 5; Electives; English 8.
- 3. Theory of Invariants; Physics 5; Electives; English 8.

^{*}The two courses are identical for the freshman and sophomore years.

FOURTH YEAR.

- Theory of Functions; Method of Least Squares; Physics 6; Mathematical Seminary and Thesis: Electives.
- Differential Equations; Geometry of Space; Physics 6; Mathematical Seminary and Thesis; Electives.
- 3. Differential Equations; Higher Plane Curves; Physics 6; Mathematical Seminary and Thesis; Electives.

COURSE IN MATHEMATICS AND ASTRONOMY.

The freshman and sophomore years are the same as in the preceding course.

THIRD YEAR.

- r. Theory of Equations; Mechanics; Electives; English 8.
- 2. Theory of Determinants; Celestial Mechanics; Electives; English 8.
- 3. Theory of Invariants; General Astronomy; Electives; English 8.

FOURTH YEAR.

- 1. Theory of Functions; Method of Least Squares; Mathematical Astronomy; Mathematical Seminary and Thesis; Electives.
- Differential Equations; Geometry of Space; Mathematical Astronomy; Mathematical Seminary and Thesis; Electives.
- 3. Differential Equations; Higher Plane Curves; Mathematical Astronomy; Mathematical Seminary and Thesis; Electives.

THE PHILOSOPHICAL GROUP.

The philosophical group includes those sciences which deal both with man as an individual, in the mental and moral spheres, especially as these are connected with his physical being, and also with man in society. The branches of knowledge included in the group occupy a place among the divisions of biological science, and it is intended to carry the spirit of biology, in the commonly accepted sense, into the investigation of these subjects. The general aim and scope of the group is the study of the character and development of the individual and of society, of the relations of man to external nature, of the influence of natural selection on social development, and, finally, of the possible effect of artificial selection on that development, through both subjective and objective influences. In method of treatment, while not neglecting the literary value of the subjects, the effort is made to arouse the scientific spirit, and to keep in close touch with the other work in the college. COLLEGE OF SCIENCE.

Under this caption the subjects of psychology, pedagogy, economics and philosophy are offered in the College of Science as electives to all chemical and natural science students, and to all students who desire to specialize in the philosophical subjects, with studies in the physical and natural sciences as a preparation for them. All the studies of this group are junior and senior subjects, open, as a rule, to those students only who have done two years of University work.

CLASSIFICATION OF SUBJECTS.

REQUIRED.

The same as either the natural science or chemical group.

ELECTIVE.

List A (Major Courses).

List B (Minor Courses).

Psychology (1 to 7), 7 credits. Psychology (1), 1 credit. Pedagogy (1 to 8), 2 to 13 credits. Economics (1), 1 credit. Economics (1 to 8), 2 to 7 credits. Philosophy (1), 1 credit. Philosophy (1 to 8), 2 to 8 credits.

List C.

The same as in the natural science group, with the omission of philosophical subjects.

REQUIREMENTS FOR GRADUATION.

To graduate from the College of Science in the studies of this group, the student must either complete the subjects of the required list* in the chemical group, or must carry those of the corresponding list* in the natural science group, and earn six full credits additional for major natural science studies. He must further do twelve terms' work, or their equivalent, on subjects in the philosophical group; must take minor courses in all the philosophical subjects (except pedagogy) in which he has not completed a major course; and must prepare and present a satisfactory thesis on a subject belonging to some department of the philosophical group of studies in which he has done at least five full terms of major work.

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^{*}Two years of French may be offered in the philosophical group in place of the five terms of German required.

DESCRIPTION OF DEPARTMENTS.

ECONOMICS.

The instruction in this subject is based on the work of the first two years in science. The relation of the study to the biological sciences commonly so called is emphasized and kept steadily in view. In the general courses the aim is to study society as an organism, to trace its evolution from primitive forms to its present complex structure, to examine the nature of its environment and its adaptation thereto, its present normal character and operations, and the forces, subjective and objective, which are at work tending to change its structure. The courses on special topics are treated as detailed studies of special organs and functions, their character as such is described, and their relations to one another and to the whole social organism is studied.

The plan of instruction combines recitations, lectures, discussions and reports by students on assigned topics. The advanced courses are divided into two groups and given in alternate years.

PEDAGOGY.

The work in pedagogy includes both the theory and practice of teaching. The purpose of public schools, the relative value of studies, their relation to one another, and the methods of teaching them, are some of the theoretical subjects to be considered. The recent establishment of a Model School under the control of the department of pedagogy affords an opportunity for applying the theory advanced. Students making the sciences a specialty, may, if they wish, direct their attention chiefly to the teaching of those subjects; they may study particularly the relative worth of science as a part of the school curriculum, its relation to the other studies, the selection of suitable subject matter and the method of teaching it. Also they may give as much instruction in the Model School in the sciences as they choose, subject to the criticism of an expert teacher.

PHILOSOPHY.

The courses offered comprise the subjects of History of Philosophy, Metaphysics, Ethics, and Logic, and are open to students who have completed at least two years of University work. They are planned to meet the needs of those who make Philosophy their specialty and also of those who desire an acquaintance with the subjects as a means of general culture. It is a constant aim to emphasize the meaning and interest of Philosophy and the relations of the problems to the life of man. The subjects are taught by lectures, recitations, and the seminary method.

PSYCHOLOGY.

The aim of the work in this department is to furnish the student, largely by means of inductive study, a knowledge of the nature of mind, its modes of behavior, the forms under which it manifests itself, the laws according to which it unfolds and develops, and the influence of environment upon this development. In the various courses the laboratory method of instruction is brought into prominent use. By means of appropriate apparatus the sensations are studied experimentally and the conditions under which the various sensations arise are accurately determined. Apparatus is also employed to demonstrate to the class the reciprocal relation that obtains between body and mind and to test and measure memory, attention, association, and other higher psychical forces. All along throughout the courses an effort is made to put Psychology upon an exact basis as a natural science.

The elementary forces of mentality as exhibited in infant life are carefully studied with a view to determine some of the components of the adult mind. A comparative study of the mental life of animals, the lower as well as the higher forms, is undertaken with a view to throw some light upon the morphology of mind. The mental life of defectives as well as pathological states of mind are discussed in their relation to the normal type. The advanced laboratory work is of a nature to develop a spirit of independent research on the part of the student. The relation of Psychology to the physical biological sciences is kept conspicuously in view, so that the student may be assisted in his endeavor to bring the manifestations of mind and matter into a related whole.

COLLEGE OF LITERATURE.

FACULTY.

THOMAS J. BURRILL, PH.D., LL.D., Acting Regent, Botany.

SAMUEL W. SHATTUCK, C.E., Mathematics.

EDWARD SNYDER, A.M., Dean, German.

FRANK F. FREDERICK, Art and Design.

EDBRIDGE R. HILLS, Captain 5th Artillery, U. S. A., Military Science.

HERBERT J. BARTON, A.M., Secretary, Latin.

CHARLES M. MOSS, PH.D., Greek.

DANIEL K. DODGE, PH.D., English.

FRANK M. MCMURRY, PH.D., Pedagogics.

DAVID KINLEY, PH.D., Economics.

JAMES D. BRUNER, PH.D., Romance Languages.

GEORGE W. MYERS, M.L., Mathematics.

KATHARINE MERRILL, A.B., English.

WILLIAM O. KROHN, PH.D., Psychology.

ELIZABETH C. COOLEY, A.B., German.

EDGAR | TOWNSEND, PH.M., Mathematics.

ANITA M. KELLOGG, B.E., Elocution.

ARTHUR H. DANIELS, PH D., Philosophy.

AMBROSE P. Winston, A.B., History.

EDITH A. SHATTUCK, Drawing.

THOMAS A. CLARK, B.L., English.

HERMAN S PIATT, A.B., French.

CHARLES W. CARTER, B.L., German.

HARLEY E. REEVES, Military Science.

COLLEGE OF LITERATURE.

The outline of studies presented below gives a view of what is contemplated in the several departments represented, while the yearly offerings set forth what may and what may not be taken in those years. The restriction of certain studies to definite periods is due to the requirements of the studies themselves, to their proper sequences, or to the demands of the other colleges, in which a part of the work of students in this college is done.

The plan proposes an adjustment of studies to the needs of students who seek either a general or special training, which shall be in harmony with the wisest thought upon this important matter. It is conceded that the propensity of the student shall be consulted, but it is likewise demanded that he shall not be afforded opportunity for an ill-advised election of studies; and the end should be an educated power of selfdirection that shall be immediately available for the practical purposes of life.

The college aims to harmonize the desire of the student and the demands of a sound training, as follows: (I) By listing a minimum of required branches. (2) By offering elections at the very outset, but requiring that they shall be two in number (from list A), and be pursued consecutively for at least two years. (3) By opening a larger range of electives at this point, and yet requiring definiteness of selection (list B). (4) By making it possible from this point to specialize, to a large extent, either by following lines already begun, or by taking up some other. (5) By a development in the courses from a less to a more comprehensive treatment of subjects, and by stimulating thereby a like growth in the student's apprehension and grasp of general ideas. In the later years of his study this purpose takes the form of the so-called seminary method, wherein it is expected that the results of all previous training will be brought to bear directly upon the investigation at first hand of topics requiring research, systematic treatment, and suitable presentation.

As aids to this intention, there are various auxiliaries. The library of 26,000 volumes is well supplied with books of special and general character; the reading room has about 200 periodicals, domestic and foreign, upon its shelves; the departments are in possession of special apparatus, such as maps, charts, relief pieces, photographs, technical books, etc., in abundance, while the appliances of the other colleges are at the service of students in this, where overlapping occurs. No distinction is made between the students of the different colleges in the treatment of subjects common to both. The application of methods in the other colleges to the subjects there dealt with, may be seen under the appropriate headings.

CLASSIFICATION OF STUDIES AND REQUIREMENTS FOR GRADUATION.

Forty term credits, including military, constitute the requirement for a degree in the literary courses. Every student must take the required subjects (nine terms); he must select at least two subjects from list A, not less than six terms each (twelve terms), and three subjects from list B (three terms), and may choose from lists A, B, and C subjects which will give him sixteen additional credits.

For the degree of A B., the two subjects must be taken in Greek and Latin; for the degree of B.L., they may be selected from Economics, English, French, German, Latin, Pedagogics, Philosophy, or Psychology.

REQUIRED.

History (), 3 credits	Military (1, 2), 2 credits.
Mathematics (1, 3), 2 credits.	English (2) and Oral Rhetoric and
	Oratory (1), 2 credits.

ELECTIVE.

List A (Major courses).

Economics (1 to 8), $6\frac{1}{2}$ credits.

English (1, 3, 5), 6 to 9 credits.

French (1, 2, 3), 6 to 9 credits.

German (1, 2, 3), 6 to 9 credits.

Greek (1 to 9), 6 to 9 credits.

- History (---), 6 to 9 credits.
- Latin (1 to 9), 6 to 9 credits.
- Mathematics (2 to 18), 6 to $14\frac{1}{2}$ credits.

Pedagogy (1 to 8), 6 to 9 credits.

Philosophy (1 to 8), 6 to 8 credits.

Psychology (1 to 8), 6 to 9 credits.

List B (Minor courses).

Astronomy (4), 1 credit.

Economics (1), 1 credit.

History (---), 2 credits.

History (---), I credit.

Philosophy (6, 7, 8), 21/2 credits.

Psychology (1), 1 credit.

List C.

Anthropology (1, 2), 1 credit.	French (4), 3 credits.
Art and Design (1,6), 3 to 6 credits.	Geology (1, 4), 1 to 3 credits.
Astronomy (1, 2, 3), 3½ credits.	German (4), 3 credits.
Botany (1, 2, 3, 4, 6), 1 to 3 or	Greek (1, 2, 3), 3 credits.
6 credits.	Italian (1), 3 credits.
Chemistry(1, 3a, 4, 5a, 5b, 5c, 7,	Latin (1, 2, 3), 3 credits.
9, 10), 1 to 3 or 6 credits.	Mathematics $(2, 4 \text{ to } 18)$, 3 to $14\frac{1}{2}$
Economics (), 3 credits.	credits.
English (1, 4), $4\frac{1}{2}$ credits.	Meteorology (1), 1/2 credit.
Entomology (4), 2 credits.	Mineralogy (1), 1 credit.
Oral Rhetoric (2, 4), I credit.Physics (I, 2, 3, 5, 6), I or 9 credits.Pedagogy (I to 8), I to 3 credits.Ssychology (I to 8), I to 3 credits.Philosophy (I to 8), I to 3 credits.Ppanish (I), 3 credits.Physiology (I, 2, 4), I to 5 credits.Zoölogy (I, 2, 3, 5, 8), I to 3 or 7 credits.

COURSES OF INSTRUCTION BY YEARS AND TERMS.

The following statement gives the terms in which the subjects are taught and the year in which they should be taken. The numerals refer to the courses marked by the same numerals in the alphabetical Statement of Courses of Instruction.

FIRST YEAR.

- Art and Design 6; Botany 1; Chemistry 1; English 1, 2; French 1; German 1; Greek 1; Latin 1; Mathematics 1 or 2; Military 1, 2; Physical Culture.
- Art and Design 6; Botany 1; Chemistry 33; English 1, 2; French 1; German 1; Greek 2; Latin 2; Mathematics 3; Military 1, 2; Physical Culture ; Zoölogy 1, 8.
- Art and Design 6; Astronomy 4; Botany 1, 6; Chemistry 4; English 1, 2; French 1; German 1; Greek 3; Latin 3; Mathematics 5; Military 2; Physical Culture; Zoölogy 1.

SECOND YEAR.

- Art and Design 6; Botany 1, 2; Chemistry 1, 5a; English 2, 3; French 2; German 2; Greek 4; History --; Latin 4; Mathematics 7; Military 2, 3; Mineralogy 1; Physical Culture; Physics 1 and 3, 2; Physiology 4: Zoölogy 1, 3.
- Art and Design 6; Botany 3; Chemistry 3a, 5b, 7, 9; English 2, 3; French 2; Geology 1, 4; German 2; Greek 5; History —; Latin 5; Mathematics 8; Military 2, 3; Mineralogy 2; Physical Culture; Physics 1 and 3, 2; Physiology 1; Zoölogy 1, 4, 5, 8.
- Art and Design 6; Botany 1, 4, 6; Chemistry 5c, 7, 9; English 2, 3; French 2; Geology 1; German 2; History ---; Mathematics 9; Military 2, 3; Mineralogy 2; Physical Culture; Physics 1 and 3, 2; Physiology 1; Zoölogy 1, 4.

THIRD YEAR.

 Botany I, 2; Economics I; English 4, 5; French 3; Geology 1; German 3; Greek 7; History —; Italian I, in 1894 — 5; Latin 7; Mathematics 10; Meteorology 1; Mineralogy 1; Oral Rhetoric and Oratory I, 2; Pedagogy I, 2, 3; Philosophy I, 2; Physiology 4; Physical Culture; Physics 5; Psychology 1; Zoölogy 3.

- Botany I, 3, 5; Economics 2; English 4, 5; French 3; Geology I, 4; German 3; Greek 8; History —; Italian 1; Latin 8; Mathematics II; Mineralogy 2; Oral Rhetoric and Oratory 1, 2; Pedagogy I, 2, 3; Philosophy 3, 6, 8; Physics 2; Physiology I; Physical Culture; Physics 5; Psychology 2, 3; Zoölogy I, 4, 5, 8.
- Botany I, 4, 5, 6; Economics 5; English 4, 5; French 3; Geology 1; German 3; Greek 9; History —; Italian 1; Latin 9; Mathematics 12; Mineralogy 2; Oral Rhetoric and Oratory 1, 2; Pedagogy 2, 3, 4; Philosophy 3, 7; Physiology 1; Physical Culture; Physics 5; Psychology 2, 5; Zoölogy 1, 4.

FOURTH YEAR.

- Economics 1, 3, 6, 8; English 6; French 4; German 4; History —; Mathematics 13, 14, 15; Oral Rhetoric and Oratory 2, 4; Pedagogy 7, 8; Philosophy 1, 2; Physics 6; Psychology 1, 7, 8; Spanish 1, in 1895-96; Zoölogy 1, 3.
- 2. Economics 2, 3, 6, 8; English 6; French 4; German 4; History —; Mathematics 15, 16, 17; Oral Rhetoric and Oratory 2, 4: Pedagogy 6, 7, 8; Philosophy 3, 5, 6, 8; Physics 6; Psychology 2, 3, 6, 7, 8; Spanish 1; Zoölogy 1, 4, 5. 8.
- 3. Economics 4, 5, 7, 8; English 6; French 4; German 4; History ---; Mathematics 15, 16, 18; Oral Rhetoric and Oratory 2, 4; Pedagogy 4, 5, 8; Philosophy 3, 4, 5, 7; Physics 6; Psychology 2, 5, 7, 8; Spanish 1; Zoölogy 1, 4.

THE SELECTION OF STUDIES.

On coming to the University each student entering the College of Literature is earnestly recommended to consult with the professors having charge of the departments in which the work of list A is to be done. Such consultation will be of great utility in suggestions as to the studies to be pursued. It will moreover serve to acquaint the students with the professors most largely interested in the success of the work to be done and will tend to establish that cordial relationship that is so essential to the best results. In selecting studies, students must be careful to observe the sequences required for each as given under the separate subjects.

DESCRIPTION OF DEPARTMENTS.

ART AND DESIGN.

This work subserves a twofold purpose. (1) It affords to the students the opportunity to acquire such a knowledge of free hand drawing as their chosen courses may require. (2) It offers to such as have

a talent or taste for art the best facilities for pursuing studies in industrial designing or other branches of fine art.

In all courses the work is made of direct benefit to the students in other lines, and at the same time it aims to develop in them a love for, and an appreciation of, the beautiful.

Special students, not otherwise connected with the University, may enter this department upon payment of very moderate fees.

ECONOMICS.

The study of economics for undergraduates extends through the last two years. The work is so arranged that the student can take a continuous course for either one or two years. The introductory courses are repeated each year and the advanced courses are divided into two groups and given in alternate years. Text books are used in the introductory courses, but only as guides. Every student is required to make frequent short reports on assigned topics and to undertake at least one more elaborate piece of investigative work. The assigned readings are designed to cover as large a field as possible in the literature of the subject, to present all disputed matters from different points of view, and are supplemented by discussions and lectures. Educational development, acquaintance with the subject, and training for good citizenship are ends kept steadily in view.

ENGLISH LANGUAGE AND LITERATURE.

The work of the department during the first two years consists of the study of literature, together with two hours a week in the freshman year devoted to Rhetoric and Themes. During the last two years the time is divided between literature and language. English 2, is required of all students in the College of Literature, and English 1 and 2 are required for the degree of B. L.

A special course in literature of one year is offered to scientific and engineering students. The course in Rhetoric and Themes is required.

GERMAN.

The primary aim of instruction in the elementary classes is reading, so that the student may avail himself of the aid of foreign work relating to his particular department. Much importance, however, is attached to the study of language as-a means of general training. A thorough study of the structure of the language is the basis; as much as possible of this is done by practical work, analysis and composition, rather than by mere memorizing rules.

The more advanced classes take up the study of the classic poets and prose writers. The third year's work consists of critical study of the prominent literary works; composition; history of the literature in German. Lectures are given in German and the use of the language in study is demanded.

The fourth year is an elementary course of Old German and Gothic.

The one year course is designed for the technical students with a minimum of grammar and a maximum of reading.

GREEK.

The general purposes of the outline which follows (including courses t-6) are: First, to teach the Greek language. Second, to cause students to appreciate its literature. Third, to call attention to those numerous points in the history, thinking, and institutions of the Greeks which illustrate similar phenomena noticeable among ourselves. To accomplish the first item, due attention is paid to the principles of grammar, particularly in making the syntax appear as the evidence of orderly mental procedure, and by continual practice in extemporaneous translation. The second is effected by a study of the surroundings and spirit of an author, and of those literary devices which give character to his productions. The third end is reached through familiar talks upon suitable topics as they are met.

In courses 7 and 8 a more mature line of work is contemplated, for which courses 1 to 6 are a graded preparation. Ample library and other appliances are provided. Course 9 is more general, but is expected to articulate, for classical students, with courses 1-8.

HISTORY.

In the work of this department, while political and dynastic narrative is allowed an important place, it is hoped further to give the student an understanding of the part that has been performed by each of the chief forces and activities which constitute the life of nations, such as the intellectual and the moral movements; the influences of superstition and religion; social instincts and economic forces, especially as they manifest themselves in the form of institutions. Investigations are also made of the influence of climate, soil, and topography. History is thus treated as a description of dynamic society, as the science which appropriates and correlates, with reference to their bearing upon the continuous life of races, the results obtained by the anthropologist, ethnologist, and philologist; by the student of religion, morals and culture, by the political scientist and economist; and, lastly, by the physiographer.

LATIN.

The courses at present offered in Latin are nine in number and extend over three years. It is recognized that many students are deficient in preparation and need rigid drill in noun and verb syntax, while there are few to whom this drill is not beneficial. With this thought, the first term's instruction is, as far as needed, grammatical, and prominence is given Latin writing as the very best method of acquiring a mastery of the language.

Ability to read Latin in the Latin order is strenuously insisted on, as inability in this particular is considered one of the chief reasons for the small results that many students secure.

As soon as this preliminary work is done, the attention is directed to two ends: First, to the acquisition of a constantly increasing power to read the language with ease and pleasure. As large a number as possible of representative authors are read. The thought is constantly emphasized that students are not simply reading Latin; they are reading some of the great literary masterpieces of the world, and should enjoy them as such.

A second aim is to introduce the student to the daily life of the Roman; to make his home life vivid, his political life a reality. The contribution of the Roman world to the language, literature, and institutions of our time is so great that an intimate acquaintance with that life is of the highest educational value.

The courses offered include a teachers' seminary. Selections are read from the last six books of Vergil's Aeneid. Discussions and lectures on methods, aims and results in Latin teaching form a part of the work. At intervals, the students take charge of the recitation.

The Latin department is amply supplied with all necessary appliances for the successful prosecution of the work.

MATHEMATICS.

In mathematics is included the entire offering of the University courses in pure mathematics, and in physics and astronomy. The instruction in pure mathematics comprises three distinct lines of study, differing in extent, in subject matter, and in the method of presentation.

The first is for students in the Colleges of Agriculture, Science and Literature, and occupies two terms, beginning in the fall. It has for its object to promote habits of mental concentration and continuity of thought, to develop the capacity to form and combine abstract conceptions, and to cultivate deductive reasoning. The second line is primarily offered to students in the College of Engineering and occupies two years, also beginning in the fall. In addition to the educational object just given, the purpose is to enable the student to meet the requirements of his engineering studies. The greater part of the time is necessarily taken up with the theory and its applications to geometrical magnitudes.

The third line is presented for students of the Colleges of Science and Literature who wish to advance further in their mathematical work than the engineering student has the time for. It is hoped that this will meet the requirements of those who wish to fit themselves for instructors, and of those who study the science for the love of it.

Parallel with the pure mathematics of the junior and senior years, two lines of associated work in applied mathematics—physical and astronomical—are offered, either of which may be, and one of which must be taken by the student wishing to make mathematics his leading course. One of these lines leads from the physics of the sophomore year through the mathematical theory of electricity and magnetism, heat, light, and sound; and the other through surveying and mechanics to celestial mechanics and to general and mathema.ical astronomy.

[For fuller information see pp. 58-62.]

ORAL RHETORIC.

The main purpose of this course is to teach command of spoken English, and to cultivate rational and effective methods of expression by voice and action. Practical exercises are given for the development of strength, flexibility, and compass of voice, healthful and expressive carriage of the body, and ease and grace of movement. The fundamental aim of the work is to cultivate the ability to analyze, to comprehend, and to appreciate the best thought and to communicate it to others through the most cultured and the truest forms of expression.

For students in the College of Literature, the course covers two years and is divided into (1) Oral Rhetoric, and (2) Oratory.

Oral Rhetoric, or more properly speaking, the Rhetoric of Oral Expression, relates to style in speaking and aims to teach the intelligen the use of voice and gesture in the conveyance of thought to others.

The work in Oratory is an advance upon Oral Rhetoric, leading the student to a knowledge and appreciation of the power of public speech, to acquaintance with the most famous orations, and offering him an opportunity to develop his own ability in this direction.

The art of conversation, extemporaneous speech, and oral composition are studied, and lectures on the essentials of public address and the philosophy of expression are given. The student is required to present original work for criticism as to composition and delivery. Practical drill is given in melody of speech, emphasis, rhythm, inflection, tone projection, and tone color.

For students in the Colleges of Agriculture, Engineering, and Science, a special course of one year is offered. It comprises training in physical presentation and management of the voice, reading from manuscript, memoriter speaking, and extempore address.

To give additional opportunity for the training of individual talent and the higher culture of the speech arts, a course in Elective Expression is offered. It is open to those who have had Oral Rhetoric (1) and (2) or their equivalent. The course includes rendering. impersonation, dialect reading, character sketches, monologues, modern plays, analytic Shakespeare, and dramatic action.

PEDAGOGY.

The department of Pedagogy aims to offer as much work in the theory and practice of teaching as a specialist in that line can accomplish, in connection with other closely allied subjects, during a period of two years. The work in the class room is mainly a discussion of the purpose of public schools and their means of accomplishing that pur-By recent action of the trustees of the University a Model pose. School has been established as a part of this department, so that students now enjoy an excellent opportunity for applying the conclusions reached in the class room and for studying children closely. Any students may have the privilege of teaching in this school who are qualified, according to the rules of the University, for the courses in Pedagogy; all such instruction will be under the constant supervision of teachers regularly employed for that purpose. Graduates of the state normal schools of this state are admitted to the course in Pedagogy immediately upon entrance into the University, and satisfactory work during two years will secure for them the University certificate.

PHILOSOPHY.

The courses offered comprise the subjects of History of Philosophy, Metaphysics. Ethics, and Logic, and are open to students who have completed at least two years of University work. They are planned to meet the needs of those who make Philosophy their specialty and also of those who desire an acquaintance with the subjects as a means of general culture. It is a constant aim to emphasize the meaning and interest of Philosophy and the relations of its problems to the life of man. The subjects are taught by lectures, recitations, and the seminary method.

PSYCHOLOGY.

The aim of this department is to acquaint the student with the nature of mind, its modes of behavior, the forms under which it manifests itself, and the laws according to which it unfolds and develops. Not only is the normal mind made the subject of thorough study, but also mind in its abnormal phases. The elements of mentality as exhibited in the various animals and in early infant life are investigated with a view to discover the components of adult mental life. The mental make up of the defective and criminal classes is also inquired into in order that light may be thrown upon the social questions as to the best methods to be employed in the treatment of these classes, the best education for the defective, and the best environment for the criminal.

Special attention is given to scientific methods of child study because of the direct and important relations in which the results of such study stand to the various pedagogical theories and the estimate of the educational value of the different subjects taught in our common schools.

THE ROMANCE LANGUAGES AND LITERATURE.

The Romance Language department offers four years of instruction in French, and one year each in Italian and Spanish. In French 1, in Italian, and in Spanish, careful attention is given to pronunciation and to the reading of modern novels and comedies. In French 2, the outlines of the literature of the seventeenth, eighteenth, and nineteenth centuries are studied, while French 3 makes a special study of the origin and development of the drama in France. In each class the literature is studied at first hand, the student being required to read the principal masterpieces and to report on them before the class. The instructor endeavors to create an interest in, and an appreciation for, the best works of French literature. In French 4, intended primarily for graduate students, but open to those who have had French 3 or its equivalent, the attention of the student is directed to the origins of the language, and he is taught the use of scientific methods of original investigation in language and literature. At the Romance Lauguage Club the instructor in charge calls attention to the latest books, articles, reviews, etc., on subjects connected with the Romance languages. The most important Romance articles contained in the contemporary reviews and magazines are reviewed by the students before the Club.

GRADUATE SCHOOL.

The administration of the affairs of this school is placed in the charge of a committee consisting of the Regent of the University and the Deans of the Colleges. Graduates of this University and of other colleges and universities approved by the committee of administration are admitted to the privileges of advanced study and research, upon presentation of their diplomas or other acceptable credentials. Candidates for advanced degrees must register as such, and in each case for the particular degree desired. The application thus made must receive the approval of the administrative committee.

MASTER'S DEGREE.

A secondary or master's degree will be conferred upon those who satisfactorily pass one full year's work in residence and who present an acceptable thesis. Graduates of this University receive such degree, though non-resident, upon the completion of a prescribed course of study with examination thereon and the presentation of an acceptable thesis. In this case the time required is not less than three years. Each candidate for a master's degree must select one subject as a major, upon which at least one-half the required work is to be done. This subject must be in line with his undergraduate course and the thesis must be based upon the work thus pursued. Two subordinate or minor subjects must also be selected upon which examinations are to be passed. Second degrees must follow in line with the first ones, viz. A.M. after A.B., M.L. after B.L., or the professional degree of M.E., C.E., etc., M.S. after B.S.

The professors in whose departments the work is taken constitute the committee on examinations, and these must be passed according to the directions of this committee. The thesis should be presented at least one month before the close of the collegiate year.

DOCTOR'S DEGREE.

The degree of Doctor of Philosophy or Doctor of Science may be conferred upon graduates of this or of any other university or college approved by the committee of administration, after three years of successful graduate study, of which at least the last year or the first two years shall be in residence at this University. These degrees will not, however, be conferred upon the basis alone of the completion of prescribed study for the length of time indicated. Besides this, special attainments must be satisfactorily shown in the power for independent research and of original thought, and the thesis must be a contribution to knowledge.

At least one-half of the prescribed work shall be devoted to the subject chosen as a major, and this work, together with that upon two minor subjects, shall be taken with the approval of the committee of administration, and shall be pursued under the supervision of the heads of the departments to which the subjects severally belong. The examinations shall be conducted as the Faculty of the University direct. At least two months before the close of the collegiate year the candidate shall submit to the Faculty through the professor in charge of his major work a fair copy of his thesis. If the degree is conferred, the recipient thereof shall have his thesis printed and deposit at least fifty copies of it in the office of the Regent of the University.

A SECOND BACHELOR'S DEGREE.

Graduates of this University and of other colleges and universities of equivalent standard may obtain a second bachelor's degree by completing all the subjects regarded as special or technical in the second course and gaining at least nine full term extra credits in addition to those counted for the first degree. A thesis is required, as for first degrees of this rank. Candidates for a second bachelor's degree are registered as resident graduates, but are not enrolled as members of the graduate school.

The amount of instruction in the special subjects required in each of the engineering courses is now so large that little else can be undertaken within the limits of four years. But as higher attainments are reached the more apparent becomes the inter-relations and mutual dependencies between subjects of different courses, and therefore the more desirable is it that a student of any one course should have the chance to gain acquaintance with at least the more closely related branches of an allied course. The above arrangement for a second bachelor's degree. is especially applicable in such cases.

COURSES OF STUDY.

The courses of study in the graduate school will be adapted in each case as nearly as possible to individual wants or requirements. Further information may be obtained by addressing the professor in charge of the department in which the desired work occurs.

In the College of Engineering the following outline of subjects is offered as an aid to candidates for a second or professional degree in the selection of courses of instruction.

FOR THE DEGREE OF MECHANICAL ENGINEERING (M.E.).

Majors.

1.	Advanced Machine Design, 1,	5.	Experimental Engineering,	I
	2, or 3 terms,		term.	
2.	Graphics and Kinematics, 1	б.	Thermodynamics, 1 term.	

- Graphics and Kinematics, 1 term.
- 3. Mill Engineering, 1 term.
- 4. Steam Engineering, 1, 2, or 3 9. Thesis. terms,
- 1. Mathematics.
- 2. Physics.
- 3. Languages.
- 4. Chemistry.

Minors

8. Hydraulic Machinery; 1 term.

5. Electrical Engineering.

7. Pneumatics, 1 term.

- 6. Civil Engineering.
- 7. Municipal Engineering.
- 8. Architectural Engineering.

FOR DEGREE OF ELECTRICAL ENGINEERING (E.E.)

Majors.

- 1. Mathematical Theory of Electricity and Magnetism, 1, 2, or 3 credits.
- 2. Absolute Measurements in Electricity and Magnetism, 3 credits.
- 3. Dynamo Electric Machinery, 1, 2, or 3 credits.
- 4. Electrical Transmission of Power, 1, 2, or 3 credits.

Minors.

- 1. Economy of Production and Utilization of Electrical Energy, 1 credit.
- 2. Consulting Engineering, 1 credit.
- 3. Thermometry and Calorimetry, 1 credit,
- 4. Photometry, 1 credit.
- 5. Electro metallurgy, 1 credit,

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FOR DEGREE OF CIVIL ENGINEERING (C.E).

All majors unless otherwise stated. Each I credit.

IN RAILWAY ENGINEERING.

- Location and construction. Ι. 2. Railway Track and Structures, and their Maintenance.
- Yards and Terminals. 3.
- Motive Power and Rolling 4. Stock.
- Signal Engineering. 5.
- Railway Operation and Manageб. ment.

BRIDGE ENGINEERING.

- 7. Bridge Designing.
- 8. Cantilever and Swing Bridges.
- Metallic Arches. 9.
- 10. Metallic Building Construction.

struction.

IN WATER SUPPLY ENGINEERING.

τ8.

- 14. Tanks, Stand Pipes, and Reservoirs.
- Sources and Requirements of 15. 19. Water Supply for a City, and Removal of Impurities. 20.
- 16. Water Works Management and Economics.
- 17. Pumps and Pumping.

IN SEWERAGE.

- 21. Sewage Purification.
- Sewage Disposal Works. 22.
- General Sewerage Design 23. and Construction.
- 25. Description of Sewerage Systems-Minor.

24. City Sanitation.

Systems-Minor.

IN ROAD ENGINEERING.

- Economic Aspect of Good Roads and Pavements. 26.
- 27. Construction of Roads and Pavements.

IN APPLIED MECHANICS.

- 28. Analytic Mechanics. Hydraulic and Hydraulic En-30. gineering.
- Resistance of Materials. 29.
- Laboratory of Applied Me-31. chanics.

- Roof Construction. II.
- 12. Stereotomy.
- History of the Development of 13. Bridge Building-Minor.

General Water Works Con-

Biological and Chemical Exam-

ination of Potable Water.

Description of Water Supply

MISCELLANEOUS SUBJECTS.

- 32. Practical Astronomy.
- 33. Description of Work Done.
- 34. Critical Description of Engineering Construction.
- 35. Any Major in Mathematics, Mechanical Engineering, or Electrical Engineering—Minor.
- Translation of Technical Engineering Work from French or German.

FOR DEGREE OF MASTER OF ARCHITECTURE (M. ARCH).

Majors.

- 1. Construction of Extensive Wooden Buildings.
- 2. Recent Uses of Stone, Brick, and Terra Cotta in Architecture.
- 3. Metallic Skeleton Buildings.
- 4. Fire-resisting and Fire-proof Buildings.
- 5. Sanitation of Public and Semipublic Buildings.
- 6. Researches on the Evolution of Architectural Styles.

- 7. Higher Application of Graphic Statics.
- Heating and Ventilation of Large Buildings.
- Higher Studies in Architectural Design.
- 10. Researches and Experiments in Applied Esthetics.
- II. Translation of an Approved Technical Architectural Work from French or German, original.

Minors.

- 1. Stereotomy Applied to American Problems.
- 2. Examinations of Heating and Ventilation of Buildings.
- 3. Higher Workshop Practice.
- 4. Photography for Architects.
- 5. Methods of Reproducing Drawings, Specifications, etc., for Architects.
- 6. Higher Problems and Methods in Perspective.
- 7. Practice in Estimates, Specifications, etc., for Large Buildings.
- 8. Higher Industrial Design.
- 9. Advanced Water Color Painting.
- 10. Study of Office Methods and Arrangements.
- 11. Any Major offered in the College of Engineering.

MATHEMATICS.

- One term in Bierly's Integral Claculus from page 190 to end; Line, Surface and Space Integrals; Mean Value of Probability; Elliptical Integrals; Theory of Functions; Differential Equations.
- 2. One term in Elliptical Integrals.
- 3. One term in Differential Equations.
- 4. One term in Salmon's Modern Algebra.
- 5. One term in Salmon's Conics.
- 6. One term in Salmon's Higher Plane Curves and Solid Geometry.

SUMMER SCHOOL.

PROFESSOR FRANK M. MCMURRY, Director. PROFESSOR DAVID KINLEY, Assistant Director.

The trustees of the University of Illinois have made arrangements for a summer school, for 1894, to begin June 18th, and to continue for Its purpose is the same as that of the University itself, four weeks. namely, to provide, at slight expense to students, adequate facilities for the study of subjects of common interest and worth. The instruction will be given almost entirely by regular members of the Faculty. A tuition fee of ten dollars will be required for attendance during the entire session. As this source of income cannot defray the expenses of the undertaking, the additional money necessary has been provided for by a liberal appropriation from the trustees of the University. It is, therefore, in no sense a money making enterprise. The subjects of instruction for this first session are as follows: Botany, Chemistry, Economics, English Literature, History, Mathematics, Pedagogics, Physical Culture, Physiology, Psychology and Child Study, Zoölogy.

These courses are open to any persons desiring them, though the hope is that teachers and those preparing to teach will especially avail themselves of the opportunities here offered. Students may devote all of their time to one study or divide it among several of them. Those who have attended the University and wish to make up back work, or to take advanced courses, will receive credit for the same in the records of the University, provided they accomplish at least one full term's work in any course and pass such examinations upon it as are customary in the department to which it belongs.

The laboratory and other facilities of the University will be utilized to the full extent of the needs of the instruction. In the sciences the courses will mainly consist of laboratory and field work. Students of natural history subjects will have the advantages of a recently established biological station on the Illinois River to which visits can be easily made. In experimental psychology the new laboratory offers special opportunities for the best work of a kind now attracting much attention.

The University library and the special libraries and collections will be open throughout the term.

COURSES OF INSTRUCTION.

Botany.—Mostly laboratory work upon phænogamic and cryptogamic plants, especially structure and physiology. Individual students will, as far as possible, have courses arranged to suit their needs, two to eight hours daily. Field excursions. MISS ALICE BARBER.

Chemistry.—Largely laboratory work. Four courses as follows: (1) Elementary Chemistry. (2) Qualitative Analysis; Principles and Determinations of constituents of unknown mixtures. (3) Quantitative Analysis; Gravimetric and Volumetric Determinations; Advanced work for those who are prepared for it. (4) Organic Chemistry; Simpler Carbon Compounds with Organic Syntheses; Proximate or Ultimate Analyses. The laboratory will be open eight hours daily. Professor PALMER and Professor PARR.

Economics.—3. Money and Banks. A discussion of monetary and banking principles and history, with special reference to the United States. Professor DAVID KINLEY.

English Literature.—The work in this subject will include a threefold course of study. First, a detailed study of some representative author; second, a course in composition; third, a course in advanced grammar and rhetoric. Assistant Professor KATHARINE MERRILL.

History.—I. Civil Government in the United States. A study of the machinery of the national government, of the changes that have been made in it since the beginning, and of the points of departure from the ideal of the framers of the constitution. 2. The Nineteenth Century. This will be mainly a study of the political changes during the century, which have resulted in the increasing spread of democracy. Professor DAVID KINLEY.

Mathematics.—Algebra and geometry as required for entrance to the University and any of the University courses in the present catalogue from I to II. Assistant Professor MYERS.

Pedagogics.—The general principles underlying method, the changes at present taking place in our public school curriculum, interest and apperception, are some of the topics that will be discussed. Much of the work will be done through round tables, *i.e.*, by informal discussion. Professor C. A. MCMURRY.

Physical Culture.—The University gymnasium will be available for both men and women, and instruction will be given in the modern scientific methods of physical education, including elementary and advanced work. The regulation suit for women is described elsewhere in this catalogue. MISS KELLOGG.

Physiology.—General human physiology with laboratory work Special attention will be given to such class demonstrations as can be made without expensive apparatus. Assistant Professor SUMMERS.

Psychology.—Subjects closely allied to pedagogics—for example, the imagination, memory, thinking. Their bearing on actual teaching will be kept in view. Professor C. A. MCMURRY.

Psychology and Child-Study.—(1) Experimental psychology, Laboratory demonstrations, and, for advanced workers, special investigations with apparatus and specimens; Lectures upon methods and results: (2) Child-Study. Order of development of mental powers, contents of mind at six years of age, mental economy and waste in school room, adolescence in relation to study, periods of life and growth. Assistant Professor KROHN.

Zoölogy.—For beginners a study of a few common types with dissections and use of microscope. For those specializing in this branch, further studies upon selected types. Advanced students will have special work to meet individual cases.

A special course in entomology, offered because, among other things, insects furnish one of the best opportunities for studies in systematic zoölogy. Assistant Professor SUMMERS.

Suitable accommodations (including both board and room) can be found in either Champaign or Urbana, at prices ranging from \$3.50 to \$5.50 per week.

Any person desiring to engage board or room, or wishing any further information in regard to the courses offered, should address a letter of inquiry to

UNIVERSITY EXTENSION.

The University offers a series of lecture courses by members of the Faculty upon a considerable number of the subjects taught by them. It is an extension of University instruction. to people at their homes who cannot attend the institution itself as students, but yet desire the information that such students gain. In the endeavor to make the University doubly useful to the people of the state, the professors hold themselves in readiness to lecture upon invitation in any accessible locality, if consistent with regular duties. The subjects and lectures are the same as at the University, so that there is a real extension of its teaching. The course upon a single subject usually consists of six lectures, one given each week and commonly upon Friday or Saturday evening. For each lecture there is distributed a printed syllabus or outline giving also directions to the best literature upon the subject, and other information. The lectures are preceded or followed by reviews, guizzes, and discussions; and at the end of the course an examination may be held. To those satisfactorily passing such examinations a special certificate is issued in the name of the University, and the proper records are made upon its books.

A special series of lectures has been arranged for teachers' summer institutes. These are not intended to take the place of the ordinary instruction given in such institutes, but to present University subjects by University methods, as far as possible, with all the aids of illustrative and demonstrative equipments.

A special circular giving the subjects and lectures for each academic year is issued during the early autumn and is sent on application.

GENERAL LIST OF SUBJECTS.

This list gives all the subjects and the entire number of courses of instruction offered to students of the University. The several courses are described, and the term or terms, when they are taught, are designated.

When in connection with any course, certain other courses are named under the head of *required*, the course is open to those students only who have already passed satisfactorily in the *required* courses.

The arrangement is by alphabetical order of the chief headings, under which the subordinate divisions, if any, are placed.

COURSES OF INSTRUCTION.

AGRICULTURE.

- I. Farm Equipment.—Careful consideration is given to the planning and methods of construction of farm buildings; to the division of the farm into fields; to a comparison of different methods of fencing, with methods of construction and care of each; to laying out, constructing, and maintaining roads. Especial attention is given to the improvement of the farm by drainage; the reasons for drainage, laying out drains, methods of leveling, estimating size of tile, and depth of drains best adapted for different situations being fully explained. Field practice accompanies the class room work. The selection, use, and care of farm implements and machinery receive full consideration. Lectures and Reference Reading. Fall term, full study. Professor MORROW.
- 2. Animal Husbandry.—The leading principles of breeding and the practical methods of feeding and managing farm animals, horses, cattle, sheep, and swine, are discussed. The purpose served by food, and the best methods of feeding for the economical production of meat, dairy products, wool, etc., are explained with free use of the records of practice by successful breeders and feeders in this and other countries. The history, characteristics, and adaptations of all important breeds of farm animals are studied. Students are 86

given the opportunity of carefully studying animals and judging them with reference to breed characteristics and their adaptations to different uses. Practice is given in study of pedigrees. *Lectures* and Reference Reading. Winter term, full study. Professor MORROW.

- 3. Rural Economy.—The relation of agriculture to other industries; the advantages and disadvantages of different systems, as stock.rearing, dairying, grain farming; of specialties and general farming, and the circumstances which make each desirable, are discussed. The culture of farm crops, cereals, roots, grasses, etc., including choice of varieties, preparation and cultivation of the soil, harvesting and utilization of each, receives as full attention as time permits. Lectures and Reference Reading. Winter term, full study. Professor MORROW.
- 4. History of Agriculture.—The development of agriculture, especially in comparatively recent times and in our own country, is studied with particular reference to the effects of climate, different phases of civilization and of legislation in advancing or retarding it. The history and characteristics of agricultural organizations of various classes are considered, and a survey is taken of agricultural literature. Lectures and Reference Reading. Spring term, half study. Professor MORROW.
- 5. Rural Law—The object of this study is to enable the student to familiarize himself with some fundamental principles of law and with the special laws which most directly affect the farmer. Tenure of real estate; laws relating to roads, fences, drainage, etc., as well as the most important parts of commercial law are considered. Lectures and Reference Reading. Spring term, half study. Professor MORROW.

ANTHROPOLOGY.

1. Anthropology.—This is at present a minor course in general anthropology, approached from the zoölogical standpoint and based upon the general zoölogy and human physiology required as a precedent. The morphological relationships of man are shown in some detail, his presumed origin and probable phylogeny are discussed, and the recognized races of mankind are distinguished and described. The bearing of general biological laws on the organization and history of man are set forth with special reference to their influence on national and social life, the course concluding with the presentation of points of contact between biological anthropology, as here

understood, and the various subjects of the philosophical group. It is taught by lectures and prescribed reading. *Fall term, half study*. Professor Forbes.

Required: Zoölogy 1, 2, 3, or 8, and Physiology 1 or 4.

This course will not be offered during the year 1894-5.

2. Anthropology.—This course considers man as a psychical being. The customs, ceremonies, rites, beliefs and folk-lore, especially of primitive peoples are studied in an historical and comparative way, with reference to the common characteristics and fundamental instincts of the human mind and to the origin and growth of existing customs and social institutions. The work consists in lectures, recitations and the investigation by the student of special subjects Fall term, half study. DR. DANIELS.

ARCHITECTURE.

 Shop Practice D.—To give a practical knowledge of various kinds of work, three terms are devoted to a course of instruction which all architectural students are required to pursue, unless they have previously had equivalent practice and obtained credit therefor.

First Term.—Carpentry and Joinery. Planing flat, square, and octagonal prisms and cylinders; framing with single, double, and oblique tenons; splices, straight and scarfed; miter, lap, and gained joints; through and lap dovetails; moldings, miters, miter-box, and panels.

Second Term.—Turning and Cabinet Making. Glue joints; moldings; inlaying; ornamental veneering; turning cylinders, balusters, ornamental forms, capitals, rosettes, vases, etc.

Third Term.—Construction of portions of buildings or of complete architectural structures at a reduced scale; roof trusses, stairs, frames of wooden buildings, etc., made from drawings. Fall, winter and spring terms, full study. Mr. PARKER.

2. Wood Construction. Formulæ and data for computing the dimensions and strengths of columns, rods, beams, girders, etc., of wood or metal are first given and then applied in the solution of numerous examples. The kinds of wood and their uses in construction and decoration, their seasoning, shrinkage, defects, and modes of protection from decay, are next studied. The construction and design of

wooden floors, walls, ceilings, and roofs are then treated, and afterwards, joinery, comprising doors, windows, bays, inside finish, cornices, wainscoting, etc. The construction and design of stairs of the various types terminate the work of the term. About twenty problems are worked out on as many plates by the student. *Ricker's Wood, Stone, Brick, and Metal Construction; Macfarlane's Elementary Mathematical Tables. Fall Term, full study.* Assistant Professor WHITE.

3. Stone, Brick, and Metal Construction. Foundations of stone, brick, concrete, and on piles, are first studied. Then the materials employed in stone masonry, their uses, defects, qualities, and mode of preparation. Kinds of masonry and external finish. Tools and methods of stone cutting. The preparation of working drawings is illustrated by practical applications in the study of the arch, the vault, and the dome. Brick masonry is next examined, with its materials and bonds, and several examples are drawn. The manufacture and refining of cast-iron, and wrought-iron, and steel are then studied, together with the processes of pattern making, molding, casting, refining, rolling, etc., as well as the stock or standard dimensions or sections to be obtained in the market. The special properties and value of each metal in a structure, the designing of a line of columns in a tall mercantile building, and of beams and girders, together with the study of joints and connections completes the work of the term. About twelve problems are drawn on the same number of plates. Same text books as in fall term. Winter term, full study. Assistant Professor WHITE and MR. GUNN.

Required: Shop Practice D; General Engineering Drawing 1, 2, 3.

4. Sanitary Construction.—Daily recitations or special lectures, with designs for special problems. The study of plumbing, trap ventilation, removal of wastes, construction of water closets, drains and systems of water supply; sewage disposal. Hot water supply and fixtures in dwellings. Gerhard's Drainage and Sewerage of Dwellings; Lectures on Sewage Disposal. Spring term, full study. Assistant Professor WHITE.

Required: Math. 4; Shop Practice D; Physics 1.

5. Roofs.—This term is devoted to the elements of graphic statics, and to the applications of the science in the designing of trussed roofs. The composition and resolution of forces, equilibrium, reactions, moments, bending moments, and shears on beams, center of gravity and moment of inertia of any form of cross sections, are first examined. The construction of wooden and of metallic roofs is next studied, then the mode of computing permanent and temporary loads on roof trusses, of obtaining end reactions, of drawing strain diagrams, determining sectional dimensions of members, and ending with the designing of joint connections. Numerous problems are solved, five different types of trusses are usually worked out, complete designs and details being made for one of wood and another of iron or steel. *Ricker's Trussed Roofs. *Spring term, full study.* Assistant Professor WHITE.

Required: Math. 2, '4, 6, 7, 8, 9; Theoretical and Applied Mechanics, 1, 2; Architecture 2, 3, 4 (except for students in civil, municipal, and mining engineering courses).

6. History of Architecture.-Two terms' work, usually divided at the beginning of the Romanesque style. Commencing with the Egyptian and ending with the Renaissance, a careful study is made of each of the more important styles, successively examining the historical conditions, the local and inherited influences, the structural materials and system, the special ornaments, and the purposes and designs of the buildings, with an examination of a few of the most important typical examples of the styles. Especial attention is given to any ideas that might be useful or suggestive in American work, and to tracing the gradual evolution of architectural forms. This study therefore becomes a very interesting branch of the history of human civilization. References are made to numerous works. especially to Fergusson, Lubke, Durm, Reber, Gailhabaud, etc. Ricker's Notes on History of Architecture. Fall and winter terms, full study. Professor RICKER.

Required: Architecture 2, 3, 4.

7. History of Architecture (Details).—Exercises in drawing at large scale the most important details of the Grecian, Roman, Early Christian, Byzantine, Mohammedan, Romanesque, Gothic, and Renaissance styles. Notes and Sketches. Spring term, full study. Professor RICKER and MR. GUNN.

Required: Architecture 2, 3, 4, 6, 8, 9, 11, 20.

 Architectural Drawing (The Orders).—Exercises in drawing the five orders of architecture in general and in detail. Applications to a series of problems requiring the use of the orders in various combinations. Vignola's Five Orders, Boston edition, with translation. Fall term, full study. MR. GUNN.

Required: General Engineering Drawing 1, 2, 3; Architecture 2, 3.

- 9. Architectural Drawing (Methods, Shades and Shadows). The subjects of instruction are the different methods of finishing architectural drawings in line and washes, and the study of shades and shadows, those being so combined to produce the greatest benefit to the student. Penciling, inking, washing, and tinting drawings are practiced, as well as obtaining cast shades and shadows. The single plane method is preferred for this purpose, and is found applicable to most cases. Shades and shadows are found on a capital and base, drawn at large scale. Drawings are finished in ink line and wash, sepia, and other tints. Notes on Shades and Shadows. Winter term, full study. MR. GUNN.
- Required: General Engineering Drawing 1, 2, 3; Architecture, 2, 3. 10. Architectural Drawing (Office Work).—This term is devoted to instruction in the office style of preparing working drawings for a given building. Rough figured sketches are furnished to the student, from which each student makes a set of general and detail drawings in pencil on opaque paper. These are then traced in ink on transparent paper or linen and colored to indicate materials. Especial care is taken to secure neat lettering and accurately figured dimensions. Personal instruction to each member of the class. Spring term, full study. MR. GUNN.

Required: General Engineering Drawing, 1, 2, 3; Architecture, 2, 3, 4

11. Architectural Seminary — Reports and discussions of original investigations of assigned topics, especially in the History of Architecture; reviews of books; abstracts of current technical journals, and other publications. One session weekly during junior year. Professor RICKER.

The seminary equipment will also be used by seniors in the preparation of theses, and by graduates for advanced work.

12. Superintendence, Estimates, and Specifications.—This study comprises several specialties in office work, not otherwise provided for, so far as they can be taught in a professional school. One-third the time is devoted to superintendence, one-half to estimates, and the remainder to specifications, contracts, etc.

Clarke's Building Superintendence is carefully read with daily recitations.

In estimates t .e purpose of the instruction is to impart a knowledge of the usual methods of measurement of materials and work, the arrangement of computations in proper and convenient order, and an acquaintance with approximate prices of materials and labor, which vary in different localities. The methods of squaring, cubing, of units, and of quanties, are each employed and illustrated by numerous examples.

In specifications, practice is obtained by writing out a complete set for a house, drawings for which have been previously made by the student.

Dietzgen's Specification Blanks are employed. The standard Contract of the American Institute of Architects is used, being first carefully studied, then filled out for the same house. Bids, certificates, and other papers are made out. Ricker's Notes on Estimates; Wolgemuth's Ready Reckoner. Fall term, full study. Assistant Professor WHITE.

Required: Architecture 2, 3, 4, 5, 6, 10; Theoretical and Applied Mechanics 1 and 2, or 3 and 4.

13. Heating and Ventilation.—A full knowledge of the scientific theory and of the practice of warming and ventilating buildings is the purpose of this study. Commencing with the fuels and the production of heat, the student passes to the flow of gases through ajutages and pipes, applying these data to the calculation of the dimensions of air ducts and chimneys. The different systems of heating by furnaces, hot water, steam, etc., are next examined, with the details of each. The sources of impurity in the air and the requirements of good ventilation are then considered, with the different methods of ventilation by aspiration, by fans, etc., ending with the study of fans of different types. Numerous problems are given. Ricker's Notes on Heating and Ventilation; Billings' Ventilation and Heating. Fall term, full study. Professor RICKER.

Required: Mathematics 2, 4, 6; Architecture 2, 3, 4, 10; Physics 1, 3; Chemistry 1; Theoretical and Applied Mechanics 1 and 2, or 3 and 4.

14. Architectural Perspective.—The theory of perspective is taught, with all labor saving methods of abbreviating the labor, and designing in perspective itself is made a special aim, this power being very useful to a draughtsman in preparing sketches for clients. Methods of diagonals, by triangles, and by coördinates are all used. Problems in angular, parallel, vertical, and curlvilinear perspective, as well as in perspective shades and shadows, are solved, requiring original work as far as possible, so as thoroughly to prepare the student for any kind of work in perspective, instead of restricting him to the study and use of a single system. Six problems are worked out on as many plates. Ware's Modern Perspective. Fall term, full study. Assistant Professor WHITE and MR. GUNN.

Required: General Engineering Drawing 1, 2, 3; Architecture 2, 3, 4, 8, 9, 10, 20.

15. Requirements and Planning of Buildings.—A study of the varied requirements of buildings erected for the more important purposes, with exercises in making sketch plans for selected programs. Block plans, grouping of parts, light courts, communications, economical and durable construction, approximate cost and rentals, etc. Lectures, with illustrations and references to architectural library and cabinet. Winter term, full study. Professor RICKER. Required: Architecture 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13.

16. Architectural Designing (Residences),-Practice in design and the study of the requirements of dwellings of moderate size are the objects of the study. Several typical plans are selected as bases, and numerous changes suggested, which usually produce radical changes in the design. The student is also encouraged to make working drawings for actual clients, criticisms and suggestions being freely made to him. The work is limited to residences, since this class of buildings is likely to afford the graduate his first opportunity for independent original work, and practice in satisfying their requirements is considered to be more valuable than the study of theoretical or impossible problems. The designing of a convenient, attractive dwelling, to cost a limited amount, is really a quite difficult problem, requiring more time and thought than any other building of equal cost. Gibson's Convenient Houses. Citv and Country Houses. Winter term. full study. Assistant Professor WHITE.

Required: Architecture 2, 3, 4, 6, 7, 8, 9, 10, 12, 13, 20.

17. Architectural Designing, (Problems) —Since students often find considerable difficulty when commencing to express their ideas in designs, several simple problems are first given, such as a tower, a store with flats over it, a small library, etc., five being studied usually during the term. Each student makes sketches at small scale, which are criticised and modified until approved, then worked out in plans, elevations, and details, one elevation being washed to show color or shade effects. The object is to obtain as much practice in original design as possible; and in the making of rapid and effective sketches, suitable for submission to a client or employer. Spring term, full study. Assistant Professor WHITE.

Required: Architecture 2, 3, 4, 6, 7, 8, 9; 10, 12, 13, 20.

18. Esthetics of Architecture. —Subject, the laws of correct design, so far as these may be formulated in words, illustrated by the study of numerous examples. Commences with the study of the nature and mode of working of the different materials used in structural and ornamental purposes, deducing the proper ornamental treatment for each, then taking up the proper decoration of walls, ceilings, and roofs. The general principles of ornamentation are next stated, as applied to flat surfaces and to solids of various shapes. A full study of the various materials used in furniture, art works, etc., is then made, with suggestions of their proper use in the art industries. About twenty problems in original design are worked out on as many plates. Ricker's (abridged) Translation of Redtenbacher's Architiktonik; Meyer's Handbook of Ornaments. Spring term, full study. Professor RICKER.

Required: Architecture 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 20.

19. Advanced Graphics.—This continues the study of graphic statics, commenced in roofs, with applications to metallic roofs of wide spans, roof trusses, of curved or arched form, and those supported by abutments and also jointed. Spherical and conical trussed domes. Continuous girders are also examined, with the effect of moving loads on girders, the instruction ending with the graphical analysis of the arch, vault, and dome, and of the Gothic system of vault and buttress. Practical applications are made to a series of problems in design for specified cases. Ricker's Notes on Advanced Graphics. References to the works of Planat, Landsberg, DuBois, Clarke, Ott, Levy, Muller, Breslau, etc., on Graphic Statics. Winter term, full study. Professor RICKER.

Required: Math. 2, 4, 6; Theoretical and Applied Mechanics 1 and 2, or 3 and 4; Architecture 2, 4, 5.

20. Architect's Course in Artistic Drawing and Modeling. (Required.)-

First term. Principles of free hand drawing and light and shade learned from drawing geometric solids (a) in outline; (b) in washes of water color; (c) in values of charcoal.

Second term. Principles applied by drawing (a) groups of common objects, as books, vases, chairs, tables, etc.; (b) casts of ornament; (c) interiors, as the corner of the room; (d) plants and flowers from nature. Special attention is given the work from casts and interiors.

Third term. Rendering perspectives in washes of water color (sepia). Sketching from nature.

Lectures are given throughout the year on design and the historic styles of ornament. Students are required to prepare (a) a monograph of the ancient, mediæval, or modern styles; (b) original exercises showing principles and methods; (c) original exercises employing color.

Lectures on perspective are given the second term, and the problems then worked out are illustrated by sketches from nature made during the third term.

Instruction in pen etching is given throughout the year, but most of the work must be done out of hours. Gregg's Architectural Rendering in Pen and Ink. Fall, winter, and spring terms, full study. Professor FREDERICK.

Required: General Engineering Drawing 1.

21. Architect's Advanced Course in Artistic Drawing and Modeling. (Optional.)

First term. Modeling in clay (a) details of human face; (b) copy of cast of ornament; (c) ornament from photograph. Casts are made of (a) at least one modeled piece; (b) arm, hand, or foot from nature; (c) foliage, fruit, or vegetable from nature. One original design required.

Second term. Study of color as a means of exterior and interior decoration, at least one color scheme to be worked out, full size, in tempera colors. In place of this a second term of modeling can be taken.

Third term. Work in water colors, groups, flowers, and perspectives, or sketching from the antique and life. Sketching from nature in color. *Fall, winter, and spring terms, full study.* Professor FREDERICK.

Required: Architecture 20.

ART AND DESIGN.

 For Special Students of Art and Design.—First year, first term. Principles of free hand drawing learned from drawing geometric solids (a) in outline, (b) in washes of water color, (c) in values of charcoal. Frederick's Notes on Free Hand Drawing.

Second term. Principles applied by drawing (a) groups of common objects, as books, vases, chairs, tables, etc.; (b) casts of ornament; (c) interior, as the corner of the room; (d) plants and flowers from nature.

Third term. Study of anatomy, using Duval's Artistic Anatomy as text book, and drawing from Rimmer's Art Anatomy and Julien's Etudes D'Aprés l'Antique Also outline drawing from the antique figure, and shaded drawings in charcoal of details of the human figure and animal forms.

Lectures are given throughout the year on design and the historic styles of ornament. Students are required to prepare (a) a monograph of the ancient mediaeval or modern styles (b) original exercises showing principles and methods, (c) original exercises employing color.

Lectures on perspective are given the second term and the problems then worked out are illustrated by sketches from nature made during the third term.

Second year, first term. Modeling in clay (a) details of human face, (b) copy of cast of ornament, (c) ornament from photograph. Casts are made of (a) at least one modeled piece, (b) arm, hand, or foot from nature, (c) foliage, fruit, or vegetable from nature.

Second term. Painting in oil color; (a) study in monochrome from still life; (b) group, as a study for composition and color.

Third term. Painting in water color: (a) group, as a study for composition and color; (b) flower and foliage from nature; (c) sketching from nature.

Design. (a) An original design for capital, panel, or spandrel modeled and cast. (b) An original design for surface decoration in color.

Third year, first term. Advanced work in oil and water color painting, and sketching from nature in color.

Second term. Modeling: (a) has relief from antique figure, (b) anatomical rendering of an antique figure, (c) bust from the antique, (d) portrait head from nature in round or relief.

Third term. (a) Shaded study of antique figure. (b) Portrait head from nature. (c) Sketching from nature in color.

Design. Details comprising the human, animal, plant, and insect forms for the purpose of design, and an original practical design employing part of this material. *Three years, double study*. Professor FREDERICK.

2. For Students of Design.— First term, same as work in design of course r; also study of the relation of design to manufacture.

Second term. Study of color as a means of interior and exterior decoration. At least one color scheme to be worked out, full size, in tempera colors.

Third term. Practice in designing in the line of work of which the student wishes to make specialty. One year, double study. Professor FREDERICK.

Required: Art and Design, I, first two years.

4. For students in College of Agriculture, and School of Natural Science.—First term, same as in course 1. Second term, same as in course 1, except that special attention is given to drawing plant and animal forms from nature. Third term, use of pen and ink and water color in work relating to these courses.

Design, same as in course 1. One year, full study. Professor FREDERICK.

- 5. For Students of Mechanical, Electrical, and Civil Engineering and of Chemistry.—First term, same as in course 1. Second term, same as in course 1, except that special attention is given to drawing details of machinery and chemical apparatus. Fall and winter terms, full study. Professor FREDERICK.
- 6. For Students in College of Literature.—The work in this course is the same as course I, as far as time will allow, including design. Students are required to attend the lectures of course 7. One or two years, full study. Professor FREDERICK.
- 7. Course in the History of Art.-Lectures with collateral reading. Selections from Ruskin, Sir Joshua Reynolds, Viollet le Duc, Day's Work on Ornament, Penot and Chipiez' and Reber's histories of art, and other works relating to the history and methods of painting, sculpture and architecture.

These lectures are illustrated by several hundred lantern slides, and are open to all students of the department. One year, once a week. Professor FREDERICK.

ASTRONOMY.

 Celestial Mechanics.—This course will include a study in detail of some of the principles and laws of analytical mechanics as applied to the solution of astronomical problems. More specifically, it will consider the following and other similar subjects: motion of a particle in space under the action of central forces; detemination of paths when the laws of force are given; determination of orbits, masses, etc., of the heavenly bodies. So far as is possible all computations are based upon data taken by the student. Watson's Theoretical Astronomy. Winter term, full study. Assistant Professor Myers. Required: Theoretical and Applied Mechanics 1. 2. Descriptive Astronomy.-For students of the College of Engineering. This course comprises the subject matter of course 1, and, in addition, some of the fundamental principles of celestial mechanics. Astronomy is here taught with a view to its utility rather than as a matter of general information. Students are required to work out problems in latitude and longitude, to deduce from the principles of mechanics formulæ for weighing the masses of the heavenly bodies against each other, to solve problems involving corrections for parallax, refraction, dip of the horizon, and to determine mathematically the distances, dimensions, and orbits of the bodies of the solar system. When favorable weather admits, the equatorial telescope is in use by students, and time is spent in the location and study of the constellations. Students are directed to make readings on astronomical subjects of value to be found in astronomical publications in the library, and are frequently required to recite upon them. Though no attempt is made to teach practical astronomy, which is taught as a specialty in civil engineering, the practical features of descriptive astronomy are kept uppermost in this course. Young's General Astronomy. Spring term, full study. Assistant Professor MYERS.

Required: Math. 4; Physics 1, 3; Theoretical and Applied Mechanics 1,

3. Mathematical Astronomy.—This course will be a continuation of the work begun in Celestial Mechanics. Considerable time must be spent in the work of the observatory. Fuller consideration will be given to these topics: the doctrine of the sphere; motions of the heavenly bodies; instrumental adjustments and methods; and various other mathematical practical features of the subject. The aim will be to familiarize the student with the practice and the problems of the working observatory. Watson's Theoretical Astronomy; Chauvenet's Practical Astronomy; Price's Analytical Mechanics. Fall term, 2 hours per week, winter and spring terms, 3 hours per week. This with Mathematics 16 and 17 constitutes a full study for each term. Assistant Professor MYERS.

Required: Astronomy 1.

4. Descriptive Astronomy.—For students in Colleges of Agriculture, Science, and Literature. The aim of this course is to supply (1) a general knowledge of the facts of astronomy, (2) a clear conception of the principles underlying them, and (3) an understanding of the methods of arriving at these facts. The subjects considered are the doctrine of the sphere, the heavenly bodies, their nature, dimensions, characteristics, and the influence they exert upon each other by their attractions, radiation, or any other ascertainable cause. The most important instruments of astronomical research are explained, and during favorable weather, the sun, moon, and planets will be studied with the equatorial telescope. Methods of spectroscopic research are discussed and, as far as possible, illustrated. Illustrative charts and lectures are also occasionally resorted to. Newcomb and Holden's Astronomy, Advanced Course, Spring term, full study. Assistant Professor MEYERS.

Required: Math. 3.

BOŢANY.

I. Histology, Morphology, and Physiology.—This course extends through one year, beginning in the fall. At first systematic studies are made upon specially difficult natural orders of flowering plants, as Compositæ, Cyperaceæ, and Gramineæ, with attention given to nomenclature and to the principles of classification. After vegetation has been destroyed by frost the remainder of the fall term is devoted to the histology of plants. Students make and study microscopical sections and other preparations, make micro-chemical tests, draw figures, and write descriptive notes. Lectures or text book recitations occur about twice a week.

The morphology and classification of special groups of plants, beginning with the lowest orders, constitute the work of the winter term. Compound microscopes are constantly in use, and the laboratory work is made the basis of instruction, variously aided and extended by the study of the text book and by lectures. Special attention is given to injurious fungi.

The third term is devoted to vegetable physiology, and includes: the extent and causes of the movements of fluids in the tissues; the absorption of nutrient materials, respiration, transpiration, and assimilation; the causes, peculiarities, and results of growth; the relations and effects of external agencies, as heat, light, gravitation; self- and cross-fertilization; variation and heredity; movements and sensitiveness. The instruction is given by lectures and recitations, supplemented by required observations and experimental practice. Bessey's Botany; Goebel's Outlines of Classification and Special Morphology; Vine's Lectures on Vegetable Physiology. Fall, winter, and spring terms, full study. Professor BURRILL and MISS BARBER.

Required: Chemistry 1; Art and Design 4.

2. Bacteriology.—Bacteria and allied organisms are now known to play exceedingly important roles in nature, and in the daily life and well being of man. This course is an introduction to existing knowledge upon the subject, and offers instruction in the modern methods of experimentation and research. The laboratory is well equipped for a limited number of students. Only those who can give extra time, when occasion demands, should undertake the work. Lectures and assigned reading accompany the laboratory work. Fall term, full study. Professor BURRILL.

Required: Botany 1 or 6; Chemistry 1; Art and Design 4.

3. Systematic Botany.—There is offered in this course an opportunity for advanced work in special groups of cryptogamic plants, to which an introduction is made in the winter term of course I. The determination and classification of species and studies upon life histories largely occupy the time. The methods of bacteriology are used in the cultivation of fresh material. Students who propose to take the course should give notice of the fact at the beginning of the year or earlier, and should make collections for themselves. Laboratory work constitutes the 'principal part of the course. Winter term, full study. Professor BURRILL.

Required: Botany 1, 2; Chemistry 1; Art and Design 4.

4. Plant Reproduction and Development.—Studies are made upon selfand cross-fertilization, embryology, and development, and upon special topics in physiology. Laboratory work, supplemented by lectures and assigned reading. Strasburger's Practical Botany; Detmer's Pflanzenphysiologisches Prakticum. Spring term, full study. Professor BURRILL.

Required: Botany 1; Chemistry 1; Art and Design 4.

5. Investigations and Thesis.—Facilities are offered for original investigations upon selected subjects upon which may be based a thesis required for a degree. Special arrangements should be made with the instructor during the preceding year, or at least not later than the beginning of the year in which the work is to be taken. Winter and spring terms, full study. Professor BURRILL.

Required: Botany 1; Chemistry 1; Art and Design 4.

6. General Botany.—This minor course is offered to students who have but a single term of botanical study. An endeavor is made to present a general view of the science and to provide an introduction to modern methods of work. Lectures or recitations, but mostly laboratory and field work. Spring term, full study. MISS BARBER.

CHEMISTRY.

- I. General and Experimental Chemistry.—This course is intended to serve as an introduction to the subject of chemistry, and is directed chiefly to the fundamental and general principles of the science. The work of the term consists of demonstrations, recitations upon the subject matter of the lectures and upon text book lessons, and of practice in the laboratory. The laboratory work, comprising a series of experiments illustrative of chemical principles and their applications, and involving a consideration of the properties of some of the more important elements and their compounds, serves in part as a preparation for the work of the class room. *Remsen's Introduction to Chemistry. Fall term, full study.* Professor PALMER and Mr.
- 2. Descriptive Inorganic Chemistry.—This course is required of all chemical students. It is mainly devoted to a study of the metallic elements, their classification, compounds, and chemical properties. The work is from lectures and assigned text (no laboratory work). Three hours per week. Remsen's Advanced Course. Winter and spring terms, half study. Professor PARR. Required: Chemistry 1.
- 3a. Qualitative Analysis.—This course includes a study of salts, their formation, solubilities, chemical reactions, etc. The periodic classification of the elements is made the basis for developing the principles of analysis. The work in the laboratory, after illustrating those principles, is occupied with the determination of base and acid constituents of a given number of unknown substances. Winter term, laboratory work 2 hours daily, and lectures 3 hours per week, full study. Professor PARR. Required: Chemistry 1.
- 3b. Qualitative Analysis, continued with more complex Substances.— A comparative study of methods, difficult separations, problems in synthesis, etc. Spring term, laboratory work 3 hours daily, full study. Professor PARR.

Required: Chemistry 1, 2.

4. Elements of Organic Chemistry.—A course in organic chemistry, provided more especially for students who are not making a specialty of chemistry. The instruction is directed mainly to the consideration of the general characteristics and the mutual relations of some of the most important classes of carbon compounds, and the course constitutes a general introduction to the principles and the methods of organic chemistry. In the laboratory a few typical substances are prepared. *Remsen's Organic Chemistry. Spring term*, *full study.* Professor PALMER.

Required: Chemistry 3a.

5a. Quantitative Analysis.—General principles and practice of gravimetric quantitative analysis, beginning with salts of definite composition. The purpose here is to gain facility and accuracy of manipulation together with a knowledge of the principles involved in the best practice. Lectures and assigned text from Fresenius's Quantitative Analysis accompanying the laboratory work. Fall term, full study. Professor PARR.

Required: Chemistry 3b.

- 5b. Volumetric Analysis, etc.—Volumetric Analysis, acidimetry, and alkalimetry, iodometry, etc., and electrolysis. Winter term, full study, laboratory work three hours daily. Professor PARR. Required: Chemistry 5a.
- 5c. Silicate Analysis, etc.—The analysis of feldspars, clays and other complex silicates. Spring term, laboratory work three hours daily, full study. Professor PARR. Required: Chemistry 5a.
- Technological Chemistry.—It is lecture room work only and comprises a study of technological chemistry as illustrated in those industries having a chemical basis for their principle operations and processes. Much use is made of the journals. Winter and spring terms, half study. Wagner's Chemical Technology. Professor PARR. Required: Chemistry 2, 3b.
- 7. Advanced General Chemistry.—A course in physical chemistry, consisting mainly of laboratory work. It comprises determinations of vapor density, specific heat, depression of freezing point, elevation of boiling point, and calculation of molecular and atomic weights from the data thus obtained, followed by use of refractometer, polariscope, and other instruments, in determining such constants as serve in characterization or for quantitative estimation of chemical substances, or which serve as the basis of theoretical generalizations. Occasional lectures and the reading of assigned subjects accompany the laboratory work. Fall, winter, or spring terms, full study. Professor PALMER.

Required: Chemistry 2, 5b; Physics 1, 3.

- Iron and Steel Analysis.—This course is devoted to iron and steel analysis. Methods for determination of all the constituents are studied, including both rapid and standard methods, especial attention being given to technical methods for determination of phosphorus and sulphur. Fall term, full study. MR. WHITE. Required: Chemistry 5c.
- 9. Organic Chemistry.—The work of this course consists in the detailed discussion of the characteristics of several of the more typical and simple organic compounds, followed by the briefer consideration of most of the important classes of the derivatives of carbon. The instruction comprises lectures, recitations upon assigned subjects, and laboratory work. Richter's Organic Chemistry is used as reference and text book. The laboratory work includes the preparation of organic compounds in accordance with the directions given in the manuals of Cohen, Fischer, and Levy, and the ultimate analysis of several of the finished products. Winter and spring terms, full study. Professor PALMER.

Required: Chemistry 2, 5a.

10. Sanitary Analysis.—Chemical examination of potable and mineral waters, Detection and estimation of some of the most important poisons, organic and inorganic, and urinalysis. Fall term, full study. Professor PALMER.

Required: Chemistry 5a.

11. Investigations and Thesis.—Candidates for graduation from the chemical courses are required to devote at least three hours per day for two terms to the investigation of some selected chemical subjects the results of which are to be embodied in a thesis. The subject must be announced immediately at the end of the Thanksgiving recess, and between that time and the beginning of the winter term an index to the bibliography of the subject must be prepared and presented to the professor who is in charge of the investigation. In the research work the student is required to make full use of the various sets of journals, not only for the purpose of preparing himself for the experimental portion of the work and arranging a proper introduction to the thesis, but also as an essential means of extending his acquaintance with chemical literature and drill in consultation of works of reference. Winter and spring terms, full study. Professors PALMER and PARR.

Required: Chemistry, 13 credits.

- 12. Theoretical Chemistry.—A course of instruction which includes discussions of the principles and theories of general chemistry. Ostwald's Outlines of General Chemistry. Winter and spring terms, half study. Professor PALMER. Required: Chemistry 5a.
- 13. Agricultural Chemistry.—A course of lectures upon the chemical principles and processes involved in agriculture, taken conjointly with laboratory practice in analysis of agricultural products and materials. Winter and spring terms, full study. Professor

Required: Chemistry 5a.

14. Metallurgy and Assaying.—Especial attention is given to the effect of impurities in ores upon metallurgical processes and finished products. Fuels, refractory materials, and fluxes are described and their value and application explained. A series of models of furnaces and specimens of furnace material and products are used in illustration. Much use is made of publications and any method for setting forth the present practice of actual plants in operation. Assaying is introduced as laboratory work for four or five weeks towards the end of the term, in connection with the study of the metallurgy of lead, silver, and gold ores. Fluxes, reagents, and charges are studied in connection with various typical ores and practice given in the use of the crucible and muffle furnaces and in the manipulations connected with fire assaying. *Fall term, full study*. Professor PARR.

Required: Chemistry 8.

15. Organic Analysis and Pharmaceutical Assaying.—One term's work, mainly devoted to proximate analysis of organic compounds and mixtures of natural occurrence or of other origin. The work is both qualitative and quantitative, and includes determinations of the more important alkaloids, carbohydrates, acids, and other essential constituents of organic substances. Dragendorff's Plant Analysis; Prescott's Organic Analysis; Allen's Commercial Organic Analysis; Lyon's Pharmaceutical Assaying. Spring term, full study. Professor PALMER.

Required: Chemistry 9.

16. Engineering Chemistry.—This course, arranged for students in chemical engineering only, deals with boiler waters, scale forming materials, determination of calorific power of coals, volatile material

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fixed carbon and ash, technical analysis of furnace gases, examination of lubricants, etc. *Winter term, full study*. Professor PARR. *Required:* Chemistry 1.

- 17. Engineering Chemistry.—This course is designed for students in electrical engineering only. It is devoted to elementary quantitative analysis (including the determination of some simple salts), the volumetric determination of iron, acidimetry, etc. Spring term, full study. Professor PARR. Required. Chemistry 3a.
- 18. Courses in special advanced work in toxicology, urinalysis, metallurg. ical chemistry, gas analysis, etc., consisting chiefly of laboratory work, may be arranged for those competent to pursue them. From one to three credits will be allowed in the undergraduate courses for such work. Professors PALMER and PARR.

CIVIL ENGINEERING.

I. Land Surveying.—Areas and distances by chain, compass, and plane table; U. S. public land surveys, including legal points involved in the re-establishment of boundaries, magnetic variation, and deter mination of true meridian. The students solve numerous problems in the field with instruments. To facilitate practice in surveying, an area has been specially prepared in which the difficulties of plane surveying are presented to the beginner as he is able to meet them, and where he is taught practical methods of overcoming them. All possible distances, directions, areas and elevations are accurately known; and hence the instructor knows beforehand the precise result which the student should obtain. This is an incentive to the student and enables the teacher to show him the degree of accuracy attained, and also to point out errors. *Bellows and Hodgman's Surveyors' Manual, Fall term, full study.* Assistant Professor PENCE.

Required: General Engineering Drawing 1; Math. 4.

2. Topographical Drawing and Surveying.—Topographical drawing is given during the bad weather of the winter term. The student spends about half a term making the standard topographical symbols. During the spring term topographical surveying is taught, in which students solve problems with the plane table and the stadia, and make a topographical survey and plot the notes. This and course 3 must be taken together. Winter and spring terms, half study. Assistant Professor PENCE.

Required: Math. 4; General Engineering Drawing 1, 2, 3; Civil Engineering 1.

3. Transit Surveying and Leveling.—Construction, adjustment, and use of the transit and level; angles, inaccessible distances, and areas with the transit; profiles and contours with the level. Two weeks' time is given to practice in running railroad curves. The department is provided with the instruments necessary for the different branches of engineering field practice, including chains, tapes, compasses, plane tables, stadias, transits, levels, barometers, base rods, and comparing apparatus, sextants, and solar transits. These instruments are in constant use by the students whenever the weather will permit. This and course 2 must be taken together. Baker's Engineers' Surveying Instruments. Winter and spring terms, half study. Assistant Professor PENCE.

Required: Math. 4; General Engineering Drawing 1, 2, 3. Civil Engineering 1.

4. Railroad Engineering.—In the field practice the class makes preliminary and location surveys of a line of railroad of sufficient length to secure familiarity with the methods of actual practice. Each student makes a complete set of notes, maps, profiles, calculations, and estimates. In addition to the mathematical theory of curves, turnouts, crossings, and the calculations of earth work, instruction is given by means of text books and lectures on the principles of economic location, particularly the effect of distance, grade, and curve upon operation and maintenance, and of methods of construction, equipment, and maintenance of way. Godwin's Railroad Engineers' Field-Book. Fall term, full study. Assistant Professor PENCE.

Required: Math. 4; General Engineering Drawing 1, 2; Civil Engineering 1, 2, 3.

5. Masonry Construction.—Requirements and methods of testing stone, brick, cement, and lime; composition, preparation, and strength of mortar and concrete; classification, construction, strength, cost of stone and brick masonry; foundations under water; theory of stability; cost, etc., of dams, retaining walls, bridge piers, bridge abutments, culverts, and arches. The students have experiments in the testing laboratory, in testing cement, mortar, stone, and brick. Baker's Masonry Construction. Fall term, full study. Professor Baker.

Required: Math. 2, 4, 6, 7, 8, 9; Theoretical and Applied Mechanics 1, 2; General Engineering Drawing 1, 2.

6. Geodesy.—Geodesy is taught by lectures and assigned reading. Studies are made of the instruments and methods employed in spirit, barometrical, and trigonometrical leveling; the apparatus and methods used in measuring base lines; the location and construction of stations; the method of measuring the angles and reducing the triangulation; the principles of projecting maps; the methods employed in running parallels and meridians. The apparatus consists of a 12-inch alt-azimuth instrument reading to single seconds, a precise level, aneroid and mercurial barometers, three wooden base rods, a comparator, a steel tape with level, thermometer, and spring balance. Problems are solved in barometrical, trigonometrical, and precise leveling, and in reading horizontal angles. Fall term, half study. Professor BAKER.

Required: Math. 4; General Engineering Drawing 1, 2, 3; Civil Engineering 1, 3; Descriptive Astronomy 2.

7. Practical Astronomy.—Lectures, recitations, and practice. The object is to familiarize the students with those principles of practical astronomy employed in extended surveying operations, and also to train the student in methods of exact observations. The apparatus consists of an observatory with five isolated stone piers; a 12-inch alt-azimuth instrument reading by micrometers to single seconds, both of altitude and azimuth; an astronomical transit; three chronometers; two sextants; two solar transits; and a set of meteorological instruments. The problems include the adjustments of all the instruments, and the determination of time, latitude, and azimuth by the several methods. Loomis's Practical Astronomy. Fall term, half study. Professor BAKER.

Required: Math. 4; General Engineering Drawing 1, 2, 3; Civil Engineering 1, 3; Descriptive Astronomy 2.

8. Bridges.—The instruction in bridges occupies two terms. (I) The first—bridge analysis—is devoted to the calculations of the strains in the various forms of bridge trusses, by algebraic and graphical methods, consideration being given to weights of bridge and train, and force of wind. (2) The second—bridge design—is devoted to designing bridges, proportioning sections, and working out of details. Each student designs and makes a full set of drawings of a

bridge. The apparatus consists of a series of full sized joints and connections of a modern iron railroad bridge, numerous models of bridges, a large collection of drawings, photographs, and lithographs of bridges. *DuBois's Strains in Framed Structures. Winter and spring terms, full study.* Professor BAKER.

Required: Math. 2, 4, 6, 7, 8, 9; General Engineering Drawing 1, 2; Theoretical and Applied Mechanics 1, 2; Architecture 6.

9. Tunneling.—This course, treating of methods of tunneling and mine attack, is given to students of civil engineering. The lectures treat first of the nature and use of explosives, compressed air and power drills. The methods of tunneling are then explained and discussed, with their accompanying methods of timbering and walling. Attention is given to the sinking of shafts for the working of tunnels, or for the purpose of driving. The details of the duties of a tunnel engineer are made as clear and concise as possible. Students are required to make written reports upon the methods employed in particular tunnels. Some time is given in the earlier part of the course to the practice in boring wells, dredging, quarrying, and subaqueous blasting. Spring term, full study. Professor BAKER.

Required: Math. 2, 4, 6; General Engineering Drawing 1, 2; Shop Practice A; Mechanical Engineering 4; Chemistry 1; Physics 1.

10. Surveying.—For students in the courses of architecture, architectural engineering, and mechanical engineering. Areas with chain and compass, U.S. public land surveys, and principles of re-establishing corners; use of transit in finding distances, areas, and in laying out buildings; use of the level in finding profiles and contours. Baker's Engineers' Surveying Instruments. Spring term, full study. Assistant Professor PENCE.

Required: Math. 4; General Engineering Drawing 1, 3; Physics 1.

II. Structural Details.—A study is made of joints and connections in wood and iron. Special attention is given to faulty methods of construction and to impress upon the student the importance of correctly proportioning the smallest details. Each student makes, preferably during the summer vacation preceding his senior year, a full detailed measurement of a railway or highway bridge, or of a trussed roof. In the class room he makes a drawing of the structure, computes the stresses, and reports upon the efficiency of each detail. Lectures, reference books and drawings. Winter term, full study. Professor BAKER.

ECONOMICS.

- Principles of Economics (elementary course).—This course is preliminary to all others, and is given every year. It is based on Ely's Outlines of Economics and Walker's Political Economy (advanced). Fall term, full study. Professor KINLEY.
- Principles of Economics (advanced course). This course examines in greater details the principles of the science in its most recent development, and aims to prepare the student for intelligent study of more advanced economic theory and practical economic problems. *Winter term, full study.* Professor KINLEY. *Required:* Economics I.
- Public Finance.—The historical, comparative, and critical study of the methods and purposes of public expenditure, and of the different sources of revenue, is the purpose of this course. It discusses public debts, also their placement and payment, including refunding and redemption. The course is based on Bastable's Public Finance. Fall and winter terms, half study. Professor KINLEY. Required: Economics 1, 2.
- 4. State and Local Taxation in the United States.—This course studies taxation in the various states and also in the cities, so far as they present features of special interest. It is based on *Ely's Taxation*. *Spring term, full study.* Professor KINLEY. *Required*: Economics 3.
 - Requirea: Economics 3.
- Money.—In this course a study of the history and functions of money is followed by a critical examination of such topics as the theory of prices, bimetallism, government paper issues, etc. Spring term, full study. Professor KINLEY.

Required: Economics 1.

6. Sociology.—In this course it is intended to study society in its normal structure. The theories of the nature of society, which have been advanced by various writers, are discussed in the light of the history of social institutions, and an effort is made to formulate some of the laws of social growth. Fall and winter terms, half study. Professor KINLEY.

Required: Economics 1.

7. Social Pathology.—This course comprises a somewhat detailed study of the problems of charity and crime, with a consideration of theories and methods of reform. *Spring term, half study*. Professor KINLEY.

Required: Economics 6.

8. Economic Seminary.—Advanced students will be formed into an economic seminary for investigation and the study of current economic literature. No student can be admitted who has not taken at least one full year's work in economics. The seminary will meet once a week for two hours during the year. Professor KINLEY.

In addition to the courses outlined under this head, the following offerings of other departments are accepted for credits in economic and social science for students who have taken Economics 1; Agriculture 4 (History of Agriculture), 5 (Rural Law); Anthropology 1, 2; Horticulture 2 (Forestry); Pedagogy 7 (History of Education); Philosophy 6 (Practical Ethics); Psychology 5, 6; and the courses in history, touching economical questions. Those who desire to take economics 6 and 7 are urged to take either previously or in conjunction with them some work in biology, and at least the Philosophy and Psychology named.

In the year 1895-96, courses 3, 4, 5, 6, and 7 will be replaced with courses on the financial history of the United States, banking, and the theory and practice of foreign and domestic exchange.

ELECTRICAL ENGINEERING.

 Dynamo-Electric Machinery.—Lectures and Laboratory. Theory, design, classification and tests of dynamo-electric machinery. This course is intended for students in Mechanical Engineering, and for others who need only a superficial acquaintance with dynamos and the necessary testing apparatus. Spring term, full study. Mr. Esty.

Required: Physics 1 and 3.

 Electromagnetism and Dynamos.—(1) Lectures on the theory and classification of electro magnets and dynamos. (2) Experimental study of electro magnets and direct current dynamos. (3) Electrical designing and draughting. Spring term, full study. Professor SHEA, Mr. ESTY, and Mr. SWENSON.

Required: Physics 4.

- Dynamo-Electric Machinery.—(1) Lectures on theory of dynamoelectric machinery, particularly motors and arc machines. (2) Experimental study of dynamo-electric machinery, particularly motors and arc machines. (3) Electrical designing and draughting. Fall term, full study. Professor SHEA, Mr. ESTY, and Mr. SWENSON. Required: Electrical Engineering 2.
- Alternating Currents and Alternating Current Machinery.—(1) Lectures on the theory and application of alternating currents. (2) Experimental study of alternating currents and alternating current

machinery. (3) Electrical designing and draughting. Winter and spring terms, full study. Professor SHEA, MR. ESTY, MR. SWENSON. Required: Electrical Engineering 4.

 Photometry.—Lectures and Laboratory. Study of arc and incandescent lamps in connection with their use in electric lighting. Winter term, half study. Mr. SWENSON. Required: Electrical Engineering 3.

 Telephony, Telegraphy, and Electric Signaling. Lectures and practice. This course includes the theory of telephone, telegraph, and electric signaling devices, and the construction, protection, and operation of lines. Winter term, full study. Mr. Estry.

Required: Electrical Engineering 3.

- Electro Metallurgy.—Lectures and Laboratory. Theory of electrolysis and practice in treatment of ores and electrolytic separation and refining of metals. Winter term, half study. Mr. ESTY. Required: Electrical Engineering 3.
- Lighting Plants.—Lectures, testing and draughting. This course includes the construction and use of arc and incandescent lamps; the methods of wiring for arc and incandescent lighting; rules and regulations, the equipment, and management of electric lighting stations; estimates. Spring term, full study. Mr. Swenson. Required: Electrical Engineering 4, 5.
- 9. Electrical Transmission of Power.—Lectures, tests and draughting. This course includes the construction, equipment, and operation of electric railways and stations; the utilization of water power; long distance transmission; applications of electricity in various engineering operations; estimates. Spring term, full study. Professor SHEA, Mr. SWENSON.

Required: Electrical Engineering 4 and 5.

10. Seminary.—Critical Discussion of current periodical literature of general physics and applied electricity. Professor SHEA.

ENGLISH.

- 1. General Survey of English Literature.—Fall, winter, and spring terms full study. Assistant Professor KATHARINE MERRILL.
- 2. Rhetoric and Themes.—For students in College of Literature. Fall, winter and spring terms, two-fifths study, with Oral Rhetoric and Oratory I receives 2 credits. Assistant Professor KATHARINE MER-RILL and Mr. T. A. CLARK.

- 3. Shakspere.—Two hours a week. Professor Dodge. History of the Drama. One hour a week. Professor Dodge. Prose writers from Johnson to Ruskin. Two hours a week. Assistant Professor KATHARINE MERRILL. Fall, winter, and spring terms, full study. Required : English I.
- 4. Themes.—Two hours a week. Optional course. Fall, winter, and spring terms, two-fifths study. Mr. T. A. CLARK. Required: English 2 or 8.
- 5. Poetry of the 19th Century.—Three hours a week. Assistant Professor KATHARINE MERRILL. Old and early English. Two hours a week. Professor Dodge. Fall, winter, and spring terms, full study. Required: English 3; French 1 or German 1.
- Eighteenth Century Prose.—Fall and winter terms. English Criticism. Spring term, 2 hours a week. Early English continued. Fall term. Chaucer's Canterbury Tales. Winter and spring terms, 3 hours a week. The whole, a full study. Professor Dodge. Required: English 5; French 1 or German 1.
- Special Course for Scientific Students.—General Survey of the history of the English language and literature. Fall and winter terms. Study of scientific prose. Spring term. The whole, a full study. Professor DODGE.
- 8. Rhetoric and Themes.—For students in Colleges of Agriculture, Engineering and Science. Three hours a week. Fall, winter, and spring terms, three-fifths study. Mr. T. A. CLARK.

GENERAL BIOLOGY.

I. General Advanced Biology.—For those who have taken a year's work in either botany or zoölogy, a single term of general biology is arranged and especially commended. It is intended to review, extend, systematize, and unify the student's knowledge of the phenomena, the history, and the laws of life, and of the relations of plant and animal, of living and not living matter, and of biology to the other sciences. It will be taught chiefly as a seminary subject, with occasional lectures and some study of text. It is especially a junior or senior study for students of the school of natural science. Spring term, full study. Professor FORBES.

Required: One year's work in full courses in either Botany or Zoölogy.

GENERAL ENGINEERING DRAWING.

I. Elements of Draughting.—This term's work is designed as a general preparation for draughting in all branches. Its aim is, first, to teach the accurate and intelligent use of instruments and materials; and, second, to start the student upon his work with those neat and orderly habits that are invaluable to the competent draughtsman.

The instruction is given by lectures and reference to books in the University library. The problems are arranged so as to be of the most practical benefit to the student, and, instead of being copies of similar problems, are designed to throw him upon his own ingenuity in applying his knowledge of principles learned. This work includes geometrical constructions; orthographic, isometric, and cabinet projections of objects from models or given data; drawings finished in line shading and water colors, in all about thirty plates. *Lectures and Blue Prints. Fall term, full study.* Mr. MCLANE and Mr. PHILLIPS.

2. Descriptive Geometry.—The first term's work in this study includes problems on the point, line, and plane, some of the simpler geometrical solids, and shades and shadows. The second term's work takes up plane, single-curved, double-curved, and warped surfaces; the generation and development of the same; sections and intersections. The application of principles and methods in numerous and varied practical problems is a large part of the work in each term, comprising in all the drawing of about thirty-nine plates. Church's Descriptive Geometry. Half of winter term, half study; spring term, full study. Mr. MCLANE and Mr. PHILLIPS.

Required: General Engineering Drawing 1.

3. Lettering — Plain and ornamental alphabets; round and stump writing; titles and title pages. *Winter term, half study*. Mr. MCLANE and Mr. PHILLIPS.

Required: General Engineering Drawing 1.

GEOLOGY.

I. Geology, Major Course.—(a) Dynamic Geology. The instruction given under this head is intended to familiarize the student with the forces now at work upon and within the earth's crust, modeling its reliefs, producing changes in the structure and composition of its rock masses, and making deposits of minerals and ores. A series of localities is studied in which great surface changes have recently taken place, with a view to ascertaining the character of the forces producing such changes, and the physical evidence of the action of like forces in the past. The subject is taught by lectures, and is abundantly illustrated by maps, models, charts, and views.

(b) Petrographic Geology. The instruction under this topic is given by lectures and laboratory work. The subjects included are the classification of rocks, the methods used in their determination, the conditions governing the formation of each species, the decompositions to which they are liable, and the products of these decompositions. Each student is supplied with a set of blowpipe tools and reagents and a series of hand specimens covering all the common species of rocks.

(c) Historical Geology. The work on this subject is substantially an introduction to the history of geology as a science, and the developmental history of the leading geological doctrines. An attempt is also made to trace the history of each geological period, so far as may be done with the data in hand.

(d) Paleontology. The scheme of instruction in this subject places before the student the classification adopted for those organic forms occurring as fossils, together with the succession of the various groups that occur in the strata, with the cause, as far as known, for their appearance and disappearance. The student is required to familiarize himself with selected groups of paleozoic fossils, abundant illustrations of which are placed in his hands. The subject is presented in lectures and demonstrations, each group being considered in connection with its nearest living representative.

(e) Economic Geology. The final term of this course is devoted to a study of the uses man may make of geologic materials, the conditions under which these materials occur, and the qualities which render them valuable. The instruction is given by lectures, with reference to the various state and government reports, transactions of societies, and monographs in which these subjects are treated, as well as by demonstrations with materials from the collections of the University.

In dynamic and historical geology Geikis's text book is used as a reference book. Petrography is pursued by means of a blue print adaptation of Rosenbusch for the crystalline rocks, and various authors for the fragmental. In paleontology Nicholson and Zittel are used for descriptions of the larger groups, Miller for general distribution, and the various state surveys for species. *Winter*, *spring, and fall terms, full study.* Professor ROLFE.

Required: Chemistry 3b; Physics 1 and 3, or 2; Mineralogy 1 or 2.

2. Investigations and Thesis.—For students who select a geological thesis guidance and facilities will be afforded for individual investigations in the field and laboratory. *Winter and spring terms, full study.* Professor ROLFE.

Required: Geology 1.

- 3. Engineering Geology.—It is the object of this course to bring together those parts of geology which will be of the greatest practical benefit to an engineer. The course will deal mainly with subjects connected with the origin, classification, and transformation of rocks, with the principles which govern the deposition and structure of rock masses; with the conditions under which the useful rocks and minerals occur, and the conditions which make them more or less valuable. The instruction is given by lectures and by demonstrations in the laboratory. Spring term, full study. Professor ROLFE.
- 4. General Geology, Minor Course.—This course includes a selection of such geological facts and theories as should be known to every intelligent person, with such discusssion of them as the time will permit. The subjects treated will be fully illustrated, and opportunity will be afforded for some study of rocks and fossils. Winter term, full study. Professor ROLFE.

GERMAN.

There are four years of instruction given in German. The first is devoted to the study of grammar supplemented by readers. In the second a select course of reading is followed with exercises in composition and conversation. In the third the study is conducted in German; the history of literature is studied from a manual and by lectures, accompanied by critical reading of classic and latest authors. The fourth year is primarily intended for graduate work and devoted to the study of Ancient German, the Gothic, Old High German, and Middle High German, with lectures on the literature of these periods, and study of the history of the language.

- For Students in College of Literature.—Joynes-Meissner's German Grammar; Joynes's German Reader. Fall, winter, and spring terms, full study. Professor SNYDER and Assistant Professor ELIZABETH C. COOLEY.
- For Students in College of Literature.—Reading, composition, and conversation. Harris's German Composition, White's German Prose, and a selection of Classics. Gœthe's Iphigenie, or Hermann

and Dorothea; Schiller's Maria Stuart, Wilhelm Tell, or Jungfrau von Orleans, etc. Also selections of modern prose. Freitag's Aus dem Staate Friedrichs des Grossen; Jensen die Braune Erica; Fouqué's Undine, etc. Fall, winter, and spring terms, full study. Professor SNYDER.

Required: German 1.

3. For Students in College of Literature.—The study in this year is conducted in German. History of German Literature, with lectures. Assigned reading and reports thereon. Texts, Bernhardt, Gœthe's Meisterwerke, Lessing's Nathan der Weise, or Minna von Barnhelm; Schiller's Wallenstein; Bucheim's Deutsche Lyrik, and selections from modern authors. Fall, winter, and spring terms, full study. Prosessor SNYDER.

Required: German 1, 2.

- 4. For Students in College of Literature.—Gothic Grammar and Reader (Wright), Old High German Grammar and Reader, Middle High German Grammar and Reader. Lectures on the formative periods of the language and their literature through the year. Fall, winter, and spring terms, three times a week, full study. Professor SNYDER. Required: German 1, 2, 3.
- 5. Special one year's course for students in Colleges of Agriculture, Engineering, and Science.—Joynes's Shorter German Grammar; Joynes's Reader: Hodges' German Science Reader. Fall, winter, and spring terms, full study. Assistant Professor ELIZABETH C. COOLEY and Mr. CARTER.
- 6. Special Scientific Readings. Equivalent of German 2 in the winter and spring terms. Gore's Science Readings; Seidensticker's Scientific Monographs; and assigned readings. Winter and spring terms, full study. Professor SNYDER and Assistant Professor ELIZABETH C. COOLEY.

GREEK.

I. Selections from Xenophon's Hellenica, with prose composition throughout the term. Studies in syntax will be prosecuted by making a systematic collation of the examples in the text. Library references to important matters, suggested by the narrative read, will be given, and summaries required. Fall term, full study. Professor Moss.

- Selections from Herodotus, with readings from Thucydides for comparison of style and historic method. Studies in Ionic etymology. Greek prose once a week, with particular reference to the syntax of the verb. Winter term, full study. Professor Moss. Required: Greek I.
- 3. Xenophon's Memorabilia. Lectures upon the work and influence of Socrates as a public teacher, with collateral readings upon assigned topics. Greek prose once a week. Spring term, full study. Professor Moss.

Required: Greek 1, 2.

- 4. Andocides De Mysteriis, with one of the shorter orations of Lysias, and Demosthenes. Comparative syntax of the pieces. The development of oratory among the Greeks, by lectures and library references. Fall term, full study. Professor Moss. Required: Greek 1, 2, 3.
- 5. Plato.—One entire dialogue and parts of others. Studies in the rhetoric and idiom of the author. Discussion of his philosophical views, so far as touched in the pieces read, with special reference to their antecedents, *Winter term, full study*. Professor Moss. *Required:* Greek 1, 2, 3, 4.
- 6. Greek Tragedy.—In 1894-5 Aeschylus' Seven against Thebes and Sophocles' Oedipus at Colonus will be read. Their history and method of production will be studied in connection with the history of the Greek drama, and of the construction of the Greek theatre. Spring term, full study. Professor Moss. Required: Greek 1, 2, 3, 4, 5.
- 7. Seminary, based upon Homer. Portions of the text will be assigned to each student to be read and used as a basis for the investigation of special topics. The results of such study will be read before the class, and be discussed and criticised. For the purpose of such study the library is well equipped with books. and the department with various appliances. Fall term, full study. Professor Moss. Required: Greek 1, 2, 3, 4, 5, 6.
- 8. Seminary. Continuation of course 7. Winter term, counts as full study. Professor Moss.

Required: Greek 1, 2, 3, 4, 5, 6.

 Course of semi-weekly lectures upon various phases of old Greek life, political, social, economic, etc. When needful the lectures will be illustrated by numerous photographs at hand, or by stereopticon views. The class will have readings prescribed, collateral to the subjects treated, which are to be synopsized and presented for criticism. Spring term. For those who take the lectures only, half study, for others counts as full study. Professor Moss.

HISTORY.

The study of history extends through the junior and senior years and includes general history, the history of civilization, and the history of the English and United States constitutions. The work of the two years is intended to be continuous, each term being helped by the one preceding; but the study of the constitutional history of the United States is arranged separately for students who have not had the course in general history. The work of the course is presented by text books, topics and lectures, and it is desired that students should obtain a considerable acquaintance with historical writers as well as facts.

- I. General history.—Three terms are given to general history (some previous knowledge of the subject being assumed) in tracing the outlines of the world's progress from the first appearance of civilization. The work is intended to be much more than an outline, however, and cause and effect, the philosophy of history, are carefully looked to as preparing the way for the special study of the history of civilization which follows. Fall, winter, and spring terms, full study. Mr. WINSTON.
- 2. History of Civilization.—In this subject the early state of mankind and the history of progress from that state on through the Greek and Roman periods is presented in lectures, followed by a consideration of the civilization of modern Europe on the basis of Guizot's Lectures. References are made to a considerable range of literature, and essays on various topics are required. Fall term, full study. Mr. WINSTON.

Required: History 1.

3. Constitutional History.—In the first term the time is given to an historical study of the English constitution with special reference to principles and precedents belonging equally to modern England and the United States. In the second term an historical and critical study is made of the constitution of the United States *Winter and spring terms, full study.* Mr. WINSTON.

Required: History 1.

4. Constitutional History.—For students who have not had the work in general history, a term is arranged giving a brief sketch of the principles of English government, and a study of the constitution of the United States. Winter term, full study. Mr. WINSTON.

HORTICULTURE.

- I. Fruit Culture.—Orchards, vineyards, small fruit plantations and their products constitute the main subjects of this term's work. Lectures are given upon propagating, planting, and cultivating trees and vines; upon identifying, classifying, and preserving fruits, and upon diseases and remedies. Studies are made upon illustrative material in the laboratory, and visits to the orchards and plantations form a part of the instruction. Fall term, full study. Professor BURRILL and Mr. MCCLUER.
- 2. Forestry.—This course embraces a study of forest trees and their uses, their natural distribution, and their artificial production. The relations of forest and climate are studied, and the general topics of forestry legislation and economy are discussed. *Lectures. Winter term, half study.* Professor BURRILL and Mr. MCCLUER.
- 3. Plant Houses and House Plants.—This study includes gardening and landscape architecture; the methods of construction, heating and ventilation, and general management of greenhouses, and the study of the kinds, propagation, growth, and care of flowering plants. Each student has practice in propagating by cuttings and otherwise, in potting and shifting, and in care of plants requiring various treatment. Insects and diseases, with remedies, are treated and the means of securing vigor of growth and abundance of flowers are studied and illustrated by practice. *Henderson's Practical Floriculture. Winter term, half study.* Professor BURRILL and Mr. McCLUER.
- 4. Gardens.—Kitchen and market gardens are made the first subjects of study, after which ornamental and landscape gardening occupies the time. Henderson's Gardening for Profit; Long's Ornamental Gardening. Spring term, full study. Professor BURRILL and Mr. MCCLUER.
- 5. Elements of Horticulture.—This is a minor course, intended for students who take but one term of horticultural work. The following topics are discussed: Orchard sites; the age of trees to plant. the season to plant; how to plant; what to plant; the management of the soil; pruning and care of trees; gathering and preserving fruit; diseases and injuries; the nursery; ornamental trees and shrubs; flower gardens; vegetable gardens, including propagating beds and

houses; the vineyard and small fruits, and timber tree plantation. Students have instruction and practice in grafting, budding, propagation by cuttings, etc. *Lectures. Fall term, full study.* Professor BURRILL and Mr. MCCLUER.

LATIN.

- Livy.—Selections from the XXI and XXII books. Hannibal and his contest with the Romans. Sight reading, Eutropius. Prose composition based upon the text of Livy in connected passages. A thorough review of noun and verb syntax. Fall term, full study. Professor BARTON.
- Cicero.—De Amicitia and De Senectute. Prose composition based on the text read. An outline of the philosophical systems then prevalent at Rome. Winter term, full study. Professor BARTON.

Required: Latin 1.

- Horace.—Selections from the Odes. Roman lyric poetry. Spring term, full study. Professor BARTON. Required: Latin 1, 2.
- 4. Cicero.—The First Book of the Tusculan Disputations; extracts from De Natura Deorum. The religious ideas of the Romans. Fall term, full study. Professor BARTON.

Required: Latin 1, 2, 3.

- Horace.—Selections from the Satires and Epistles. The private life of the Romans. Winter term, full study. Professor BARTON. Required: Latin 1, 2, 3.
- Plautus; Terence.—Captivi, or Trinummus; Phormio. Roman Comedy. Spring term, full study. Professor BARTON. Required: Latin 1, 2, 3.
- Tacitus.—Agricola; Annals, Selections. Fall term, full study. Professor BARTON. Required: Latin 1, 2, 3.
- Juvenal.—Satires. The social condition of Rome. Winter term, full study. Professor BARTON. Required: Latin 1, 2, 3.
- Vergil.—Teachers' Seminary. Extracts from the last six books of the Aeneid. Matters pertaining to the teaching of Latin are discussed, such as the preparation of the teacher, the conduct of the

recitation, the aim in Latin instruction and the advantages of the study. The students, at intervals, take charge of the class. Spring term, full study. Professor BARTON.

Required: Latin 1, 2, 3.

MATHEMATICS.

The instruction offered in pure mathematics constitutes two distinct lines of study differing in extent, partially in subject matter, and in the method of presentation. The first is for students in the Colleges of Agriculture, Science, and Literature, and occupies one year, beginning in the fall. It has for its object to promote habits of mental concentration and continuity of thought, to develop the capacity to form and combine abstract conceptions and to cultivate deductive reasoning. The second is primarily offered to students in the College of Engineering and occupies two years, also beginning in the fall. In addition to the educational object just given, the purpose is to enable the student to meet the requirements of his engineering studies. The greater part of the time is necessarily taken up with the theory and its applications to geometrical magnitudes.

The first line of study includes the courses numbered 1, 3, and 5; the second, courses 2, 4, 6, 7, 8, and 9.

- Advanced Algebra.—For students in the Colleges of Agriculture, Science, and Literature. Functions and their notations; series and the theories of limits; imaginary quantities; general theory of equations. Topical reviews of all preceding algebraic processes. Wells's College Algebra. Fall term, full study. Assistant Professor MYERS.
- 2. Advanced Algebra.—For students in the College of Engineering. Principles of small practical value are subordinated to those of higher utility. Accuracy and dispatch in the use of principles are continually emphasized. A topical review of principles of elementary algebra is made from time to time. This review is sometimes made by requiring students to solve practical problems illustrative of principles not well understood. Some of the most important subjects in which instruction is given are functions and their notation; the progressions; theory of numbers; permutations and combinations; probabilities; convergency and divergency of series; summation of series; undetermined coefficients; doctrine of limits; logarithms and general theory of equations. Networm's College Algebra. Fall term, full study. Assistant Professor Myers.

3. Trigonometry.—For students in the Colleges of Agriculture, Science, and Literature. Trigonometry, plane and spherical; fundamental relations between the trigonometrical functions of an angle or arc; relations between the functions of different angles or arcs; construction and use of tables; solution of triangles; angles as functions of sides, and sides as functions of angles; applications. Oliver, Wait, and Jones's Trigonometry. Winter term, full study. Assistant Professor Myers.

Required: Math. 1.

4. Trigonometry.-For students in College of Engineering. The ratio system is studied chiefly, but the necessary connection between it and the line system is carefully proved and illustrated. Students are frequently required to demonstrate the same proposition, using first the line values, then the ratio value of the functions. The subjects taught are the circular measurement of angles, general formulas of plane and spherical trigonometry, relations between functions of multiples of 90° plus or minus an angle, solution of right and oblique plane triangles, of spherical right and oblique triangles, Napier's rules and analogies, and practical applications of principles to the solution of astronomical problems. Teaching is in part by text book, and in part by assigning principles to be demonstrated and problems to be solved outside of the text book. Oliver, Wait, and Jones's Trigonometry, Winter term, full study. Assistant Professor Myers.

Required: Math. 2.

5. Conic Sections (geometrical method).—Definitions and general properties of the ellipse, hyperbola, and parabola, curvature of the conic sections; elements of analytical geometry. Properties and relations of the point and right line in a plane of the conic sections. Coffin's Sections and Analytical Geometry. Spring term, full study. Assistant Professor MYERS.

Required: Math. 1, 3.

6. Analytical Geometry.—The aim is to acquaint the student with analytical methods of investigation and to familiarize him with some of the most recent developments in synthetic geometry; to make him more skillful in the use of algebraic processes, especially as a means of demonstrating geometric properties of loci. Subjects considered are the elementary theory of the point and right line in a plane; use of abbreviated notation; elementary theory of the conic sections,

their equations and properties developed analytically; poles and polars; synthetic geometry of the circle, and the discussion of the general equation of the second degree. Newcomb's Analytic Geometry. Spring term, full study. Assistant Professor MyERS. Required: Math., 2, 4.

7. Differential Calculus.—Variables and functions; limits and infinitesimals; differentials and derivatives; differentiation of explicit functions, implicit functions and functions of several variables; derivatives of higher orders; successive derivatives; developments in series; maxima and minima of functions; indeterminate forms; plane curves, tangents and normals; asymptotes, singular points and curve tracing; theory of envelopes, of curvature, of evolutes and involutes. Newcomb's Differential and Integral Calculus. Fall term, full study. Professor SHATTUCK.

Required: Math. 2, 4, 6.

8. Advanced Analytical Geometry—Position and direction in space; the plane; the straight line in space; quadric surfaces.

Modern Geometry.—The principal of duality; the distance ratio; the simi ratio; the anharmonic ratio and properties; projective properties of figures; harmonic points and lines; Pascal's theorom and its correlative; trilinear co-ordinates; line co-ordinates. Newcomb's Analytical Geometry. Winter term, full study. Professor SHATTUCK.

Required: Math. 2, 4, 6, 7.

9. Integral Calculus.—Elementary forms of integration; integrals immediately reducible to the elementary forms; integration by rational transformations; integration of irrational algebraic differentials; integration of transcendent functions; definite integrals; successive integration; differentiation under the sign of integration; integration by means of differentiating known integrals; double integrals; triple and multiple integrals; product of two definite integrals.

Rectification and quadrature; the parabola, the ellipse, the cycloid, the Archimedean spiral, the logarithmic spiral, the limniscate, the cycloid, quadrature of surfaces of revolution and of surfaces in general, cubature of volumes; the sphere, the pyramid, the ellipsoid, any solid of revolution, and of volumes in general. Newcomb's Differential and Integral Calculus; Newcomb's Analytical Geometry. Spring term, full study. Professor SHATTUCK.

Required: Math. 2, 4, 6, 7, 8.

10. Theory of Equations.—The development of the general properties of equations; relations of the roots and coefficients of equations, with applications to symmetric functions; transformation of equations; solution of reciprocal and binomial equations; algebraic solution of cubics and biquadratics; properties of derived functions; the limits and separation of the roots of equations; the solution of numerical equations of the nth degree. Burnside and Panton's Theory of Equations. Fall term, full study. Assistant Professor TOWNSEND.

Required: Math. 2, 4.

11. Theory of Determinants.—It is designed to give the student a thorough working knowledge of the subject and of its applications. It will, in general, cover the origin and notation of determinants, properties of determinants, determinant minors, multiplication of determinants, determinants of compound systems, determinants of special forms—Jacobians, Hessians, Wronskians—with applications to algebra including linear transformations, and to analytic geometry. Weld's Theory of Determinants with selected chapters from Scott's Theory of Determinants. Winter term, full study. Assistant Professor TOWNSEND.

Required: Math. 2, 4, 6, 7.

12. Theory of Invariants.—The course will cover the general development of the theory of invariants from both the geometric and the algebraic side. Applications of invariants will be made to systems of conics and to higher plane curves. Salmon's Modern Higher Algebra will be followed in part, but frequent use will be made of Gordan's Invariantentheorie. Spring term, full study. Assistant Professor TOWNSEND.

Required: Math. 7, 10, 11.

13. Theory of Functions.—By way of introduction, considerable attention will be given to the geometric representation of the complex variable, including Argand's diagram, conformal representation, and harmonic ratios, and bilinear transformation. This will be followed by the development of the theory of infinite series, algebraic and transcendental functions, integration of uniform functions. Riemann's surfaces, and so much of elliptic functions as the time will permit. Harkness and Morley's Theory of Functions. Fall term, full study. Assistant Professor TOWNSEND.

Required: Math. 8, 9, 12.

14. Method of Least Squares.—The object of this course is to present the fundamental principles of the subject in a manner so plain as to render them intelligible and useful to students of astronomy and engineering. The following subjects will be studied: Law of probability and error, adjustment of observations, precision of observations, independent and conditioned observations, etc. Merriman's Least Squares. Fall term, three hours per week. This, with Astronomy 3 two hours per week, makes a full study. Assistant Professor MYERS.

Required: Mathematics 7, 8, 9.

- 15. Seminary and Thesis.—Fall, winter, and spring terms, half study.
- 16. Differential Equations.—This subject is designed for students in the courses of engineering and mathematics and astronomy. It will embrace the following topics: General linear equations with constant coefficients, special forms of differential equations of higher order, integration of series, etc. A. R. Forsyth's Differential equations. Winter and spring terms, three hours per week. This, with Astronomy 3 of winter and spring terms, constitutes a full study. Assistant Professor MYERS.

Required: Math. 7, 8, 9.

17. Analytic Geometry of Space.—A general review will be given of the position of the plane and the right line in space and the more general properties of surfaces of the second degree. To this will be added the classification of quadrics, special properties of quadrics, foci and confocal surfaces, general theory of surfaces, curves and developables, families of surfaces, and surfaces of higher orders. Charles Smith's Solid Geometry, with references to Salmon's Geometry of three Dimensions. Winter term, full study. Assistant Professor TOWNSEND.

Required: Math. 7, 8, 11.

18. Higher Plane Curves.—The course is designed to cover the general properties of Algebraic curves, including the theory of multiple points and tangents, curve tracing, poles and polars, and reciprocal curves; to which will be added envelopes, cubics and quadrics, transcendental curves, transformation of curves, and the general theory of curves. Salmon's Higher Plane Curves. Spring term, full study. Assistant Professor TOWNSEND.

Required: Math. 8, 9, 12.

MECHANICAL ENGINEERING.

1. Shop Practice A.—In the shops the students are advanced in the work as fast as their ability will permit. The work, as far as possible, is carried along the same lines as those practiced in our leading commercial shops. The exercises are in general chosen from parts of machines under construction, being carefully graded according to the skill of the student. The policy of the department is to give the student every possible advantage and to teach him to produce accurate work in the shortest possible time.

Beginning with the care and use of the tools with which he is to work, the student is carried through the various operations of machine shop practice. The following outlines the work in the several shops as laid down for the regular classes, the work of the several terms being subject to transposition.

First Term, Wood Shop.—Primary exercises relating to the use and care of tools, and the construction of a series of exercises in joint work and turning preparatory to pattern making.

Second Term, Wood Shop.—The work of this term is devoted largely to the making of patterns and core boxes, particular attention being given to the principles of molding.

Third Term, Foundry—The student here receives instruction in the management of the cupola and molding, including green and dry sand core making. *Fall, winter, and spring terms, full study.* Mr. CURTISS.

 Shop Practice B.—First Term, Forge Shop.—Instruction is given in the forging and welding of iron and steel, special attention being given to the forging and tempering of lathe and planer tools, annealing and case hardening.

Second Term, Machine Shop.—During this term the student receives instruction in chipping, filing, and elementary lathe and planer work.

Third Term, Machine Shop.—Lathe, planer, drill, shaper, or bench work. *Fall, winter, and spring terms, half study.* Mr. CLARK and Mr. JONES.

 Shop Practice C and Laboratory.—First Term, Machine Shop.— Lathe, planer, milling machine, grinding machine, or bench work. Second Term, Machine Shop.—Advanced work on any of the machines in the shop, or erecting and fitting.

Third Term, Mechanical Engineering Laboratory.—Fall, winter, and spring terms, half study. Assistant Professor VANDERVOORT, Mr. CLARK, Mr. CURTISS, and Mr. JONES. 4. Elements of Machine Design .- The basis of this work is found in Klein's Elements of Machine Design. A series of plates 26x40 inches are constructed, covering a wide range of machine parts. There are 334 formulas, empirical and rational, the use and derivation of which are explained. By means of a large number of practical examples, sufficient drill is obtained in using them to enable the student to make the calculations required when designing such parts of machines as screw threads, nuts and bolts, rivets and riveted joints, keys, connecting rod ends, belts, pulleys, stepped cones, shafts, end and neck journals, pivots, and bearings for rotating pieces. Problems relating to gearing are taken up, such as exact and approximate methods of laying out profiles of teeth, proportions of teeth for strength and durability; circular and diametral pitch; cast and cut gears; sizing of blanks; gear cutters; wooden teeth: spur, bevel, and worm gearing, and proportions of worm gearing for highest efficiency. Fall, winter, and spring terms, full study.

Required: General Engineering Drawing 1, 2, 3.

5. Mechanism.—A study of the nature and equivalence of mechanisms. Determination of centrodes. Graphical diagrams of the paths, speeds, and accelerations of important points of familiar mechanisms. Laying out of cams. Analysis of difficult mechanisms. Determination of velocity ratios. Particular attention is paid to problems relating to motions of gearing, steam engine mechanisms, parallel motions of indicators, governors, link motions, valve gears, and indicator riggings. Fall term, full study. Professor BRECK-ENRIDGE.

Required: Math. 2, 4, 6; Mechanical Engineering 1, 2, 4.

6. Steam Engines and Boilers.—A study of the details of modern engines and boilers and of the principles involved in their construction and operation. Text books used are: The Steam Engine, Holmes, and A Treatise on Steam Boilers, Wilson-Flather. Winter term, full study. Assistant Professor VANDERVOORT.

Required: Math, 2, 4, 6; Theoretical and Applied Mechanics 1.

7. Thermodynamics.—The fundamental principles underlying the transformation of heat into work, more especially as exemplified in the steam engine, are carefully studied. Considerable attention is paid to the solution of numerous examples, such as will arise in steam, air, or gas engineering, as well as drill in the rapid and accurate use of standard steam tables. *Fall term, full study*. Professor BRECKENRIDGE.

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics 1; Physics 1, 3.

8. Mechanics of Machinery.—This is a study of the theoretical principles involved in the construction of such machinery as comes under the head of hoisting apparatus, pumping engines, air compressors, fans, blowers, machinery for transmitting power, locomotives, pile drivers. Winter and spring terms, full study. Professor BRECKEN-RIDGE.

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 5, 6, 7, 11.

9. Machine Design.—This work follows the design of a high speed steam engine, and comes under two heads:

Advanced Design.—Under this head the work begins with simple machines and extends to more difficult designs as the student progresses. The design of attachments to existing machines, or the complete design of some machine that can be built in the shops, is often a part of this work. Such designs as hoists, pumps, drills, lathes, shapers, water motors, etc., are undertaken and the student is supplied with the same information as he would be in commercial offices for this kind of work.

Original Designs.—In this work the student's previous training in designing is combined with his inventive ability, and often valuable and ingenious work is done. The machines are to be designed for accomplishing a certain prescribed work. Often but a single piece is handed the student, and a machine is required to produce a given number of these pieces per hour.

A large amount of study of existing machines is required. The student is taught to consult the standard works on designing, such as Unwin, Reuleaux, Klein, Marks, Richards,, and to use such pocket books as Nystrom, Haswell, Taschenbuch der Hütte, etc. Winter and spring terms, full study. Professor BRECKENRIDGE.

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 1 to 8, and 11.

 Estimates.—Calculations and estimates are made as to the cost of machinery, power, plants, boilers, chimneys, systems of piping, engines and their foundations, different methods of power transmission. Also forms of contracts and specifications are studied. Spring term, full study.

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics I, 2, 3; Mechanical Engineering I to 6, 9, 11, 12.

11. Valve Gears and Steam Engine Design.—Under this head the steam engine is carefully studied in all its details. A series of plates are drawn showing for the minimum, average, and maximum horse power the pressure of steam on the piston at all points of the stroke, the pressures at cross head, crank pin, crank shaft at all crank angles; taking into account the forces of inertia combined with the steam pressures—counterbalancing crank disc, weight of fly wheel. Each part of a complete engine is designed, and detailed drawings made and traced so that each member of the class may have a complete set of blue prints.

The work in valve gears will be done partly by recitations and partly by drawing room work. The application of graphical diagrams as an aid in the study and design of valves for engines is carefully brought out. *Fall term, full study.* Assistant Professor VANDERVOORT.

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics r, 2; Mechanical Engineering r to 7.

12. Mechanical Engineering Laboratory.—This work is a continuation of the work begun during the last term of the junior year. It consists of a study of such instruments as are found in the mechanical engineering laboratory, methods of using and calibrating scales, thermometers, gauges, indicator springs, planimeters, counters, calorimeters, brakes, etc. Experiments are made with engines, pumps, injectors, boilers, motors, etc., to determine under what conditions they may be expected to give a maximum efficiency. A limited amount of commercial testing may be undertaken. Tests of plants in the vicinity are made a feature of this work. Carefully prepared reports are always required. Special investigations and research are undertaken as far as possible. Fall, winter, and spring terms, full study.

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 1 to 7, 11.

METEOROLOGY.

 Meteorology.—The study of those atmospheric movements which bring our changes of weather, with their relations to heat, cold electrical conditions, wind, cloud, barometric pressure, etc., constitutes the work of the first half of the fall term. Abercrombie's Weather is used as an introductory text book; but most of the instruction is given by lectures, the study of charts, and attempts by the student to forecast weather changes. Fall term, half study. Professor ROLFE.

Required: Chemistry 3b; Physics 1 or 2.

MILITARY SCIENCE.

- 1. Drill Regulations.—For all male students. School of the soldier; school of the company in close and in extended order; bayonet exercise. Fall and winter terms, one-fifth study. Professor HILLS.
- 2. Drill Practice.—For all male students. Six terms, two-fifths study. Professor HILLS.
- Recitation and Practice for Military Class.—(a) School of the battalion, close and extended order; artillery drill.

(b) Ceremonies, review, and inspection; military signaling; sword exercise; artillery drill.

(c) Guard, outpost, and picket duty; military signaling; artillery drill.

(d) Military administration; reports and returns; theory of fire arms; target practice.

(e) Organization of armies; field fortifications; art of war. Seven terms; recitations, 1 to 2 hours a week; drill, 2 hours a week. Professor HILLS.

MINERALOGY.

I. Elements of Mineralogy.—The first term's work is intended to be a general introduction to the subject. Instruction is given both by lectures and in the laboratory. In the lectures, which occur on specified days (2 or 3) each week, such subjects as follow are discussed: genesis of minerals; conditions favoring their deposition; origin of the massive and crystalline forms; relationships of minerals, and their classification; the physical properties of minerals; as color, luster, hardness, gravity, streak, etc., with the conditions which may cause these properties to vary; elements of crystallography, etc.

In the laboratory the student is first made acquainted with the simplest trustworthy methods for proving the presence or absence of the acids and bases. He is then required to determine a large number of species by their physical and chemical properties only. *Fall term.* Professor ROLFE.

Required: Chemistry 4.

2. Crystallographic Mineralogy.—(I) During the second term a careful study of the forms of crystals is made, including the measurement of angles and determination of complex forms. The student is also required to identify many species of minerals by their crystalline forms, and to verify his conclusions by the methods in use during the preceding term.

(2) Optical Mineralogy.—The work of the third term will be devoted to the microscopic determination of rock forming minerals; to the methods for separating the mineral constituents of fine grained rocks, etc., etc. Winter and spring terms, full study. Professor RolfE.

Required: Mineralogy 1.

MUNICIPAL ENGINEERING.

I. Road Engineering.—Instruction is given by means of text books and lectures. In country highways the value and importance of road improvement and the best means of securing it are considered, together with the principles and details of construction of earth, gravel, and macadam roads. In city streets, the methods of construction, cost, durability, and desirability of the various kinds of pavement, and the question of grades, cross sections, methods of assessment of cost, and methods of maintenance and cleaning are treated. Gilmore's Roads, Streets, and Pavements; Lectures and Reading. Winter term, with Civil Engineering 4, makes a full study. Professor TALBOT,

Required: Math. 4; General Engineering Drawing 1, 2; Civil Engineering 1, 2, 3, 4.

2. Water Supply Engineering.—This subject is intended to cover the principal features of the construction of water works, including the tests and standards of purity of potable water; the choice of source of supply; the designing of the distribution system, pumps and pumping machinery, reservoirs, stand-pipes, and the filtration of water. Lectures; Fanning's Water Supply Engineering. Fall term, full study. Professor TALBOT.

Required: Theoretical and Applied Mechanics 1, 3; Chemistry 1; Mechanical Engineering 6. 3. Sewerage.—The design and methods of construction of sewerage systems for cities, including the following: sanitary necessity of sewerage; water carriage systems, both separate and combined; surveys and general plans; hydraulics of sewers; relation of rainfall to storm water flow, and determination of size and capacity of sewers; house sewage and its removal, form, size, design, and construction of sewers and sewer appurtenances; modern methods of sewage disposal by filtration, chemical precipitation, irrigation, etc., with resultant changes in the sewage; estimates and specifications. Lectures; Staley and Pierson's Separate System of Sewerage. Winter term, full study. Professor TALBOT.

Required: Theoretical and Applied Mechanics 1, 3; Chemistry 1.

- 4. Botany.—This is a study of the lowest orders of plants, including such species as are most commonly met with in microscopical examinations of water, and found associated with putrescent substances. Lectures or recitations and microscopical laboratory work. This is practically the same as the first part of the second term of Botany I, in College of Science. Winter term, half study. Professor BUR-RILL.
- 5. Bacteriology.--For students in course in municipal engineering. This course includes the identification and classification of bacteria, and of allied organisms, their relations to health and to disease, the methods of separation and cultivation, and the methods of air and water analysis. The laboratory is furnished with sterilizers, culture ovens, microscopes, etc., and students have abundant opportunity to do practical work. This is at first the same as Bacteriology r, in the College of Science, but in the latter part of the term special investigations are undertaken by the engineering students. Fall term, full study. Professor BURRILL.

Required: Municipal and Sanitary Engineering 4.

MUSIC.

Music is not included in the courses for graduation in any department of the University, but instruction is given to all students who desire to take either vocal or instrumental lessons in connection with their regular work, and to others who register specially for the work of this department. For the latter no entrance conditions are required. For fees see this subject in latter part of this catalogue. Miss KIMBALL

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ORAL RHETORIC AND ORATORY.

- Oral Rhetoric.—(1) Mechanism of voice, breathing, voice building, voice development, articulation, pronunciation, modulation, principles of position and gesture. (2) Reading aloud, thought analysis, prepared reading, sight reading, recitations. Fall, winter, and spring terms, one hour a week, one-fifth study. With English 2 counts 2 credits. Miss KELLOGG. Required: English 2.
- Oratory.—(1) Melody of speech, grouping, emphasis, rhythm, inflections. (2) Conversation, extempore speech, analysis, study of orations, original work, philosophy of expression. Fall, winter, and spring terms, one hour a week, one-fifth study. Miss KELLOGG. Required: English 2; Oral Rhetoric and Oratory 1.
- 3 For Students in Colleges of Agriculture, Engineering and Science.— A special course of one year is offered. It comprises practical training in physical presentation and the management of the voice. Reading from manuscript, memoriter speaking and extemporaneous address. Fall, winter, and spring terms, one hour a week, one-fifth study. Miss KELLOGG. Required: English 8.
- Elective Expression.—(1) Rendering, impersonation, dialect reading, character sketches, modern plays, comedies, Shakspere, dramatic action, pantomime. (2) Public addresses, bible and hymn reading, reading of church service, delivery of sermons, conduct of meetings. Fall, winter, and spring terms, one hour per week, one-fifth study. Miss KELLOGG.

Required: Oral Rhetoric and Oratory 1, 2.

PEDAGOGICS.

I. General Pedagogy.—This course discusses the purpose of the public schools and the means that they furnish for its attainment. The relation of instruction to character, the choice of a course of study, the relation of the branches of instruction to one another, and the general principles which underlie method in the teaching of all subjects are the chief topics for consideration. This course aims to show what is meant by a science of pedagogics, and includes the points usually considered under pedagogical psychology. Fall and winter terms, full study. Professor MCMURRY. 2. Special Method.—This course considers how the theory advanced by the course on general pedagogy finds application in the school room. The method of teaching each study will be discussed. In company with the professor of pedagogy the students will visit public schools in the vicinity and compare the observations there made; they will also prepare recitations on definite topics. Both they and the professor of pedagogy will frequently hold recitations in the public schools and receive criticisms on the plan of the recitations and the manner of its execution. The desire here is not only to cause pedagogical principles to be better understood by seeing how they are applied, but to give students much practice in planning and criticising recitations in a scientific manner. Fall, winter, and spring terms, half study. Professor McMURRY.

Required: Pedagogy 1; or taken with Pedagogy 1.

3. Pedagogical Seminary.—The seminary will be simply a round table in which frequently one of the recitations observed in the public school will undergo especially careful criticism. Occasionally an article in some educational journal, a new book on education, or a particularly interesting question in pedagogy will be the subject of discussion. At times the students will be asked to read papers on certain topics, and discussion of the same will follow. *Fall, winter, and spring terms, half study (two hours together).* Professor MC-MURRY.

Required: Pedagogy 1; or taken with Pedagogy 1.

4. Philosophy of Education.—In this course portions of Bain's Education as a Science, Spencer's Education, and other well known works on education will be used as a basis and will be supplemented with lectures. Spring term, full study. Professor McMURRY.

Required: Pedagogy 1.

- 5. School Government.—This subject treats of the government of pupils, punishments, etc., duties of principal and superintendent, their relation to school boards, to parents of pupils and to their assistant teachers. Spring term, full study. Professor McMURRY.
- 6. School Hygiene.—The aim of this course is entirely practical. The endeavor is to enlighten those taking the course upon the best methods to be pursued with reference to the following points pertaining to school buildings: Location, soil, elevation, and surroundings; form of structure, ventilation, heating, lighting, plumbing; equipment, especially furniture; play grounds and apparatus

for physical exercise. The course will be illustrated with views of school buildings that are more or less perfect in their hygienic arrangements, and visits to school houses will be made from time to time. Lectures and assigned readings. *Winter term, full study.* Professor McMURRY.

7. History of Education.—This course consists of a study of Greek ideas in regard to education; the system of education of the middle ages and of modern reformers, such as Comenius, Locke, Rousseau, Basedow, Pestalozzi, Frœbel, etc. Fall and winter terms, full study. Professor McMURRY.

Required: Pedagogy 1.

- Teaching in the Model School.—Teaching in this school will consist of a daily recitation in a single study throughout one term.
- Arrangements for such instruction will be made with the professor of pedagogy. *Fall, winter, and spring terms, full study.* Professor McMURRY.

Required: Pedagogy 1.

PHARMACY.

1. Pharmacy.—This course is intended to serve as an introduction to the theory and practice of pharmacy.

Instruction consists of lectures and text book work, with recitations upon the history of pharmacopœias, weights and measures, specific gravity and the general operative methods of pharmacy, problems in calculating formulas in parts by weights and percentage strengths, chemical proportions, etc. *Remington's Practice of Phar*macy. Fall term, full study. Mr. SANDFORD.

 Pharmaceutical Preparations. — This work consists of practice in manufacturing samples of the various official and unofficial preparations.

The student is not required to prepare a great number of each class, but as it is necessary to have sufficient practice to become expert in the manipulation involved, he is directed to make as many as will accomplish that end. Satisfactory work is required on over one hundred preparations. When this work is completed, it is thought that the field of manufacturing pharmacy will be sufficiently covered to give the student a solid foundation for his future work.

Accompanying the laboratory work is a study of all the official and the important unofficial preparations, recitations from text books, lectures and laboratory work. U. S. Pharmacopaia; National Formulary; U. S. and National Dispensatories. Winter and Spring terms, full study. Mr. SANDFORD.

Required: Chem. 1; Pharmacy 1.

- 3. Pharmacognosy.-This course is intended to make the student thoroughly acquainted with the chemicals and drugs found in the pharmacy and used by the medical profession. The work begins with comparative studies of the salts, etc., used in medicine and of the methods of readily distinguishing between chemicals of like appearance, at the same time their physiological action, dose, sources, and methods of manufacture are considered in a general way. Following this, the organic materia medica is taken up. A complete study of the animal and vegetable drugs, including a close study of the pharmacopœial, English, and common names. By continued practice at the desks the student becomes familiar with all the roots, leaves, seeds, barks, etc., in use, and by the aid of a lens and pocket knife should be able to recognize any of the substances employed in the practice of pharmacy. Maisch's Organic Materia Medica: U. S. Pharmacopaia. Fall term, first year; spring term, second year. Mr. SANDFORD.
- 4. Pharmaceutical Technology.—The sources, manufacture, uses, etc., of the inorganic and organic substances used in pharmacy. Impurities and means of detecting them. Official standards of purity and strength. Prescription reading and practice. The latinity of prescriptions, study of incompatibilities and rules for dispensing.

Finally a general review of the two year's work in pharmacy to serve in part as a preparation for the examination required by the State Board of Pharmacy for registration as pharmacists. U. S. and National Dispensatories; U. S. Pharmacopaia; Remington's Practice of Pharmacy. Fall and winter terms, full study. Mr. SANDFORD.

PHILOSOPHY.

 Outlines of Philosophy.—The object of this course is to furnish a general introduction to the study of Philosophy. It is designed not only for the students who have a special interest in the subject but also for the benefit of those desiring a general knowledge of Philosophy and who have but a single term for the study. The most important problems of Philosophy are presented in lectures and discussions. Selections from several writers are read. Fall term, full study. Dr. DANIELS.

- Greek Philosophy.—A rapid survey is taken of the development of philosophical thought in Greece, from its beginning through Neo-Platonism. Selections from the writings of Plato and Aristotle are read and discussed. In the Post-Aristotelian philosophy, Stoicism, Epicureanism, and scepticism receive special attention. Fall term, full study. Dr. DANIELS.
- 3. Modern Philosophy.—This course considers the formation and development of the problems and conceptions in philosophy from Descartes to the present time. Selections from the philosophical masterpieces of this period are carefully studied. Special emphasis is laid upon the philosophy of Kant. Winter and Spring terms, half study. Dr. DANIELS.
- 4. Philosophical Seminary.—This course has two objects. A somewhat critical and thorough study of subjects of special prominence in philosophy, e. g., realism, idealism, and theory of knowledge. No text book is used. Topics are assigned and papers, prepared by the students, are read and discussed in the class.

Acquaintance with current philosophical thought. To this end various articles on different aspects or problems of modern philosophy are read and criticised. *Spring term, half study.* Dr. DANIELS.

5. Advanced Philosophy. The work consists in a critical study of Lotze's Microcosmus, together with supplementary readings and discussions upon suggested topics. The course is designed for somewhat advanced students and is open to those who have received at least two credits in philosophy or have done an equivalent amount of work in this department. Winter and Spring terms, full study. Dr. DANIELS.

Required: Philosophy 2, 3.

- 6. Practical Ethics.—In this course those questions which bear the closest relation to life and conduct are raised and discussed. The duties of the individual, the family, and the state are among the subjects considered. Special subjects in social ethics may be taken up, including the duties of society to the unfortunate and delinquent classes. Winter term, half study. Dr. DANIELS.
- 7. History and Criticism of Ethical Theories.--A careful and historical examination of the various types of ethical theory, including rational, hedonistic, eudemonistic, esthetic, and evolutional ethics. It is designed to make the student as familiar as the time allows with the writings of representative men of the various schools. Spring term, full study. DR. DANIELS.

8. Logic.—This course aims to give a knowledge of the principles of deductive and inductive reasoning. In deductive logic, special attention is given to an analysis of the syllogism and a study of its functions and logical value. In inductive logic, the problem, grounds, and principles of induction are discussed. This study is designed not only to direct the student in practical reasoning and correct thinking, but also to familiarize him with the principles and methods of scientific investigation. Winter term, full study. Dr. DANIELS.

PHYSICAL CULTURE FOR WOMEN.

This course furnishes a liberal education of the body according to modern scientific methods. Each student comes under the personal observation of the instructor and is graded for work according to her physical condition. Special attention is given to defects of bodily carriage and movement, and prescriptions of exercises are given for the correction of round shoulders, uneven hips, drooping heads. The training has for its fundamental aims, health, strength muscular flexibility and grace. It is divided into practical and esthetic work, and includes German, French, and Swedish exercises. The Delsarte culture is studied after the practical gymnastic drill is acquired. It is thoroughly taught as the higher use of the muscles, and includes artistic principles in the management of the body.

An outline of two years' work is as follows: Free hand gymnastics, light gymnastics, the day's order, the nine laws of Ling, plain and fancy marching, apparatus work, Delsarte culture, studies in expression and attitude, pantomime.

Every woman student, not physically disqualified, may take this gymnastic drill three times a week for three or six terms, and for this work, satisfactorily performed, one credit or two credits, respectively, are allowed toward graduation from any University course. Attendance and proficiency will be considered in each term's standing, of which records will be made as for other class credits. MISS KELLOGG.

PHYSICS.

 General Descriptive Physics.—Lectures. This course is designed for those who wish to gain a knowledge of the more important laws and phenomena of physical science, and of the means for exhibiting, studying, and applying such laws and phenomena. It is prescribed for the students in the College of Engineering. Three times a week. Fall, winter, and spring terms, two-fifths study. Professor SHEA. Required: Math. 3 or 4.

2. Elementary Physical Measurements.—Laboratory. This course is designed for those who wish to become acquainted with the simple methods only for the qualitative and quantitative study of physical phenomena. Once a week. Fall, winter, and spring terms. Professor SHEA.

Required: Math. 3 or 4.

Advanced Physical Measurements.—Laboratory. This course is designed for those who wish to study quantitatively by the aid of the more accurate scientific methods the chief laws and phenomena of physical science. It is prescribed for students in the College of Engineering, and must be taken by them in same year with Physics I. Once a week. Fall, winter, and spring terms, three-fifths study. Professor SHEA.

Required: Math. 3 or 4.

4. Advanced Electrical Measurements.—Lectures and Laboratory. This course is a discussion of the theory of electricity, particularly with respect to electrical units, and electrical measuring instruments, together with laboratory work in advanced problems in electrical measurements. It is prescribed for students in electrical engineering. *Fall and winter terms, full study*. Professor SHEA, Mr. ESTY, and Mr. SWENSON.

Required: Physics 1 and 3; Math. 7, 8, 9.

 Mathematical Theory of Electricity and Magnetism.—A general treatment of electrostatics, electro-dynamics, magnetism, and electromagnetism. Fall, winter, and spring terms, full study. Professor SHEA.

Required: Physics 1 and 3; Math. 7, 8, 9.

6. Mathematical Theory of Heat, Light, or Sound.—A general treatment of the more important problems of heat, light, or sound. Fall, winter, and spring terms, full study. Professor SHEA. Required: Physics 3; Math. 7, 8, 9.

PHYSIOLOGY (Human).

 Major Course. —Taking as a basis the knowledge of the structure and physiology of mammals obtained in Zoölogy 1 and 3, there is made a systematic study of the differences, so far as they are of physiological import, between the anatomy of man and of the type mammal there studied; a more detailed study of the facts and methods of mammalian histology; and finally, with as much fullness as the time will permit, a study of the special physiology of man. In the laboratory work the topics are selected to illustrate so far as possible the different methods of obtaining physiological data. *Winter and spring terms, full study*. Assistant Professor SUMMERS.

Required: Chemistry 4; Zoölogy 3*.

2. Advanced Physiology.—The first term is devoted to a study of the physiology of foods, digestion, and excretion, illustrating the application of chemical principles and methods to physiological research. The second term is given to a study of the blood, the circulation, and the respiration. This involves principally the application of physical methods, and practice in the use of instruments of precision. The third term is occupied with a study of the muscular and nervous systems. Fall, winter, and spring terms, full study. Assistant Professor SUMMERS.

Required: Physiology 1; Physics 1.

- 3. Investigation and Thesis.—An opportunity for original investigation, upon which may be founded the graduating thesis, is offered to students in their senior year. While the instructor will have a general supervision of this work, it is expected that the student will at all times take the initiative, seeking only such information and advice as he would ask of any co-worker in his department of science. Winter and spring terms, full study. Assistant Professor SUMMERS. Required: Physiology 1, 2.
- 4. Minor Course.—This course is planned for literary students and for students of natural science specializing in other lines. While some attention is paid to all the important processes of the body, especial emphasis is laid upon those facts that serve as a basis for practical hygiene. Fall term, full study. Assistant Professor SUMMERS.

Required: Chemistry 1.

POLITICAL SCIENCE.

 Political Science.—This is a short course in comparative constitutional law and administration, based on the second volume of Bruges' Political Science and Constitutional Law. Spring term, full study. Professor KINLEY.

^{*}In 1894-95 a special course in general and vertebrate zoölogy will be given, which will take the place, so far as the requirement for Physiology 1 is concerned, of Zoölogy 3, for those students who have not had the latter.
PSYCHOLOGY.

- r. General Psychology.—In this introductory course are considered the more general problems of the mental life of the normal individual, especially those that have a living interest for the student, and find illustration in his every day life. Among the large number of topics discussed the following are the chief: Relation of mental activity to bodily changes, sensation, habit, attention, memory, imagination, association of ideas, reasoning, instinct, emotion, will, localization of cerebral functions, time relations of mental phenomena. The course is amply illustrated by the use of apparatus, charts, prepared tissue, and photographs. Endeavor is made to give the class the more important results of recent researches. A considerable number of the best reference books have been purchased, and all the important Psychological journals are taken. *Fall term, full study*. Assistant Professor KROHN.
- 2. Laboratory Psychology.—This course is made up of lectures and laboratory work, with assigned reading. The class performs a series of about one hundred experiments to illustrate the time relations of mental processes, the influence of mind and body upon each other, and the psychic factors in sensation. The psychological laboratory of the University is already well equipped with apparatus, to which additions are constantly making. The current literature in this field is discussed in class and made the basis of reports and reviews on the part of the students. Winter and spring terms, half study. Assistant Professor KROHN.

Required: Psychology 1.

- 3. Comparative Psychology.—This course embraces the study of the more elementary mental activities, as manifested in the life of various animals. The object of this course is to trace the development of mind along the animal scale, ranging from the lower forms to the more complex mental phenomena in the conscious life of man. *Romanes and Lloyd-Morgan. Winter term, half study.* Assistant Professor KROHN.
- 4. Educational Psychology.—In this course are discussed the growth and development of the mind, especially with reference to the first years of childhood. The attempt is made to devise methods by means of which the content of a child's mind may be determined at any period of its development. Thus the various methods of testing

and training the memory, attention, and other mental powers, will be submitted and employed in actual observations, upon which notes will be made for discussion in class. The order in which the various mental capacities unfold will also form an important theme for study. The course is thoroughly practical in its nature. *Krohn's Practical Lessons in Pyschology. Fall term, half study.* Assistant Professor KROHN.

- 5. Psychology of Crime.—This course consists of a special study of the criminal as a morbid individual in comparison with the normal person. Spring term, half study. Assistant Professor KROHN. Required: Psychology I.
- 6. Psychology of the Abnormal Types.—In this course the following, among other subjects, will be studied: The chief forms of mental disease or types of insanity, the diseases of memory, the diseases of language, the diseases of will, double personality, peculiar dreams, hallucinations, illusions and delusions, and hypnotism. The life of the blind, deaf, and imbecile will be inquired into with a view to determine the best methods of education for these classes. Winter term, half study. Assistant Professor KROHN.

Required: Psychology 1.

7. Advanced Experimental Psychology.—Work in this course is arranged for each student individually, and may involve a systematic review by laboratory methods of some master work in Experimental Psychology, or it may involve original research. The aim is to give treatment to certain special problems, necessitating original research, and the verification of important features in earlier experiments. Fall, winter, and spring terms, full study. Assistant Professor KROHN.

Required: Psychology 1, 2.

8. Psychological Seminary.—The subject and hours to be determined after consultation with those who apply. The work in this course is chiefly in the line of discussion of physiological topics and special investigation, as well as reports on the recent psychological literature. All students pursuing major work in this department are required to take an active part in the seminary during their second year. Assistant Professor KROHN.

ROMANCE LANGUAGES AND LITERATURES.

FRENCH.

 For Students in College of Literature.—The course begins with a study of grammatical constructions, with exercises in composition and conversation. Careful attention is given to French pronunciation. Reading of the representative works of modern authors, such as Halévy, George Sand, Jules Verne, Erckmann-Chatrian, and others. *Fall, winter, and spring terms, full study.* Mr. PIATT.

- For Students in College of Literature.—(1) Rapid reading of the representative novels of Chateaubriand, X. de Maistre, Lamartine, Victor Hugo, George Sand, Balzac, Halévy, Erckmann-Chatrian, and others. (2) Outlines of the French literature of the seventeenth, eighteenth, and nineteenth centuries. *Fall, winter, and spring terms, full study.* Professor BRUNER and Mr. PIATT. *Required:* French 1 or 5.
- For Students in College of Literature.—(1) Rapid reading of the representative dramas of Corneille, Racine, Molière, Voltaire, Beaumarchais, Victor Hugo, Sandeau, Augier, Dumas, Sardou, and others. (2) Lectures on the origin and development of the French drama. (3) Outlines of the French literature of the Middle Ages and the Renaissance. Fall, winter, and spring terms, full study. Professor BRUNER.

Required: French 2.

4. For Students in College of Literature, but Primarily for Graduate Students.—(1) Old French Readings. Clédat, Les Auteurs Français du Moyen Age; Suchier, Aucassin et Nirolete; Gautier, La Chanson de Roland. (2) Physiological Phonetics, Lectures; Sweet, A Primer of Phonetics; Passy, Les Sons du Français; Beyer, Französische Phonetik. (3) Old French Philology. Lectures on the development of Old French from the Popular Latin; Swan, Altfranzösische Grammatik. Fall, winter, and spring terms, full study. Professor BRUNER.

Required: French 3.

5. For students in Colleges of Agriculture, Engineering, and Science.— This is similar to course r, but less attention is given to grammar and more to translation from French into English. Fall, winter, and spring terms, full study. Mr. PIATT.

ITALIAN.

I. Grandgent's Italian Grammar; rapid reading of modern authors; Dante's Divina Commedia; outlines of Italian literature. Fall, winter, and spring terms, full study, 1894-5. Professor BRUNER.

Spanish.

 Manning's Spanish Grammar; rapid reading of modern authors; Cervantes' Don Quijote; outlines of Spanish literature. Fall, winter, and spring terms, full study, 1895-6. Professor BRUNER.

THEORETICAL AND APPLIED MECHANICS.

I. Analytical Mechanics.—The mechanics of engineering, rather than that of astronomy and physics, is here considered, with a view to the future needs of the student of engineering. In addition to fixing the fundamental concepts and demonstrating the general principles of equilibrium and motion, application of principles and methods is made to numerous and varied engineering problems in such a way that the student must discriminate in the use of data and in the statement of conditions, and so obtain a working knowledge of the subject. The methods of the calculus are used whenever preferable. As mathematical processes and forms express most readily and quickly the rules and methods of work, the training in this direction is important. This subject requires a thorough working knowledge of the mathematics preceding it in the course.

Outline of the subject: Nature and measure of force; composition and resolution of forces; moments; conditions of equilibrium; resultant of systems; of forces; center of gravity; moment of inertia; rectilinear and curvilinear motion, and the relation between such motion and the constraining and accelerating forces; dynamics of a rigid body; momentum and impact; work, energy, and power; mechanical advantage; friction. Bowser's Analytical Mechanics. Fall term, full study. Professor TALBOT.

Required: Math. 2, 4, 6, 7, 8, 9.

2. Resistance of Materials.—In the treatment of this subject it is the aim to give the student a thorough training in the elementary principles of the mechanics of materials, to follow with such experiments and investigations in the testing laboratory as tend to verify the experimental laws, and to add such problems in ordinary engineering practice as will train the student in the use of his knowledge.

Outline of the subject: Elasticity of materials; stresses and strains; experimental laws; working strength for different materials; resistance of pipes and riveted joints; bending and resisting moment; shear and elastic curve of cantilever, simple, restrained, and continuous beams; column formulas; torsion. and shafts; maximum internal stresses in beams; fatigue of metals; working strength for repeated stresses; resilience; reliability of the common theory of flexure, as shown by actual experiment; design and strength of rolled and built beams and columns; specifications for materials and methods of testing. *Merriman's Mechanics of Materials. Winter term, full study.* Professor TALBOT.

Required: Math. 2, 4, 6, 7, 8, 9; Theoretical and Applied Mechanics 1.

 Hydraulics.—In hydraulics the instruction is by text book and laboratory work.

The subject covers the following: Weight and pressure of water; head; center of pressure; velocity and discharge through orifices, weirs, tubes, pipes, conduits, canals, and rivers; measurement of pressure, velocity, and discharge; motors and meters; water power. Merriman's Hydraulics. Spring term, full study. Professor TALBOT-Required: Math. 2, 4, 6, 7; Theoretical and Applied Mechanics 1, 2.

4. Applied Mechanics.—To be taken instead of Analytical Mechanics. The course of study and topics studied will be nearly identical. *Peck's Elementary Mechanics. Fall term, full study.* Assistant Professor MYERS.

Required: Mathematics 2, 4, 6.

5. Strength of Materials.—To be taken instead of Resistance of Materials. The course of study will be nearly the same, though somewhat simplified. *Merriman's Mechanics of Materials. Winter term*, full study. Assistant Professor MYERS.

Required: Mathematics 2, 4, 6; Theoretical and Applied Mechanics 4.

VETERINARY SCIENCE.

- I. Anatomy and Physiology.—The anatomy and physiology of the domestic animals constitute the subjects of instruction for a term. The instruction is given by lectures, aided by demonstrations with use of skeletons and models illustrating the details of structure and formation of parts. This is supplemented by the study of text books. Strangeway's Veterinary Anatomy; Smith's Physiology of the Domestic Animals. Fall term, full study. Professor McINTOSH.
- 2. Principles and Practice of Veterinary Medicine.—This subject comprises veterinary medicine, surgery, and hygiene, and is taught by lectures and text books, and illustrated by specimens of morbid anatomy, with observations and practice at the clinics. The latter are held at the veterinary infirmary, where a large number of animals are treated or operated upon once each week. Dissections and

post mortems are made. Williams's Practice of Veterinary Medicine and Surgery; Courtney's Practice of Veterinary Medicine and Surgery. Winter and spring terms, full study. Professor McINTOSH.

3. Materia Medica.—The substances and agents used for the prevention or cure of disease and for the preservation of health are studied in this course. The instruction is given by lectures and text books. In the illustrative collections are specimens of all the drugs used. Dun's Veterinary Materia Medica; Wood's Human Materia Medica. Fall, winter, and spring terms, full study. Professor MCINTOSH.

ZOÖLOGY.

1. General Zoölogy, Major Course.-The three terms' work here described forms a continuous course, beginning in the winter term of the freshman year and ending with the fall term of the sophomore year. It is the immediate object of this course to lay the foundation for a working knowledge of zoölogy, and its secondary object to draw from zoölogical science its distinctive discipline as an element in a liberal education. It is planned with a view to giving to students a wide acquaintance with the methods of zoölogical research in field, laboratory, and library, and a general acquaintance with zoölogical theory and the leading facts of observation and experiment upon which such theory rests. It is devoted especially to a series of laboratory studies of animal types, and to lectures on the morphology, physiology, and relations to nature of this selected series. The laboratory work includes dissections of the crayfish and earthworm, serial sections of the latter and of Hydra, and numerous studies and preparations of the Protozoa. Lectures on the structure, physiology, and classification of the Protozoa, their relations to plants and to the organization, embryological development, and history of the higher animals, are made to elucidate and illustrate the general theory of zoölogy, which is here presented in outline to be filled in and completed as the work proceeds. The general zoölogy of the remaining lower invertebrate forms, incluing Vermes, finishes the work of the term.

The second term is devoted to the morphology, physiology, and general classification of the remaining invertebrates, with principal attention to the Arthropoda. It is directed especially towards the entomological course of this department, and is required of all students expecting to take entomology. The laboratory work includes a study of the embryology of some insect form, and a considerable amount of semi-independent work upon the invertebrate fresh water fauna of the region.

The third term's work is done on vertebrates, with principal attention in the laboratory to anatomical work on the larger animals. The general method of the work is that of comparative anatomy, with special reference to the anatomy of man, this part of the course being directed particularly towards the physiological courses of the University which follow upon it. Philosophical zoölogy takes the form in this term of a course of lectures on the general theory of organic development, illustrated by a systematic study by lectures and reading of the modern doctrine of the descent of man. *Winter*, *spring* (freshman), and fall (sophomore) terms, full study. Professor FORBES and Mr. SMITH.

Required: Chemistry 1.

2. This course consists of the first and second terms' work of Zoölogy 1. It will be accepted as major work on the list of restricted electives from those who follow it with Zoölogy 4. Winter and spring terms, full study. Professor FORBES and Mr. SMITH.

Required: Chemistry 1.

3. This course consists of the first and third terms' work of course 1. It will be accepted as major work under the list of restricted electives from those who follow it with Physiology 1. Winter and fall terms, full study. Professor FORBES and Mr. SMITH.

Required: Chemistry 1.

4. Entomology.—This course of two terms should be taken by preference in the sophomore year. It is practically a sequel to course 2 in general zoölogy, the work of the second term of that course being directed especially towards entomology.

Presuming upon a general knowledge of the Arthropoda, the instruction begins with more detailed work on Insecta. The greater part of the course consists of laboratory studies of the structure and classification of insects; practice in the determination of species and the description and illustration of species and structures; field work and observation, including the collection of specimens of all orders and stages, aquatic and terrestrial; office work in the preparation, labeling, and arrangement of collections; a systematic independent study of life histories of selected species, with full records, descriptions, and drawings; experimental insecticide work; and library practice in the collection, collation, indexing, and abstracting of the literature of the species principally studied; concluding with a thesis on a single species studied both biologically and experimentally. Special instruction is given in this course in the art of entomological illustration, under the supervision of an expert natural history artist.

It is intended that the student shall come through this course accomplished in all the methods of the zoölogical laboratory as applied to entomology, competent to determine, to draw, and to describe species, and experienced in the various operations of field, laboratory, library, and economic entomology. *Winter and spring terms*, *full study.* Professor FORBES and Mr. JOHNSON.

Required: Zoölogy 1 or 2.

5. Embryology.—A course in comparative vertebrate embryology is offered in the winter term. The laboratory work will be chiefly devoted to the practical study of the development of the chick. The student will become familiar with approved methods of sectioning, reconstruction from sections, and other means of embryological study. The more general features of vertebrate embryology will be covered by lectures and required reading. *Winter term, full study.* Mr. SMITH.

Required: Zoölogy 1, 2, or 3.

6. Advanced Zoölogy.—To students who have had course 1, 2, or 3, an opportunity is offered for a year's work, two hours a day, in advanced zoölogy, to be taken individually under the guidance of an instructor. It may be closely adapted to the bent and ability of the student. Three main lines of work will, however, be especially provided for: (1) Systematic zoölogy (including paleontology), with field and laboratory work in the collection, determination, and description of species; (2) œcological studies with a basis in field observations and laboratory experimentation; (3) comparative anatomy and embryology, or other morphological work. A full study of the theory of development, with application in detail to the genealogy of some group of animals is recommended for all students in this course.

Very unusual facilities for the work of this year are at hand in the library and collections of the State Laboratory of Natural History, which occupy rooms convenient to those of the zoölogical department of the University. *Fall, winter, and spring terms, full study.* Professor FORBES.

Required: Zoölogy 1, 2, or 3.

7. Thesis Investigation.—Candidates for graduation in the College of Science who select a zoölogical subject as a thesis are required to spend at least two hours a day for the winter and spring terms of their senior year in making an independent investigation of some selected zoölogical subject. While this work is done under the general supervision of an instructor, it is in its methods and responsibilities essentially original work. Winter and spring terms, full study. Professor FORBES.

Required: Zoölogy 1, 2 and 4; or 3 and 5.

8. General Zoölogy, Minor Course.—For the benefit of students of natural science specializing in some other direction, as well as for literary students desiring some general knowledge of zoölogy, a course of a single term is offered which contains enough laboratory and descriptive work to give a practical idea of the method of zoölogical science, and a sufficient number of lectures, with study of text, to cover the general subject in a cursory manner. Principal attention is paid to the Protozoa, to insects, and to birds. Winter term, full study. Mr. SMITH.

PRIZES AND SCHOLARSHIPS.

THE HAZLETON PRIZE MEDAL.

Capt. W. C. Hazleton provided a medal, of beautiful and artistic design, which is to be awarded at a competitive drill to be held near the close of the year, to the best drilled student. Each competitor must have been in attendance at the University for at least sixteen weeks of the current college year; must not have had more than four unexcused absences from drill; and must present himself for competition in full uniform.

The award will be made on the following points:

- 1. Erectness of carriage, military appearance, and neatness.
- 2. Execution of the school of the soldier, without arms.
- 3. Manual of arms, with and without numbers.

The successful competitor will receive a certificate setting forth the facts, and may wear the medal until the 15th day of May following, when it will be returned for the next competition.

HONORARY SCHOLARSHIPS.

Provision has been made for one honorary scholarship for each county in the state. The holder of the scholarship may attend the University for four years, under proper regulations, free of charge for tuition or incidental expenses. The total value of this scholarship in \$90.

Several of these scholarships are already occupied. The vacancies in other counties will be filled as follows.

Examinations are to be held in the several counties, under the supervision of the county superintendents thereof, on the second Friday and Saturday of June, at such places as the superintendents may select. Candidates for the examination must be approved in the common English branches by the superintendents. Questions will be furnished from the University, and the answers, in writing, will be sent to the University for judgment. The scholarship will be awarded to the candidate who passes the best examination, provided he has a standing in each subject of not less than 75, and an average standing on all the subjects of not less than 80 per cent.

Each pupil who enters the examination may choose whether he will be examined to enter upon a course in the Colleges of Agriculture, Engineering, or Science, or one of the courses in the College of Literature.

In the first case, the subjects of his examination will be algebra, geometry, physiology, botany, natural philosophy, and English rhetoric and composition.

In the second case, the subjects will be as above, three books of Cæsar, five orations of Cicero, and six books of the Aeneid.

The two classes of examinations are intended to conform to the requirements stated under the head, *Examinations for Admission*, p. 153. It is essential that the examinations in the counties be held at the time named above, publicly, and with reasonable notice; requests for special or private examinations cannot be considered.

ACCREDITED SCHOOL SCHOLARSHIPS.

Scholarships in the University are offered to high schools on its accredited list, one a year to each school, upon the same terms and subject to the same conditions as the HONORARY SCHOLARSHIPS heretofore established, except as noted below:

1. Examinations for the *accredited school scholarships* will be held at the several accredited schools, by the principals thereof, on the third Thursday and Friday in May.

2. There need be no advertisement of the examination, further than by principals to all pupils eligible to pass the same.

3. The term of each scholarship will be for the two school years next after the examination upon which it was awarded, and vacancies will not be filled, except that if any person to whom a scholarship has been awarded shall be unable to accept the same, then the next highest in the competition may be awarded the scholarship.

4. Scholarships will be awarded on these examinations to such persons only as shall be full graduates of their several accredited schools, either of the current or some preceding year.

CHICAGO CLUB LOAN FUND.

The CHICAGO CLUB OF THE UNIVERSITY OF ILLINOIS offers two loans of \$250.00 each, payable to the beneficiary, \$100.00 the first year, \$75.00 the second year, \$50.00 the third year, and \$25.00 the fourth year. The loans are offered to residents of Cook County, Illinois, only, and are to be awarded upon competitive examination to those obtaining the highest average grades. The loans are due six years after matriculation. They bear no interest while the student is in school, but six per cent after graduation. The examination questions are prepared at the University and cover the same subjects as those for the honorary scholarships.

MILITARY SCHOLARSHIPS.

Students who have gained six term credits in class room military instruction and six such credits in drill practice are eligible for appointment as commissioned officers of the battalion. Those attaining this rank may have awarded them special scholarships, good for one year and equal in value to the University term fees for the same length of time.

FELLOWSHIPS.

The University offers four fellowships, open to graduates of this or other similar institutions, conditioned upon required qualifications and a designated amount of service to the University. Each fellowship is good for one year and has a money value of \$400.00, payable in ten monthly installments. Appointments to these fellowships are made upon the grounds of good character, high attainments, promise of distinguished success in the line of studies chosen, and of usefulness to the University. The holders of the fellowships are required to give instruction in assigned subjects 5 to 10 hours a week during the year. The time remaining is to be devoted to graduate study, and fellows are enrolled as members of the graduate school. Advanced degrees are open to them as to other members of this school.

SOCIETIES.

The Literary Societies have from the opening of the University en joyed its fostering care.

The ADELPHIC and PHILOMATHEAN societies, for men, and the ALETHENAI, for women, occupy spacious halls, which the members have furnished and decorated with taste and elegance. Meetings are held Friday evenings throughout the term time, are well attended, and are maintained with unflagging interest. They furnish excellent drill in writing, speaking, and parliamentary methods.

Both the YOUNG MEN'S and YOUNG WOMEN'S CHRISTIAN ASSOCIA-TIONS are active and useful organizations and have a large membership.

Subscriptions have been made by students and graduates, amounting to about \$15,000.00 towards a new building for these organizations. A canvass has been started outside with the hope of raising the sum to \$35,000.00. If this is successful the building will be begun at once. An excellent site has been purchased.

Special organizations unite the students of NATURAL HISTORY, of CIVIL ENGINEERING, of MECHANICAL ENGINEERING, of ARCHITECTURE, of AGRICULTURE, and of CHEMISTRY, and in ATHLETICS.

REGULATIONS AND ADMINISTRATION.

ADMISSION.

[For further information than is here given address W. L. Pillsbury, Registrar, Urbana, Ill.]

Examinations of candidates for admission to the University, or to any of its departments, are held at the University Thursday, Friday, and Saturday before the beginning of the fall term in September and on the two days previous to the opening of each of the other terms, and at other times and places specially announced.

Applicants must be at least sixteen years of age, and it is considered desirable that they be two to three years older than this. They must pass the required examinations, and must pay the prescribed fees. No distinction is made in regard to sex, nativity, color, or place of residence. Entrance may be made at any time, provided the candidate is competent to take up the work of the classes then in progress; but it is very much better to begin upon the first collegiate day in September, when a large number of the classes are organized, several of them to continue during the year. Satisfactory entrance may usually be made at the beginning of the winter term.

The engineer and architect should be adepts in the various departments of drawing, and some previous study of this branch will be of great advantage. Faunce's Mechanical Drawing is recommended as a text book, and the drawings should be made on smooth paper, eight by ten inches, then inked properly.

ENTRANCE EXAMINATIONS.

The subjects upon which entrance examinations are held are numbered and described in the list given below. Those required for the several colleges and courses are designated by the groups of numbers corresponding to the subjects in the list. The physics, physiology and botany described are each required as preparatory to these subjects as taught in this University. The text books are named only to aid in showing the requirements. Equivalents are accepted,

- I. For the Preparatory Classes.-Subjects I, 2, 3, 4.
- 2. For the Colleges of Agriculture, Engineering, and Science.—Subjects, I, 2, 3, 4, 5, 6, 7, and any three from 12, 13, 14, 15, 16, 17, 18. Instead of the literature part of 5, 10 or 11 will be accepted; but candidates presenting one of these will be required to take one year's advanced language work in his undergraduate course.
- 3. For the College of Literature.—Subjects I, 2, 3, 4, 5, 6, 7, 8, and any three from 12, 13, 14, 15, 16, 17, 18. For those who desire to take courses including Greek, 9 is required and may be presented instead of the three sciences which would otherwise be selected from 12 to 18.
- 4. For entrance to the University without designation of a particular department.—Subjects 1, 2, 3, 4, 5, 6, 7, and any three from 8, 9, 10, 11, 12, 13, 14, 15, 16, 17. In this case special attention must be paid to the requirements for entrance to particular classes as given above and in connection with the description of the subjects taught, p. 87; also to the requirements for a degree, if this is desired, p. 163.
- 5. Persons over twenty-one years of age, not candidates for a degree, may be admitted to classes, after satisfying the Regent and professor in charge of the department in which such classes are taught, that they possess the requisite information and ability to pursue profitably, as special students, the chosen subjects. Such students are not matriculated; they pay the fees required of students in the preparatory classes.

SUBJECTS FOR ENTRANCE EXAMINATIONS.

- ARITHMETIC.—Simple and denominate numbers, metric system of weights and measures, common and decimal fractions, practical measurements, percentage, ratio and proportion. Grammar or high school work.
- 2. GEOGRAPHY.—Mathematical, physical, and political divisions and natural features of the earth's surface; movements of the air and water, climates, natural and commercial productions, animals and man. Grammar school study.
- 3. HISTORY.—The most important facts in the history of the United States from the settlement of the country to the present time, but

especially the main features of the constitution and the development under it of the republic and of the states. Grammar or high school study.

- 4. ENGLISH GRAMMAR.—The essentials of orthography, etymology, and syntax, including the derivation and composition of words, their classification as parts of speech, declension and conjugation; sentential analysis, with definition and classification of parts, whether principal or subordinate, whether words, phrases, or clauses. Illustrative words, sentences, etc., may be required, as well as the correction of ungrammatical examples.
- 5. ENGLISH COMPOSITION AND LITERATURE.—Correct spelling, capitalization, punctuation. paragraphing, definition and proper use of rhetorical figures; a knowledge of the qualities of style, the kinds of discourse, and the elements of versification; an acquaintance with the masterpieces of English literature. Besides answering questions on the above, the candidate will be required to write an essay of something like 500 words to illustrate his power of using the English language, and his knowledge of the literature. For 1894 the works required will be: Shakspere's Merchant of Venice, Scott's Lady of the Lake, Emerson's American Scholar, Longfellow's Evangeline, Macaulay's Second Essay on the Earl of Chatham. For 1895 the works required will be: Shakspere's Henry V., Scott's Ivanhoe, Macaulay's Essay on Clive, Hawthorne's House of the Seven Gables, Longfellow's Tales of a Wayside Inn.

Real equivalents for any of these works will be accepted.

- 6. ALGEBRA.—Fundamental operations, factoring, fractions, simple equations, involution and evolution, radicals, quadratic equations and equations reducible to the quadratic form. The subject as given in Wells's Higher Algebra through quadratic equations, or the same in Wentworth's Algebra.
- 7. GEOMETRY.—Plane, solid, and spherical geometry as given in Wells's Plane and Solid Geometry.
- 8. LATIN.—Three books of Cæsar's Commentaries, five Orations of Cicero, six books of Vergil's Aeneid, with scansion of hexameter verse and the translation of English sentences into Latin prose, based on the portions of Cæsar and Cicero above named. This will necessitate a thorough knowledge of the etymology and syntax of Latin grammar.

Allen and Greenough's or Harkness's Grammar and Collar's Latin Prose Composition are recommended.

Real equivalents for any of the above mentioned works will be accepted.

The Roman method of pronunciation is used.

9. GREEK.—Greek Grammar (Goodwin's), Greek Prose Composition (Collar and Daniel's), and three books of Xenophon's Anabasis, or an equivalent amount from any classic Greek author. Writing Greek with the accents will be required.

The so called Continental sounds of the vowels and diphthongs and pronunciation according to accent are recommended.

- FRENCH.—Elements of grammar, tested by the correct translation of simple English sentences into French and by questions; reading easy French prose at sight. At least one year's work.
- 11. GERMAN.—Elements of grammar, tested by the correct translation of simple English sentences into German and by questions; reading easy German prose at sight. At least one year's work.
- 12. PHYSICS.—The elements of physics as given in Gage's Introduction to Physical Science, taught with the use of apparatus for illustration and experiment. It is earnestly recommended that all teachers who can command the necessary apparatus prepare their pupils in a course of experiments such as is outlined in Hall & Bergen's Text Book of Physics.
- 13. ASTRONOMY.—The subject as given in Newcomb and Holden's Astronomy for High Schools and Colleges.
- 14. CHEMISTRY.—Elementary Inorganic Chemistry as presented in Remsen's Chemistry, Briefer Course; Shepard's "Elements of Chemistry;" Elliot & Storers "Manual of Elementary Chemistry," or Armstrong and Norton's "Laboratory Manual of Chemistry.

Laboratory practice is essential for the proper preparation in this subject and the laboratory note book must be submitted.

- 15. Physiology.—The anatomy, histology, and physiology of the human body and the essentials of hygiene, taught with the aid of charts and models and demonstrations upon inferior animals, to the extent given in Martin's Human Body, Briefer Course.
- 16. BOTANY.—The parts and organs of plants in the descriptive language of the science; the relations of plants to the atmosphere, to temperature, light, soil, etc., to the inferior animals, and to man; characteristics of prominent orders and the determination of species by use of an artificial key. Gray's Lessons and Manual.

17. ZOÖLOGY.—The subject as taught in the best high schools with laboratory facilities. Mere text book work will not be accepted.

All persons who will enter the University at the opening of the term 1894, except those holding certificates of graduation from accredited schools, must present themselves at the Registrar's office, room 14, University Hall, at 9 o'clock a.m., Thursday, September 6th. At that time applications for admission will be received, also county superintendents' certificates covering part of the examinations, and applicants will be given all necessary directions as to examinations.

The program of examinations is as follows:

English Composition and Literature	Thursday	1:00 p.m.
	F	3.30
	eriuay	0.00 a.m.
U. S. History	••	10:30
Geometry	"	1:00 p.m.
Botany		3:30 ''
Physics	Saturday	8:0 0 a.m.
Zoölogy	· · ·	10:30 ''
Physiology	"	1:00 p.m.
Astronomy	4.1	2:20 11
Physical Geography 5		3.30
Latin	Aonday	8:00 a.m.
Greek)		
German }	**	1:00 p.m.
French		-

County Superintendents' Certificates.—To prevent loss to those who are not prepared to enter the University, but might come, hoping to pass the examinations for admission, the following arrangement has been made.

County Superintendents of schools will be furnished with questions and instructions for the examination of candidates in the four common branches, arithmetic, geography, English grammar, and history of the United States; applicants who pass creditably, will, when they present the superintendents' certificates to that effect, be admitted to the classes of the preliminary year.

Persons who hold teachers' certificates from county superintendents will be admitted to the preliminary class without further examination.

ACCREDITED HIGH SCHOOLS.

The Faculty, after personal examination, appoints accredited high schools, whose graduates may be admitted to the University without further examination within twenty-eight months after the date of their graduation. These must be schools of first-rate character, whose course of instruction includes all the studies required for admission to some one of the colleges of the University. A member of the Faculty will examine a school making application as to its facilities for teaching, its course and methods of instruction, and the general proficiency shown. If the report is favorable, the name of the school is entered in the published list of high schools accredited by the University. The graduates of these schools are admitted to any college to which their high school studies as certified by the principal have prepared them to enter. Annual reports are asked from these schools. A re-examination will be made whenever it may be deemed necessary.

The accredited schools whose graduates are admitted to any of the colleges of the University are the following public high schools:

SCHOOLS, AND SUPERINTENDENTS OR PRINCIPALS.

Alton, G. E. Wilkinson.	Arcola, G. W. Smith.
Atlanta, C. W. Harriman.	Auburn Park (Calumet High School)
Aurora, East, W. Z. Pringle.	A. S. Hall.
Aurora, West, Kittie Reynolds.	Austin, B. F. Buck.
Beardstown, M. Moore.	Belvidere, J. C. Zinser.
Bement, J. M. Martin.	Bloomington, Fred B. Spaulding.
Blue Island, Robert McCay.	Cairo, T. C. Clendenen.
Champaign, C. A. Bowsher.	Carrollton, Clyde Slone.
Canton, C. M. Bardwell.	Charleston, Louise Baumberger.
Chicago, North, O. S. Wescott.	Chicago, South, Jeremiah Slocum.
Chicago, Northwest, Franklin P.	Chicago, West, Geo. M. Clayberg.
Fisk.	Clinton, Ia., Julia J. Sweet.
Danville, Joseph Carter.	Davenport, Ia., H. H. Roberts.
Decatur, Louis B. Lee.	Delaven, Geo. A. Franklin.
Dixon, W. H. Williamson.	Dundee, S. M. Abbott.
Elgin, H. F. Derr.	Englewood, James E. Armstrong.
Evanston, H. L. Boltwood.	Farmer City, R. W. Sharp.
Freeport, F. T. Oldt.	Galena, Lawrence DeGraff.
Galva, F. U. White.	Geneseo, Ada Schnabele.
Griggsville, W. R. Hatfield.	Hinsdale, J. N. Kelley.
Hyde Park, Chas. W. French.	Jacksonville, Virginia Graves.
Jerseyville, J. Pike.	Joliet, J. Stanley Brown.
Kankakee, Ellis D. Walker.	Keokuk, Ia., George F. Marshall.
Kewanee, Horace Phillips.	La Grange, E. G. Cooley.
Lake, E. F. Stearns.	Lake View, Jas. H. Norton.

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Lincoln, Jane Kidd.	Macomb, S. F. Hall.
Mattoon, E. Kate Carman.	Maywood, C. W. Minard.
Mendota, Wm. R. Foster.	Moline, B. C. Caldwell.
Morrison, Mrs. P. F. Burtch.	Nashville, Chas. L. Stout.
Oak Park, W. H. Hatch.	Ottawa, J O. Leslie.
Paris, A. Harvey.	Pekin, F. W. Reubelt.
Peoria, A. W. Beasley.	Pittsfield, I. F. Matthews.
Pontiac, E. S. Combs.	Princeton, Richard Metcalf.
Quincy, W. B. Corbyn.	Rockford, W. A. Edwards.
Rock Island, J. A. Bishop,	Roodhouse, T. H. Cobbs.
South Chicago, C. I. Parker.	Shelbyville, F. D. Jordan.
Springfield, Wm. W. Helmle.	Streator, R. Williams.
Taylorville, A. C. Butler.	Urbana, J. W. Hayes.
Virden, P. M. Silloway.	Wilmington, J. J. Eckman.
Yorkville, W. I. Sutherland,	

Also the high school of the Illinois State Normal University, at Normal, O. L. Manchester, Principal, and the high school of the Southern Illinois Normal University, at Carbondale.

The accredited schools whose graduates are admitted to the Colleges of Engineering, of Agriculture, or of Science, are the public high schools in

Aledo, J. P. Kuntz. Augusta, Annie McKee. Belleville, H. W. Brua. Barry, H. C. McCarrel. Cambridge, Laura J. Haggart, Camp Point, J. W. Creekmur. Centralia, Lulu Clark. Chicago English High and Manual Collinsville, D. B. Fager. Training School, A. R. Robinson. DeKalb, J. T. Bowles. DuQuoin, J. E. Wooters. East St. Louis, C. L. Manners. Effingham, I. A. Smothers. Gibson City, J. D. Shoop. Greenville, D. W. Lindsey. Harvard, C. W. Groves. Hillsboro, Margaret Hubbard. Jonesboro, W. H. Lirely. Keithsburg, K. M. Whitham. Lena, S. A. Harker. Lexington, Ira M. Ong. Lyons, Ia., H. E. Robbins. Marengo, C. W. Hart. Milford, Eva Roberts. Mound City, M. N. McCartney. Newman, J. L. Hughes. Olney, O. J. Bainum. Onarga, J. R. Freebern. Oregon, A. M. Steele. Paw Paw, M. L. Lyon. Paxton, H. G. Strawn. Peru, F. S. Smedley. Polo, I. M. Bridgman. Ridge Farm, E. Hollingsworth. Rochelle, C. F. Philbrook. Rossville, H. W. Flanegin. Savanna, B. F. Hendricks.

Sheldon, A. M. Brownson.	Sparta, John M. Nickles.
Sterling (Wallace High School), A.	Sterling (2nd Ward), S. B. Hursh.
Bayliss.	Sullivan, B. F. McClelland.
Sycamore, A. J. Blanchard.	Tolono, Charles Jeffers.
Virginia, T. W. B. Everhart.	Warren, W. C. Smith.
Warsaw, A. W. Hussey.	Washington. F. L. Calkins.
Watseka, S. W. Dixon.	Winchester, A. V. Storm.
Wenona, Inez Wingate.	

Also the Chicago Manual Training School, H. H. Belfield, Principal.

REGISTRATION.

At the beginning of each term each student must present himself for registration during the two days preceding the formation of classes; and he must be present and be registered at the first exercise of each class he is to attend.

CHOICE OF STUDIES.

Great freedom in the choice of studies is permitted. It is, however, necessarily required that the student shall be thoroughly prepared to enter, and keep pace with the classes in the chosen studies; that he shall take these in the terms and at the time of day elsewhere designated, and that, when expecting to take a degree, he pursue the studies leading to that degree. In the College of Engineering the courses are practically prescribed. Following the description of each course of instruction given in the general alphabetical list of courses, will be found the necessary requirements, if any, for admission to that particular course. Careful attention must be given to these requirements and to the sequence of studies thus indicated. For instance, under Astronomy 2, for students of the College of Engineering, page 98, there are required "Mathematics 4;" "Physics 1 and 3;" "Theoretical and Applied Mechanics 1." Turning now to the general list of subjects, p. 87, it is found that Mathematics 4 is Trigonometry, Physics 1 is the major course of one year, and Theoretical and Applied Mechanics I is Analytical Mechanics. All these subjects must have been satisfactorily passed before admission to the class in astronomy can be gained.

The work in military instruction and drill practice is required as described, of all male students during the freshman and sophomore years. Women may take an equivalent amount of gymnasium drill. The described courses in rhetoric and oratory must be taken by all students at the times and to the extent given in the suggested and prescribed courses of study.

Each student must have three distinct studies, affording three daily class exercises, unless specially permitted by the Faculty to take less or more.

MILITARY SCIENCE.

The military instruction is under the charge of a graduate of the U. S. Military Academy, and an officer of the regular army of the United States. The course as a whole has special reference to the duties of officers of the line. A full supply of arms and ammunition is furnished by the War Department, including 300 cadet rifles and accoutrements, and two field pieces of artillery. Ammunition is supplied for the practice and target firing and for artillery use.

Every male student, able to perform military duty, and not excused for sufficient cause, is required to drill twice, each week until he has gained six creditable term records. He is also required to study Drill Regulations for Infantry and to recite upon the same once a week until he passes two creditable term examinations. This practical instruction begins as soon as possible after he enters the University; but a preparatory student, carrying no freshman studies and not expecting to matriculate during the year, is not permitted to drill. The standings in study and drill are placed on record, with other class credits; two terms of recitations and drill count one credit, and the four remaining terms of drill another, and are requisite to graduation in every University course.

Appointments in the battalion are made on nomination by the professor in charge and confirmation by the Faculty.

Students who have passed two examinations in the drill regulations and who have gained two term credits in drill practice are eligible for corporals; those having three term credits in each are eligible for sergeants; and those having six term credits in each, for lieutenants and for officers of higher rank.

The battalion (six companies) is composed mainly of the members of the freshman and sophomore classes; the first supplying the corporals, the second, the sergeants, while the captains and lieutenants are taken from those of the junior class who have passed through the lower grades satisfactorily.

A special military scholarship, good for one year, is open to each student who attains the grade of a commissioned officer, the value of which is paid the holder at the close of the year. An artillery detachment is organized mainly from the second year or sophomore class, which receives practical instruction twice each week during the college year.

Towards the close of the spring term, a committee appointed by the Faculty examines candidates for nomination to the governor of the state to receive commissions as brevet captains in the state militia. Candidates must be members of the senior class in full standing at the time of this examination; must have completed the course of military studies; must have served three terms as captains or lieutenants, and must be approved by the Faculty, as having good reputations as scholars, officers, and gentlemen.

Under the authority of the acts of corporation, the Trustees have prescribed a uniform of cadet gray, coat trimmed with black mohair braid, trousers with black cloth stripe, cut after the U. S. army pattern. The uniform of the cadet officers is of dark blue cloth for coat and light blue for trousers; cap for all of dark blue cloth, army pattern, with university badge embroidered thereon in gold bullion; white gloves; that of the band, dark blue throughout, with special trimmings.

The University Cornet Band is composed of students, and every full term of service therein is counted as one term of drill.

PHYSICAL TRAINING.

The spacious Military Hall affords admirable facilities for gymnasium practice for men, and there is a special gymnasium for women. In both there is a good supply of the best apparatus, and regular instruction is given by specialists in their lines. The Athletic Association has an easily accessible enclosed park with grand stand, track, and ball grounds. Practice and games are all under the general supervision of the instructor.

The gymnasium work for women (see course of instruction, p. 138) is treated as to time requirements and credits towards graduation like military science and practice for men. The gymnasium uniform for women consists of a navy blue flannel blouse and divided skirt with white trimmings, and black slippers. These uniforms must be procured within two weeks after the organization of the classes at the beginning of the year.

TERM EXAMINATIONS.

Examinations are held at the close of each term or oftener, or whenever any study has been completed. Any student failing to answer correctly 60 per cent of the questions proposed, loses all credit for that study, and is precluded from proceeding with any other studies without special permission. If he answers from 60 to 74 per cent of the questions he is *conditioned* and may have another examination on application to, and arrangement with, the instructor. This arrangement must be made within ten days from notification of term standing; 75 per cent is required to pass.

A record is kept of each student's term standing.

A statement of the scholarship of each student will be sent to his parent or guardian as soon as may be after the end of each term.

DEGREES.

The usual bachelors' and masters' degrees are conferred upon those who satisfactorily complete the courses of study described under the different colleges. A candidate for a bachelor's degree must pass in the subjects marked *required* in his chosen course, and must conform to the directions given in connection with that course in regard to electives. In the College of Engineering he must complete the course of study as laid down. In the Colleges of Agriculture, of Science (41 credits in chemical group), and of Literature 40 term credits are required for graduation. This number includes two credits for military science for men, and for women the same number for physical culture. Men excused for cause from the military requirements, and women who do not take courses in physical culture, may elect in lieu thereof two extra terms' work in any subjects taught in the University.

Credits from other colleges or universities may be accepted by the Faculty for advanced standing; but at least one year's residence at the University and the completion of one year's work are necessary to secure a bachelor's degree.

In all cases an accepted thesis is required for graduation. The subject must be anounced not later than the first Monday of November, and the completed thesis must be handed to the Dean of the proper College by April 30th. The work should be done under the direction of the professor in whose department the subject naturally belongs, and should be in the line of the course of study for which a degree is expected. The thesis should be based upon original research, and must contain at least 2,000 words, or an equivalent in tables, drawings, and illustrations. It must be presented upon regulation paper and will be deposited in the library of the University.

I. The degree of Bachelor of Arts will be given to those who complete a classical course in the College of Literature. 2. The degree of Bachelor of Letters will be given to those who complete one of the other courses in the College of Literature. The name of the course will be inserted after the degree.

3. The degree of Bachelor of Science will be given to those who complete a course of study in the College of Engineering, of Agriculture, or of Science. The name of the course will be inserted after the degree.

4. The master's degrees, M.A., M.L., and M.S., and the equivalent degrees of Civil Engineer and Mechanical Engineer, etc., are given to graduates of this University or of other similar institutions who have pursued at this University a year of prescribed graduate studies and have passed examinations thereon. Non-resident graduates of this University may receive masters' degrees within not less than three years after graduation by successfully passing examinations upon an accepted course of study and practice. (See Graduate School, p. 78.) Studies for a master's degree must be in the general line of the bachelor's degree already received, and of the degree sought.

In all cases an accepted thesis is required, and this should be presented at least one month before the close of the collegiate year. It must be based upon original research and must show scholarly acquirements of high order.

5. The degrees of Doctor of Philosophy and of Doctor of Science may be conferred upon graduates of this or other such university or college after three years of graduate study. (See Graduate School, p. 78.)

BOARD.

The University does not furnish board, but there is an abundance of suitable private places in Urbana and Champaign, within walking distance of the University, and easily accessible by electric railway, where students can obtain table board and rooms. Boarding clubs are formed at which the cost of meals is about two and a half dollars a week. Some students prepare their own meals, thus considerably reducing expenses.

The Business Agent and the Young Men's and Young Women's Christian Associations of the University will aid new students in procuring rooms and boarding places.

EXPENSES.

THE TUITION IS FREE in all the University classes, for matriculated dents.	S	łu-
THE MATRICULATION FEE entitles the student to membership in		
the University until he completes his studies, and is\$	ιo	00
THE DIPLOMA FEE, payable before graduation, is	5	00
THE TERM FEE, for incidental expenses, is, for each student, except		
in Graduate School	7	50
THE TUITION FEE, for all special students (except in music), for stu-		
dents in the Junior Course in Agriculture, and for pupils of		
the Preparatory School, per term, is	5	00
THE MUSIC FEES ARE:		
Piano instruction, ten weeks-2 lessons a week	15	00
Ten weeks—I lesson a week	8	00
Use of piano, one hour daily, per term	2	o o
Vocal instruction, ten weeks-2 lessons a week	20	00
Ten weeks—I lesson a week	[2	00
No deduction on account of absence in either course, except in	Ca	ase
of protracted illness.		

Each student working in laboratories, or in the draughting or engineering classes, is required to make a deposit varying from 50 cents to \$10, to pay for chemicals and apparatus used, and for any breakages or damages.

ALL BILLS due the University must be paid within ten days after the student enters classes.

ESTIMATES OF EXPENSES.

The following are estimated maximum and minimum annual expenses, exclusive of books, clothing, railroad fare, laboratory fees, if any, and small miscellaneous needs.

Term fees	\$22	50	\$22	50
Room rent for each student (two in a room)	22	50	50	00
Table board in boarding houses and clubs	90	00	126	00
Fuel and light	10	00	15	00
Washing at 60 cents per dozen	12	00	18	00
Total	\$157	00	\$231	50
Board and room in private houses, per week	. 4	00	6	00

CAUTION TO PARENTS-STUDENTS' FUNDS.

The Business Agent will receive on deposit any funds parents may intrust to him to meet the expenses of their sons and daughters. No greater error can be committed than to send young people from home with large amounts of spending money, without the authoritative care of some prudent friend. Half the dissipation in colleges springs from excessive allowances of money. Students have little real need for money beyond that required for fees, board bills, and books. The attention of parents and guardians is earnestly requested to this matter, and especially in the case of those students who are under age.

PREPARATORY SCHOOL.

EDWARD G. HOWE, PRINCIPAL.

ADMISSION.

A candidate for admission must be at least sixteen years of age and must pass in subjects 1, 2, 3, and 4, under the heading "Subjects for Entrance Examinations," on page 154. Entrance should be made in September, when examinations for the purpose are held at the University, for 1894, on Thursday, Friday, and Saturday, the 6th, 7th, and 8th of that month, Examinations in these same subjects may be conducted in Illinois county superintendents of schools as for teachers' certificates, and their favorable reports will be accepted for entrance to this school. First or second grade teachers' certificates from superintendents in Illinois will also be taken for the same purpose.

Latin.—The Latin class of the Preparatory School begins with Cicero's Orations, and candidates for admission will be examined with a view to testing their ability to read that author in class. This examination will comprise the more fundamental facts of the language and will be based upon three books of Caesar or their equivalent. An ability to write simple Latin is taken as a satisfactory test of the preparation needed, and is preferred to all other offerings that candidates can make.

ADVANCED STANDING.

Pupils may present themselves for examination in any preparatory study they are ready for; and on passing, will be permited to select such other work as they may be fitted to take up, either in the classes of the Preparatory School or in those of the University.

No pupil conditioned in any essential preparatory study, will be allowed to take advanced work, except by special permission.

COURSE OF STUDY.

The course of study extends through two years, and is specially intended to meet the needs of those desiring to prepare for a University course in the shortest time consistent with requisite thoroughness.

The following courses are taught:

COURSE PREPARATORY TO THE COLLEGES OF AGRICULTURE, OF ENGI-NEERING, AND OF SCIENCE.

FIRST YEAR.

- 1. Algebra; English; Physiology; Freehand Drawing.
- 2. Algebra; English; Zoölogy; History.
- 3. Algebra; English; Botany; History.

SECOND YEAR.

- 1. Geometry; English, Botany; French or German.
- 2. Geometry; English; Physics; French or German.
- 3. Geometry; English; physics; French or German.

COURSE PREPARATORY TO THE COLLEGE OF LITERATURE, EXCEPT THE CLASSICAL COURSE,

FIRST YEAR.

- 1. Latin; English; Physiology; Algebra.
- 2. Latin; English; Zoölogy; Algebra.
- 3. Latin; English; Botany; Algebra.

SECOND YEAR.

- 1. Latin; English; Botany; Geometry.
- 2. Latin; English; Physics; Geometry.
- 3. Latin; English; Physics; Geometry.

COURSE PREPARATORY TO THE CLASSICAL COURSE OF THE COLLEGE OF LITERATURE.

FIRST YEAR.

- 1. Latin; English; Physiology; Algebra.
- 2. Latin; English; Zoölogy; Algebra.
- 3. Latin; English; Botany; Algebra.

SECOND YEAR.

- 1. Greek; Latin; Geometry.
- 2. Greek; Latin; Geometry.
- 3. Greek; Latin; Geometry.

ONE YEAR COURSE.

To pupils of mature age, robust health, and earnest character, a one year course is open. Maturity and life experience will compensate for some minor deficiencies in preparation.

Candidates must be on hand promptly at the opening of the year and take the regular examinations. Each case will then be considered on its merits, and, if thought best, permission will be granted for a trial term; this to be extended to a full year, if the pupil proves worthy and competent.

Application for this course must be made with the clear understanding that permission will be granted to such persons only and for such time only as shall be deemed best for the interests of all concerned.

ONE YEAR COURSE FOR COLLEGE OF AGRICULTURE, OF ENGINEERING, AND OF SCIENCE.

- 1. Algebra; English; Physiology; Geometry.
- 2. Algebra; English; Physics; Geometry.
- 3. Algebra; English; Physics; Geometry.

If the knowledge of English is sufficient, French or German may be substituted.

One additional science must be made up at some other time.

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GENERAL PLAN OF INSTRUCTION.

ENGLISH.

This subject will be presented so as to increase the pupil's vocabulary, and train him to rapid and clear apprehension of the printed page and to elegance and exactness of expression. Grammar and Rhetoric will be taught in connection with the other work.

The reading and study of literary masterpieces will form part of the work, and, while furnishing material for the written exercises, will cultivate a taste for helpful books. Considerable collateral reading will be required. This will be so selected as also to aid the historical studies by presenting pictures of important epochs in the world's development.

HISTORY.

The aim in this will be to present a brief outline of the development of the human race. The topical method will be used, as most conducive to that thoughtful consideration of the facts presented by the past which leads to their application by the citizen of the present.

The work will be closely associated with that in English, and the required reading will be made mutually helpful to both subjects. *Myer's General History* and collateral reading.

Algebra.

Rapidity and accuracy in all operations will be rigidly required. Especial emphasis will be laid upon the use of purely literal expressions, radicals, fractional and negative exponents, and upon the fundamental nature of the equation. The text book used is *Wells's Higher Algebra*.

GEOMETRY.

Plane and solid Geometry will be taken during the first and second terms. The third term will be devoted to inventive and original work, which will constitute a review of the whole subject. Especial attention will be paid to the development of the idea of a mathematical demonstration; and, as many students who can reason logically, can not express their ideas adequately, due attention will be paid to correctness of form.

As soon as the student has attained the art of rigorous demonstration, he will be required to devise constructions and demonstrations for himself. The text book used is *Wells's Plain and Solid Geometry*.

LATIN.

Two years will be devoted to this subject by all who do not select a modern language. The work covered will be five orations of Cicero, six books of Vergil's Aeneid, with scansion of hexameter verse and the translation of English sentences into Latin prose, based on the portions of Cicero above named. This will necessitate a thorough knowledge of the etymology and syntax of Latin grammar. Allen and Greenough's Grammar, and Collar's Latin Prose Composition.

The Roman method of pronunciation is used.

Greek.

This will form a full study in the second year for all students in the classical course. Greek Grammar (Goodwin's), Moss's First Greek Reader, Greek Prose Composition (Collar and Daniel's), and three books of Xenophon's Anabasis.

GERMAN AND FRENCH.

These will be begun, as their early possession will greatly aid the University work, especially in science and engineering.

The methods of teaching followed will be inductive; grammatical work being, from the first, based upon selected portions of standard works.

The languages themselves will, as far as practicable, be used in the class room. Joynes-Meissner's German Grammar, with Joynes's German Reader; Bernhardt's Im Zwielicht I. Van Daell's Beginning French, accompanied by suitable texts.

FREE HAND DRAWING.

This will be taught in the first term, that the pupils may have the benefit of its valuable training in the studies which follow. *Frederick's* Notes on Free Hand Drawing.

PHYSIOLOGY.

This will be taken up first, because of its bearing on the health and habits of the pupils, and as being a suitable introduction to Zoölogy. Charts, skeleton, and manikin will be used, with illustrative material from the lower animals, to give a knowledge of the organs of the human body, their functions and relation to each other. Huxley's Elementary Physiology.

ZOÖLOGY.

This study will follow Physiology, and, while comparative as regards man, will in the laboratory and class room extend the student's knowledge through the study of types to the scientific basis of classification and prepare for the more exact work of the University.

BOTANY.

This is a study of plants rather than of books about plants, though the latter are not disregarded. It is an introduction to the science, giving to those who go no farther in it a general acquaintance with the chief features of the vegetable kingdom, and to others, the required preparation for future work.

The analysis of simple flowers will form part of the work, and the preparation of a small herbarium of correctly named and properly mounted plants will be required.

The fall term of the second year will be devoted to the analysis of the more difficult flowers and to a study of the results of the season's growth, the preparation for the winter's rest, and renewed life in the spring.

PHYSICS.

Two terms will be given to this subject, and much of the time to laboratory work.

In this study the spirit of scientific investigation will be cultivated along those lines of exact experiments and the formulation of physical laws from their comparison.

The note book, with an exact and orderly record of personal investigation, will be required as an index of work done. Allen's Laboratory Physics.

REGULATIONS.

Reports regarding all non-resident, minor pupils (and, upon request, regarding any others) will be sent to parents or guardians as soon as the pupils are settled at their work (by the end of the first month), and reports regarding all pupils will be sent out at the close of each term.

The calendar of the Preparatory School is the same as that of the University.

For fees and expenses see page 165.

For special information with regard to the Preparatory School, address Edward G. Howe, Champaign, Illinois.

LIST OF STUDENTS.

GRADUATE SCHOOL.

Bartlett, Henry Emmett, B.S.	,	
Univ. of Ill.,	Mt. Sterling,	Civil Engineering.
Carter, Charles Willard, B.L.	,	
Univ. of Ill. (Fellowship),	Aledo,	Eng. and Mod. Lang.
Gibbs, William David, B.S., Univ	•	
of Ill. (Fellowship),	Winchester,	Agriculture.
Hart, Ralph Warner, B.S., Univ		
of Ill.,	Harvey,	Architecture.
Miller, Clendon Vanmeter, B.S.		
Univ. of Ill. (Fellowship),	Mattoon,	Chemistry.
Piatt, Herman S, A.B., Univ. of Ill.,	Champaign,	Classical.
Surface, Harvey Adam, M.S., Ohio	c	
State Univ.,	Waynesville,	O., Natural Science.
Vial, Robert Clark, B.S., Univ. o	f	
Ill.,	Western Spr	ings, Civil Engineering.
Connet, Ella, B.L., Univ. of Ill.,	Champaig n ,	Eng. and Mod. Lang.
Palmer, Mrs. Anna Shattuck, B.L.	,	
Univ. of Ill.,	Champaign,	Eng. and Mod. Lang.
RESIDENT	GRADUATE	S.
Beach, Charles Worth, B.S., State	e	
Agricultural College, Colo.,	Stuart, Ia.,	Civil Engineering.
Bennett, Cleaves, M.L., Univ. o	f	
III.,	Champaig n ,	Natural Science.
Benson, Edward Mills, B.S., Univ	•	
of Ill.,	Colfax,	Electrical Engineering.
Brown, Frank Manear, B.S., Univ		
of Ill.,	Champaign,	Architecture.
Cantine, Edward Ike, B.S., Univ	•	
of Ill.,	Lopez, Wash.,	Electrical Engineering.
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Kendall, William Finley, B.S.		
Univ. of Ill.,	Rock Island,	Architecture.
Pillsbury, Arthur Low, B.S., Ha	r-	
vard Univ.,	Urbana,	Architecture.
Townsend, William, B.S., Univ.	of	
111.,	Champaign,	Civil Engineering.
Wright, Royal, B.L., Univ.	of	
111,	Urba na ,	Eng. and Mod. Lang.
Pettee, Mrs. Ida May, B.L., Uni	v.	
of Ill.,	Champaign,	Eng. and Mod. Lang.
Seibert, Emma Effie, B.S., Uni	v.	
of Ill.,	Riverdale,	Art and Design.
Sim, Keturah Elizabeth, B.L., Uni	v.	
of Ill.,	Urbana,	Eng. and Mod. Lang,

SENIOR CLASS.*

Atwood, Levi Patten,	Rockford, Civil Engineering
Babcock, Clyde Leslie,	Harvard, Neb., Civil Engineering
Barker, Louis William,	Sparta, Electrical Engineering
Bauman, Otto	Quincy, Electrical Engineering
Beasley, Harrison Easton,	Peoria, Civil Engineering
Braucher, Herbert Hill,	Lincoln, Agriculture
Browning, Howard Allen,	Elgin, Architecture
Burrill, William Thomas	Shelby, Neb., Architecture
Bush, Arthur Willis,	Joliet, Architecture
Butterfield, Clarence James,	Chicago, Architecture
Carmack, Clyde Roberts,	Camargo, Mechanical Engineering
Chipman, Paul,	Mt. Carmel, Civil Engineering
Clark, Amos Cable,	Urbana, Architecture
Coffman, Birch David,	Champaign, Natural Science
Cornell, Frank Howe,	Yorkville, Natural Science
Crawford, Thomas,	Sterling, Electrical Engineering
Dickinson, Richard Jay,	Eureka, Civil Engineering
Duffy, Sherman,	Ottawa, Latin
Eakle, Silas Jackson,	Forreston, Chemistry
Elder, Charles Abbott,	Topeka, Kansas, Architecture
Engberg, Martin Jonas,	Chicago, Chemistry
Fellheimer, Alfred,	Chicago, Architectural Engineering

*The students of the four undergraduate classes are classified upon the credit^S earned by the beginning of the spring term, 1894. Ferris, Hiram Burns, Fletcher, Marcus Samuel, Foote, Ferdinand John, Foster, Alfred Bradford Frederickson, George, Frye, Theodore Christian, Funston, Jesse Grant, Gaut, Robert Eugene, Goldschmidt, Otto Emil, Hallinen, Joseph Edward, Heideman, George Herman, Hicks, Preston Thomas, Holbrook, Frederick Samuel. Holston, Benjamin Baldwin, Hottes. Charles Frederick. Jansen, Dietrich Herman, Jasper, Thomas, Johannsen, Albert, Johannsen, Oskar August, Keeler. Frederick Blair. Kennedy, John William, Kerchner, Fred William Kimball, Conrad Bryant, Lake, Edward John, Lowry, John Albert, McCaskrin, George Washington, McCaskrin, Harry Madison, McConnell, Ernest, McNutt, John, Jr., Mather, Fred Elbert, Maxon, Robbins Yale, Miller, Grant Clark, Mogensen, Peter, Morris, Edgar William, Morrissey, Daniel C, Nelson, Elnathan Kemper, Parry, Joseph Lawrence, Phelps, Albert Charles, Reed, James Horatio, Riley, Walter Busey, Rutledge, John Joseph,

Classical. Carthage. Ridge Farm. Natural Science. Champaign, Electrical Engineering. Civil Engineering. Bradford. Natural Science. Champaign, Congerville, Natural Science. Chambaign. Mechanical Engineer'g. Mt. Sterling. Civil Engineering. Chicago. Electrical Engineering. Natural Science. Champaign. Elmhurst. Electrical Engineering. Warren. Civil Engineering. Englewood. Chemistry. Nashville. Natural Science. Mascoutah. Natural Science. Pekin. Civil Engineering. Ouincy. Electrical Engineering. State Center, Ia., Architecture. State Center, Ia., Architecture. Earlville. Architecture. Collinsville. Architecture. Belleville. Chemistry. Champaign, Architecture. Viroqua, Wis. Architecture. Gibson City. Civil Engineering. Rantoul. Natural Science. Natural Science. Rantoul. Table Rock. Colo.. Architecture. Humboldt. Latin. Naperville. Architecture. Danville. Civil Engineering. Rockford. Architecture. Copenhagen, Den., Civil Engineering. Onarga, English and Mod. Lang. Champaign, English and Mod. Lang. Chemistry. Paris. English and Mod. Lang. Tolone. Lockport, Architecture. Evanston. Electrical Engineering. Champaign, English and Mod. Lang. Alton. Mining Engineering.

Schneider, Albert. Slater, William Frederick, Somers, Elbert Sheldon, Spurgin, William Grant, Stocker, Edwin Warren, Strauss, William, Strehlow, Oscar Emil, Sy, Albert Philip, Tackett, William C, Templeton, Benjamin Franklin, Tower, Willis Eugene, Trego. Charles Henry. Walton, Thomas Percival, Weaver, Leslie Alvord, Webster, Charles Carlton, Weedman, Fred John, White. Solon Marks. Wilder, Charles Thornton, Wood, Robert Alvin. Yeakel, William Kriebel, Boggs, Pearl, McCaskrin, Louise Elizabeth, McCormick, Flora. Nichols. Maude E. Scott, Daisy Coffin, Shawhan, Gertrude, Thompson. Marion. Wingard, Anna Laura, Woolsey, Ola C,

Weston. Natural Science. Momence. Electrical Engineering. San Diego, Cal., Architecture. Classical Urbana. Rock Island. Architecture. Pittsfield, Chemistry. Champaign. Civil Engineering. Altamont. Chemistry. Champaign, English and Mod. Lang. Palestine. Classical Chana. Chemistry. Hooveston. Electrical Engineering. Civil Engineering. Paxton. Danville. Latin Polo. Electrical Engineering. Chicago, Eng. and Mod. Languages. Sandwich. Natural Science. Champaign. Natural Science. Woodburn, Mechanical Engineering. Natural Science. Polo. Urbana. Classical. Rantoul. Natural Science. Champaign, English and Mod. Lang. Urbana Natural Science. Champaign, Latin. Urbana, English and Modern Lang. Bement. Latin. Champaign, English and Mod. Lang. Polo. Latin.

JUNIOR CLASS.

Arms, Franklin David, Arms, Herbert Clarke, Armstrong, John Adam, Atkinson, John Thomas, Ayers, Clarence Otto, Barr, Richard James, Barry, Charles, Bassett, John Benjamin, Baum, Henry William.

Chicago, Architecture. Chicago. Architecture. Kewanee, Mechanical Engineering. Wilmington, Mechanical Eng. Nashville. Natural Science. Wilton Center, Eng. and Mod. Lang. Mechanical Engineering. Henry, Kewanee. Civil Engineering. Phoenix, Ariz. Civil Engineering.

Beebe, Fred Albert. Boon, William Guthrie. Bower, Robert Allan, Brenke, William Charles, Burdick, Charles Baker, Burt, Henry Jackson, Busey, Frank Lyman, Campbell, George Henry, Capps, Earl Vanhise, Carberry, Ray Shepard, Carpenter, Frank Albert, Chester, Henry Ezra, Chester, Wilfred Dudley, Clement, Clarence Adelbert, Clinton, John Dewitt, Dewey, George French, Dillon, William Henry, Drake, Louis Sanford, Fouts, Lewis Hayden, Fulton, George Thomas, Green, James Albert, Hall, Emery Stanford Hamilton, Frank Henry, Harms, Armin, Harvey, Guy Charles. Heaton, Thomas Reid. Herdman, Herbert Orvill. Hiles, Elmer Kirkpatrick. Hoag, Parker Hale, Hobbs, Reuben Merrill. Hoblit, John Alexander, Jr., Holtzman, Stephen Ford, Honens, Fred William, Hunt, Ernest Alexander, Jerry, Edward Ellsworth, Junkersfeld, Peter, Kent, Louis Maxwell, Ketchum, Milo Smith, Ketchum, Richard Bird, Lemen, William Clarence Smith, Lewellyn, David Rossiter,

Wisner, Neb., Mechanical Eng. Armstrong. Civil Engineering. Eng. and Mod. Lang. Tolono, Chicago, Chemistry. Sterling, Civil Engineering. Urbana; Civil Engineering. Urbana, Mechanical Engineering. Eng. and Mod. Lang. Louisville. Mt. Pulaski, Electrical Eng. Mansfield, Civil Engineering. Rockford, Architecture. Champaign, Chemistry. Champaign, Mining Engineering. Municipal Engineering. Tiskilwa. Polo. Chemistry. Civil Engineering. Cairo, Normal, Architectural Engineering. Eng. and Mod. Lang. Chicago, Eng. and Mod. Lang. Bradford, Civil Engineering. Waterman, Mechanical Engineering. Ivesdale. Urbana, Architecture. Springfield, Civil Engineering. Rock Island. Chemistry. Tolono. Chemistry. Civil Engineering. Delavan, Natural Science. Taylorville, Chicago. Mechanical Engineering. Champaign, Classical. Yorkville. Chemistry. Mechanical Engineering. Atlanta. Pontiac, Architectural Engineering. Civil Engineering. Milan. Electrical Engineering. Urbana. Urbana. Civil Engineering. Sadorus. Electrical Engineering. Danville. Eng. and Mod. Lang. Elmwood. Civil Engineering. Civil Engineering. La Prairie. Uniontown, Ky., Civil Engineering. Electrical Engineering. Sterling,
Long. Albert Milton, Lyons, Timothy John, McElfresh, Fred Morgan, McLane, John Wallace, McRae, John Alexander, Mann. Edward Loring. Marsh, Horatio Richmond. Maxwell, Charles Jacob, Morrison, William Robert, Munn. Alexander Majors, Noble. Charles William, Noble. William. Powell, John Ellsworth, Ouade, John Conrad, Reardon, Edward Emmett, Reely, Thomas, Reeves, Harley Edson. Root, George Hinchliff, Rowe, Herbert Brunskill, Roysdon, William Ira, Sayers, Albert Jefferson, Scott, William John, Scurlock, Henry Harrison, Seastone, Charles Victor, Shepardson, John Eaton, Simons, Alexander Martin, Sperling, Godfrey, Stark, Robert Watt, Stoltey, Benjamin Franklin, Stone, Frank Lemuel. Thomas. Homer. Vance, Walter Noble, Weinshenk, Theodore. Williams, Parker Merrill, Brown, Katharine, Call, Hortense, Clarke. Florence. Cole, Mary Maude, Folger, Rachel Ellen. Foote, Mrs. Dora Francelia Burton, Champaign, Forbes, Bertha Van Hoesen,

Virden. Architecture. Eng. and Mod. Lang. Sadorus. Facksonville. Natural Science. Allerton, Ia., Chemistry. Kewanee. Mechanical Engineering. Gilman. Eng. and Mod. Lang. Foliet. Natural Science. Champaign, Chemistry. Foliet. Architecture. Swift, Neb .. Civil Engineering. Architecture. Chicago. Champaign. Classical. Powellton. Civil Engineering. Moline, Civil Engineering. Boynton, Eng. and Mod. Lang. Spring Green, Wis., Architecture. Urbana. Civil Engineering. Chicago, Architectural Engineering. Redmon. Chemistry. Champaign, Eng. and Mod. Lang. Champaign, Mechanical Engineering, Champaign, Eng. and Mod. Lang. Fackson, O., Eng. and Mod. Lang. New Boston. Civil Engineering. Aurora. Civil Engineering. Quincy, Electrical Engineering. Dewey. Civil Engineering. Chemistry. Augusta, Champaign, Archi'tural Engineeri'g. Port Byron, Municipal Engineering. Kickapoo, Archi'tural Engineering. Bement. Electrical Engineering. Champaign, Mechanical Engineering. Moline. Electrical Engineering. Oreana. Natural Science. Urbana, Natural Science. Quincy, Natural Science. Rantoul. Latin. Ridge Farm, Natural Science. Natural Science. Ųrbana, Natural Science

Green, Marianna, Ludden, Eva Louise, Mills, Mary Wilder, Moore, Grace Lillian, Pillsbury, Bertha Marion, Sparks, Marion Emeline, Spencer, Bertha, Stewart, Mabel, Champaign, Eng. and Mod. Lang. East Lynn, Eng. and Mod. Lang. Webster Groves, Mo., Natur'l Science. Tolono, Natural Science. Urbana, Classical. Champaign, Classical. Decatur, English and Mod. Lang. Champaign, Natural Science.

SOPHOMORE CLASS.

Adams, Edward Langford, Arnold, John William, Atherton, George Henry, Bailey, Leonard Lionel, Ball, Elmer Newton, Banschbach, Edward Aaron, Beasley, Abel Harwood, Begole, Joshua Franklin, Boyd, George, Brower, Ralph Plumb, Burke, William Harry, Burtt, Wilson Bryant, Campbell, Walter Gilbert, Carswell, Arthur Scott, Chatten, Melville Clarke, Colver, Horace Nathaniel, Cooper, Paul Henry, Cowles, Roy Merrick, Cutter, Scott Clay, Donnan, Alexander, Dubsky, John Joseph, Jr., Durstine, Warren Edward, Estee, Henry Clarence, Evans, Robert Herman, Everett, Frank Milton, Everhart, Rollin Orlando, Fay, Frank Earle, Fitzwilliam, Frank Joel, Gabelman, Julius,

Austin. Mechanical Engineering. Civil Engineering. Lockport. Streator, Eng. and Mod. Lang. Chicago, Architectural Engineering. Mitchellville, Ia., Architecture. Princeton. Electrical Engineering. Chemistry. Champaign. O'Fallon, Mechanical Engineering. Roseville Civil Engineering. Champaign, Civil Engineering. Champaign, Electrical Engineering. Hinsdale. Civil Engineering. Electrical Engineering. Champaign, New City. Electrical Engineering. Ouincv. Architecture. Marengo, Electrical Engineering. Mendota, Electrical Engineering. Englewood, Mechanical Engineering. Oswego. Chemistry. Independence, Ia., Architecture. Chicago, Civil Engineering. Rock Falls, Electrical Engineering. Gibson City. Civil Engineering. Bloomington, Architecture. Quincy, Electrical Engineering. Pana. Classical Marengo, Civil Engineering. Bloomington, Arcitecture Okawville. Civil Engineering.

Gamble, Samuel Wesley, Ganung, Howard D. Gazzolo, Frank Henry Serafino, Green, Frank Hopkins, Green, Herbert John, Haskell, Howard Hall, Havard. Oliver David. Higgins, Charles Campbell, Hindman, John, Hopkins, Frank Coffeen, Hottes, Henry Gustav, Howard, George Augustus, Hubbard, George David, Hughes, Frank Alexis, Huston. Fred Thales, Jobst, George I. Jones, Fred R. Jones, Walter Wynn, Keeler, Harry, King, Wesley, Edward, Kirkpatrick. Harold H. Klossowski, Theodore Julius, Leffler, Burton Rutherford, Lewis, Charles Milton, Liese, George Charles, Lilly, John Crozier, Linn, Homer Roberts, Ludwick, George Washington, MacGregor, Leonard Allen, McKee, James Harry, McNichols, Ira Arthur, Manard, Robert Payton, Marble, Harry Curtiss, Mason, William Charles, Maxwell, Irvine William, Mead, Ellis Herman, Mell, Joseph Leonard. Milne, Edward Lawrence, Morgan, Walter Montgomery, Morse, Jeddidiah D., Morse, Samuel Theodore,

Chicago, Architecture. North Fairfield O., Architectural Eng. Chicago. Chemistry. Ivesdale. Mechanical Engineering. Kewanee. Architecture. Electrical Engineering. Mendota. Electrical Engineering. Urbana. Aurora. Electrical Engineering. Eng. and Mod. Lang. Champaign. Chicago, Electrical Engineering. Mascoutah. Architecture. Highland Park. Architectural Eng. Urbana. Natural Science. Pueblo, Colo., Civil Engineering. Blandinsville. Natural Science. Peoria. Civil Engineering. Neponset. Mechanical Engineering. Civil Engineering. Chicago, Chicago. Natural Science. Champaign, Eng. and Mod. Lang. Mayview, Classical. Dixon, Civil Engineering. Naperville, Civil Engineering. Blue Mound. Architecture. Nashville. Architecture. Champaign, Natural Science. Byron, Mechanical Engineering. Champaign, Architecture. Earlville. Architecture. Chicago. Mechanical Engineering. Tolono. Chemistry. Rockford. Architecture. Champaign, Electrical Engineering. Ripon, Wis., Architecture. Electrical Engineering. Savoy. Belvidere, Electrical Engineering. San Jose, Civil Engineering. Lockport, Civil Engineering. Kinmundy, Eng. and Mod. Lang. Champaign, Electrical Engineering. Carlinville. Civil Engineering.

Mueller, Oscar, Myers, James William, Newcomer, Joseph Hardin, Noble, Harry Charles, Oyler, Harry Schuyler, Perkins, Allie Christian, Pfeffer, John Edward, Phelps, George Budd, Pierce, William Thomas, Pinkerton, Cyrus Bertram Eugene, Rantoul, Porter, Robert Knight, Reasoner, Mathew Aaron, Rickard, Earnest Thomas, Risor, Cady Alvern. Roby, Luther Edward, Row, George Edward, Saunders, Harry J. Scott, George Harvey, Shea, John Clark, Shippee, Henry Claud, Smith, Friend Orville, Steele, William LaBarthe, Stone, Percy Allyn, Sweney, Don, Tarble, Myron Joy, Thompson, Fred Lawrence, Tilton, Harry William, Vail, Walter Cheney, VanOrstrand, Charles Edwin, Vickery, Charles Roy, Wakefield, George Mighell, West, George Amasa, Whitham, Myron Elwin, Whittemore, Floyd, Williams, Scott, Wills, George Arthur, Wills, Oscar T, Woody, Frederick Way, Zimmerman, Walter, Bennett, Georgia E. Besore, Nellie,

Decatur. Mechanical Engineering. Eng. and Mod. Lang. Chrisman. Petersburg, Mechanical Engineering. Champaign. Eng. and Mod. Lang. Mt. Pulaski. Chemistry. Electrical Engineering. Tolono. Bondville, Mechanical Engineering. Carlinville, Architecture. Mt. Carroll, Civil Engineering. Classical. Champaign, Classical Fisher. Natural Science. Spring field, Pharmacy. Eureka. Electrical Engineering. Mechanical Engineering. Decatur, Centralia, Mechanical Engineering. Chicago, Natural Science. English and Mod. Lang. Rantoul, Mechanical Engineering. Danville, Ashton, Pharmacy. Ashton, Pharmacy. Springfield. Architecture. Elect. Engineering. Bradfordton, Gettysburg, Pa., Mech. Engineering. Aurora, Municipal Engineering. Civil Engineering. Isabel, Mt. Carmel, Electrical Engineering. Kewanee. Architecture. Pekin, Civil Engineering. Dwight, Natural Science. Waterman. Electrical Engineering. Mechan. Engineering. Leaf River, Mechanical Engineering. Warren. Sycamore, Mechanical Engineering. Bloomington, Architecture. Electrical Engineering. Chicago, Mendota. Electrical Engineering. Champaign, Municipal Engineering. Champaign, Mechanical Engineering. Milford Centre, O., Chemistry. Urbana, Latin.

Cairns, Cora Mae, Kiler, Aureka Belle, Leal, Sophie Nott, Mather, Althea Susan, Moore, Minnie Rose, Munhall, Grace May, Noble, Isabelle, Noble, Mary Elizabeth, Northam, Lottie Alice, Read, Kate, Stewart, Grace Adele, Webster, Sarah Emeline,

Polo, English and Mod. Languages. Urbana, Eng. and Mod. Languages. Urbana. Latin. Foliet, Eng. and Mod. Languages. French Grove, Eng. and Mod. Lang. Champaign. Eng. and Mod. Lang. Urbana. English and Mod. Lang. Urbana. Latin Nora, Natural Science. Grand Ridge, Eng. and Mod. Lang. Champaign, Eng. and Mod. Lang. Champaign, Natural Science.

FRESHMAN CLASS.

Allen, James Charles, Anderson, George Forbes, Armstrong, James Wadsworth, Armstrong, John Walter, Barker, Robert Collver, Barker, William Prentice, [r., Barnhart, John Carns, Barr, George Andrew, Beadle. Thomas B. Beebe, Charles David, Beem, Fred Clarkson, Bell, Edgar Deforest, Blakeslee, James Woodberry, Block. Richard Arthur. Boone, Allen, Bowen, John, Bower, Samuel Meharry, Branch, James, Brandt, Eugene Hermann, Brode, Luther David, Brower, Lyle Ireneus, Brown, Walter Burrows, Brubaker, William Arthur, Burroughs, Edward, Cahow, Edwin Scott,

Rockford, Architectural Engineering. Carbondale. Civil Engineering. Cedar Rapids, Ia., Architecture. Champaign, Natural Science. Peoria. Chemistry. Batavia. Civil Engineering Rock Island. Architecture. Wilton Center. Latin. Kewanee. Chemistry. Evanston, Mechanical Engineering. Ottawa, Architecture. Urbana, English and Modern Lang. Kinmundy. Eng. and Mod. Lang. Sidney. Electrical Engineering. Electrical Engineering. Chrisman. Kewanee. Civil Engineering. Tolono. Natural Science. Seymour. Natural Science. Appleton City, Mo., Architecture. Electrical Engineering. Urbana, Ottawa. Architecture. Rock Falls, Chemistry. Robinson, Architectural Engineering. El Paso. Classical. Kewanee, Mechanical Engineering.

Campbell, George Washington, Belvidere. Architecture. Capron, Frank Read, Carthage, Architecture. Carpenter, Hubert Vinton, Argo, Electrical Engineering. Carpenter, Oliver Elijah, Electrical Engineering. Chicago, Chester, Guy Jacob, Champaign, Electrical Engineering. Chester, Manley Earle, Champaign, Electrical Engineering. Clarke, Octave Besancon, Quincy, Electrical Engineering. Coffeen, Harry Clay, Champaign, Chemistry. Crellin, Charles Virgil, Winfield, Ia., Electrical Engineeri'g. Davis, John Franklin, Watseka. Pharmacy. DeVries, Stephen George, Pekin. Electrical Engineering. Dewey, James Ansel, Natural Science. Urbana Doney, Oliver Kinsey, Urbana. Eng. and Mod. Lang. Dull, William Raymond, Burlington, Kas., Mechanical Eng. Dunaway, Arthur Newton, Ottawa. Electrical Engineering. Dunlap, Elmer Edgar, Columbus, Ind., Architecture. Eaton, Henry Cassius, Architecture. Fullon. Edbrooke, Harry Willoughby James, Chicago, Architecture. Eichberg, William Nathan, Electrical Engineering. Chicago, Errett, Harry Boyd, Architecture. Kewanee. Ewing, Joseph Chalmer, Gibson City, Electrical Engineering. Flannigan, Edwin Clark, Champaign, Natural Science. Flynn, Thomas Francis, Tolono. Electrical Engineering. Forbes. Ernest Browning. Champaign. Natural Science. Frees. Herman Edward. Chemistry. Chicago, Fuller, Spencer Samuel, Hoopeston, Natural Science. Furst. Frank Everett. Freeport, Eng. and Mod. Lang. Gayman, Bert A, Champaign, Electrical Engineering. Gearhart, Orval Lee. Farmer City. Architecture. Gilchrist, Francis Foster. Chicago. Civil Engineering. Graham, Arthur, Alexis. Electrical Engineering. Graham, Hugh, Illiopolis, Civil Engineering. Grimes, George Lyman, Moline, Mechanical Engineering. Gulick, Clyde Denny, Champaign, Natural Science. Hadsall, Harry Hugh, Wilmington. Civil Engineering. Haley, Arthur Fenn, Champaign, Eng. and Mod. Lang. Hamilton, LeRoy F, Kewanee, Hammers, Morgan J, Champaign, Mechanical Engineering. Hanson, Samuel Jay, Urbana. Eng. and Mod. Lang. Harvey, Harry Hayler, Paris, Eng. and Mod. Lang. Herwig, George Washington, Mason City, Agriculture.

Latin.

Hiller, George Myers, Hills, Stacey Romeyn, Hobart, Albert Claude, Horn, Carl John, Hostetter, Alvin, Hotchkiss, Robert James, Howard, Hartwell Carver, Jr., Howison, Charles, Hull, John Kress, Johnson, Martin Nathaniel, Judy, Herbert Bolivar, Kiler, William Henry, Kingman, Charles Dudley, Kinzel, Frederick August, Kistner. Theodore Charles. Kuehne, Carl Oskar, Lantz, Simon Everett, Larson, Charles Sigurd, Leigh, Charles Wilbur, McDill, James Theodore, Mann, Arthur Richard, Manny, Fred Hugh, Marsh, Loren William, Marsh: Norman Foote. Matteson, Victor André, Mesiroff, Josef, Millar. Adam Vanse. Murphy, Francis Joseph, Muse, Ernest, Nelson, Fred Irwin, Newcomer, Paul William, Noble, Robert William, Ogiwara, Chijokichi, Olmsted, Roy, Osgood, Harry Haviland, Paine, Arthur Elijah, Parr, John Louis, Pattison, Samuel Lowry, Pepper, William Allen, Peterson, Martin, Perry, James Alfred

Kohoka, Mo., Classical. Urbana. Architecture. Elein. Civil Engineering. Naperville. Architecture. Camp Point. Architecture. Peoria. Architecture. Champaign, Natural Science. Sandwich. Architecture. Moline, Eng. and Mod. Languages. Moline. Mechanical Engineering. Troy. O. Architecture. Urbana, Eng. and Mod. Languages. Mattoon, Civil Engineering. Mattoon. Classical. Carlinville. Architecture. Chicago, Architectural Engineering, Carlock. Natural Science. Chicago, Electrical Engineering. La Prairie Centre, Mechan. Eng'ng. Electrical Engineering. Sparta, Gilman. Mechanical Engineering. Mound Station. Natural Science. Foliet, Electrical Engineering. Upper Alton, Architecture. Evansion. Architecture. Chicago, Mechanical Engineering. Mattoon. Civil Engineering. Rock Island, Chemistry. Metropolis, Architecture. Buda Electrical Engineering. Petersburg, Chemistry. Champaign, Chemistry. Tokio, Japan, Mechan. Engineering. Prophetstown, Elec. Engineering. Lostant. Natural Science. Rosemond. Classical. Wyoming, Wis., Architecture. Indianapolis, Ind., Elec. Engineering. Joliet. Electrical Engineering. Englewood, Architecture. Woodstock, Mechanical Engineering.

Philips, Thomas Lewis, Pirkins, Reed Miles, Pitney, Clarence Orville, Pohlman, John Edward, Poole, Edward Warren. Meyer, Harry, Porter, Horace Chamberlain, Ray, George Joseph, Rayburn, Charles Clyde, Rutherford, Cyrus Wilson, Sachse, Edward George, Sammis, John Langley, Saunders, Rome Clark, Savers, William Wesley, Schacht, Frederick William, Schroeder, John Lewis, Schultz, Arthur Ernest, Searing, Charles Aaron, Shepardson, Ralph Steele, Sherman, Cecil Harvey, Sherrill, Walter Dickens. Simmons, Norton Andrews, Smith, Bruce. Spurgin, Isaac Meigs. Staley, William Theron. States, William Daniel, Stebbins, Will Theodore. Steinwedell, George Otto, Stoolman, Almond Winfield Scott, Strawn, John Harris, Street, Lester Chapin. Taylor, George Terry, Terry, Charles Dutton. Thornhill, Charles Calaware, Todd, Hiram Eugene, Trogdon, James Edmund, Vail, Richard Hart, Vail, Richard Randolph, Vigal, William Myron, Voigt, Charles Bernard, Wade, Thomas Brian,

Belvidere. Civil Engineering. Latin. Springfield, Natural Science. Augusta. Joliet. Civil Engineering. Dover. Electrical Engineering. Mechanical Eng. Davenport, Ia., Champaign, Classical. El Paso. Civil Engineering. Roseville. Chemistry. Newman Pharmacy: Morris. Electrical Engineering. Iacksonville. Chemistry. Champaign, Electrical Engineering. Champaign. Mechanical Eng. Moline. Natural Science. Davenport, Ia. Electrical Eng. Olney. Electrical Engineering. Oak Park. Architecture. Aurora. Architecture. Elgin, Architecture. Colona, Architecture. Brighton, Electrical Engineering. Newman. Latin. Urbana, English and Mod: Lang. Urbana, English and Mod. Lang. Elwood. Mechanical Engineering. Battle Creek, Mich., Electrical Eng. Quincy, Electrical Engineering. Natural Science. Champaign, Albion. Classical. Dixon. Civil Engineering. Urbana. Electrical Engineering. Kewanee, Mechanical Engineering. Champaign. Mcchanical Epg. Kankakee, English and Mod. Lang. Paris, Electrical Engineering. Kewanee, Chemistry. Lone Tree. Civil Engineering. Edinburg. Electrical Engineering. Mattoon. English and Mod. Lang. Champaign, Natural Science.

Wallace, Herbert Milford, Webber, Hubert Anthony, Wheldon, Clarence Sutton, Willett, William Marble, Wingard, Lewis Forney, Young, Charles Whittier, Young, John Hayes, Alpiner, Amelia Darling, Brownlee, Mary Lavinia, Buck, Luella Eugenia, Burt, Lula, Chester, Florence, Chester, Mary, Cleland, Blanche Keeney, Dewey, Louise Sarah. Hartman, Fanny Taylor, Henry, Maud May, Ice, Marinda, Ice. Meldora. Kent, Jennie Isabella, Kratz, Laura, Lindsey, Blanche, McFadden, Belle Lorraine, O'Brien, Marguerite Helen, Powers, Florence Victoria, Raynor, Clara Mae, Zilly, Mabel Helen,

Agriculture. Chicago. Architecture. Mt. Vernon, Electrical Eng. Emporia, Kan., Yorkville, Electrical Engineering. Champaign, Architectural Eng. Natural Science. Tracy, Electrical Engineering. Tracy. Kankakee. English and Mod. Lang. Latin. Urbana, Champaign, Natural Science. English and Mod. Lang. Urbana. Natural Science. Champaign, Champaign, Natural Science. Rock Island, Architecture. Urbana. Natural Science. Ft. Wayne, Ind., Art and Design. Oregon, English and Mod. Lang. English and Mod. Lang. Gifford. Gifford, Architecture. English and Mod. Lang. Urbana. Monticello, English and Mod. Lang. Onarga, English and Mod. Lang. Latin. Champaign, Champaign, Eng. and Mod. Lang. Tiskilwa, Art and Design. Champaign Classical. Eng. and Mod. Lang. Champaign,

SPECIAL STUDENTS.

Balding, James Palmer,	Evanston,	Architecture.
Bates, Charles Edgar,	Indianapolis, Ind.,	Architecture.
Dunseth, James Martin,	Urbana,	Latin.
Frederickson David Terhune,	Champaign, Eng	and Mod. Lang.
Gründler, Franz,	Zwickan, Germany,	Electrical Eng.
Hays, Thomas Smith,	Champaign. Eng	and Mod. Lang.
Martin, John Madison	Bement,	Natural Science.
Melluish, George James,	Bloomington, Election	rical Engineering.
Nye, Robert,	Moline, Munic	ipal Engineering.
Postlethwaite, Francis William Her	nry, Toronto, Canada	, Electrical Eng.
Riley, George Washington,	Champaign,	Art and Design.

Sheppard, Samuel Henry,	Jacksonville,	Pharmacy.
Smolt, Alfred Ernest,	Paw Paw,	Pharmacy
Vandeventer, Homer Givens,	Mt. Sterling.	Agriculture.
Wolcott, James Thompson,	Peoria,	Chemistry.
Wurdeman, Charles,	Columbus, Net	Architecture.
Barnard, Alice Sarah,	Chicago, Ei	nglish and Mod. Lang.
Brownlee, Elizabeth Emma,	Urbana, Engl	ish and Modern Lang.
Campbell, Mary,	Urbana,	Art and Design.
Carter, Carrie Mabel,	Champaign,	Art and Design.
Chambers, Gertrude,	Sadorus,	Music.
Chester, Edith,	Champa ign ,	Art and Design.
Clendenin, Adelle,	Cairo, Engl	ish and Modern Lang.
Creamer, Alice Carey,	Washington C.	H., O., En.& Mod. Lan.
Grinnell, Jessie Claire,	Mayfair,	Art and Design.
Havard, Jennie,	Urbana,	Music.
Heath, Bessie,	White Heath,	Eng. and Mod. Lang.
Hughey, Marie Lorie,	Hillsboro, O.,	Eng. and Mod. Lang,
Leal, Mary Cloelia,	Urbana,	Art and Design.
Lewis, Lela J,	Santa Monica	, Cal., Artand Design.
McIntosh, Mabel Charlotte Urquha	rt, Champaign,	Eng. and Mod. Lang.
McIntosh, Winifred Wilhelmina		
Stuart,	Champaign,	Eng. and Mod. Lang.
Phelps, Grace Esther,	Oak Park,	Eng. and Mod. Lang.
Rapp, Mrs. Jean Morrison,	Champaig n ,	Art and Design.
Roysdon, Grace Elizabeth,	Champaign,	Art and Design.
Sherfy, Fannie Belle,	Champaign,	Physical Culture.
Sims, Ona Neosho,	Champaign,	Music.
Spry, Zua,	Sidell,	Classical.
Van Patten, Hanna,	Steward, Eng	lish and Modern Lang.
Walker, Cora Elizabeth,	St. Joseph, E.	nglish and Mod. Lang.
Woody, Jamie E,	Champaign,	Art and Design.

PREPARATORY SCHOOL.

Big Neck,	Civil Engineering.
Chicago,	Architecture.
Bondville,	Eng. and Mod. Lang.
Winchester,	Electrical Engineering.
Champaign,	Eng. and Mod. Lang.
Mt. Vernon,	Agriculture.
Arthur,	Latin.
	Big Neck, Chicago, Bondville, Winchester, Champaign, Mt. Vernon, Arthur,

Beekman, Jonathan Colby, Benham, Fred Henry, Blake, Burton Aaron, Boggs, Oliver Carter, Bone, Hugh Alvin, Bosworth, Carroll Arthur, Boyles, Rice, Brockman, John, Brown, Arthur Artemas, Brown, Louis Sylvester, Bunn, Walter Pennington, Byrne, Lee, Campbell, Clinton Oliver, Carter, Henry Clay, Clark. Howard Wallace. Coghlan, Graham, Connell, Richard, Costello, Don, Curtis, William, Davis, Philip Henry, Dighton, William, Dill. Arthur Williams. Donoghue, Charles Richard, Eaton, Horace David, Edson, George Edmund, Evans, Ray, Forbes, Stuart Falconer, Forman, Charles William, Francis, Edmund Carlton, Frazier, Elmer Allen, Gardner, Frank Arthur, Gardner, Samuel Boon, Gebbie, Frank Kelsoe, Gordy, Alva Nelson, Graham, George Woods, Greb, George, *Grinnell, John Cornelius, Grussing, John, Haggard, William Thomas, Hall, Seymour Elbridge,

Civil Engineering. Tallula. Lincoln. Mechanical Engineering. Tiskilwa. Architecture. Urbana. Eng. and Mod. Lang. Classical. Bethany, Chicago, Civil Engineering. Louisville. Classical. Davenport, Ia., Electrical Eng. Champaign, Mechanical Engineering. Butler. Eng. and Mod. Lang. Golconda. Chemistry. Minneota, Minn., Classical. Champaign, Classical. Buck Creek, Ind., Architecture. Quincy, Architecture. Philadelphia, Electrical Engineering. Delavan. Architecture. Freeburg. Natural Science. Delavan, Electrical Engineering. Rock Falls. Architectural Eng. Monticello. Natural Science. Richmond, Ind., Architecture. La Salle. Latin. Champaign, Pharmacy. Chicago, Civil Engineering. El Paso, Mechanical Engineering. Urbana, Architecture. Nashville, Eng. and Mod. Lang. Austin. Architecture. Champaign. Electrical Engineering. Osceola. Electrical Engineering. Utica. Electrical Engineering. Mascoutah, Electrical Engineering. Philo. Eng. and Mod. Lang. Freeport, Electrical Engineering. Springfield, Civil Engineering. Mayfair. Electrical Engineering. Cissna Park, Civil Engineering. Farmer City, Mechanical Eng. Champaign, Eng. and Mod. Lang.

*Deceased.

Hamm, Ira Lewis, Hammers, Jesse, Haseltine, Theodore Lorraine, Haws, Joel, Hay, Mark, Hayes, Albert Leslie, Hayes, James Benjamin, Helbling, Louis Ferdinand, Helton, Alfred Joseph, Henninger, Carl Gustave, Herman, John Newton, Herwig, Fred William, Hill, Irwyn Horatio, Holden, James Allen, Hunter, Benjamin Aikens, Hurd. Arthur Burton. Jackson, William John, Jones, Maurris M, Kaeser, Albert Fred, Kennard, Edward Morrison, Key, David Francis Scott, Kittner, Ferdinand B, Kruse, Conrad Fred, Leidendeker, Albert Richard, Lloyde, Clifford Luther, Lowes, Forrest Mitchison, McConney, Porter David, McCormick, Olin, McIntire, Merton Pearson. McMillan, Frederick Routt, Marker, William Franklin, Marx, Maurice, Masten, George, Mellen, Earnest Roy, Miner, Earl Henry, Moore, Dwight Merritt, Morse, Robert Pope, Morrissey, Matthew James, Muller, Albert Charles, Muse, William Osborne, Nicholson, James Calvin,

Mechanical Engineering. El Paso. Champaign, Classical. Aurora, Eng. and Mod. Lang. Magnolia, Pharmacy. Chicago. Architecture. Galva. Mechanical Engineering. Riverton, Chemistry. Champaign, Electrical Engineering. Eng. and Mod. Lang. Atwood. Architecture. Eddyville, Ia., Freeburg. Electrical Engineering. Mason City, Mechanical Engineering. Architecture. Foliet, Aurora, Mechanical Engineering. Rockford, Mechanical Engineering. El Paso. Mechanical Engineering. Electrical Engineering. Chicago, Eng. and Mod. Lang. Fisher. Highland, Natural Science. Champaign, Civil Engineering. Carbondale, Electrical Engineering. Defiance, O., Civil Engineering. Davenport, Ia., Architecture. Champaign, Civil Engineering. Champaign, Natural Science. Geneseo. Latin. Indianapolis, Ind., Mechanical Eng. Gibson City, Electrical Eng. Neponset, Electrical Engineering. Jacksonville, Electrical Eng. Champaign, Mechanical Eng. Nashville. Electrical Engineering. Woonsocket, S. D., Eng. & M. Lan. Electrical Engineering. Amboy. Winchester, Electrical Engineering. Monticello, Electrical Engineering. Indianapolis, Ind., Architecture. Champaign, Chemistry. Chicago. Architecture. Jacksonville. Civil Engineering. Litchfield, Mechanical Eng.

O'Donnell, Patrick Henry, Olson, Jesse Mathias, O'Rourke, Eugene James, Onstott, Hiley Hiram, Parker, George Arthur, Parker, Walter Asbury, Peoples, John Vanralzah, Perrett, Galen Joseph, Perrett, Irving Thomas, Phillips, William Oliver, Plym, Francis John, Piatt, Jay Cantrell, Pixley, Arthur Homer, Price, Charles Jacob, Prince, Henry Adelbert, Ratz, Gustavus George, Reinhart, Julius Emil, Rice, Fred Lee, Richards, Clarence Morgan, Richmond, Shannon Alexander, Ritchie. Andrew. Rodgers, Leon, Roysdon, Emmett Russell, Schaad. Thomas Ferdinand. Schneck, Sereno, Schneiter, Samuel, Schuyler, James Chauncey, Seass, Louie Dexter, Shaffer, Robert Lyman Shless, Charles, Sloan, John Francis, Spaulding, Robert Limbert, Smith. Fred McClellan. Smith, John Cummings, Stone, Albert James, Sumner, William Thompson, Tatman, Frank, Thompson, Guy Andrew, Trevett, Ross Lannington, Turner, Clyde Briggs, Twyman, Frank,

Belvidere. Latin. Latin. Seneca. La Salle, Electrical Engineering. Du Quoin. Eng. and Mod. Lang. Champaign, Chemistry. Decatur, Natural Science. La Junta, Colo., Electrical Eng. Chicago, Electrical Engineering. Electrical Engineering. Chicago. Architecture. Chicago. Architecture. Aledo. Clarion. Chemistry. Ingraham, Electrical Engineering. Forreston. Natural Science. East Syracuse, N. Y., Architecture. Red Bud. Agriculture. Chicago. Mechanical Engineering. Champaign, Eng. and Mod. Lang. Urbana, Mechanical Engineering, St. Joseph, Mo., Chemistry. Foosland. Electrical Engineering. Riverton. Civil Engineering. Champaign, Natural Science. Chandlerville. Agriculture. Mt. Carmel. Natural Science. Paxton, Eng. and Mod. Languages. Sycamore, Mechanical Engineering. Urbana, Mechanical Engineering. Electrical Engineering. Neoga, Chicago, Eng. and Mod. Languages. Brimfield, Eng. and Mod. Lang. Villa Ridge, Electrical Engineering. Virginia, Latin. Pekin. Electrical Engineering. Electrical Engineering. Quincy, Emden, Eng. and Mod. Languages. Farmer City, Mechan. Engineering. Steward. Eng. and Mod. Lang. Champaign, Electrical Engineering. Atlanta, Mechanical Engineering. Macomb. Electrical Engineering.

Uppendahl, Willie John, Van Patten, Seth Fields. von Oven. Frederick William. Voris. Alvin Coe. Walker, Rufus, Jr., Walsh, John Henry, Webber, Arthur. Webster, William W. Weeks. Charles Henry. Wiley, Leo, Williamson, Albert St. John, Wilmot, Arthur Xenophon, Winslow, Charles Erastmus, Winslow, Fred Albert, Wray, David Couden, Zink, George, Bailey, Gertrude Hannah, Bassett, Minnie, Bennett, Orpha Adelia, Berry, Edna May, Berry, Floy Elaine, Boyd, Bertha Marion, Busey, Laura, Busey, Marietta Ruth, Campbell, Maude Permill, Frazey, Alice Belle, Frazier, Della Purl, Hanson, Mattie Alice, Hammers, Lillian, Irwin, Blanche B., Kerns, Mazie White, Morrow, Grace Eliot, Owens, Daisie Margaret, Ray, Maude Lucille, Somers, Mabel Carson, Wilson, Grace, Wright, Marion.

Dalton City, Eng. and Mod. Lang. Steward. Latin. Naperville. Civil Engineering. Neoga. Electrical Engineering. Moline. Eng. and Mod. Lang. Civil Engineering. Ivesdale, Pharmacy. Galatia, Philo. Mechanical Engineering. Upper Alton, Architecture. Paris. Electrical Engineering. Electrical Engineering. Quincy, La Prairie Center. Electrical Eng. Electrical Engineering. Freeport, Freeport, Electrical Engineering. Elida. Mechanical Engineering. Litchfield, Chemistry. Long View, Eng. and Mod. Lang. Eng. and Mod. Laag. Champaign, Milford Center, O., Latin. Urbana, Classical. Urbana, Classical. Roseville. English and Mod. Lang. English and Mod. Lang. Urbana, Latin. Urbana, Champaign. Natural Science. Classical. Urbana. Eng. and Mod. Lang. Champaign, Art and Design. Urbana, Chambaign. Eng. and Mod. Lang. Long View, Eng. and Mod. Lang. Champaign, Natural Science, Natural Science. Champaign, Urbana, Natural Science. Eng. and Mod. Lang. Champaign, Urbana, English and Mod. Lang. English and Mod. Lang. Penfield, Urbana, English and Mod. Lang.

FREE COURSE IN AGRICULTURE STUDENTS.

Coolidge, Arthur Earle,	Galesburg.
Funk, Arthur Correll,	Bloomington.
Haire, Dodd William,	Divernon.
Hall, Fred Fay,	Champaign.
Heath, Noble Porter,	White Heath.
Hollensbe, Alvin Orin,	Champaign.
Hyde, Charles B,	Rising.
McCluer James Warren,	Farina.
Malady, Thomas Edward,	Seneca.
Morrison, William Marshall,	Leeds, Wis.
Nottinger, Dale Roy,	Plainfield.
Pallissard, Armand,	St. Anne.
Pratt, George Wallace,	Staley.
Quanté, Hiram Henry,	Metropolis.
Shoot, Clarence W,	Charleston.
Simpson, William Neil,	Farmington.
Skinner, George,	Urbana.
Sparks, George,	Urbana.
Tomlin, Isaac Funk,	Pleasant Plains.
Travis, Abraham,	Womac.
Twohig, Joseph,	Delavan.
Upperman, William Walter,	Cowden.
Van Dervoort, William,	Ellsworth.
Walker, William Leonard,	Odell.
Ware, Walter Scott,	Mahomet.

SUMMARY.

					Un	iver	sit	y.			PreS	par: cho	atory iol.	U and tor	niver Pre y Sc	rsity epara- hool.
Courses and Classes.	Graduate School	Resident Graduates	Seniors	Juniors	Sophomores	Freshmen.	Specials	(Men	Total J Women	Total	Men	Women	Total	(Men	Total Women	Total
Agriculture, Men Mechanical Eng., Men Electrical Eng., Men Civil Eng., Men Mining Eng., Men	1 2		1 3 11 14 1	- 11 7 22 1	18 23 19	2 16 38 14	 I 3	48 84 73 2		5 48 84 73 2	3 19 39 13	 	3 19 39 13	8 67 123 86 2		8 67 123 86 2
Sanitary Eng., Men Men Architecture	 1	 3	 18	2 8	2 18	 29	12	5 79	 	5 	 19		 19	5 98	 	5
(Women Architectural Eng., Men (Men Chemistry	 I	 	 1 8	 5 10	 3 5	2 4 11	 T	13 36	2) 13	 1 7		 1 7	14 14	2) 14 44
Women Pharmacy, Men Natural	 I	 I	 14	 4	1 3 7	 2 17	 2 1	 7 45	1 	7	 3 8	 	3	10 53	1) 10
History Women English and Men Modern	 1	ï	2 6	9 12	27	4 12	 2	 41	17	{ 79	22	4 	{ } 33	 63	21 	{/4 {112
Languages (Women Latin { Women	2 	2 	333	3 1	8 3	9 4 2	11 2 	•••• 9	38 9	18	6	11 2	8	15	49 11	26
Classical { Men Women	т 	•••	3	2	4 	6	 1 1	.16 	 5	21	5		} 8	21 	8	29
Design Women Music, Women Physical Culture. Women.		ı 		••		2	9 3 1	•••	12 3 1) 13 3 1		т 	ı 		13 3 1	} 14 3 1
Total { Men	8	9	83	84	109	155	16	464	-	 	145		 	609		<u>-</u> ,
Total	10	- 12	92	43 99	14 123	175	41 41	<u></u>		552			166	<u> </u>		718

Adding to the number enumerated above the 25 men who attended the one term course in Agriculture gives-

HOLDERS OF SCHOLARSHIPS, PRIZES AND COMMISSIONS.

HONORARY SCHOLARSHIPS.

Steinwedell, George Otto.
Carpenter, Hubert Vinton.
Marble, Harry Curtis.
Campbell, George Henry.
Webster, Sallie E.
Millar, Adam Vanse.
Bailey, Leonard Lionel.
Templeton, Benjamin Franklin.
Carmack, Clyde Robert.
Heideman, George Herman.
Strawn, John Harris.
Ketchum, Richard B.
Webber, Hubert Anthony.
Shepardson, John E.
Sparks, Marion E.
Holtzman, Stephen F.
Row, George S.
Newcomer, Joseph Hardin.
Woolsey, Ola C.
Beasley, Harrison E.
Schacht, Frederick William.
Porter, Robert K.
Van Orstrand, Charles E.
Reeves, Harley E.
Barr, George A.
Carpenter, Frank A.
Burroughs, Edward.

ACCREDITED SCHOOL SCHOLARSHIPS.

Elgin High School, Hobart, Albert Claude.

CHICAGO CLUB LOAN FUND.

Mesiroff, Josef.

WINNERS IN JUNIOR PRIZE SPEAKING CONTEST.

Parry, Joseph Lawrence, First Prize. Woolsey, Ola C, Second Prize.

COMMISSIONED BY THE GOVERNOR AS CAPTAINS BY BREVET IN THE ILLINOIS NATIONAL GUARD, 1893.

Craig, Ed	ward Chilton,	Earl, Mark Alden.
Graham,	William Johnson,	Spalding, Fred Milton.
	Stewart,	John Truesdale.

The following have been named to the Secretary of War as worthy of special commendation:

Earl, Mark Alden, Spalding, Fred Milton, Stewart, John Truesdale.

ROSTER OF OFFICERS AND NON-COMMISSIONED OFFICERS. OF THE BATTALION FOR 1893-94.

> Adjutant, Captain C. W. Noble. Sergeant-Major, H. R. Marsh.

- Co. A—Captain, W. N. Vance; 1st Sergeant, F. H. Green; Sergeant, W. C. Brenke; Corporals, L. I. Brower, G. L. Grimes, C. D. Gulick, H. Graham, M. Peterson.
- Co. B—Captain, A. M. Munn; 1st Sergeant, G. H. Scott; Sergeant, G. E. Row; Corporals, F. C. Beem, G. W. Herwig, J. E. Trogdon, J. C. Barnhart.
- Co. C—Captain, H. E. Reeves; 1st Sergeant, R. P. Brower; Sergeant, R. P. Manard; Corporals, C. W. Leigh, W. M. Vigal, H. C. Eaton, T. J. Klossowski.
- Co. D-Captain, E. V. Capps; 1st Sergeant, R. K. Porter; Sergeant, C. A. Risor; Corporals, J. L. Sammis, C. W. Young, L. C. Street, W. N. Eichberg.

- Co. E—Captain J. E. Shepardson; 1st Sergeant, J. H. McKee; Sergeant, J. J. Dubsky; Corporals, H. C. Porter, A. E. Paine, A. E. Schultz, F. J. Murphy, C. O. Keuhne.
- Co. F—Captain, J. A. Green; 1st Sergeant, G. A. Howard; Corporals, J. H. Young, H. C. Coffeen, O. T. Wills, W. T. Stebbins, A. Graham.
- Artillery Detachment—Captain, L. A. MacGregor; 1st Sergeant, W. T Pierce; Corporals, A. C. Hobart, G. F. Anderson.
- Band-C. M. Lewis, Drum Major; W. L. Steele, Leader.

1894.	1895.	1895.	1895.				
SEPTEMBER.	JANUARY.	MAY.	SEPTEMBER.				
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THE UNIVERSITY CALENDAR.

1894-95.

FALL TERM-1894.

Sept. 6, Thursday.	Entrance examinations begin.
Sept. 10, 11, Monday and Tuesday.	Registration Days.
Sept. 12, Wednesday.	Instruction begins.
Nov. 5, Monday.	Latest date for announcing Subjects of Theses for Baccalaureate Degrees.
Nov. 29, Thursday.	Thanksgiving Recess.
Dec. 3, Monday.	Instruction resumed.
Dec. 17, Monday.	Term Examinations begin.
Dec. 19, Wednesday.	Term ends.

WINTER TERM-1895.

Jan. 7, Monday.	Entrance Examinations.
Jan. 7, 8, Monday and Tuesday.	Registration Days.
Jan. 9, Wednesday.	Instruction begins.
March 25, Monday.	Term Examinations begin.
March 27, Wednesday.	Term ends.

SPRING TERM-1895.

March 25, 26, 27, Mon-	ן	
day, Tuesday and	Registration Days.	
Wednesday.	ļ	
March 28, Thursday.	Instruction begins.	
April 27, Saturday.	Latest day for presenting Theses and Orations.	Commencement

May 27, Monday.	Hazleton Prize Drill.
May 28, Tuesday.	Competitive Drill.
May 30, Thursday.	Senior Examinations begin.
June 5, Wednesday.	Term Examinations begin.
June 9, Sunday.	Baccalaureate Address.
June 10, Monday.	Class Day.
June 11, Tuesday.	Alumni Day.
June 12, Wednesday.	Twenty-fourth Annual Commencement.
Sept. 5. Thursday.	FALL TERM—1895. Entrance Examinations begin.
Sept. 9, 10, Monday and Tuesday.	Registration Days.
Sept. 11, Wednesday.	Instruction begins.
Nov. 4, Monday.	Latest Date for Announcing Subjects of Theses for Baccalaureate Degrees.
Nov. 28. Thursday. Dec. 2, Monday. Dec. 19, Thursday. Dec. 20, Friday.	Thanksgiving Recess. Instruction resumed. Term Examinations begin. Term ends.

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