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ILLINOIS  
**Industrial University,**

URBANA, CHAMPAIGN COUNTY, ILL.

~~1878-9~~  
77-8

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LEARNING AND LABOR.

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CIRCULAR

—OF THE—

ILLINOIS

**Industrial University,**

URBANA, CHAMPAIGN COUNTY, ILL.

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1877-8.

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CHAMPAIGN :  
GEORGE SCROGGS, PRINTER.  
1878.

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**UNDER LAW OF MAY 7, 1873.**

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Professor of Geology and Zoology.

J. BURKITT WEBB, C. E.,  
Professor of Civil Engineering.

JOSEPH C. PICKARD, M. A.,  
Professor of English Language and Literature.

N. CLIFFORD RICKER, M. Arch.,  
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Instructor in Book-Keeping.

PROF. PETER BAUMGRAS,  
Instructor in Industrial Art and Designing.

MAJ. WM. A. DINWIDDIE,  
First Lieut. 2d Cavalry U. S. A.,  
Professor of Military Science and Tactics.

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*INSTRUCTORS AND ASSISTANTS.*

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MISS CHARLOTTE E. PATCHIN,  
Instructor in Music.

IRA O. BAKER, C. E.,  
Assistant in Civil Engineering and Physics.

MELVILLE A. SCOVELL, M. S.,  
First Assistant in Chemical Laboratory.

CHARLES I. HAYS, B. S.,  
Assistant in Horticulture and Botany.

CHARLES L. PICKARD, B. A.,  
Assistant in English and Ancient Languages.

EDWIN L. LAWRENCE,  
Head Farmer.

E. A. KIMBALL,  
Foreman in Machine Shop.

JOSEPH C. LEWELLIN, B. S.,  
Assistant in Architecture and Foreman of Carpenter Shop.

*INSTRUCTORS AND ASSISTANTS.*

JOHN E. GREGORY,  
Second Assistant in Chemical Laboratory.

C. W. CLARK, B. S.,  
Second Assistant in Civil Engineering.

WILLIAM D. RUDY, B. S.,  
Third Assistant in Chemical Laboratory.

GEORGE A. WILD,  
Taxidermist.

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Teacher of Elocution.

LORADO TAFT.  
Teacher of Clay Modeling.

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**SUMMARY OF LIST OF STUDENTS.**

Resident Graduates—Gentlemen.....	6	
—Ladies.....	4	10
Seniors—Gentlemen.....	35	
—Ladies.....	11	46
Juniors—Gentlemen.....	36	
—Ladies.....	13	49
Sophomores—Gentlemen.....	49	
—Ladies.....	10	59
Freshmen—Gentlemen.....	78	
—Ladies.....	25	103
Preparatory—Gentlemen.....	104	
Ladies.....	14	118
Special Students—Ladies.....		19
Total.....		<hr/> 404

# Illinois Industrial University.

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## HISTORY.

The Illinois Industrial University, the State University of Illinois, had its origin in a movement for the higher education of the industrial classes, began in 1851, and resulting in the Congressional grant of lands for this purpose, made to the several States in 1862, and amounting in this State to 480,000 acres. The University was chartered in February, 1867, and opened to students in March, 1868. In addition to the endowment from the land grant, over \$400,000 were donated by Champaign County in bonds, buildings and farms. The State has also made large appropriations for fitting up and stocking the farms, for library and apparatus, and for buildings, including the large Main Building erected in 1872 and 1873, the Mechanical Building and Drill Hall, and the Chemical Laboratory, the present year. Successive Colleges and Schools have been added as required, till four Colleges, including fifteen distinct Schools, have been organized.

The whole number matriculated as students since the opening is 1285. The number graduated from the several Colleges, including the class of 1877, is 160. In 1871 the University was opened for lady students, on the same terms as to gentlemen. In 1874 a fine Art Gallery was established, containing a large collection of casts of celebrated statues and sculptures, and of engravings and autotypes.

## LOCATION.

The University has a beautiful and healthful situation on the high grounds between the contiguous cities of Champaign and Urbana, and within the corporate limits of the latter. It is one hundred and twenty-eight miles south from Chicago, at the junction of the Illinois Central Railroad and the Indianapolis, Bloomington and Western Railway. The county is a region of beautiful rolling prairies, with large belts of timber along the streams, and is one of the richest farming districts in the State.

## BUILDINGS AND GROUNDS.

The domain occupied by the University and its several departments embraces about 623 acres, including stock farm, experimental farm, orchards, gardens, nurseries, forest plantations, ar-



boretum, botanical garden, ornamental grounds, and military parade ground.

The University buildings, fifteen in number, include a grand Main Building for public use, one large and two small Dormitory buildings, a large Mechanical and Drill Hall, a large Chemical Laboratory, a Veterinary Hall, a small Astronomical Observatory, three dwellings, two large barns, and a large green-house.

The Mechanical Building and Drill Hall is of brick, 126 feet in length and 88 feet in width. It contains a boiler, forge and tank room ; a machine shop, furnished for practical use, with a steam engine, lathes, and other machinery ; a pattern and finishing shop, shops for carpentry and cabinet work, furnished with wood-working machinery ; paint and draughting-rooms, and rooms for models, storage, etc. In the second story is the large Drill Hall, 124 by 80 feet, sufficient for the evolutions of a company of infantry, or a section of a battery of field artillery. It is also well supplied with gymnastic apparatus. One of the towers contains an armorer's shop and military model room, an artillery room and a band room. The other contains a printing office and editor's room.

The large Dormitory Building is 125 feet in length and five stories in height. It affords 80 Dormitory rooms for students. Two smaller Dormitory buildings contain eight rooms each. The new Chemical Building, erected this year at a cost, including furniture, of \$40,000, contains five laboratories, and is said, by good judges, to be one of the best and largest in the United States.

#### PROPERTY AND FUNDS.

Besides its lands, buildings, furniture, library, etc., valued at \$470,000, the University owns 25,000 acres of well-selected lands in Minnesota and Nebraska. It has also endowment funds invested in State and County bonds amounting to \$319,000, besides other property and avails, valued at \$33,000. The State has appropriated \$25,000 to the Agricultural Department for barns, tools, stock, etc. ; \$20,000 to the Horticultural Department for green-house, barns, drainage, tools, trees, etc. ; \$25,000 for Mechanical and Military Building, machinery, etc. ; \$127,000 toward the erection of the Main Building, and furnishing the same ; \$10,500 for Chemical Apparatus ; \$25,000 for Library and Apparatus ; \$5,000 for the Apparatus of a Physical Laboratory ; \$3,000 for a Veterinary Hall, Stable and Apparatus ; \$40,000 for Chemical Building ; besides smaller amounts for agricultural experiments, etc.

#### MUSEUM AND COLLECTIONS.

The collections of minerals, fossils, shells, birds, mammals, insects, plants, etc., have been made with much care, and are no-

tably large in some departments, affording valuable facilities in the study of Natural History and Geology. The collection in Entomology is one of the largest in the West. With the aid of a late state appropriation, valuable collections of mammals, birds, and fishes have been purchased, embracing many specimens of great rarity and value.

One of the Trustees presented the full series of celebrated casts of fossils made by Prof. H. A. Ward, of Rochester, N. Y. This collection embraces the most rare and valuable fossils of the British Museum and of other great European collections, as well as those of President Hitchcock and others in America.

#### ART GALLERY.

This Gallery is one of the largest and finest in the country. It is the gift of citizens of Champaign and Urbana. It occupies a beautiful hall, 60x80 feet, and the large and beautiful display of Art objects in it surprises and delights all visitors. Perhaps no collection in the West equals it in the number and value of its specimens. Many of the great master-pieces of Sculpture are here exhibited in casts taken directly from the originals. The value of this splendid collection as a means of education is already exhibiting itself in the several departments of Drawing and Design at the University.

#### LIBRARY.

The Library, selected with reference to the literary and scientific studies required in the several courses, includes over 11,000 volumes. The large Library Hall, fitted up as a Reading Room, is open throughout the day for study, reading and consultation of authorities. It is well provided with American, English, French and German papers and periodicals, embracing some of the most important scientific and art publications. The following periodicals are regularly received:

<p>AGRICULTURAL AND HORTICULTURAL.</p> <p>American Agriculturist, Cultivator and Country Gentleman, California Farmer, Live Stock Journal, <i>London</i>, Journal d'Agriculture Pratique, <i>Paris</i>, New England Farmer, National Live Stock Journal, Prairie Farmer, Practical Farmer, Rural New Yorker, Western Farmer, Wallace's Monthly, Gardner's Chronicle, <i>London</i>, Agricultural Gazette, <i>London</i>, Western Agriculturist,</p>	<p>Gardner's Monthly and Horticulturist, Western Rural, Williamette Farmer, Revue Horticole, <i>Paris</i>, Farmer and Fruit Grower, Factory and Farm, Kansas Farmer.</p> <p style="text-align: center;">ENGINEERING.</p> <p>Encyclopedie d'Architecture, <i>Paris</i>, Engineering, <i>London</i>, Architektonisches Skizzen-buch <i>Berlin</i> English Architect, <i>London</i>, Railroad Gazette, Scientific American, Scientific American Supplement, The Builder, <i>London</i>,</p>
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<p>Van Nostrand's Eclectic Engineering Magazine, The Workshop.</p> <p>LITERARY.</p> <p>Edinburgh Review, London Quarterly, The Nation, Educational Weekly, Library Journal, Legal Adviser, New Englander, Magazine of American History, Illini, North American Review, British Quarterly Review, Revue des Deux Mondes, Paris, Scribner's Magazine, Deutsche Rundschau, Berlin, Atlantic Monthly, International Review, New England Journal of Education, American Journal of Education.</p> <p>SCIENTIFIC.</p> <p>American Chemist, American Journal of Science, Grevillea, London, Polytechnisches Journal, Augsburg, Popular Science Monthly.</p>	<p>Official Patent Office Gazette, Patent Right Gazette, Jahrbericht der Chemie, Giessen, Berichte der Deutschen Chemischen Gesellschaft Berlin, Viehsucht, Berlin, American Naturalist, Annalen der Chemie, Leipsic, British Microscopic Journal, London, Comptes Rendus, Paris, Journal of the Franklin Institute, National Guardsman, Nature, London. Quarterly Journal of Mathematics London. American Journal of Mathematics, NEWS. Champaign County Gazette, Champaign County Herald, Rantoul Journal, Champaign Union, Champaign Times, Urbana Republican, Douglas County Review, Homer Enterprise, Sullivan Progress, Danville News. Indiana Farmer, Agr. and Hor.</p>
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## ORGANIZATION OF THE UNIVERSITY.

### COLLEGES AND SCHOOLS.

The Institution is a true University in the best American sense, though differing designedly in the character of some of its Colleges from the older Institutions of this country. It is divided into four Colleges, and these are again subdivided into Schools. A School is understood to embrace the course of instruction needful for some one profession or vocation. Schools that are cognate in character and studies, are grouped under the same College.

#### I. THE COLLEGE OF AGRICULTURE.

School of Agriculture. School of Horticulture.

#### II. COLLEGE OF ENGINEERING.

School of Mechanical Engineering. School of Civil Engineering.  
School of Mining Engineering. School of Architecture.

#### III. COLLEGE OF NATURAL SCIENCE.

School of Chemistry. School of Natural History.  
School of Domestic Science.

## IV. COLLEGE OF LITERATURE AND SCIENCE.

School of English and Modern Languages. School of Ancient Languages.

## V. ADDITIONAL SCHOOLS.

School of Military Science. School of Commerce. School of Art and Design.

Vocal and Instrumental Music, Telegraphing and Photography are also taught, but not as parts of the regular courses.

## CHOICE OF STUDIES.

It has been a favorite aim of the University from the outset, to allow as much freedom as possible in the selection of studies.

A University is designed not for children, but for young men and women, who may claim to know something of their wants, powers and tastes. It is not useful to require every student, without regard to his capacity or practical wants, to take entire some lengthened "course of study." Each student should weigh carefully his own powers and needs and counsel freely with his teachers as to the branches he may need to fit him for his chosen career, and then pursue them with earnestness and perseverance, without faltering or fickleness.

It is necessarily required, 1st, That the student shall be thoroughly prepared to enter and keep pace with the classes in the chosen studies; and, 2d, That they shall take these studies in the terms in which they are taught.

Each student is expected to have three distinct studies, affording three class exercises each day. On special request, the Faculty may allow less or more.

No change in studies can be made after the beginning of a term, without permission of the Faculty.

Students often need advice in the selection of studies, and the arrangement of a proper course. To meet this need, the Faculty have carefully arranged several Courses of Studies, which are expected to be followed by those who have no special reason for diverging from them. See Courses under the several schools.

Due care will be taken to prevent, as far as possible, all abuse of the liberty of choice. Students failing to pass satisfactory examinations in their chosen studies, will not be permitted to remain and take other studies without a vote of the Faculty.

To secure the more certainly the diffusion of the sciences relating to the great industries, the State Legislature, in 1873, prescribed that each student should be taught some of those branches.

The Trustees have accordingly made the following classification of studies, and they require that each student shall take, each

term, one study at least from the first class. The second study must be of either the first or second class, and the remaining studies from either of the three classes.

CLASS I. Physics, Chemistry, Mineralogy, Physical Geography, Anatomy and Physiology, Botany, Zoology, Geology, Entomology, Algebra, Geometry, Trigonometry, Calculus, Drawing, Surveying and Engineering, Mining and Metallurgy, Mechanics, Architecture, Principles of Mechanism, Hydraulics, Thermodynamics, Strength of Materials, Prime Movers, Mill Work, Machine Drawing, Origin and Treatment of Soils, Culture, etc., of Plants, Breeding of Domestic Animals, Veterinary Science, Farm Products and Manufactures, Roads and Railroads, Book-Keeping, Construction and Use of Machinery, Modeling and Patterns, Bridges, etc., Astronomy, Military Science and Domestic Science.

CLASS II. English Language and Literature, German Language and Literature, French Language and Literature, General History, United States History, Ancient History, Mediæval History, Modern History, Constitutional History, History of Civilization, Logic, Political Economy, History of Agriculture, Constitutional Law, International Law, Rhetoric and Oratory.

CLASS III. Any study taught in the University not enumerated in the first and second classes.

#### AIMS OF THE UNIVERSITY.

The University being both State and National in origin, its aims are defined by the following extracts from the laws of Congress and of the State Legislature :

"Its 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 such manner as the Legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life."—*Act of Congress, 1862, Sec. 4.*

"The Trustees shall have the power to provide the requisite buildings, apparatus, and conveniences, to fix the rates of tuition, to appoint such professors and instructors, and establish and provide for the management of such model farms, model art, and other departments and professorships as may be required to teach, in the most thorough manner, such branches of learning as are related to agriculture and the mechanic arts, and military tactics, without excluding other scientific and practical studies."—*Act of General Assembly, 1867, Sec. 7.*

In accordance with the two acts above quoted, the University holds, as its principal aim, to offer freely the most thorough instruction which its means will provide, in all the branches of

learning useful in the industrial arts, or necessary to "the liberal and practical education of the industrial classes, in the several pursuits and professions in life." It includes in this all useful learning—scientific and classical,—all that belongs to sound and thorough scholarship.

PRELIMINARY YEAR.

Preparatory work is already well done in the many excellent High Schools of the State, and the funds of the University ought not to be diverted from their proper uses, to provide instruction in merely Preparatory Studies. But a needful advance in the standard for admission to the College courses, and the necessity of providing temporarily for those who come from places where no good High Schools exist, have induced the Trustees to provide for preparatory classes *in the studies lying between the Common School studies and the College Courses.*

Candidates for these classes must be at least fifteen years old. They must also pass satisfactory examinations in Arithmetic, Geography, English Grammar, and History of the United States. The examination in these branches should be equal to that usually required for a Second Grade certificate for teachers. This examination may be made by county superintendents. The studies taught in the preliminary year are as follows :

*FIRST TERM.*

Algebra (Olney's), Physiology (Dalton's), Book-Keeping.

*SECOND TERM.*

Geometry (Olney's), English, Elements of Composition (Swinton's School Composition, or an equivalent), Orthoepy and Word Analysis (Introduction to Webster's Academic Dictionary), and Natural Philosophy (Peck's Ganot).

*THIRD TERM.*

Geometry completed ; English (as in Second Term, with the addition of Goldsmith's Traveler, or an equivalent, read for analysis), and Botany.

For candidates for the Classical course the studies will be as follows

FIRST TERM.—Algebra, Latin (Cæsar), Greek (Grammar and Reader). SECOND TERM.—Geometry, Latin (Cicero), Greek (Anabasis). THIRD TERM.—Geometry, Latin (Virgil), Greek (Anabasis).

Students in the preparatory studies are not matriculated as University students. They pay no entrance fee, but are charged a tuition fee of Ten Dollars a term, and the incidental fee of Five Dollars a term. They have all the privileges of the library and of the public lectures.

## COLLEGE OF AGRICULTURE.

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### FACULTY.

THE REGENT,	PROFESSOR MORROW, Dean.
PROFESSOR SHATTUCK,	PROFESSOR BURRILL,
PROFESSOR TAFT,	DOCTOR F. W. PRENTICE,
PROFESSOR WEBER,	C. I. HAYS,
M. A. SCOVELL.	

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### SCHOOLS.

SCHOOL OF AGRICULTURE.      SCHOOL OF HORTICULTURE.

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### ADMISSION.

Candidates for admission to the College of Agriculture must be at least fifteen years of age, and must pass satisfactory examinations in the common school branches, and in the studies of the preliminary year (See page 12). While by law, students may be admitted at fifteen years of age, in general it is much better that they shall be eighteen or twenty. It will be well if candidates shall have pursued other studies besides those required for admission. The better the preparation the more profitable the course.

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## SCHOOL OF AGRICULTURE.

### OBJECT OF THE SCHOOL.

The aim of this school is to educate scientific agriculturists. The frequency with which this aim is misunderstood, demands that it shall be fully explained. Many, who look upon agriculture as consisting merely in the manual work of plowing, planting, cultivating, and harvesting, and in the care of stock, justly ridicule the idea of teaching these arts in a college. The practical farmer who has spent his life in farm labors, laughs at the notion of sending his son to learn these from a set of scientific professors. But all this implies a gross misunderstanding of the real object of agricultural science. It is not simply to teach *how* to plow, but the reason for plowing at all—to teach the composition and nature of soils, the philosophy of plowing, of manures, and the adaptation of the different soils to different crops and cultures. It is not simply to teach *how* to feed, but to show the composition, action and value of the several kinds of food, and the laws of feeding, fattening, and healthful growth. In short, it is the aim of the true Agricultural College to enable the student to understand thoroughly, all

that man can know about soils and seeds, plants and animals, and the influences of light, heat and moisture on his fields, his crops, and his stock ; so that he may both understand the reason of the processes he uses, and may intelligently work for the improvement of those processes. Not "book farming," but a knowledge of the real nature of all true farming—of the great natural laws of the farm and its phenomena—this is the true aim of agricultural education. Agriculture involves a larger number of sciences than any other human employment and cannot be regarded as an unfit end of a sound collegiate training.

The steady aim of the trustees has been to give to the College of Agriculture the largest development practicable, and to meet the full demand for Agricultural education, as fast as it shall arise. Agricultural students are especially invited to the University.

Boards of Agriculture, and Agricultural Associations, State and County, are invited to co-operate with the University in its efforts to awaken a more general appreciation of the value of education, and to add, by the establishment of scholarships or other means, to the number of those who avail themselves of its facilities for instruction.

#### INSTRUCTION.

The instruction unites, as far as possible, theory and practice—theory explaining practice and practice illustrating theory. The technical studies are mainly taught by lectures, with careful readings of standard agricultural books and periodicals, and frequent discussions, oral and written, by the students, of the principles taught. These are also illustrated by demonstrations and observations in the fields and stables, not only of the University, but of leading farmers and stock-growers in the vicinity.

#### TECHNICAL STUDIES.

*Elements of Agriculture.*—Outline of the general principles underlying Agriculture in its theory and practice, introductory to the other technical and scientific studies of the course.

*Agricultural Engineering and Architecture.*—Arrangement of the Farm ; its improvement by mechanical means, as Drainage and Irrigation ; its divisions, fences, hedges, etc. ; its water supply ; the construction of Roads ; arrangement, planning and construction of Farm Buildings ; the construction, selection, care, and use of Farm Implements and Machinery.

*Animal Husbandry.*—Principles of breeding and management of our domestic animals ; description of all important breeds and varieties, giving their history and adaptations.

*Rural Economy.*—Relations of agriculture to other industries and to national prosperity ; influences which should determine the class of farming to be adopted ; comparisons of special



and general systems ; uniting of manufacturing with farming ; culture of the various farm crops—cereals, grasses, etc.

*History of Agriculture.*—Progress and present condition in this and other countries. Influence of climate, Civilization and Legislation in advancing or retarding. Agricultural Literature and organizations.

*Rural Law.*—Business Law; Laws especially affecting Agriculture—tenures of Real Estate ; Road, Fence, Drainage Laws, etc.

*Laboratory Work.*—Experiments and Special Investigations by each student. A *Thesis* is required embodying the results of this work.

#### VETERINARY SCIENCE.

In Veterinary Science the lectures are given by a graduate of the schools of veterinary science in both Edinburgh and London. This science is taught during the third year. In the first term the Anatomy and Physiology of the Domestic Animals will be taught by lectures, demonstrations and dissections. Post-mortems of healthy and diseased animals will be made, so that the student may become practically acquainted with the tissues in health and in disease. The first six weeks of the second term will be devoted to the study of Veterinary Medicines, their action and uses ; the remainder of the term to lectures on the Principles and Practice of Veterinary Science. During the third term, practical instruction will be given in clinical work, as cases present themselves, at the veterinary infirmary, where animals are treated or operated on free of charge, for the instruction of the students. Lectures will also be given on Veterinary Sanitary Science and the Principles and Practice of Veterinary Surgery.

For details as to the study of Botany, Chemistry, Zoology, Entomology, Geology and Meteorology, see statements in College of Natural Science.

#### APPARATUS.

The College has for the illustration of practical agriculture, a Stock Farm of 410 acres, provided with a large stock barn fitted up with stables, pens, yards, etc. ; also an Experimental Farm of 180 acres, thoroughly furnished with all necessary apparatus. It has also fine specimens of neat cattle, Short-Horns and Jerseys. Also several breeds of swine, to illustrate the problems of breeding and feeding. The Experimental Department exhibits field experiments, in the testing of the different varieties and modes of culture of field crops, and in the comparison and treatment of soils. It includes also experiments in agriculture and horticulture, under the direction of the Professors of Agriculture and of Horticulture and of the Farm Superintendent, and experiments in feeding animals of different ages, and development upon the various kinds of food. In common with similar departments in the

several State Agricultural Colleges of the country, it attempts to create positive knowledge towards the development of an agricultural science.

The Barn on the Stock Farm has north and west fronts of 80 feet each. Each limb, or L, is 40 feet wide. It is of the kind known as the side-hill barn. The Barn on the Experimental Farm is of less size, but is fitted up with great convenience, and is supplied with a mill for grinding feed, run by a large wind-mill.

A Veterinary Hall and Stable has been provided, and a Clinic is held to illustrate the lectures on Veterinary Science. The department has *papier-mache* models of the foot and teeth of the horse at different ages. Dr. Auzoux' celebrated complete model of the horse in 97 pieces, and exhibiting 3,000 details of structure, has just been received from Paris.

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 also has fine collections of soils, seeds, plants, implements, skeletons of domestic animals, plans, charts, and other apparatus, including a large number of models of agricultural machinery from the Patent Office.

#### AGRICULTURAL COURSE.

##### *Required for the Degree of B. S. in School of Agriculture.*

##### FIRST YEAR.

1. Elements of Agriculture, Chemistry, Trigonometry and Adv. Geometry.
2. Chemistry, American Authors, Free Hand Drawing.
3. Vegetable Physiology, Chemistry, Rhetoric.

##### SECOND YEAR.

1. Agricultural Chemistry, (soils and plants), Botany, German.
2. Agricultural Chemistry (tillage, fertilizers, foods), Botany, German.
3. Economic Entomology, Zoology, German.

##### THIRD YEAR.

1. Agricultural Engineering and Architecture, Animal Anatomy and Physiology, Geology or Ancient History.
2. Animal Husbandry, Veterinary Science, Physics or Mediæval History.
3. Landscape Gardening, Veterinary Science, Physics or Modern History.

##### FOURTH YEAR.

1. Meteorology and Physical Geography, Mental Science, History of Civilization.
2. Rural Economy, Constitutional History, Logic.
3. History of Agriculture and Rural Law, Political Economy, Laboratory Work, Graduating Thesis.

## FARMER'S COURSE.

To meet the wants of young farmers or others who cannot give the time necessary for the full course, and yet desire to better fit themselves to be successful farmers, a special course has been arranged, in which the student gives exclusive attention to the technical Agricultural studies, including Veterinary Science, and completes these in one year. Students will be admitted to this course on passing a satisfactory examination in the common school branches, but they will receive greater benefit from it if they have made better preparation, especially if they have a good knowledge of Botany and Chemistry. They should not be less than eighteen years of age. The studies in this course are arranged in the following order:

1. Elements of Agriculture, Agricultural Engineering and Architecture, Animal Anatomy and Physiology.
2. Animal Husbandry, Rural Economy, Veterinary Science.
3. History of Agriculture and Rural Law, Practical Entomology, Landscape Gardening or Veterinary Science.

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**SCHOOL OF HORTICULTURE.**

## OBJECT OF THE SCHOOL.

The aim of this school is to afford a scientific and practical education specially adapted to the wants of those who cultivate garden and orchard plants, or wish to manage nurseries, parks and pleasure grounds.

## INSTRUCTION.

The instruction is both theoretical and practical. The classroom recitations and lectures are supplemented by practice in the fields and plant-houses. The course recommended for those intending to prepare for the duties of the practical horticulturist, is given below.

At the end of the course a Thesis is required upon some subject connected with Horticultural Science or pursuits. This must be the record of original experiment or research, with appropriate deductions. Suitable illustrations are to accompany the paper. All Theses will be deposited in the library of the University.

## APPARATUS.

Ample provision is made for the illustration of the subjects taught. The cabinet contains among other things: a series of colored plaster-casts of fruits prepared at the University; *modeles plastiques* of fruits and flowers by Auzoux of Paris; collections of seeds of native and exotic plants; of specimens of native and

foreign woods; of beneficial and injurious insects, and specimens showing their work; numerous dry and alcoholic specimens and preparations; maps, charts, diagrams, drawings, etc.

The school is well supplied with compound microscopes and apparatus, and students have abundant 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.

Upon the grounds devoted to the use of the school, there are:

1. A very large specimen apple orchard planted in 1869, and containing above 1000 varieties,—many varieties of pears, cherries, grapes and small fruits.
2. A nursery of young trees, in which students have regular work in propagation, etc.
3. A forest-tree plantation embracing the most useful kinds for timber.
4. An arboretum in which all hardy indigenous and exotic trees are planted as fast as they can be secured, and now containing nearly 100 varieties. The ornamental grounds which surround the University building, embrace about twenty acres, and are kept in neat and attractive style. These, with all the adjuncts of trees and flowering shrubs, lawn and beds of flowers and foliage plants, walks of different material and styles of laying out, give illustration to the class-room work in landscape gardening. A spacious green-house, much enlarged the past year, contains a collection of plants of great value for the classes in floriculture and landscape gardening, besides furnishing students with practice in hot-house and green-house management. The library contains the best literature upon these subjects.

#### TECHNICAL STUDIES.

*Elements of Horticulture.*—This study is an introduction to the subjects which are presented in a comprehensive manner afterward, and gives the most possible information in regard to cultivated trees, fruits, vegetables, and flowers, in the time devoted to it. The instruction is mainly by lectures illustrated by specimens and drawings. 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 Plantations. Students have instruction and practice in grafting, budding, propagation by cuttings, etc. Each student has usually grafted from two hundred to one thousand root-grafts of apples.

*Pomology and Forestry* are studied fourteen weeks. Much

of the first half of the term is spent in the orchards, nurseries, and forests, making observations and collections, and in laboratory work, determining species, varieties, etc. A large collection of apples, pears, grapes, peaches, etc., is made each year, and the chief characteristics of each pointed out. Practice is also had in making drawings and plaster casts. Written descriptions of the fruits are carefully made and compared with those given in the books, and systems of analysis and classification put to practical test. Students see and perform the skilled operations usually practiced in the propagation and growth of trees.

Pruning and training by various methods, especially of grapes, are discussed in the class-room, and illustrated upon the grounds.

Students also study the injurious insects and fungi which cause or accompany diseases of trees and fruits, and the methods of preventing or diminishing their ravages.

The native forests of the vicinity and of the country at large are studied as a foundation for the lessons upon the influence and value of timber and other trees, and their artificial culture. For the latter, the forest tree plantation on the University grounds, and the arboretum, afford practical illustration.

Downing's "Fruits and Fruit Trees of America"; Warder's "Pomology"; Thomas' "Fruit Culturist"; Grigor's "Arboriculture"; Brown's "The Forester"; and Bryant's "Forest Tree Culturist," are important books of reference.

*Plant Houses and Management.*—This study includes garden and landscape architecture, the methods of construction, heating and ventilation and general management, so as to secure, under the different circumstances, the best plant growth. The class-room work consists of lectures and architectural designing and drawing. Illustration and practice are afforded by the plant-houses of the University.

*Landscape Gardening.*—Eleven weeks are devoted to this study. Lectures are given upon the general principles of the art, the history and styles, the kinds and use of trees, shrubs, grass and flowers, the introduction and management of water, the construction and laying out of drives and walks, fences, buildings, etc. The class draw first from copy, then, after the actual study of some locality with its environments, design and draw full plans for its improvement, indicating position of all prominent objects, including the kinds and groups of trees and other plants. These plans, with specifications, are to be deposited in the library of the school. Excursions are made when found practicable for the study of public and private grounds.

Important reference books are: Downing's "Landscape Gardening"; Weideman's "Beautifying Country Homes"; Robinson's "Parks, Promenades and Gardens of Paris."

*Floriculture.*—Fourteen weeks are occupied in the study of the kinds, propagation, growth and care of flowering and other ornamental plants. Each student has practice in propagating by cuttings and otherwise, in potting and shifting, and care of plants requiring various treatments. Insects and diseases with the remedies are thoroughly treated, and the means of securing vigor of growth, or abundance of flowers, are studied and illustrated by practice.

Among the reference books the following are important: Henderson's "Practical Floriculture"; Loudon's "Encyclopedia of Plants"; Parkman's "Book of Roses."

For statement of studies in *Botany* and *Entomology* and for *Microscopy and Fungology*, see School of Natural History.

For *Agricultural Chemistry*, see School of Chemistry.

*Horticultural History and Rural Law.*—Ten weeks. This term's study nearly corresponds with that for the same time in the Agricultural course, and when alike the two classes are made one. Students of this course have special study of the history and literature of Horticulture, so far as these are distinct from that of Agriculture.

All Theses and other required manuscripts in the College of Agriculture must be on regulation paper, of the size of 8x11½ inches.

#### HORTICULTURAL COURSE.

##### *Required for Degree of B. S. in School of Horticulture.*

##### FIRST YEAR.

1. Elements of Horticulture, Chemistry, Trigonometry and Adv. Geometry.
2. Chemistry, Free Hand Drawing, American Authors.
3. Vegetable Physiology, Chemistry. Rhetoric.

##### SECOND YEAR.

1. Botany, Agricultural Chemistry (Soils and Plants), German.
2. Botany, Agricultural Chemistry (Tillage and Fertilizers), German.
3. Economic Entomology, Zoology, German.

##### THIRD YEAR.

1. Pomology and Forestry, Architecture and Engineering, Geology or Ancient History.
2. Plant Structures and Management, Physics, Mediæval History.
3. Landscape Gardening, Physics, Modern History.

##### FOURTH YEAR.

1. Floriculture, Meteorology and Physical Geography, Mental Science.
2. Microscopy and Fungology, Constitutional History, Logic.
3. Horticultural History and Rural Law, Political Economy, Laboratory Work, Graduating Thesis.

**COLLEGE OF ENGINEERING.****FACULTY.**

THE REGENT,	PROF. ROBINSON, Dean.
PROFESSOR SHATTUCK,	PROFESSOR WEBER,
PROFESSOR WEBB,	I. O. BAKER,
PROFESSOR RICKER,	PROFESSOR BAUMGRAS,
J. C. LEWELLIN.	

**SCHOOLS.**

MECHANICAL ENGINEERING,	CIVIL ENGINEERING,
MINING ENGINEERING,	ARCHITECTURE.

**ADMISSION.**

Applicants should be at least eighteen years of age. None are admitted under fifteen. The requirements for admission embrace the common school branches and the studies of the preliminary year. (See page 12.) The examinations in Mathematics are especially thorough.

Those who will make further preparation than is required before entering, can make their courses more extensive and profitable. The following suggestions are offered to such as wish to make thorough work: French and German, are pursued at least one year each. Some preparation in Latin will be of great assistance in these languages. 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; "Warren's Draughting Instruments" may be used as a text-book, and the drawings made on smooth paper, eight by ten inches.

**REGULATION PAPER.**

The following sizes and qualities of paper will be required in all the College Exercises:

For manuscript and unimportant drawings, a heavy flat-cap paper. For ordinary drawings, not colored, a heavy, first quality, smooth drawing paper. For drawings finished in colors, the best Whatman's paper. For topographical and right-line drawings, and lettering, the best three-sheet Bristol board.

**SIZES.**

For Problems, Exercises, Vacation Journals, Lecture Notes, Theses and other Manuscripts, and for Geometrical Projection, Topographical, Railroad, Typographical and Construction Drawings, paper  $8 \times 11 \frac{1}{2}$  inches, the size of the plate being  $8 \times 10$  with  $\frac{1}{2}$

added for binding. If Bristol board is used it must be cut 8x10 inches, and the binding margin hinged on with muslin.

#### CONTRIBUTIONS.

Our friends and students are invited to send us specimens of material and manufactures, and drawings, models or photographs of machinery, bridges, and other engineering and architectural works. Finished and detailed working drawings, perhaps otherwise useless, may be of great value for instruction. Illustrated circulars and price lists of manufacturing firms are desired. Contributions will be labeled with the donors' names and placed in the cabinets of the College for the inspection of students, and the illustration of lectures.

#### SPECIAL EXERCISES, VACATION JOURNALS, AND MEMOIRS.

During the second and third vacations, Journals are required to be kept by each student of the College, to be presented at the opening of the winter term, and read before the faculty and students of the College, in evening sessions.

The Journal should consist of illustrated descriptions of engineering and architectural subjects: such as important steam engines, water and gas works, mines and mining machinery. Special methods in use of government and land surveys, make-up of parties; plans and ornamentation of important buildings; architectural style and details, stability, economy and novelty of construction of roof trusses, arches, bridges, canals and reservoirs, peculiar instruments, machinery for spinning metals, making gas pipes, saws, etc.

#### THESES.

In all the schools of this College a Thesis is required as a condition of graduation. It must be an original composition of suitable length, upon a subject appropriate to the school, and approved by the Professor in charge. The student must be prepared to explain and defend it before his class. It must be illustrated with such photographs, drawings and sketches as may be needed, and embellished with a title page neatly designed and printed with India ink, or colors. It must be upon Regulation Paper and securely bound. It will be prepared during the latter part of the fourth year and presented at the close of the course, after which it will be deposited in the Library of the University.

The Vacation Journals will be preserved in the cabinets of the respective schools for future reference. These papers, and also the practical exercises mentioned in each course, will be credited upon the diploma, and no course of the College will be accounted complete without them.



**SCHOOL OF MECHANICAL ENGINEERING.**

## OBJECT OF THE SCHOOL.

This school seeks to prepare students for the Profession of Mechanical Engineering. It aims to fit them to invent, design, construct and manage machinery for any branch of manufactures. The State has need of men who, to a thorough knowledge of the principles of machinery and of the various motors, shall add the practical skill necessary to design and construct the machines by which these motors are made to work.

## INSTRUCTION.

The instruction, while severely scientific, is thoroughly practical. It aims at a clear understanding and mastery of all mechanical principles and devices. Practice in the Mechanical Laboratory, is counted as one of the studies of the course.

In PRINCIPLES, the knowledge is imparted by lectures, combined with the use of plates and illustrative models, and by text books. Examples are also given, showing the application of the theories and principles taught. Experiments in the testing of machines and motors are undertaken by the student.

In PRACTICE, the instruction consists in the production of elementary forms and in the execution of Projects, in which the student constructs machines, or parts thereof, of his own designing, and from his own working drawings.

In DESIGNING, the student begins with elements, and proceeds with progressive exercises till he is able to design and represent complete machines.

## INSTRUCTION IN MECHANICAL ART AND DESIGN.

An elementary course of shop practice has been carefully arranged, the object of which is to familiarize the student with the forms of the parts of machines, and how to produce them. It aims to acquaint the student with all the ordinary cutting tools for iron and wood; the form and condition for most effective work; the machines and appliances by which they are put into action, and the instruments by which desired dimensions of product are obtained. This practice is carried on in the Mechanical Laboratory, and represents five different shops, viz:

1—PATTERN MAKING.

2—BLACKSMITHING.

3—MOULDING AND FOUNDING.

4—BENCH WORK FOR IRON.

5—MACHINE TOOL WORK FOR IRON.

In the 1st, the practice consists of planing, turning, chiseling,

etc., in producing true surfaces of various forms in wood, and also of combining pieces by glue joint, etc., preliminary to correct pattern making. Patterns are finally made from which are cast pieces in iron, brass, etc., to be worked in the subsequent shops.

In the 2d, the student uses the forge and performs the various elementary operations, such as drawing, upsetting, bending, welding, etc.

In the 3d, several pieces are moulded in sand and cast, part of which are useful in the succeeding shops.

In the 4th, there is first a course of free-hand bench work, where the cold-chisel and file are the only tools. After the hand and eye are sufficiently trained, fitting is begun, and the square, bevel, rule, compasses and other auxiliary bench tools are brought into requisition. Pieces are then fitted together by the file, with surfaces carefully finished in the best manner of the fitter's art.

The 5th shop involves the use of the ordinary machine tools of the machine shop. The first practice employs three machines with their usual cutting tools or bits, in the common operations, such as turning cylinders, disks, grooves and fillets; boring, drilling, hand-turning, milling, planing, etc. Following this is a course of practice in fitting and finishing, in which the usual aids, such as calipers, rules, etc., are introduced, and many of the various fittings employed in machinery are produced. Polishing and finishing of surfaces are also practiced.

Lectures are combined with this practice, in which the most favorable forms and manipulation of cutting tools and auxiliary appliances are explained.

Previous to the shop work, the pieces are drawn by the student, and the exact thing to be done is indicated, thus avoiding mistakes, and facilitating practice.

Simultaneously with this practice, the designing of such machine elements as pulleys, journal boxes, cranks, stuffing boxes, etc., cultivates a knowledge of proportion, and of its proper representation on paper. This practice in designing and drawing is a leading feature in the course of instruction.

This elementary practice fits the student for the advanced shop practice in designing and construction of complete machines undertaken later in the course.

#### STUDIES.

The studies are given by the year and term in the tabular view of the course. The order of studies there indicated should be closely followed, that the student may avoid interference of his hours of recitation. The following is a detailed view:

#### PURE MATHEMATICS.

*Advanced Geometry.*—Applications of Algebra to Geometry;

Transversals; Harmonic Proportions, etc. *Trigonometry*.—Analytical and Plane. Relations between the functions of an arc; Formation and use of Tables; Solution of plane triangles. *Analytical Geometry*.—Construction of equations; Discussion, in a plane, of the point, right-line, circle, ellipse, parabola and hyperbola; Higher plane curves, cycloid, cissoid of Diocles, etc.—*Differential Calculus*.—Differentials of algebraic and transcendental functions; Maclaurin's Theorem; Taylor's Theorem; Maxima and Minima of functions of one variable; Equations of tangents, normals, sub-tangents, sub-normals, etc.; Differentials of lines, surfaces and volumes. *Integral Calculus*.—Integration of elementary forms and of rational fractions; Rectification of plane curves; Quadrature of plane areas and surfaces of revolution; and Cubature of solids of revolution.

## SECOND YEAR.

*Advanced Algebra*.—Binomial Theorem; Properties and summation of series. Exponential quantities, Logarithms. General theory and methods of solving equations. *Analytical Geometry*.—Loci in space; Surfaces of the second order. *Differential Calculus*.—Differentials and Maxima and Minima of functions of two or more variables; Osculatory curves; Radius of curvature; Evolutes, involutes and envelopes; Discussion of algebraic and transcendental curves and surfaces; Tangent and normal planes; Partial differentials of surfaces and volumes. *Integral Calculus*.—Integration of transcendental and irrational differentials; Differentials of higher orders; Differential equations; Rectifications, quadrature and cubature in general. *Spherical Trigonometry*.—General Formulas; Solution of Spherical Triangles. *Calculus of Variations* will be taught to advanced students.

## PHYSICS.

The course in Physics is complete and thorough, embracing the four kinds of work following:

1. Recitation, four exercises a week, in which a text book is used as a guide.
2. Physical experiments one day each week, in which the student uses the instruments in testing the principles taught.
3. Illustrated experiments one evening each week, in which the more costly apparatus is used before the whole class, in such experiments as are difficult to perform, and which are most effective when prepared for an audience.
4. The higher physical experiments by advanced classes, consisting either of researches, or of reviews of careful and elaborate experiments previously worked up by others.

To prepare for the last named work, the student must have pursued Physical studies at least one term in the first three.

The department of Physics is amply provided with illustrative

apparatus for use in the lecture room, and an extensive Physical Laboratory. The collection of instruments, costing over \$5,000, embraces Acoustic apparatus from R. Koenig, of Paris; apparatus for Heat and Molecular physics from J. Salleron, of Paris; for Light, Optics and Electricity from Stoehrer, of Leipsic, and Browning and Newton, of London; Pneumatic and Electrical apparatus from E. S. Ritchie, of Boston; and a large number of pieces prepared at the Mechanical Shops of the University. It includes, also, Browning's Electric Lamp; and from Eliot Bros., London, Resistance Coils, Galvanometers, etc., for higher researches in Electricity.

#### TECHNICAL STUDIES.

*Cinematics, and Principles of Mechanism.*—Relative Motion of points in a system of connected pieces; Motion independent of Force; Velocity ratio; Investigation of motion of elementary parts of machines, as Friction and Noncircular Wheels in rolling contact, Cams and Curves in sliding contact; Correct-working Gear Teeth; Gearing Chains; Escapements; Link-Work.

*Analytical Mechanics.*—Equations of Equilibrium; Moments; Virtual Velocities; Centers of Gravity; Mechanical Powers; Friction; Dynamics.

*Hydraulics.*—Amount and Center of Pressure upon submerged surfaces; Flow of Liquids through Orifices, Weirs, Pipes and Channels; Distribution of water in cities. Forms and arrangement of orifices for fountains.

*Thermodynamics.*—The Laws and complete Theory of thermodynamics as required in the study of all kinds of heat engines, including the deportment of perfect gases during expansion, and also steam and other fluids not perfect gases; action of heat in changes of state, and in confined fluids.

*Resistance of Materials.*—See School of Civil Engineering.

*Prime Movers.*—The theory and useful effects of Turbine Water-wheels, and best form of the parts for high efficiency. Other Water-wheels and Wind-wheels. Application of Thermodynamics in the study of Heat Engines. Relative Economy of different engines.

#### MILL-WORK AND MACHINERY.

Trains of Mechanism, studied with reference to their Resistance and Efficiency. Best forms for transmission of power for short and great distances. Forms of the parts for securing desired results in power and velocity; Elastic and ultimate strength of parts.

*Projection Drawing.*—Use of Instruments in applying the Elements of Descriptive Geometry; Use of Water Colors; Isometrical Drawing; Shades and Shadows; Perspective.

*Free-Hand Drawing.*—Sketches of Machinery; Ornamentation; Lettering.

*Machine Drawing.*—Working Drawings of Original Designs; Finishing in Water Colors, and in Line-shading; Details for Shop Use according to the practice of leading manufacturers.

*Projects and Practice.*—The Shop Practice of the first year has already been described. The second year practice will have for its object the production of some model or machine. The students under the immediate direction of teachers, carefully determine the dimensions and shapes best suited for the parts of some machine, reduce them to neat and accurate working drawings and make tracings for shop use. No student will commence his advanced shop practice without working drawings. The designs are such as require executions in iron, brass and wood, for the purpose of giving breadth of practice. The student is required to make the patterns and castings, finish the parts, and put them together in accordance with the working drawings and the required standard of Workmanship. This acquaints him with the manner in which the Mechanical Engineer carries his designs into execution, and teaches him to so shape, proportion and dispose the parts of a machine as to secure the greatest economy of construction and durability in use. The practice of the third year will include the careful construction of mechanical movements, strictly in accordance with the theoretical determination of the form of the parts.

Besides these practical exercises, students of sufficient skill may be employed in the Commercial work which is undertaken by the shop. For this work they receive compensation. This work includes all kinds of machine building and repairing, and will serve to extend and confirm the practical experience of the student.

*Experiments and Practical Problems.*—Experiments in the testing of Prime Movers and other machines, are undertaken by each student. They take Indicator Diagrams from the engine of Mechanical Laboratory and in factories in the adjoining towns, and determine from them the power developed with different degrees of expansion, and the defects of valve movement in distribution of steam.

In strength of materials the student determines the modulus of rupture and coefficient of elasticity of about six kinds of building material. In Hydraulics the flow of water through orifices of different form are studied experimentally. In Mechanism each student works out and reports on an original problem involving mechanical movements.

#### APPARATUS.

This school is provided with plates and a cabinet of models illustrating mechanical movements and elementary combinations

of mechanism. This collection is rapidly increasing by our own manufacture, and by purchase from abroad. It includes many of Riggs' models, and others from the celebrated manufactory of J. Schröder, of Darmstadt, Germany. About two hundred valuable models from the United States Patent Office are also included in the cabinet.

The state has provided a large Mechanical Laboratory and Workshop.

The Pattern Shop is furnished with complete sets of tools, benches and vises for Pattern-makers. In a separate building are forges, a moulder's bench with sand, and brass and iron furnaces sufficient for the castings ordinarily required. Additional sets of tools are provided for the special use of students in the shop-practice classes.

#### MECHANICAL ENGINEERING COURSE.

*Required for Degree of B. S. in School of Mechanical Engineering.*

##### FIRST YEAR.

1. Plane Trigonometry and Advanced Geometry; Projection Drawing; French.
2. Analytical Geometry; Descriptive Geometry and Lettering; French.
3. Calculus; Shop-Practice and Free-Hand Drawing; French.

##### SECOND YEAR.

1. Designing and Construction of Machines; Advanced Algebra and Analytical Geometry; German.
2. Advanced Calculus; Designing and Construction of Machines; German.
3. Advanced Calculus; Astronomy; German.

##### THIRD YEAR.

1. Mechanism and Mechanical Laboratory; Advanced Descriptive Geometry; Chemistry and Laboratory Practice.
2. Analytical Mechanics and Mechanical Laboratory; Chemistry and Laboratory Practice; Physics.
3. Analytical Mechanics; Modern History; Physics.

##### FOURTH YEAR.

1. Resistance of Materials and Hydraulics; Geology; Thermodynamics; Pneumatics.
2. Prime Movers; Constitutional History; Construction Drawing.
3. Mill Work; Designing and Laboratory Practice; Political Economy, Graduating Thesis.

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### **SCHOOL OF CIVIL ENGINEERING.**

#### OBJECT OF THE SCHOOL.

The School is designed to furnish a course of theoretical instruction, accompanied and illustrated by a large amount of practice, which will enable students to enter intelligently upon the various and important duties of the Engineer.

## INSTRUCTION.

The student should lay a broad foundation in general culture, which will enable him to pursue his professional studies with greater ease and advantage. With this view, the subjects peculiar to Civil Engineering are not introduced until the second year.

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

## COURSE OF STUDIES.

The complete Course occupies four years. The tabular view shows the arrangement of the subjects. The studies of the first three years will prepare students for undertaking many engineering operations, such as the building of railroads, canals, embankments, etc. The fourth year is intended to fit them for the higher engineering constructions, as the building of arches, trussed bridges, and supporting frames of all kinds.

Each year consists of thirty-six working weeks, divided into Fall, Winter and Spring Terms. The four years are divided among the different branches nearly as follows: Languages, 360 recitations; Pure Mathematics, 369 recitations; Drawing of all kinds, 840 hours; Lectures with Mathematical Analysis, 100 hours; Surveying, recitations, drawing and field practice, 200 hours; Physics, Mechanics, Hydraulics, Astronomy, Geology, Chemistry, Mental Philosophy, Logic, Political Economy, History, altogether 680 lectures, recitations, and exercises; Practice in the Chemical Laboratory, 110 hours; Engineering Projects, 240 hours. Besides the above, there are various special exercises requiring time, the amount of which cannot be assigned. Each recitation requires one hour in the class-room, and to its preparation should be given an average time of three hours.

## TECHNICAL STUDIES.

*Mathematics.*—For a list of the principal subjects included under Pure Mathematics, see the school of Mechanical Engineering.

The following are those included in Applied Mathematics: *Descriptive Geometry.*—Problems on the Point, Right Line and Plane; Warped Surfaces; Perspective; Shades and Shadows; Practical Problems.

*Analytical Mechanics and Hydraulics.*—See School of Mechanical Engineering.

*Astronomy.*—The Observatory; Instruments and their ad-

justments ; Determination of time, latitude and longitude ; Practical exercises.

*Geodesy*—Figure of the Earth ; Surveys of the Earth's Surface ; Base Lines ; Parallel's and Meridians ; Methods of the United States Surveys ; Barometric Measurements.

*Land Surveying*—Areas ; Distances ; Omissions and Corrections ; Standard Units ; Metrical System ; Refraction ; Curvature of the Earth ; Theories of Surveying Instruments ; Adjustment of Instruments. *R. R. Surveying*—Curves ; Turnouts ; Crossings ; Obstructions ; Slope Stakes ; Earth-work ; Grades ; Curvature of Rails ; Coning of Wheels ; Calculation and use of Tables.

#### DRAWING.

*Projection Drawing*.—Use of Instruments in applying the Elements of Descriptive Geometry ; Use of Water Colors ; Isometrical Drawing ; Shades, Shadows and Perspective ; Drawings finished in colors and by right-line shading ; Bridges ; Right and Oblique Arches. *Free-Hand*—Landscapes ; Buildings ; Lettering and Ornamental Work. *Topographical*—Sketching ; Ink Drawings ; Conventional Signs, etc. *Mapping*—Railroad and City and County Maps. *Architectural*—Designing and Drawing of Engineering Structures.

#### NATURAL SCIENCE.

*Physics*.—See School of Mechanical Engineering. *Chemistry*—Inorganic Chemistry and Qualitative Analysis. *Geology*—Elements of Physiographic, Lithological, Historical and Dynamical Geology.

#### ASTRONOMY AND GEODESY.

*Descriptive Astronomy* is given by lectures with a text-book. The Equatorial Telescope is in constant use during the favorable weather. *Practical Astronomy* is given by lectures and practical work with the Meridian Circle, Sextant, Theodolite, and Engineer's Transits adapted to Astronomical work ; and by Astronomical calculations. *Geodesy* is given by lectures, practice and calculations.

#### ENGINEERING.

*Road Engineering*.—Location and Construction of Roads and Railroads ; Grades ; Gauges ; Tunnels, etc. *Resistance of Materials*—Elasticity ; Safe Limits ; Shearing Stress ; Flexure and Strength of Beams and Columns ; Practical Formulæ. *Trusses*—Analysis of a variety of Roofs and Frames, with methods of obtaining the strains. *Bridge Construction*—Warren's,



Howe's, and other Trusses; Tubular and Suspension Bridges; Arches, etc. *Stone Work*—Stone; Limes and Mortars; Foundations, etc.

#### PROJECTS.

During the Spring Term of the second year, an accurate Topographical Survey of a locality is made by the class, and instruction given in the use of the Level, preparatory to a project in Railroad Engineering, which is executed in the Fall Term of the next year. The Plane-table is used as in the U. S. Surveys.

The Project consists of a Preliminary Survey, Locations, Drawings and Estimates.

The Preliminary Survey will consist in an examination of the locality, and in running tangent lines, with leveling and topographical sketching.

The Location will consist in running the line over the route decided upon, with all the necessary measurements and calculations for establishing the grade, setting slope stakes, determining the amount of earthwork, designing the buildings, bridges, culverts, etc.

The Drawings will include Alignment, Profile, Plans, and Sections.

The estimates will give the cost of ground, earthwork structures, rolling stock, etc.

A project in Geodesy, or Higher Engineering, will be executed during the Senior year.

#### APPARATUS.

The School is provided with both English and American Instruments for the different branches of Engineering Practice, and for the Astronomical work of Higher Surveying. It has numerous models for illustration of its specialties, and access to the cabinets of the other Schools. To facilitate the practice in Trigonometrical and Land Surveying, it has a specially prepared area, 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. This area is subdivided by a large number of lines, the positions of which are accurately known, but not by the student. He is then required to determine the position of the "corners" by various methods, and to calculate the enclosed areas. Other problems are given in determining inaccessible distances, passing obstacles, avoiding local attractions, etc., for which the ground is prepared. The number of divisions is so large that no two students need have the same problem, and so accurately laid out that the correctness of the student's work can at once be determined.

An Astronomical Observatory for meridian observations, and of suitable size for the practical exercises in Astronomy, has been erected and is in use. An Equatorial telescope has also been mounted for the use of the students. A set of Smithsonian Meteorological instruments has been procured, placed in suitable positions, and observations commenced. A Universal Instrument for Astronomical and Geodetic work is being made for the use of the Senior classes, by Messrs. Ertel & Son, Munich. It will read to seconds of arc both in altitude and azimuth by four micrometers, and will in all respects be a superior instrument, adapted to the most accurate work.

#### CIVIL ENGINEERING COURSE.

*Required for Degree of B. S. in School of Civil Engineering.*

##### FIRST YEAR.

Same as in Mechanical Engineering.

##### SECOND YEAR.

1. Advanced Algebra and Analytical Geometry; Land Surveying; German.
2. Advanced Calculus; Drawing, 10; German.
3. Advanced Calculus and Spherical Trigonometry; Topographical Surveying; German.

##### THIRD YEAR.

1. Advanced Descriptive Geometry; Chemistry and Laboratory Practice; Railroad Surveying.
2. Analytical Mechanics; Chemistry and Laboratory Practice; Physics; Weekly Exercises in Practical Astronomy.
3. Analytical Mechanics; Astronomy; Physics; Weekly Exercises in Practical Astronomy.

##### FOURTH YEAR.

1. Resistance of Materials and Hydraulics; Meteorology and Physical Geography; Geodesy.
2. Bridges; Constitutional History; Geology.
3. Stone Work; Physical Laboratory; Political Economy; Graduating Thesis.

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### **SCHOOL OF MINING ENGINEERING.**

#### OBJECT AND INSTRUCTION.

This School is intended to qualify the student for undertaking mining operations of all kinds. Its instruction consists of a thorough training in the principles of theoretical and applied chemistry, of chemical and blow-pipe analysis, of assaying and metallurgy, and of the engineering operations of mining.

## STUDIES AND APPARATUS.

The course of studies embraces both the engineering and metallurgical studies, with practical exercises in analysis and assaying.

A large collection of models from a celebrated European manufactory, and costing over \$2,000, has been provided for this school. The geological and mineralogical cabinets are well provided with specimens of minerals, ores and rocks. In the new chemical laboratory, provision is made for metallurgical and assaying laboratories, with stamp mill, furnaces and other apparatus required for practical instruction in this department.

## COURSE IN MINING ENGINEERING.

*Required for Degree of B. S. in School of Mining Engineering.*

## FIRST YEAR.

1. Plane Trigonometry and Advanced Geometry; Projection Drawing; French.
2. Analytical Geometry; Descriptive Geometry and Drawing; French.
3. Calculus; Drawing; French.

## SECOND YEAR.

1. Advanced Algebra and Analytical Geometry; \*Chemistry and Laboratory Practice; German.
2. Advanced Calculus; \*Chemistry and Laboratory Practice; German.
3. Advanced Calculus and Spherical Trigonometry; Topographical Surveying; German.

## THIRD YEAR.

1. Advanced Descriptive Geometry; Surveying; Mineralogy.
2. Analytical Mechanics; Physics; \*Chemical Laboratory.
3. Analytical Mechanics; Physics; \*Chemical Laboratory.

## FOURTH YEAR.

1. Resistance of Materials and Hydraulics; Geology; \*Chemical Laboratory, and Metallurgy.
2. Mining Engineering; Drawing or Constitutional History; \*Chemical Laboratory and Metallurgy.
3. \*Chemical Laboratory; Drawing; Political Economy; Graduating Thesis.

**SCHOOL OF ARCHITECTURE.**

## OBJECT OF THE SCHOOL.

The School seeks to prepare students for the profession of Architecture. For this a thorough knowledge of scientific principles applied to building, ability and correct taste in design, and some technical knowledge of the various building trades, with

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\*For explanation of Chemical Laboratory Practice, see courses of laboratory work in School of Chemistry.

skill in the use of tools are necessary, and are prominent features of the course of instruction.

#### INSTRUCTION.

The technical instruction is given chiefly by lectures, illustrated by sketches, models or engravings, and practical application is made by the student.

Drawing is practiced throughout the course, and, as far as possible, original work is executed. Drawing from casts and modeling in clay, give facility in sketching details and correct knowledge of form.

In shop practice, designs are made by the student, to reduced scale, of roofs, stairs, etc., and worked out in wood.

The course in Mathematics, Mechanics, Physics, etc., is nearly identical with that in the other schools of Engineering.

#### TECHNICAL STUDIES.

*Drawing from Casts*—Outline sketches and finished drawings in pencil and crayon.

*Modeling in Clay*—From casts and original designs ; weekly exercises in designing architectural ornaments.

*Wood Construction and Drawing*—Construction and finish of wooden buildings, roofs, ceilings, domes, towers, stairs, etc.

*Iron, Brick and Stone Construction, and Drawing*—Buildings of brick, stone and iron walls, arches, stone work, iron fronts, fire-proof floors, etc.

Two lectures and eight hours of drawing weekly.

*Architectural Drawing*—Preparation of full sets of finished drawings from sketches ; weekly exercises in design of architectural details.

*Architectural Designing*—Working out of original designs for specified project and preparation of complete finished drawings.

*History of Architecture*—Daily lectures on history of architectural style ; the construction and decoration employed ; most important examples ; ideas applicable to American architecture.

*Æsthetics of Architecture*—Three lectures and seven hours' designing weekly in Æsthetics applied to architecture ; laying out grounds, planning buildings for various purposes, grouping their parts, external and internal decoration, harmonies of color ; general principles of decoration by form and color, for wall paper, hangings, carpets, furniture, etc.

*Estimates*—Practice in measuring, valuing of materials and labor for all kinds of builders' work and in making out full sets of estimates.

*Agreements and Specifications*—Lectures on, and preparation of, complete sets.

*Heating and Ventilating*—The best modes of ; fuels, and motion of air in flues.

## SPECIAL EXERCISES.

Specimen plates will be required of each student at the close of each term in drawing, to form a part of his record. All such papers must be on paper of regulation size, except when otherwise directed.

## SHOP PRACTICE.

To give a practical knowledge of various kinds of work, a full course of instruction is arranged, filling three terms, which all architectural students are required to pursue unless they have already had equivalent practice. The system is similar to the Russian system, so much admired at the Centennial Exposition, but more comprehensive, and applied to building rather than Mechanical Engineering.

*First Term*—Carpentry and Joinery.

Sharpening Tools, Planing Flat Surfaces, at Right Angles, Uniform Width and Thickness, Framing with Single Tenons, Double Tenons, Paneling, Splices, Dovetailing, Sticking Moulding.

*Second Term*—Cabinet Making and Stair Building.

Paneling, Chamfers, Turning, Fret Sawing, Veneering, Buhl, Reissner and Inlaid Work, Carving, Stairs, Hinges, Strings, Setting Balusters, Squaring and Moulding Rails.

*Third Term*—Miscellaneous. Finishing in Shellac, Oil, Wax and Varnish, Polishing Painting and Ornamenting, Gilding. Metal Work, Filing, Turning, Drilling, Cutting Screws, Ornamental Work, Casting Soft Metals, Tempering.

Stone Work, in Plaster, Cutting Ashler and Moulded Work, Rusticated Work, Voussoirs for Arches, Domes, and Vaults, Carving, relief and incised.

## 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 Schools of Architecture and Designing ; Models of roofs, trusses, stairs, etc. Models in stone cutting, of Splices, Joints, etc., made by Schroder, of Darmstadt.

The casts, photographs, etc., of the Art Gallery. A library containing many of the best English, German, French and American Architectural works and Periodicals, such as *Daly's Motifs Historiques*, *Architecture Privee*, *Racinet's Ornament Polychrome*, *Builder*, *Civil Engineer's and Architect's Journal*, *Workshop*, *Skizzenbuch*, *Encyclopedie d' Architecture*, *Owen Jones' Grammar of Ornament*, &c.

A large Carpenter and Cabinet shop, containing full sets of

tools, six sets of model-making tools, foot lathe with slide rest, chuck, drills, etc. Cross and splitting saws, planer, moulding and tenoning machine, lathe, whittler, fret saw, etc.

#### BUILDER'S COURSE.

The Trustees allow persons desiring to fit themselves for Master Builders to take a course of a single year, pursuing such technical studies of the course in architecture as they may be prepared to enter upon with profit, and as will be most advantageous to them.

Candidates for the Builder's course must pass the examinations in the common branches, but need not pass in the studies of the Preliminary Year unless they shall desire to pursue other studies than those marked in the following: (The figures denote the hours per week). Fee, \$10 per term.

1. Wood Construction, 10; Projection Drawing, 10; Shop Practice (Carpentry and Joinery), 10.
2. Stone, Brick and Metal Construction, 10; Architectural Drawing, 10; Shop Practice (Stair Building), 10.
3. Agreements, Specifications, Estimates, Heating and Ventilation, Architectural Designing, 10; Shop practice (Cabinet Making), 10.

#### ARCHITECTURAL COURSE.

*Required for the Degree of B. S. in School of Architecture.*

##### FIRST YEAR.

1. Projection Drawing, 10; Plane Trigonometry and Advanced Geometry; French.
2. Descriptive Geometry and Drawing, 10; Analytical Geometry; French.
3. Drawing and Modeling, 10; Calculus; French.

##### SECOND YEAR.

1. Wood Construction, 10; Advanced Algebra and Analytical Geometry; Modeling or Drawing, 10.
2. Stone, Brick, and Metal Construction, 10; Advanced Calculus, Free-Hand Drawing and Designing.
3. Shop practice, Architectural Drawing, Modern History.

##### THIRD YEAR.

1. Architectural Drawing, 10; Descriptive Geometry and Drawing, 10; Chemistry and Laboratory Practice, 10; Vacation Journal.
2. History of Architecture, Analytical Mechanics, Physics.
3. History of Architecture, Architectural Designing, 10; Physics.

##### FOURTH YEAR.

1. Aesthetics of Architecture, 10; Resistance of Materials and Hydraulics, Geology, Vacation Journal.
2. Architectural Designing, 10; Constitutional History; Water Color Sketching, 10.
3. Estimates, Agreements and Specifications, Heating and Ventilation, 10; Physical Laboratory, 10; Political Economy, Graduating Thesis.

## **COLLEGE OF NATURAL SCIENCE.**

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### **FACULTY.**

THE REGENT,	PROFESSOR BURRILL, Dean.
PROFESSOR S. W. ROBINSON,	PROFESSOR TAFT,
PROFESSOR WEBER,	MISS LOU C. ALLEN,
C. I. HAYS,	I. O. BAKER,
M. A. SCOVELL,	J. E. GREGORY,
GEORGE A. WILD.	

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### **SCHOOLS.**

SCHOOL OF CHEMISTRY.                      SCHOOL OF NATURAL HISTORY.  
SCHOOL OF DOMESTIC SCIENCE.

#### **ADMISSION.**

Candidates for the College of Natural Science must be at least fifteen years of age, and must pass satisfactory examinations in the common school branches and in the studies of the Preliminary Year.

Their preparation should be specially good in the Scientific studies of the Preliminary Year. Some knowledge of drawing of natural objects will also greatly facilitate the student's progress. A knowledge of the Latin language is a good preparation for the mastery of the scientific names which must be learned in this course.

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### **SCHOOL OF CHEMISTRY.**

This school aims to impart such knowledge of Chemistry as will enable the student to apply the principles of the science to the related arts, and to fit him for the field of original research, or for the practical business of the Druggist, Pharmaceutist and Practical Chemist.

#### **INSTRUCTION.**

Text-book instruction in the principles of Chemistry and Chemical Physics, occupy six weeks of the first term of the first year. The remainder of the year the recitations alternate with laboratory practice. During the next three years each student is expected to work two hours daily in the laboratory, five days in the week. In order to graduate, each is required at the close of his course, to make an original investigation, and present a Thesis.

Students who pursue Chemistry as a part of other courses

work at least two consecutive hours daily during such time as their specialty may require.

*Text-Books*—Roscoe's Chemistry; Douglas & Prescott's Analysis; Fresenius' Analysis; Miller's Chemistry; Rose's Analysis.

*Books of Reference*—Gmelin's Handbook of Chemistry; Graham-Otto's Ausfuhrliches Lehrbuch der Chemie; Watts' Dictionary of Chemistry; Lehmann's Physiological Chemistry; Percy's Metallurgy; Mitchell's Practical Assaying; Wormley's Micro-Chemistry of Poisons; Taylor on Poison.

Four courses of laboratory work have been arranged as follows:

#### CHEMICAL COURSE.

##### FIRST YEAR.

*First Term.*—Qualitative Analysis, Tests and Separation of the Alkalies, Alkaline Earths, (N H 4) 2 S Group, and 1st and 2d Division of H 2 S Group.

*Second Term.*—Qualitative Analysis Completed, Tests, and Separation of 3d Division of H 2 S Group, and the Acids, Analysis of 20 Simple Salts, and 20 Compound Substances.

*Third Term.*—Quantitative Analysis of Sodium Sulphate, Dolomite, Ammonium Alum, Potassium Chloride, Bone Ash, Iron Ore.

##### SECOND YEAR.

*First Term.*—Quantitative Analysis of Calamine (Zinc Carbonate), Copper Pyrites, Galena, Spathic Iron Ore, Nickel Ore, Clay, Soil, Determination of Iron, Copper, etc., both volumetrically and Gravimetrically.

*Second Term.*—Volumetric Analysis, Alkalimetry and Acidimetry, Preparation of Standard Solutions, Analysis of Sodium Carbonate, Sodium Hydroxide, Potassium Hydroxide, Pearl Ash, Cream of Tartar, Sulphuric, Hydrochloric, Oxalic and Citric Acids, Analysis of Corn or other Grain.

*Third Term.*—Preparation of Salts, Acids, etc., Electroplating with Silver, Gold, Copper, Nickel.

##### THIRD YEAR.

*First Term.*—Ultimate Analysis, Determination of Carbon, Hydrogen, Oxygen, Nitrogen Chlorine, Phosphorus and Sulphur in Organic Compounds, Analysis of Urine.

*Second Term.*—Blow Pipe Analysis, Determination of a collection of minerals representing over thirty of the Metals. Assaying in both the dry and wet way of Gold, Silver and Lead Ores.

*Third Term.*—Photography, Preparation of Ether, Absolute Alcohol, Gun Cotton, Cadmium Iodide, Ammonium Iodide, Glacial Acetic Acid, Silver Nitrate, Collodion, Taking Negatives, Printing Positives, Toning and Mounting.

##### FOURTH YEAR.

*First Term.*—Gas Analysis, Calibration of Eudiometers, Analysis of Air from Lungs, Atmospheric Air, Marsh Gas, Illuminating Gas and Crude Coal Gas, Analysis of Mineral Waters.

*Second Term.*—Toxicology, Micro-Chemistry of Poisons, Testing for Mineral and Vegetable Poisons, Separation from Organic Mixtures.

*Third Term.*—Original Researches, Thesis.



## PHARMACEUTICAL COURSE.

## FIRST YEAR.

Same as in Chemical course.

## SECOND YEAR.

*First Term.*—Quantitative Analysis of Commercial Drugs, White Lead, Red Lead, Paris Green, Sodium Nitrate, Oxalic Acid, Tartar Emetic, Commercial Hydrochloric, Nitric and Sulphuric Acid.

*Second Term.*—Analysis of Mineral Waters, Preparation of Tinctures, Solid and Fluid Extracts, Reading and Compounding Prescriptions.

*Third Term.*—Isolation of Alkaloids, Atropine, Strychnine, Quinine, Nicotine, Aconitine, Morphine, Preparation of Salicylic Acid, Examination of Alcoholic Liquors, Reading and Compounding Prescriptions.

## THIRD YEAR.

*First Term.*—Same as second term, second year of Chemical course.

*Second Term.*—Same as first term, third year of Chemical course, without Analysis of Urine, Reading and Compounding Prescriptions.

*Third Term.*—Preparation of Salts, Perfumes, Flavoring Extracts, Cosmetics, Electroplating with Gold, Silver, Copper and Nickel.

## FOURTH YEAR.

*First Term.*—Same as second term, fourth year, of Chemical course.

*Second Term.*—Analysis of Urine, normal and pathological, Reading and Compounding Prescriptions.

*Third Term.*—Original Researches, Thesis.

## AGRICULTURAL COURSE.

## FIRST YEAR.

Same as in Chemical course.

## SECOND YEAR.

*First Term.*—Quantitative Analysis of Feldspar, Soil, Ashes of Plants and Grains.

*Second Term.*—Analysis of Commercial Fertilizers, Manures and Minerals used for Fertilizers.

*Third Term.*—Preparation of Organic and Inorganic Salts, Starch from Potatoes, Corn, Wheat, etc., Sugar, Dextrine, Alcohol.

## THIRD YEAR.

*First Term.*—Same as in Chemical course.

*Second Term.*—Analysis of Milk, Corn, Wheat, Potatoes, Fruits, etc.

*Third Term.*—Silt Analysis of Soils, Analysis of Mineral Waters.

## METALLURGICAL COURSE.

## FIRST YEAR.

Same as in Chemical course with the Quantitative Analysis of Brass, Solder and Type Metal in third term.

## SECOND YEAR.

*First Term.*—Same as in Chemical course.

*Second Term.*—Assaying of Gold, Silver, and Lead Ores, both dry and wet way. Blowpipe Assaying.

*Third Term.*—Analysis of Malachite, Azurite, Cinnabar, Tin Ore, Cobalt and Nickel Ore containing Arsenic, Bog Manganese, Grey Antimony.

## THIRD YEAR.

*First Term.*—Analysis of Pig Iron, Wrought Iron, Steel, Furnace Slags, Rolling Mill Slags and Cinders.

*Second Term.*—Same as in Chemical course, with Analysis of Mineral Waters in place of Assaying.

*Third Term.*—Same as second term, fourth year, of Chemical course, with Analysis of Coal in place of Mineral Waters.

## APPARATUS.

The facilities offered for obtaining a practical knowledge of Chemistry are believed to be unsurpassed by those of any other institution in the West. A large Laboratory Building, 75x120 feet, and four stories in height, has just been erected, at an expense, including furniture, of \$40,000. It includes five laboratories, a milling and metallurgical room, a photographic atelier and chemical manufacture room. The apparatus includes a large platinum retort for the preparation of hydrofluoric acid; a Dove's polarizer, with a complete suit of accompanying apparatus; a Geissler's mercurial air pump; Hoffman's apparatus for illustrating in the lecture-room the composition of compound gases; a Soliel-Scheibler's saccharimeter of the most recent and approved construction; an excellent set of areometers; a Hauy's goniometer; a camera with Ross' lenses; a Ruhmkorff's coil; galvanic batteries of Grove and Bunsen; also a potassium dichromate battery, a galvanometer and a thermo-electric pile, a spectroscope and a large binocular microscope; two additional chemical balances, peculiar in the shortness of their beams, and remarkable for their accuracy and rapidity. Also an extensive set of metallurgical apparatus, consisting of models of furnaces, etc., and a full set of photographic apparatus.

The Library of the School is rich in complete sets of standard scientific works; the *Annalen der Chemie und Pharmacie*; the *Jahresbericht ueber die Fortschritte der Chemie*; *Dingler's Polytechnic Journal*; the *Handwörterbuch der Chemie*; *Percy's Metallurgy*; *Silliman's Journal*. See Table of Contents for the list of periodicals taken.

SCHOOL OF CHEMISTRY COURSE.

*Required for Degree of B. S. in School of Chemistry.*

FIRST YEAR.

1. Chemistry and Laboratory Practice; Trigonometry and Advanced Geometry; British Authors or French.
2. Chemistry and Laboratory Practice; Analytical Geometry; American Authors or French.
3. Organic Chemistry and Laboratory Practice; Calculus or Free-Hand Drawing; Rhetoric; French (optional).

SECOND YEAR.

1. Laboratory Practice; Physiology; German.
2. Laboratory Practice; Zoology or Botany; German.
3. Laboratory Practice; Zoology; German.

THIRD YEAR.

1. Laboratory Practice; Mineralogy; German.
2. Laboratory Practice; Physics; German.
3. Laboratory Practice; Physics; German.

FOURTH YEAR.

1. Laboratory Work; Mental Science; Meteorology and Physical Geography.
2. Constitutional History; Laboratory Work; Logic.
3. Political Economy; Geology; Laboratory Work and Thesis.

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**SCHOOL OF NATURAL HISTORY.**

The aim of this school is to educate practical geologists, collectors and curators of cabinets and museums of natural history, and superintendents of scientific explorations and surveys. It acquaints the student with the latest researches in respect to the structure of the earth and to the origin and distribution of its organic products; teaches him to collect and preserve specimens and arrange them for study, and to conduct original investigations.

INSTRUCTION.

The instruction is given by lectures and text-books, and excursions, when practicable, made under charge of the professors.

*Botany.*—Candidates for admission are examined upon Gray's "Lessons in Botany," or an equivalent, and are expected to be able to analyze readily common wild flowers. Beginning with the Fall Term of the second year, systematic and structural Botany is continued by illustrated lectures and laboratory work upon fresh, dried and alcoholic specimens. Students, throughout the course, are required to observe for themselves, and to make notes and drawings of their investigations. A series of these drawings,

upon a uniform scale, together with the accompanying descriptions, are deposited in the library of the Laboratory.

Each student provides himself with suitable pencils, drawing pens and paper, needles in handles, glass slides for mounting objects, and razor for making thin sections. For the first term, a Manual of Botany (Gray's or Wood's) is required. Microscopes and other apparatus are furnished by the University, for which a deposit of three dollars is required, but no charge is made except for damage and material used.

The first six weeks are devoted to the study of the natural orders of flowering plants. About twelve lectures are given upon the characteristics of the prominent orders—their geographical distributions, importance, etc., together with the history of a few special plants and their products. During this time, two hours per day, three days per week, students analyze, in the Laboratory, flowering plants of the more difficult orders, Compositæ, Graminæ, etc., especially such as are best obtained in Autumn. The seventh week is devoted to practical instruction in the use of the compound microscope, and in the preparation of objects. For this, students are furnished with printed directions, and have individual instruction. During the five weeks following, the general morphology of plants, including vegetable anatomy and histology, is studied, there being about ten lectures, and thirty hours of laboratory work. Tests are made from time to time, by the use of disguised vegetable substances. Two Weeks are taken for review, finishing drawings and examination. The special morphology of the great divisions of Cryptogamic and Phænogamic plants, their chief characteristics, their classifications, and the identification of species of Cryptogams, or flowerless plants, constitute the work of the second term. Special attention is given to injurious fungi, from specimens in the herbarium, or grown in the laboratory. Aquaria furnish numerous kind of fresh water algæ, and the green-houses supply specimens in nearly all the groups studied. During the term, there are about twenty lectures, and fifty-four hours of laboratory work, besides review and examination.

The most important books of reference in the English language are Sach's "Text-Book of Botany," LeMaout & Decaisne's "Botany," Gray's "Structural Botany," Lindley's "Introduction to Botany," Berkley's "Cryptogamic Botany and Fungology," Cooke's "Fungi," and "Hand-book of British Fungi."

*Vegetable Physiology* is studied the third term of the first year. The botanical part of Johnson's "How Crops Grow" is made the basis of this work, supplemented by lectures and references to other publications, and experimental practice. Respiration, assimilation, the circulation of fluids, the influence of light and temperature, growth and reproduction, are some of the topics

treated, and sufficiently show the magnitude and importance of the study. Throughout the course, the attempt is made to introduce the students to the literature of the various subjects, and to acquaint them with the authority for the facts stated.

*Anatomy and Physiology.*—This study commences the first term of the second year, and the Anatomy is taught by lectures, aided by works of reference. The human skeleton and manikin are made the basis of comparison in the more extended Zoological researches. The Physiology taught by means of Dalton's Unabridged Work, accompanied by familiar lectures, in which especial attention is given to the subjects of food, digestion, dress, circulation, respiration, ventilation, etc. The senses will be carefully studied, accompanied with suggestions for prolonging their greatest efficiency—the practical and useful always taking the precedence of the merely theoretical, that the controllable powers of the body may be preserved with their most efficient activities, to avoid preventable suffering and death, and secure vigor and happiness.

*Zoology* continues two terms. In the first, Invertebrate Zoology is studied, unfolding the cardinal facts exemplified in the Sub-Kingdoms, Protosia, Cœlenterata, Anuloida, Anuloso and Mollusca, together with the general principles of respiration, circulation, special methods of reproduction and development; geographical and geological distribution; principles of natural classification, depending upon morphological type and specialization of the functions, etc.

Vertebrate Zoology follows, embracing embryology, modification of plan by which animals are adapted to the various conditions of existence, as manifest in their Comparative Anatomy; Systematic Zoology, so that the orders may be recognized at sight, etc. Nicholson's Manual of Zoology will be used as a text book.

*Geology.*—In Geology, Dana's Manual is used; commencing with Dynamical Geology, which explains the forces known to produce observed phenomena in the crust of the earth; as Life, in the formation of lime-stone, coal, peat; water, in eroding, transporting and depositing material for strata; heat, as manifested in consolidation, metamorphism and crystallization, as well as mountain folds on the surface of a shrinking globe.

Lithological Geology is the next term's work. This treats of the kinds, nature and material of rocks, stratified and unstratified; their mineral constituents; structure original or induced; concretions, veins, dykes, etc.; methods of determining the chronological order of the strata. Also the historic development of the earth as revealed by

*Paleontology*, or the entombed fossils of the previous inhab-

itants, through the Silurian and Devonian ages. The third term explains the Carboniferous age with its coal, the Reptilian and Mammalian ages, with their wonderful inhabitants; the Glacial period with its continent of ice, and through to the present time. Here also are discussed the elements of Time, the system of Life, the origin of Species, the climax of Man.

*Physical Geography and Meteorology.*—The principles of the phenomena manifest in the life of the earth bear the same relation to Geology that Physiology does to Anatomy. This subject, a result of the facts of Geology, with an application of the laws of Physics, is taught by lectures and works of reference. It explains how the solid earth, influenced by winds and waters, driven by heat and electricity, aided by light, constitutes a fit abode for man, the last link of terrestrial being.

*Entomology.*—The time given to this study is eleven weeks. After three or four introductory lectures upon the most useful literature, and the methods of collecting and preserving specimens, about five weeks are devoted to the special anatomy of insects and the outlines of classification,—four lectures, and one review or two hours of practical work per week. During this time students make collections as fast as possible, reserving, however, the determination of species until the last half of the term. During this latter portion of the term three lectures per week are given upon injurious and beneficial insects, methods of exterminating, etc., and four hours per week are taken for laboratory work, naming species, noting habits observed, making detailed descriptions, etc. A careful and complete description of some one species, illustrated by drawings of important parts, is made by each student and deposited in the library of the school. The large collection of named species, the ample reference library, the drawings and other illustrations to which students have access, are invaluable aids in the study. The most important reference books are Westwood's "Introduction to the Modern Classification of Insects," Packard's "Guide to the Study of Insects," Harris' "Insects Injurious to Vegetation," and the publications of the Smithsonian Institute, Entomological Societies, and the reports of the State Entomologists.

Students are required to provide themselves with collecting nets and bottles, pins, and lined boxes, and books for notes. Microscopes and other required apparatus are furnished by the University.

*Microscopy and Fungology.*—Eleven weeks. Students have in this study further practice in the use of the compound microscope, the management of light for particular purposes, the testing of lenses, measurement of magnifying powers and angles of aperture, drawing and photographing objects, preparation and

mounting of material etc. The application, as indicated above, is mainly, but not exclusively, devoted to minute fungi, including those of the different fermentations and putrefactions. Such fungi as are known or supposed to be injurious to plants or animals are studied as carefully and thoroughly as circumstances permit, cultures being made for the purpose, and specimens obtained from various sources.

#### APPARATUS.

In *Botany*, the school has a collection of about one thousand species of the plants indigenous to the State of Illinois, including a very nearly complete set of the grasses; a collection of Rocky Mountain and Western plants; a collection of plants from Dr. Vasey, Botanist of the Department of Agriculture, Washington, D. C., and others obtained by exchange from various parts of the United States. A collection of the fungi of the vicinity has been begun and already contains numerous species. The green-houses and out-door plantations furnish a large amount of illustrative material for the classes. Enlarged *papier-mache* models of flowers and fruits by Dr. Auzoux, exhibiting structure and development, are in the cabinet. Sections of wood from one hundred and seventy species of trees and shrubs indigenous in Illinois were exhibited at the Centennial and exchanged for foreign specimens. The native specimens now largely duplicated are to be replaced as soon as possible.

In *Entomology* numerous species have been contributed by the State Entomologist, who is required by law to deposit his first series of specimens in the cabinet of the University. Local collections and exchanges have further increased this number, amounting now to about three thousand species.

The University now has first-class microscopes of four different styles from European makers, one by a prominent American maker, and others of which the glasses were made to order in Europe, and the stands, a new pattern, manufactured in the shops of the University. These latter have a firm iron base with joint for inclining, coarse adjustment by rack and pinion (Jackson model), fine adjustment attached to stage, glass sliding stage and wide range of power.

In *Zoology* the cabinets contain: a human skeleton, purchased in Paris, and a manikin made by Dr. Auzoux; skeletons of the different orders of mammals, and of birds; stuffed preparations of a large number of birds, mammals, fishes, reptiles, etc., a dissected horse's leg and hoof, a dissected eye, trachea and vocal apparatus, in *papier-mache*, by Dr. Auzoux; collections of shells, fossils and insects.

The Geological Cabinet has been immensely improved the

past year. In addition to the specimens from the State Geological Survey and other illustrative specimens, mineral and fossil, the cabinet has been the recipient of Prof. Ward's celebrated college series of famous fossils, so essential in elucidating the various phases of life in Geological History. This set was the munificent donation of Emory Cobb, Esq., President of the Board of Trustees.

A valuable and extensive collection of the leads of the State, and accompanying mineral, was donated by Gen. J. C. Smith and other gentlemen, of Galena.

#### COURSE IN SCHOOL OF NATURAL HISTORY.

##### *Required for Degree of B. S. in School of Natural History.*

#### FIRST YEAR.

1. Chemistry; Free Hand Drawing, (optional); Trigonometry and Advanced Geometry; French.
2. Chemistry; Free Hand Drawing, (optional); Analytical Geometry; French.
3. Vegetable Physiology; Chemistry, or Free Hand Drawing; Rhetoric; French, (extra).

#### SECOND YEAR.

1. Advanced Anatomy and Physiology; Botany; German.
2. Zoology; Botany; German.
3. Zoology; Economic Entomology; German.

#### THIRD YEAR.

1. Geology; Mineralogy; German; Ancient History (optional, extra).
2. Geology; Physics; German; Mediæval History (optional, extra).
3. Geology; Physics; Modern History, or Astronomy.

#### FOURTH YEAR.

1. Meteorology and Physical Geography; History of Civilization; Mental Science.
2. Constitutional History; Microscopy and Fungology; Logic.
3. Political Economy; Physical Laboratory; Laboratory Work and Graduating Thesis.

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### **SCHOOL OF DOMESTIC SCIENCE.**

#### OBJECT OF THE SCHOOL.

It is the aim of the School to give to earnest and capable young women an education, not lacking in refinement, but which shall fit them for their great duties and trusts, making them the equals of their educated husbands and associates, and enabling



them to bring the aids of science and culture to the all-important labors and vocations of womanhood.

This School proceeds upon the assumption that the house-keeper needs education as much as the house-builder, the nurse as well as the physician, the leaders of society as surely as the leaders of senates, the mother as much as the father, the woman as well as the man. We discard the old and absurd notion that education is a necessity to man, but only an ornament to woman. If ignorance is a weakness and a disaster in the places of business where the income is won, it is equally so in the places of living, where the income is expended. If science can aid agriculture and the mechanic arts to use more successfully nature's forces and to increase the amount and value of their products, it can equally aid the house-keeper in the finer and more complicated use of those forces and agencies, in the home where winter is to be changed into genial summer by artificial fires, and darkness into day by costly illumination; where the raw products of the field are to be transformed into sweet and wholesome food by a chemistry finer than that of soils, and the products of a hundred manufactories are to be put to their final uses for the health and happiness of life.

The purpose is to provide a full course of instruction in the arts of the household, and the sciences relating thereto. No industry is more important to human happiness and well-being than that which makes the home. And this industry involves principles of science, as many and as profound as those which control any other human employment.

#### TECHNICAL STUDIES.

*Food and Dietetics.*—This study extends through two terms. The first term is devoted to the consideration of the simple aliments, such as Sugar, Starch, the Albuminoids, Fats, etc. In the second term, the studies include the compound aliments: Chemical structure of the cereals, especially the Wheat; the chemistry of Bread-Making, care of Milk and Butter; the nature, uses, preservation and preparation of animal and vegetable food, for the healthful, and for the invalids; the chemistry of cooking; chemical composition, preparation and physiological effects of the beverages, such as Tea, Coffee, Chocolate, etc., and the effects of alcoholic drinks.

*Domestic Hygiene.*—Location of Dwelling Houses, importance of Drainage, uncleanliness as a source of disease; necessity of ventilation and sunlight; uses, construction, material and hygiene of dress; principles of nursing and care of the sick.

*Household Esthetics.*—Principles of taste as applied to ornamentation, furniture, wall and ceiling decoration, carpets, pottery,

clothing and landscapes, harmony of colors, forms, proportions, etc.

*Household Science.*—Principles of heating and ventilation, chemistry of illumination, materials of culinary utensils, tin, iron, brass, etc. ; adulterations of foods.

*Domestic Economy.*—Economy of time, management of servants, government and instruction of children, household expenditures. *Usages of Society.* Laws of etiquette, social customs, etc.

*Home Architecture.*—Principal architectural styles, as Grecian, Roman, Gothic, Renaissance, Modern Gothic, etc. ; exterior of the house ; general characteristics ; interiors, chief requisites, convenience, light, warmth, etc. ; requirements of different apartments, programmes for designs, as of cottages of various styles and capacity, farm houses, villas, etc. ; internal decoration and construction ; sanitary requisites, cellars, walls, water supply, etc.

*Landscape Drawing and Green-house Work* see School of Horticulture.

For other studies see the proper Schools.

#### HEALTH AND PHYSICAL TRAINING.

A spacious Gymnasium for young women has been fitted up in the library wing, and instruction in calisthenics is given to two or more classes daily. Lectures on health, and its conditions, and on other important topics, will be delivered to these classes, at suitable intervals, and great pains will be taken to secure, to the utmost possible extent, physical vigor, robust health, and a graceful carriage, and to prepare young women to take enlightened care of their own health, and the health of others under their charge.

The materials for the calisthenic uniform must be made up under the direction of the Instructor in this department.

The Trustees desire that all female students shall participate in these exercises unless excused for good cause. They have been witnessed and heartily approved by some of the most eminent medical men in the State.

#### COURSE IN DOMESTIC SCIENCE.

*Required for Degree of B. S. in School of Domestic Science.*

##### FIRST YEAR.

1. Chemistry ; Trigonometry and Drawing ; British Authors.
2. Chemistry ; Designing and Drawing ; American Authors.
3. Chemistry ; Designing and Drawing ; Rhetoric.

SECOND YEAR.

1. Botany ; Physiology ; German or English Classics.
2. Food and Dietetics, (simple aliments) Botany and Green-House ; German or English Classics.
3. Food and Dietetics, (Compound Aliments and Principles of Cooking etc.) Zoology ; German or English Classics.

THIRD YEAR.

1. Domestic Hygiene ; Ancient History ; German or French.
2. Physics ; Mediæval History ; German or French.
3. Physics or Landscape Gardening ; Modern History ; German or French.

FOURTH YEAR.

1. Household Esthetics ; Mental Science ; History of Civilization.
2. Household Science ; Constitutional History ; Logic.
3. Domestic Economy ; Usages of Society, etc. ; Political Economy ; Home Architecture ; Graduating Thesis or Oration or Essay.



## COLLEGE OF LITERATURE AND SCIENCE.

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### FACULTY.

THE REGENT,	PROFESSOR SNYDER, Dean.
PROFESSOR PICKARD,	PROFESSOR CRAWFORD,
PROFESSOR SHATTUCK,	PROFESSOR BURRILL,
PROFESSOR WEBER,	PROFESSOR TAFT,
PROFESSOR ROBINSON,	F. A. PARSONS,
PROFESSOR BAUMGRAS,	CHAS. I. PICKARD.
MAJOR DINWIDDIE.	

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### SCHOOLS.

ENGLISH AND MODERN LANGUAGES.  
ANCIENT LANGUAGES AND LITERATURE.

#### ADMISSION.

Candidates for the School of English and Modern Languages will be examined in the studies mentioned on page 12, including the Latin but not the Greek. Those desiring to enter the School of Ancient Languages will be examined also in the Greek, but not in the elements of Botany, Physiology and Natural Philosophy. The examinations in Latin and Greek will be as follows :

#### LATIN.

Latin Grammar including Prosody. (Harkness' or Allen and Greenough's). Latin prose composition. (Forty-four exercises, to the passive voice, in Arnold's Latin Prose Composition, or parts one and two, to page 166, of Harkness' Introduction to Elementary Latin Prose Composition, or an equivalent in Allen and Greenough's Latin Composition), four books of Cæsar's Commentaries, six orations of Cicero, and six books of Æneid. *Real equivalents* for any of the above mentioned works will be accepted. The so-called Roman method of pronunciation of Latin is recommended, as found in Allen and Greenough's, or in the last edition of Harkness' Grammar.

#### GREEK.

Greek Grammar (Goodwin's or Hadley's), Greek Prose Composition (Jones' Exercises in Greek Prose Composition or an equivalent in Arnold's), and four books of Xenophon's Anabasis. Writing Greek with the accents will be required. *The Greek Etymology must be thoroughly learned.*

The so-called Continental sound of the vowels and diphthongs and pronunciation according to the accent are recommended.

#### OBJECT OF THESE SCHOOLS.

The object of the schools in this College is to furnish a sound and liberal education to fit students for the general duties of life, and especially to prepare them for those business pursuits which require a large measure of literary and scientific knowledge and training. They meet the wants of those who wish to prepare themselves for the labors of the press as editors or publishers, for teachers in the higher institutions, or for the transaction of public business.

Students in the agricultural and other technical schools, desiring to educate themselves as teachers, writers, and professors, in their special departments, require a knowledge of the Ancient, as well as the Modern Languages, to give them a full command of all the instruments and facilities required for the highest proficiency in their studies and proposed work. The University seeks through these Schools to provide for this important part of its mission—the furnishing of teachers to the industrial schools of the country, and investigators and writers for the Arts. The large liberty allowed in the selection of the special studies of his course will permit the student to give such direction to his education as will fit him fully for any chosen sphere or pursuit.

#### INSTRUCTION.

The plan of instruction embraces, besides the ordinary textbook study, lectures and practical exercises in all the departments, including original researches, essays, criticism, proof reading, and other work intended to illustrate the studies pursued, and exercise the student's own powers. It is designed to give to all the students voice culture and a training in elocutionary practice.

A prominent aim will be to teach the right use of books, and thus prepare the student for self-directed investigation and study, which will extend beyond the curriculum of his school and the period of his graduation. With this view, constant use of the already ample and continually enlarging stores of the Library will be required and encouraged. As a farther aid in this direction, members of the advanced English classes are expected to act as assistant librarians. In this service they are able to obtain much valuable knowledge of the various departments of English Literature, of prominent authors, and the extent and scope of their writings. Of special value as an incentive to, and the means of practice in, English Composition, should be mentioned *THE ILLINI*, a month-

ly paper edited and published by the students of the several colleges, each of which is appropriately represented in its columns. A printing office has been provided for in the Mechanical Building, and a press with the requisite supply of type.

*The Library* is well supplied with works illustrating the several periods of English, American, French, and German Literature, as also those of Ancient Literature. It contains at present over ten thousand well selected volumes, and is constantly growing by purchase at home and abroad. Valuable American and Foreign periodicals are received regularly in the Reading Room, a list of which is given on page 8.

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## SCHOOL OF ENGLISH AND MODERN LANGUAGES.

### ENGLISH LANGUAGE AND LITERATURE.

*Studies of the School.*—In the arrangement of the studies the endeavor is to present a thorough and extended drill in grammatical and philological study, and in the authors and history of the English Language, affording a training equivalent to the ordinary studies of the classical language. This drill extends through three years of the course, but may be shortened according to the ability and preparation of the student.

The first two terms of the first year are given to a general survey of the whole field of British and American Literature from the middle of the sixteenth century to the present time. All the really representative writers come into notice, and representative specimens from the writings of each are carefully read in class. Moreover, each student is required each term to read the entire work of some classic author, making choice from a prescribed list. Frequent exercises in writing abstracts or original compositions on themes assigned are also required. The study of Rhetoric occupies the third term.

During the second year some four or five of the great masters are studied, their work analyzed, the shaping forces of their times, and their influences upon succeeding times are investigated. Lectures are given from time to time on Poetry, Epic, Lyric, Dramatic, etc. Writing and reading required as in first year.

In the senior year attention is given to Old English; to the Anglo-Saxon, for which the way has been prepared by the study of both English and German; to Philology; to the Philosophy of English Literature, and to Æsthetics. Essays, Forensics, and orations are required.

*French and German.*—The modern languages taught in this School are confined to one year of French and two years of Ger-

man, but the student may, at his option, substitute a second year of French for one of German. Abundant practical exercises are given both in composition and translation, and the diligent student gains the power to read with ease, scientific and other works in these languages, and may, with a little practice, write and speak them with correctness. A constant attention is also given to the Etymologies common to these languages and the English, and thereby a large advantage is gained by the student in linguistic culture. "He who knows only one language," said Goethe, "knows not even that one properly."

In the first year, the student passes over a complete grammar and reader, acquiring a knowledge of the technicalities of the idiom, and a sufficient vocabulary for the use of books of reference within the course. The second year is devoted to a critical study of the languages and philological analysis, and to a course of select classic reading, composition and conversation.

*Mathematics, Physics and Astronomy.*—For these studies, see School of Mechanical Engineering.

*Natural Sciences.*—See Schools of Chemistry and Natural History.

#### HISTORY AND SOCIAL SCIENCE.

The historical studies are designed to afford a general view of the history, social organization and progress of the race. They embrace also the history of the Arts and Sciences, and of Civilization, the principles of civil polity and law, the philosophy of history, and the principles of political economy and constitutional law. The instruction is given chiefly by lectures, with readings of specified authors, and the study of historical geography and chronology.

The course occupies six terms in the third and fourth years of the University Courses.

#### THIRD YEAR.

Ancient History of Greece and Rome, with notices of other nations ; Ancient Geography ; Mediæval History ; Modern History ; general European History ; European Geography.

#### FOURTH YEAR.

Constitutional History of England and the United States, five lectures a week ; History of Civilization, Analysis of Historical Forces and Phenomena, notices of the Arts and of the Inductive Sciences ; Political Economy.

#### PHILOSOPHY AND LOGIC.

The studies of this department are taught chiefly by lectures, with readings of specified authors, and written essays.

These studies require much maturity of powers, and are therefore confined to the fourth year of the course.

**Mental Philosophy.** Analysis and classification of mental phenomena; theories of perception, imagination, memory, judgment, reason. **Mental Physiology,** or connection of Body and Mind, healthful conditions of thought, growth and decay of mental and moral powers. **Philosophy of Education.** Theory of Conscience; Nature of Moral obligation, Moral feeling. The Right. The Good. **Practical Ethics;** Duties. Formation of character. **Ancient Schools of Philosophy;** **Modern Schools of Philosophy.** Influence of philosophy on the progress of civilization, and on modern sciences and arts.

Principles of logic; conditions of valid thinking; forms of arguments; fallacies and their classification. Inductive and scientific reasoning; principles and methods of investigation. Practical applications of logic in the construction of argument, in the detection and answer of fallacies, and in the formation of habits of thinking, and the common judgments of life.

#### COURSE OF SCHOOL OF ENGLISH AND MODERN LANGUAGES.

#### *Required for Degree of B. L.*

##### FIRST YEAR.

1. Cicero de Amicitia, or British Authors; French; Trigonometry and Advanced Geometry.
2. Livy, or American Authors; French; Analytical Geometry.
3. Rhetoric; French; Calculus, or Drawing; Horace (optional, extra).

##### SECOND YEAR.

1. English Classics; German; Physiology, or Botany.
2. English Classics; German; Zoology, or Botany.
3. English Classics; German; Astronomy.

##### THIRD YEAR.

1. German; Chemistry; Ancient History or Geology.
2. German; Physics or Chemistry; Mediæval History.
3. German; Physics; Modern History.

##### FOURTH YEAR.

1. Anglo-Saxon; Mental Science; History of Civilization.
2. English Literature; Constitutional History; Logic.
3. Aesthetics; Political Economy; Chemistry or Geology; Graduating Thesis or Oration.



**SCHOOL OF ANCIENT LANGUAGES AND LITERATURE.**

In the School of Ancient Languages and Literature, the methods of instruction, without swerving from their proper aim, to impart a sufficiently full and critical knowledge of the Latin and Greek languages and writings, will make the study of these tongues subservient, in a more than usual degree, to a critical and correct use of the English. With this view, written translations, carefully prepared, with due attention to differences, equivalences and substitution of idioms, and the comparison and discrimination of synonyms, will form part of the entire course.

The study of Latin and Greek Composition will constitute a weekly exercise through the first year, and will be continued, to some extent, through the course. Essays, historical and critical, will be required from time to time, in connection with the works read, and a free use of the library is urged. It is intended that each student completing the course in Ancient Languages shall have a clear knowledge of the history of Greek and Latin Literature, and of the principal authors in both languages. As an aid to the appreciation of the literature of the two peoples, Greek and Roman history will form an important part of the course, and will be taken up in the beginning of the course, illustrating the works read. In the first term of the third year Ancient History is taken up as a separate study, and especial attention is then given to the history of Greece and Rome, and the nations with whom they came in contact. Classes will be formed for students who wish to carry their classical study farther than the prescribed course, and every assistance will be given them.

For the studies in *History, Philosophy, &c.*, see School of English and Modern Languages.

For the studies in *Mathematics and Natural Science*, see Schools of Mechanical Engineering and Natural History.

## COURSE OF SCHOOL OF ANCIENT LANGUAGES.

*Required for Degree of B. A.*

## FIRST YEAR.

1. Cicero de Amicitia and prose composition ; Iliad and prose composition ; Trigonometry and Advanced Geometry.
2. Livy and prose composition ; Boise and Freeman's selections from Greek Authors and prose composition ; Analytical Geometry.
3. Odes of Horace and prose composition ; Memorabilia and prose composition ; Calculus.

## SECOND YEAR.

1. Satires of Horace ; Thucydides or German ; Physiology.
2. Terence ; Sophocles or German ; Zoology.
3. Tacitus ; Demosthenes or German ; Astronomy.

## THIRD YEAR.

1. Juvenal or French ; Chemistry ; Ancient History or Geology.
2. Quintilian or French ; Physics ; Mediæval History.
3. De Officiis or French ; Physics ; Modern History.

## FOURTH YEAR.

1. History of Civilization ; Mental Science ; Meteorology and Physical Geography.
2. Constitutional History ; English Literature ; Logic.
3. Æsthetics ; Plato ; Political Economy ; Graduating Oration or Thesis.

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**ADDITIONAL SCHOOLS.**

*NOT INCLUDED IN THE FOUR COLLEGES.*

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**SCHOOL OF MILITARY SCIENCE.**

By the law of Congress, and of the State, the University is required to teach Military Tactics to its students. All able-bodied male students of the College classes are enrolled in the companies of the University Battalion, and receive instruction according to the following programme, the exercises occupying from one to three hours each week (see figures in programme.)

The Military Organization of the University ranks in the State Militia as the University Battalion, Illinois National Guards.

## PROGRAMME.

**FIRST YEAR.**—*Fall Term*—School of Soldier, Manual of Arms, 3. *Winter Term*—School of Company, Firings, etc., 2. *Spring Term*—School of Battalion, 2.

**SECOND YEAR.**—*Fall Term*—Reviews of Company and Battalion Drill, 2. *Winter Term*—Bugle Calls and Skirmish Drill, 1. *Spring Term*—Skirmish Drill, and Battalion Evolutions, 2.

**THIRD YEAR.**—*Fall Term*—Review, Picket Duty, 1. *Winter Term*—Guard and Picket Duties, 1. *Spring Term*—Skirmish and Battalion Evolution, 1 to 2.

**FOURTH YEAR.**—*Fall Term*—Reviews, 1. *Winter Term*—Bayonet Fencing, 1. *Spring Term*—Battalion Evolutions, Target Practice, 1 to 2.

## CLASS IN MILITARY SCIENCE.

A class is taught in Military Science and Art, as far as is requisite for officers of the line. From this class are selected the officers of the several companies, for which they act as drill sergeants and instructors. The military instruction is now under the charge of Major W. A. Dinwiddie, an experienced officer of the regular army of the United States. A full supply of arms and am-

munition is furnished by the War Department, including 300 cadet rifles and accoutrements, two pieces of field artillery, 1,000 fixed cartridges and 1,000 blank cartridges annually for target practice, with 200 rounds for artillery.

No student is eligible to the military class till he has reached the winter term of the second or Sophomore year, and is in good standing in all his studies. The course of instruction is confined strictly to two years, terminating always with the first term of the fourth or Senior year. No student will be permitted to retain a command who does not maintain a good standing in conduct and scholarship.

The instruction and exercises occupy two hours each week, arranged as far as possible so as not to interfere with any other courses of study, to allow the members of other courses to enter this. Students must be careful, however, to ascertain, before entering the military class, that the proper studies and exercises of their chosen courses will not be interfered with.

*Commissions.*—The Governor of the State commissions as Captains in the state militia, such students of the Military Class as complete the course thoroughly, and obtain the necessary experience in command, and whom the Faculty of the University recommend for their high character both as students and as gentlemen.

*University Uniforms.*—Under the authority of the acts of incorporation, the Trustees have prescribed that all male students, after their first term, shall wear the University uniform. The University cap is to be worn from the first. The uniform consists of a suit and cap of cadet gray mixed cloth, of the same color and quality as that worn at West Point, and manufactured by the same establishment. Students can procure them ready-made on their arrival here. The University cap is ornamented in front with the initials I. I. U., surrounded by a wreath. Students will always wear their uniforms on parade, but in their rooms and at recitations may wear other clothing.

The University Library contains books on Military Science, Military History and Engineering.

*Gymnasium.*—The Drill Hall is furnished with a full set of gymnastic apparatus, and classes in gymnastic exercises are organized in the fall and winter terms under careful leaders. Fee \$1.

*Telegraphy.*—In connection with the military department there is a Telegraph office in the new University Building with accommodations for learners, and connections with the Mechanical and Military building, the Dormitory and several private houses, making about three miles of telegraph lines. The students form an association or class, and the members join the University main line, using their own instruments in

their rooms. The class appoint their own officers, inspectors, etc., and pay a small contribution for maintaining batteries, etc. At present there are twenty-seven instruments on the line.

#### COURSE IN SCHOOL OF MILITARY SCIENCE.

##### SECOND YEAR.

2. School of the Soldier and Company ; Bayonet Fencing, 2.
3. School of Battalion ; Ceremonies and Reviews ; Skirmish Drill.

##### THIRD YEAR.

1. Brigade and Division Evolutions ; Sword Fencing, 2.
2. Guard Outpost and Picket Duty ; Sword Fencing, 2.
3. Military Administration ; Reports and Returns ; Theory of Fire-arms ; Target Practice, 2.

##### FOURTH YEAR.

1. Organization, etc., of armies ; Art of War ; Field Fortifications, 2.

### **SCHOOL OF COMMERCE.**

The aim of this School is to teach those principles of business, and of accounts, which will enable the student to manage correctly his business affairs, to engage in the larger enterprises of trade and commerce, or to fit him for the work of a professional Book-keeper.

The course of instruction will occupy at least one year. In the first term will be taught the principles of Book-keeping in general, and forms of business paper in general use. In the second term the student will learn the application of Book-keeping to special lines of business, and also special business forms and papers. The third term is devoted to Banking and the higher operations of the counting-house, commercial law, political economy and the principles of trade. The course is designed to be as comprehensive and thorough as that of the best of the Commercial Colleges, with advantages such as no mere Commercial College can give.

#### ACTUAL BUSINESS.

The advantages to be gained in this School have been greatly increased by the addition of a course of practical business operations. In passing satisfactory examination in theoretical work the student is furnished a capital of \$2,000 in College currency with which to transact business. To secure its careful use, and to invest the student with some responsibility of actual gain or loss to himself, such as all business men must bear, a deposit of

one-fourth per cent. of his capital in real money is required. At the close of the course all currency in good condition is redeemed at the same rate. Prices are regulated by gold quotations and goods are bought and sold by sample tickets in retail and wholesale trade. Commission business, in its various forms, is also carried on between commission merchants and dealers in distant cities, located in different parts of the spacious hall. All the varied forms of paper by means of which business is conducted, such as Bills, Notes, Drafts, Checks, Invoices, Account Sales, etc., are required to be carefully drawn and properly signed, endorsed or accepted before the transactions for which they are drawn are completed. Special attention is paid to business correspondence.

To facilitate these operations, and to furnish a means of teaching practical Banking, the "Commercial Department Bank" has been built and equipped. Its capital is \$200,000, from which students in actual business are supplied.

All business common in banks, except that of failure, is here conducted and the student fills each different office in succession, performing the duties and keeping the books connected therewith.

Candidates for admission to this school, in full standing, must have the same preparation as that required for admission to the College of Natural Sciences. But those who wish simply to take the year's course in Book-keeping may pursue the study through the Preliminary Year, and in connection with the studies of that year, paying the fees required of preparatory students.

The full course of the school is as follows :

FIRST YEAR.

1. Theoretical Book-keeping in Single and Double Entry, Theory of Mercantile Accounts, the Principal Books and Auxiliaries, Cash Book, Bill Book, Invoice Book and Sales Book, Notes, Drafts and Checks, Penmanship and Letter-Writing, British Authors, Chemistry or French.
2. Actual Business, Retail and Wholesale, Books kept by Single Entry, with and without Invoice Book and Sales Book, changed to Double Entry and continued by various methods. Bills, Receipts, Notes, Drafts, Checks, and Accounts Current; Commercial Calculations, American Authors, Drawing or French.
3. Actual Business, Agency, Commission and Shipping, Importing and Jobbing, Invoice Book, Domestic and Foreign, Sales Book, Receiving Book, Commission Sales Book, Business Correspondence, Invoices, Account Sales, Bills of Exchange, Rhetoric, Drawing or French.

SECOND YEAR.

1. Theoretical Banking and practice in teaching Book-keeping, German, English Classics or Physiology, History of Civilization or French.
2. Banking by Theory and Practice, German, Constitutional History.
3. Commercial Law and Forms of Legal Paper, German, Political Economy.

**SCHOOL OF ART AND DESIGN.**

This School is to subserve a two-fold purpose. 1. It affords to the students of the several colleges the opportunity to acquire such a knowledge of free-hand drawing as their chosen course 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. Schools of Design, in Europe and in this country, have been found important aids to the higher manufactures, adding to the beauty of fabrics and to the skill and taste of workmen. The School is, at present, under the charge of Professor Peter Baumgras, an artist of good reputation, and a graduate of the Art School of Munich, Bavaria.

**COURSE OF INSTRUCTION.**

The course in Industrial Art and Designing occupies two years, and if faithfully followed, will fit students to become efficient designers in the various branches of industry in which artistic skill and taste are indispensable to success. The course is divided into four stages, as follows :

**STAGE A.** Elements of Form ; Analysis of Compound Forms ; Outline Drawing on Paper and Black-board ; Principles of Shading ; Elementary Designs ; Lectures on Art ; Descriptive Geometry.

**STAGE B.** Shading with Pencil, Chalk, Pen, Charcoal, Ink and Sepia ; Monochrome and Distempera Color ; Perspective ; Drawing from Models and Common Objects ; Elementary Designs from Elements of Plant and Animal Forms ; Designs for Specified Objects ; Lectures on Art and its History.

**STAGE C.** Shading from Models and Casts ; Outlines from Natural Foliage ; Botany as applied to Ornamentation ; Harmony and Contrasts in Color ; Optical and Physical principles underlying Color in Nature ; Contrasts in Design ; Styles and History of Ornamentation ; Higher Linear Perspective and Shadows ; Lectures on Art.

**STAGE D.** Drawing from Statuary, Casts and Models ; Drawing and Sketching from Nature ; Compositions in Ornamental and Industrial Art ; Compositions in Monumental and Pictorial Designs ; Analysis of Ornamental Art ; Esthetics ; Water Color and Oil Painting ; Lectures on Art History.

**ADVANCED COURSE IN ART AND DESIGN.**

This course comprises the regular branches of Figure, Portrait and Landscape Painting ; Designing and Illustrating on Wood ; Modeling in Clay, Wax, etc. It is designed for those who wish to become teachers, or to pursue painting and designing as a profession.

Special art students will be received for this course, and allowed to devote their whole attention to the art studies.

Students completing the full course in Industrial Designing will receive a certificate from the School. Fee for special students, Ten Dollars the term.

**MUSICAL DEPARTMENT.**

UNDER CHARGE OF MISS CHARLOTTE E. PATCHIN.

## COURSE OF INSTRUCTION.

Instruction Book; Clementi's Sonatines, Op. 36, 37, 38; Kohler's Studies, Op. 50, Books 1 and 2; Schmitt's Finger Exercises; Clementi's Sonaten Studien, Op. 165; Czernie's Op. 500, Grand Exercises of the Scales; Czernie's Op. 299, School of Velocity, Books 1, 2, 3, and 4; Czernie's Op. 740, Fifty Finishing Studies, Books 1, 2, 3, 4, 5; Cramer's Studies, Book 1; Chopin's Op. 25; Thalberg's Studies, Op. 26; Clementi's Gradus ad Parnassum; Selections from Bach's Well Tempered Clavicorn; Johnstone's Thorough Bass; Palmer's Harmony.

The pupils take, during the course, such pieces as are adapted to their advancement.

During the last year Bethoven's Sonates, and other classical compositions, are studied.

Besides the private lessons, every one is required to attend class meetings every week, at which the pupils play in the presence of each other and the teacher.

Blackboard exercises in the varieties of time, accent, scales, modulation and transposition are given to these classes, qualifying them to render and analyze music more intelligently.

The more advanced pupils have an opportunity to take part in public musical rehearsals, also in the public exercises given by the various societies connected with the University.

## TUITION.

Piano and Cabinet Organ, per term of 20 lessons. . . . .	\$ 10 00
Practice on the Piano, per term. . . . .	5 00
Harmony and Thorough Bass, in classes. . . . .	5 00

Twenty-six lessons are required in the Fall Term, that the work in this study may correspond with that in the other departments.

Terms, strictly in advance.

**MISCELLANY.**

## EXAMINATIONS.

Written examinations are held at the close of each term and whenever any study has been finally completed. Any student failing to answer correctly 75 per cent. of the questions proposed, loses all credit for that study, and is precluded from proceeding with any other studies without special permission.

A record is kept of each student's term work and standing, and from this his final certificate of graduation is made up.

## DEGREES AND CERTIFICATES.

No Degrees have heretofore been given by this University. The law forbade it. On petition of the Alumni, the last General Assembly of the State enacted that "on like recommendation of the Faculty, the Trustees may authorize the Regent, as President of the University, to issue diplomas to such persons as shall have completed satisfactorily the required studies, and sustained the examination therein, conferring such Literary and Scientific Degrees as are usually conferred by Universities for similar or equivalent courses of studies, or such as the Trustees may deem appropriate." Approved May 11, 1877.

Before exercising the power granted by this act the Trustees deemed it wise to ascertain fully the views of other institutions of similar character, and especially of those organized under the same Congressional grant. A conference of the leading officers of these institutions was finally invited, and held in Columbus, Ohio, Dec. 27, 1877. The institutions represented concurred unanimously in the utility of Degrees when properly conferred, and all except this University had already introduced them. In accordance with the able report of the conference, the following system of Degrees has been adopted for the University :

1. All studies will remain as heretofore free. Each student may choose and pursue such studies as he may desire, subject only to such conditions as to preparation, times of study, and number of studies as may be necessary to secure efficiency in classes and economy in teaching.

2. But students who wish to be candidates for any degree must complete fully the course of studies prescribed for such degree.

3. Students not candidates for any degree will be enrolled as special students, and will receive at the close of their attendance, if not less than a year, the certificates provided by law, with statement of work done and of credits attained.

4. It is designed that the requirements for all the Bachelors' Degrees shall be, as nearly as possible, equal in amount and value.

5. The Degree of Bachelor of Science, B. S., will be given to those who complete either of the courses of studies in the Colleges of Engineering, Agriculture, or Natural Science, or in Domestic Science. The name of the School will be inserted after the degree.

6. The degree of Bachelor of Letters, B. L., will be given to those who complete the course in the School of English and Modern Languages.

7. The degree of Bachelor of Arts, B. A., will be given to those who complete the course in the School of Ancient Languages.



8. The Masters' degrees, M. S., M. L., and M. A., and the equivalent degrees of C. E., M. E., &c., will be only given to those who have pursued and passed examinations on a year of prescribed post-graduate studies, and presented an accepted Thesis, or after a term of successful practice with a Thesis.

#### EXAMINATION FOR ADMISSION.

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 Superintendent's Certificates.*—County Superintendents of Schools will be furnished with questions and instructions for the examinations of candidates in the four common branches, Arithmetic, Geography, English Grammar and History of the United States ; those who pass creditably will, when they present the Superintendent's certificate to that effect, be admitted to the Preliminary Classes.

*Examining Schools.*—The Trustees have authorized the Faculty to designate one or more High-Schools in each County of the State, of sufficiently high grade and good reputation, whose certificates of examination, in the branches required of candidates for the University, may be received in lieu of the usual examination of the University.

These must be Graded, or High-Schools of good reputation, and of sufficiently extended course to prepare students for the University. The principal teachers of the schools selected for this class will be authorized to prepare questions and conduct examinations of any of their students desirous of entering the University, but the papers must be sent to the University for final decision.

The following is a list of the Schools already accepted as

#### EXAMINING SCHOOLS :

Rockford West High-School.....	J. H. Blodget, Principal.
Tuscola " " .....	E. J. Hoenshal, "
Buda " " .....	J. V. Wilkinson, "
Kankakee " " .....	C. W. Rolfe, "
Champaign, East Side School.....	Eugene De Burn, "
Maplewood High School.....	S. F. Hall, "
Sterling, 2d Ward High School.....	Alfred Bayliss, "
S. Belvidere High School.....	J. W. Gibson, "
Geneseo High School.....	B. F. Barge, "
Belvidere High School.....	— Sherrill, "
Urbana " " .....	J. W. Hays, "
Lanark " " .....	F. T. Oldt, "
Gibson City " " .....	J. W. Mercer, "

*Accredited High Schools.*—In addition to the Examining Schools above mentioned, the Faculty are authorized, after personal examination, to appoint accredited High Schools, whose graduates may be admitted to the University without further examination. These must be schools of first-rate character, whose courses of instruction include all the studies required for admission to some one of the colleges of the University. On application, a member of the Faculty is sent to examine the school making the 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 on the published list of High Schools, accredited by the University. The graduates of these schools are admitted to any of the colleges for which their studies may have prepared them. The appointment continues as long as the work of the school is found satisfactory.

#### ACCREDITED HIGH SCHOOLS.

Princeton High School.....	H. L. Boltwood, Principal.
Lake View “.....	A. T. Nightingale, “
Champaign, West High School.....	W. H. Lanning, “
Tolono High School.....	O. C. Palmer, “
Decatur “.....	E. A. Gastman, “
Salem High School.....	N. S. Scovell, “

N. B.—Schools desiring to be placed on either of these lists will be furnished, on application, with the circular of instructions.

#### DORMITORIES AND BOARD.

There are in the University buildings about one hundred private rooms, which are rented to the students who first apply. Most of the rooms are of ample size for two students. All are without furniture.

There are many boarding houses near the University where either table board, or board and rooms can be obtained, with the advantages of the family circle. Boarding clubs are also formed by the students, by which the cost of meals may be reduced to \$2.25 per week. Some students prepare their own meals, and thus reduce expenses still farther.

Coal is purchased at wholesale and furnished to the students at cost.

For estimates of annual expenses, see page 68.

The Young Men's Christian Association of the University will aid new students in procuring rooms and boarding places.

#### LABOR.

Labor is furnished, as far as possible, to all who desire. It is classified into Educational and Remunerative labor.

Educational Labor is designed as practical instruction, and constitutes a part of the course in several schools. Students are credited with their proficiency in it as in other studies. Nothing is paid for it.

Remunerative Labor is prosecuted for its products, and students are paid for what their work is worth. The maximum rate paid for farm, garden and shop labor is *ten cents*, and for that about the buildings and ornamental grounds, *eight cents per hour*. Students of sufficient experience may be allowed to work by the piece or job, and thus by diligence or skill, secure more pay.

Some students, who have the requisite *skill, industry and economy*, pay their entire expenses by their labor; but, in general, young men cannot count upon doing this at first, without a capital to begin with, either of skill, or of money to serve them till a degree of skill is acquired. As the number of students increases it is found more and more difficult to furnish the labor needed, and students cannot count so certainly upon finding employment.

#### STUDENTS' GOVERNMENT.

For several years an experiment has been in progress, in self-government of the Students of the University. By permission of the Faculty, the General Assembly of the Students was organized, and a constitution adopted providing for the election of a President, Vice-President, Secretary, and Marshal; for a Senate of twenty-one members, a court consisting of a Chief Justice and two Associate Judges. Under this constitution, laws are enacted by the Senate, which become valid only when approved by the Regent of the University. All offenses against these laws are tried before the Students' Court, and punished by fines according to the class of the offense. Cases which require the severer penalties of suspension or expulsion from the University are referred to the Faculty. Students refusing to pay the fines imposed by the Students' Government are suspended from University privileges. The government has thus far rendered important aid in maintaining good order in the dormitories and grounds, in preserving public property, in preventing the visiting of saloons, and in other matters requiring the intervention of authority.

#### GENERAL DIRECTIONS TO STUDENTS.

Young men or women desiring a liberal education, and living at a distance from any College or University, are often puzzled to understand precisely what they will be required to know and do in order to gain admission. To such these words are addressed:

1. Notice that a College, or a University, (which is properly a collection of Colleges,) is designed for the higher education

only, and not for the study of the common branches. None of the common branches, such as Arithmetic, Geography, English Grammar, Reading and Spelling, are taught in this University. These must all be finished before you come.

2. In order to pursue profitably the true College studies, and to keep pace with the classes, you must be ready to pass a strict examination in the common branches just mentioned, and in certain other preparatory studies, differing with the different Colleges of the University. (See pages 12 and 50 of this circular).

3. If well prepared only in the common branches above named, you may be admitted, not to the Colleges, but to the Preparatory Classes, in which you will study the other preparatory studies required for admission to College. (See page 12). All preparatory studies must be completed before you can be admitted, as a matriculated student, to any College class.

4. Remember that all College studies are arranged in regular systematic courses, in which each term's work is designed to prepare for the next. To take the studies in their order, you should enter at the beginning of the College year, in September. If unable to enter at that time, you may enter at any later time by making up the studies already passed over by the class.

5. Enter College with the purpose of going through, and make your course regular as far as you go. If obliged to leave before you have finished the course, you will have done the best thing for yourself in the meantime; while if you remain, the regular course is in nine cases out of ten, the most useful and effective.

Student's desiring only a winter's schooling should go to some high school.

#### ADVICE TO THE YOUNG MEN AND WOMEN OF ILLINOIS.

There are in the State of Illinois over 500,000 young men and women between the ages of fifteen and twenty-five. To these our words are addressed. All of you desire success. All wish a happy and prosperous life. Some seek it in property; some in social standing; some in public offices, and others in professional or business distinction. A sound and liberal education is the surest pathway to success in all these pursuits. Statistics prove that the well educated man will, on the average, be as far advanced in his career at 35 as the uneducated man at 45 or even 50. His education is as good as ten years' start of his competitors. While not *one* out of every *ten* educated men makes a comparative failure, not one out of every *ten* of uneducated men achieves success. The chances of the educated man are therefore *ten to one better* than those of the uneducated. This is true in every branch

of business, in agriculture and mechanic arts, as well as in law, medicine or trade. In the long run, then, *ignorance costs more than education.*

Nearly all of you can, if you will, get a fair common education. One-fourth of you can get a high school education. One, at least, in ten has the talent to take a liberal College education. Nothing hinders in most cases but your own want of will. More than one-half the college students of this country are from the middle classes in society or lower. A large proportion of these students pay their own way. Take the first step, and the second becomes easier, and so on to the end. Where there is an earnest Will, there is sure to open a feasible Way.

The lamentation, "too late," has killed or chilled many a good thought. "It is never too late to learn." Preparation for College ought to begin at 14 or 15 years of age, but many of our best men commenced their preparatory studies at 20 or 25 even, and not a few have taken the College course at 30, 35, and sometimes at 40 years of age.

Do not linger too long over the common branches, as they are called, in the vain hope of making them perfect before taking any higher studies. As soon as you have gone through the common practical Arithmetic with a tolerable understanding of it, take up Algebra or Geometry. After completing a single book in Geography, proceed at once to Natural Philosophy or Physiology, without waiting for the higher Geography. As soon as the first Grammar is fairly finished take up Rhetoric and Composition, or if you can find a teacher, Latin or French. There is enormous waste of time in going over and over again, the same studies, with new text-books, in the foolish expectation of attaining a perfect understanding of them. What you want is not more study of the old, but more mind, new knowledge to feed mind, broader intelligence, larger views. You may then return some day to your old studies and make more progress in a month than you made before in a year. Thousands of students are robbed of a liberal education by this common blunder.

Finally, wait for no teacher or school term. All study must be done by yourself. All learning is the act of your own mind. Teachers and schools are helps, but he who has the courage to study alone may do without them.

If half the students were in College who ought to be there, for their own sakes, and for public weal, every College in the State would be crowded to its utmost. And the State, feeling the influx of this large measure of educated brain, would march with a giant's pace to larger wealth, higher social and political power and to a more splendid and fruitful civilization.

**EXPENSES.**

THE TUITION IS FREE in all the University Classes.

THE MATRICULATION FEE entitles the Student to membership in the University until he completes his studies, and must be paid before he enters. Amount.....\$10 00

THE TERM FEE for Incidental Expenses is, for each student 5 00  
Room Rent in University Dormitory, each Student per  
Term..... \$2 00 to \$8 00

Each Student in the Chemical and Physical Laboratories, and in the Draughting and Engineering Classes, is required to make a deposit varying from 50 cents to \$8, to pay for Chemicals and apparatus used, and for any breakages or damages.

ALL BILLS due the University *must be paid, and the receipt* of the Treasurer *shown* to the Regent *before the student can enter* the Classes.

The following are the estimated Maximum and Minimum Annual Expenses, exclusive of books and clothing, of a residence of thirty-six weeks at the University :

	MIN.	MAX.
Term Fees and Room Rent for each Student ..	\$21 00	\$ 27 00
Table Board in Boarding Houses and Clubs...	72 00	144 00
Fuel and Light.....	10 00	15 00
Washing, at 75 cents per dozen .....	13 50	27 00
Total Annual Amount.....	\$116 50	\$213 00
Board and Room in Private Houses, per week.	4 00	6 00

## FEES IN THE PRELIMINARY YEAR.

Tuition, per Term.....	\$ 10 00
Incidental Fee, per Term.....	5 00

## SPECIAL FEES.

For Music, for 20 lessons.....	\$ 10 00
For Painting and Drawing to Special Students.....	10 00
Graduating Fee.....	5 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. *No greater error can be committed than to send boys 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 20 years of age.

**CALENDAR FOR 1878.**

Examinations for Admission, Monday	September 16
First or Fall Term begins, Tuesday	September 17
Closing of the First Term	December 24

*Winter Vacation.***FOR 1879.**

Examination for Admission to Advanced Classes	January 6
Opening of the Second or Winter Term, Tuesday	January 7
Anniversary Day	March 11
Second Term Closes Tuesday	March 25
Third or Spring Term begins, Tuesday	March 25
Baccalaureate Address in University Chapel	June 8
Class Day	June 9
Society Addresses	June 10
Commencement, Wednesday	June 11

*Summer Vacation.*

Examinations for Admission, Monday	September 15
First or Fall Term begins Tuesday	September 16
Closing of the First Term	December 23

*Winter Vacation.***DONATIONS TO THE NATURAL HISTORY MUSEUM FOR THE PAST YEAR.**

LIUT. GEO. R. BACON AND CAPT. CHAS. BENDIRE, Camp Harney, Oregon.—114 Bird Skins, including Great White Pelican, Swan, Golden Eagle, Crane, Sage Cocks, etc.; 137 Birds' Eggs; 35 Species Wood; Volcanic Rocks, etc.

SMITHSONIAN INSTITUTE.—72 Species Fish (Alcoholic).

GEO. A. WILD, Rochester, New York.—Mounted Skeletons of South American Ostrich, Water Snake, Genette, Martin, Black Scoler, Turtle, etc.

A. B. BAKER.—Blue Racer.

———.—Crystal Quartz and Garnet.

AARON BROWN.—Iron Ore, N. Y.

CHAS. ADAMS.—Raccoon: 5 Bird Skulls.

J. FORSYTHE.—Mink; Rabbit.

GEO. FRENCH.—English Rabbit.

DR. ZEIGLER, Farmer City.—2 Tarantulas; Scorpion and unknown.

J. K. LOVE, Philo.—Barn Owl.

MAJ. INGALLS.—Valuable Collection of Ethnological Specimens; Indian Arms, Utensils, etc.

A. C. SWARTZ, Nevada.—Porcupine; Head of Blacktail Deer; also of Whitetail Deer, (in velvet).

——— MYERS.—Skeleton of Hog.

UNIVERSITY FARM.—Skeleton of Jersey Cow.

———.—Boar's Skull.

J. R. GULICK, Esq.—Jack Rabbit.

CHAS. R. WEBB, Philadelphia, Pa.—Valuable and important aid in collecting specimens.

C. W. BUTLER.—Skeleton of Owl.

C. E. PERCIVAL.—One Pouched Gopher (rare).

## Letter from Members of the General Assembly of Illinois.

SPRINGFIELD, ILL., April 6th, 1877.

*Hon. J. M. Gregory, Regent Illinois Industrial University, Champaign, Illinois :*

DEAR SIR : Being among the number of the Members of the Legislature who recently visited the University, we desire to express our surprise and gratification at the magnificence of the University Buildings, the completeness of their appointments, and the superior facilities of the Institution for imparting instruction in the Literary, Artistic, Scientific and Mechanical departments. From what we saw and heard during our visit, we are convinced that this great Educational Institution of our State, in which we can all take honest pride, is not well enough known to our people to be properly appreciated. Founded and endowed by the munificent generosity of the Nation and the State for the education of the young men and women of Illinois, the excellence of its advantages ought to be familiar to every citizen of the State. Hoping that ere long this knowledge will become universal, and the enjoyment of its privileges more widely distributed, we tender you our sincere congratulations upon the high standing and proficiency of the Institution, and testify with pleasure to the advantages enjoyed in all the departments, for imparting sound, practical, useful instruction.

JAMES SHAW,  
Speaker H. R., 30th G. A.

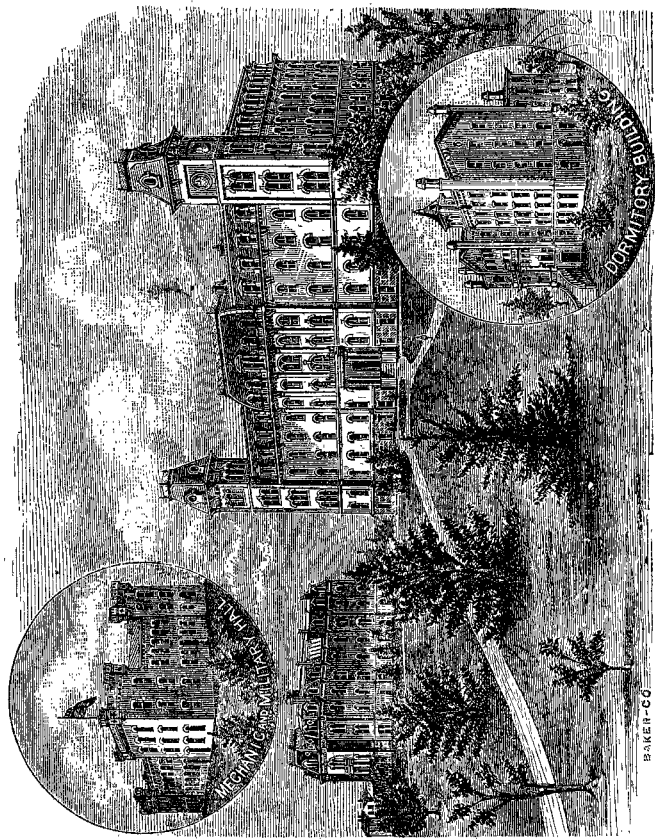
THOMAS J. ABEL, Rep. 29th Dist.	D. C. SMITH, Rep. 27th Dist.
E. K. WESTFALL, Rep. 23d Dist.	ISAAC L. MORRISON, Rep. 39th Dist.
JAS. G. WRIGHT, Rep. 14th Dist.	PETER S. LOTT, Rep. 13th Dist.
WM. LINDSEY, Rep. 45th Dist.	JOSEPH E. SMITH, Rep. 2d Dist.
M J. WENTWORTH, Rep. 1st Dist.	F. E. ALBRIGHT, Rep. 50th Dist.
JAS. HERRINGTON, Rep. 34th Dist.	THOS. J. FRILLS, Rep. 33d Dist.
C. H. WHITAKER, Rep. 23d Dist.	











# Illinois Industrial University.