Register
of the
University of Arizona

Thirteenth Year
1903-1904

Announcements
1904-1905

Tucson, Arizona
MDCCCCIV
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sept. 15, Thursday</td>
<td>Entrance Examinations.</td>
</tr>
<tr>
<td>Sept. 16, Friday</td>
<td>Registration Day.</td>
</tr>
<tr>
<td>Sept. 19, Monday</td>
<td>First Semester begins.</td>
</tr>
<tr>
<td>Sept. 20, Tuesday</td>
<td>Thanksgiving Recess begins.</td>
</tr>
<tr>
<td>Nov. 23, Wednesday</td>
<td>Instruction resumed.</td>
</tr>
<tr>
<td>Nov. 28, Monday</td>
<td>Holiday Recess begins.</td>
</tr>
<tr>
<td>Dec. 23, Friday</td>
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**1905**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>Jan. 5, Tuesday</td>
<td>Instruction resumed.</td>
</tr>
<tr>
<td>Feb. 2, Thursday</td>
<td>First Semester ends.</td>
</tr>
<tr>
<td>Feb. 3, Friday</td>
<td>Arbor Day; celebrated also as the Anniversary of the University.</td>
</tr>
<tr>
<td>Feb. 6, Monday</td>
<td>Second Semester begins.</td>
</tr>
<tr>
<td>May 28, Sunday</td>
<td>Baccalaureate Discourse.</td>
</tr>
<tr>
<td>May 29, Monday</td>
<td>Exhibition Military Dept.</td>
</tr>
<tr>
<td>May 31, Wednesday</td>
<td>Exhibition Mechanic Arts Dept.</td>
</tr>
<tr>
<td>June 1, Thursday</td>
<td>Commencement.</td>
</tr>
</tbody>
</table>
BOARD OF REGENTS

EX-OFFICIO

HON. ALEXANDER O. BRODIE .................. Phoenix
   Governor of the Territory

HON. N. G. LAYTON .......................... Phoenix
   Superintendent of Public Instruction

APPOINTED BY THE GOVERNOR

HON. WINFIELD SCOTT, A. B., D. D. (Chaplain, U. S. A., retired) .............. Scottsdale
   Chancellor

HON. GEORGE J. ROSKRUGE .................. Tucson
   Secretary

HON. JOHN M. ORMSBY ....................... Tucson
   Treasurer

HON. MARK J. EGAN .......................... Clifton
FACULTY

KENDRIC CHARLES BABCOCK, Ph. D.
President, Professor of History. 1903*.

WILLIAM PHIPPS BLAKE, A. M.
Ph. B., 1852, Yale; A. M., Dartmouth.
Professor of Geology, Metallurgy and Mining; Director School of Mines. 1895.

HOWARD JUDSON HALL, A. M.
B. S., 1890, Michigan (Agricultural); A. B., 1896, Stanford; A. M., 1900, Harvard.
Professor of English; Librarian; Dean of the Faculty. 1891.

ROBERT HUMPHREY FORBES, M. S.,
B. S., 1892, M. S., 1895, University of Illinois.
Director and Chemist Agricultural Experiment Station. 1894.

SHERMAN MELVILLE WOODWARD, M. S., A. M.
Professor of Mathematics and Mechanics; Meteorologist Agricultural Experiment Station. 1896.

FRANK NELSON GUILD, M. S.
B. S., 1894, M. S., 1903, Vermont.
Professor of Chemistry and Mineralogy. 1897.

ALFRED JAMES McCLATCHIE, A. M.
A. B., Nebraska; A. M., Olivet.
Professor of Agriculture and Horticulture, Agricultural Experiment Station. (Residence, Phoenix.) 1898.

DAVID HULL HOLMES, B. S.
1892-1894, Washington University: B. S., as of 1901, Arizona.
Professor of Mechanic Arts and Drawing; Secretary of the Faculty. 1898

WILLIAM W. SKINNER, M. S.
B. S., 1895, Maryland (Agricultural). M. S., 1897, Columbian.
Associate Chemist Agricultural Experiment Station; Instructor in Photography.† 1899.

GEORGE EDSON PHILIP SMITH, C. E.
B. S., 1897; C. E., 1898, Vermont.
Professor of Physics and Engineering. 1900.

* The dates following titles indicate appointment to service in the University.
† Associate Professor (elect) of Chemistry,
JOHN JAMES THORNBER, A. M.
B. S., South Dakota (Agricultural); B. S., 1897, A. M., 1901, Nebraska.
Professor of Biology; Botanist, Agricultural Experiment Station. 1901.

THOMAS FRANKLIN McCONNELL,
Professor of Animal Husbandry, Agricultural Experiment Station. (Residence, Phoenix)

FAUST CHARLES GEORGE DeWALSH, A. B.
A. B., 1903, Rochester.
Professor of Modern Languages. 1903.

MASON M. MAXON, Captain, U. S. A.
1868, West Point.
Professor of Military Science and Tactics. 1903.

IVAN DeLASHMUTT, B. S.
B. S., 1901, California.
Professor of Metallurgy. 1904.*

MABEL GRAY HOOVER,
Graduate Oread School of Domestic Science.
Instructor in Domestic Science. 1901.

HATTIE FERRIN, B. S.
B. S., 1898, Arizona.
Instructor in English and Latin. 1901.

ELBERT JOHN HOLLINGSHEAD,
Instructor in Bookkeeping and Civics. 1902.

MARION CUMMINGS STANLEY, B. L.
B. L., 1900, California.
Instructor in Latin and English. 1902.

GEORGE MARK EVANS, LL. B.
LL. B., 1894, Michigan; Ph. B., 1903, Arizona.
Instructor in Mathematics. 1902.

JOHN WILLIAM GORBY, A. M.
A. B., 1901, Marietta; A. M., 1903, Arizona.
Instructor in Public Speaking. 1902.

ALICE OLIVIA BUTTERFIELD, A. B.
A. B., 1901, Stanford.
Instructor in History and Physical Culture; Assistant Librarian. 1902.

BENJAMIN FRANKLIN STACEY, A. B., B. D.
A. B., 1896, B. D., 1898, Lombard; A. M., 1903, Arizona.†
Instructor in Science and Philosophy. 1902.

* Absent on leave until September, 1904.
JOHN WILLIAM PROUT, JR., B. S.
B. S., 1903, Arizona.
Assistant in Chemistry. 1903.

ANNA BEARD,
Instructor in Stenography and Typewriting. 1903.

O. A. KATES
Acting Director of Physical Training. 1904.

OTHER OFFICERS

HERBERT BROWN
Curator Territorial Museum.

JAMES STEPHEN MANN, B. S.
Commercial Assayer. 1902.

GEORGE G. HOOLE
Secretary to the President.

MRS. CORDELIA M. STEWART
Matron in Charge of North Hall.

EDWARD BANNISTER
Superintendent of Buildings and Machinery. 1903 (Dec.).

CHAS. E. CHASE
Engineer.

STUDENT ASSISTANTS

ERNEST JONES

ARCHIE MOORE

FRANK C. KELTON

WILLIAM E. GAMBLE

WILLIAM B. BROSTROM

BENITO G. SUAREZ

WILLIAM D. WHIPPLE

WM. B. ALEXANDER

ROY MORFOOT

ARNOLD SCHMID

CHARLES ALEXANDER

HATTIE L. DAVIS

ROY L. CORNELL

† Connection with the University severed April, 1904.
STANDING COMMITTEES OF THE FACULTY

1903-4

The President is ex-officio member of all committees.

EXECUTIVE

REGISTRATION AND CLASSIFICATION
Profs. Woodward, Hall, Guild, Smith

DISCIPLINE
Profs. Smith, Skinner, Hall.

LIBRARY
Profs. Hall, Guild, Smith, Miss Butterfield.

PRINTING AND PUBLICATION

ATHLETICS
Profs. Smith, Skinner, Thornber, Mr. Stacey.

PUBLIC EXERCISES
Mr. Gorby, Miss Ferrin, Mrs. Stanley.

INTERCOLLEGIATE DEBATE
Profs. Hall, Woodward, Thornber, Mr. Gorby.

MANUAL TRAINING
Profs. Holmes, Smith, Miss Hoover.

CO-OPERATIVE ASSOCIATION
Profs. Woodward, Holmes, DeWalsh, Miss Ferrin.

PRIZES
Profs. Guild, Thornber, Miss Butterfield.

SUB-COLLEGIATE DEPARTMENT
Profs. Woodward, Hall, Mrs. Stanley.
UNIVERSITY OF ARIZONA

Established by act of the Legislative Assembly, 1885; opened to students October, 1891

DESIGN

The purpose of the University of Arizona is, in the language of the organic law, "to provide the inhabitants of this Territory with the means of acquiring a thorough knowledge of the various branches of literature, science and the arts;" and so far as possible a technical education adapted to the development of the peculiar resources of Arizona. In furtherance of this latter purpose, instruction is especially provided in agriculture, the mechanic arts, and in mining and metallurgy. The Agricultural Experiment Station, a department of the University, is wholly engaged in investigating and developing the agricultural resources of the Territory. The institution aims to fill in the Territory the place occupied in the States by the State Universities. The undeveloped condition of secondary education in the Territory, and the desire to make the University serviceable to all, have led to the establishment and maintenance of a Sub-Collegiate Department.

GOVERNING BOARD

The government of the University is vested in a corporation styled The Board of Regents of the University of Arizona, consisting of the Governor of the Territory and the Superintendent of Public Instruction, ex-officio, and four other members appointed by the Governor.

LOCATION AND CLIMATE

The University of Arizona is located at Tucson, one of the largest towns in the Territory, on the main line of the Southern Pacific railway, 312 miles west of El Paso, Texas, and 500 miles east of Los Angeles, Cal. The town lies in a broad, flat valley at an elevation of 2,400 feet above sea level and is surrounded by mountains. Its dry, healthful situation with its mild and equable climate has made Tucson a famous winter resort.

The winter climate is especially good; the temperature is cool and strengthening but not severe, the lowest temperature recorded during the average year being about twenty degrees above zero, Fahrenheit. Little rain falls during the winter; fogs are unknown; cloudy days are rare. The percentage of
sunshine throughout the winter is greater than that recorded at any other place in the United States. Owing to the extreme dryness of the air the highest temperatures known are less oppressive to the senses and less dangerous to the health than the summer heat of the upper Mississippi Valley States. The total amount of rainfall averages less than twelve inches.

SITE

The University is situated upon high ground about a mile from the business center of the city with which it is connected by a street-car line. On every side it commands a view of mountain scenery of remarkable extent and grandeur. The location cannot be surpassed for healthfulness. The water supply of the University is drawn from a well on the campus 120 feet deep and is of unusually good quality.

BUILDINGS

The main building, University Hall, is 200x105 feet, two stories in height, the first story of gray stone, the second of red brick, and is completely surrounded by a wide two-story veranda. The building contains the administrative offices, recitation rooms, laboratories and apparatus rooms of various departments, the libraries of the University and Experiment Station, and the Territorial Museum.

North Hall, a dormitory two stories in height built of gray stone of fine quality, originally provided as a home for male students, is now occupied by the young women. Besides the parlor and the rooms of the matron, it contains sixteen rooms, each large enough to accommodate two students. The building was renovated in 1903, a large and handsome parlor being fitted up and furnished by the University.

South Hall, a brick dormitory containing forty rooms, with bath and toilet rooms, is for the use of male students and instructors. The discipline of this dormitory is in charge of the Commandant of Cadets.

A new Dining Hall with kitchen, 40x104 feet in size, provides ample accommodations for all persons living in the dormitories.

A Library and Museum building to cost $26,000, exclusive of furnishing, provided by the Twenty-first Legislative Assembly, has been in course of erection during the current year. The contract calls for completion of the building in September, 1904. Five thousand dollars was appropriated by the last Legislative Assembly for furnishings.

The Gymnasium, given the University by Professor James Douglas and his associates, of the Copper Queen Consolidated Mining company, is now completed. With the $2,000 appro-
EQUIPMENT

appropriated by the Legislative Assembly for equipment, a large quantity of first class gymnasium apparatus has been purchased and installed. Shower baths with necessary plumbing, and about one hundred lockers have put the Gymnasium in excellent shape for steady use.

The Shop and Assay building is a large substantial brick structure. It contains a commodious drawing room for mechanical and freehand drawing, a large forge, machine and carpentry laboratory, in which are placed 24 forges, 4 lathes, drills, besides engine and locker rooms. The commercial assaying department occupies a suite of rooms fully equipped with a large melting furnace, the necessary muffle furnaces, and other accessories for making complete and accurate assays.

The Mill building is located on the tract of land at the northeast of the campus, acquired by the University with the $1,400 appropriated for that purpose by the last Legislative Assembly. The building with machinery formerly constituting the annex to University Hall, was removed in the fall of 1903 to the new site.

Three brick houses two stories in height are occupied as homes by the president and professors.

Other buildings are the boiler-house, which also contains the well and pumps whereby the water supply for irrigation and general purposes is obtained; a green-house, 80x21 feet; two propagating-houses; the cottage occupied by the classes in domestic science; and a temporary wooden building used for various purposes.

EQUIPMENT

LIBRARY

The Library, containing 8,100 bound volumes and 11,000 pamphlets, is open to the use of all students. A valuable feature of the library is the collection of complete sets of scientific and literary periodicals, which are of special service in research work.

The reading-room is furnished with about seventy scientific, literary and general periodicals, besides the weekly Territorial newspapers.

The Carnegie Library of the city of Tucson is also open to the use of the students of the University.

MUSEUM

The Seventeenth Legislative Assembly of Arizona passed an act establishing a general museum at the University. The object of the museum is to collect materials of all kinds illus-
trating the resources and development of Arizona, and particularly to preserve historical relics, including those pertaining to the aboriginal inhabitants.

Donations of specimens and collections will be received and gratefully acknowledged, but no special provision has yet been made by the Territory for the support of this department aside from a small appropriation for the salary of a curator.

The collections now displayed at the University comprise representative series of minerals, ores and rocks of Arizona. Among these may be particularly mentioned superb specimens from the mines of the Copper Queen at Bisbee. There are also collections of typical rocks and minerals for comparison, and many specimens of ores from different parts of the United States and from abroad. Great numbers of valuable specimens are now stored in trays preparatory to classification and distribution in cases. It is desired to make the collection of ores and minerals fully represent the great mineral resources of Arizona.

The museum is indebted to Mr. Herbert Brown, curator, for a large and valuable collection of skins of the birds of Arizona, which he has deposited in the museum, as well as for a collection of ancient aboriginal pottery and other relics. The fossil skull and teeth of an elephant and other fragmentary remains of extinct animals sent from Yuma by Mr. Brown also deserve special mention.

Historical records of much value are gradually accumulating as a part of this museum, and an appeal is made to old settlers and others to bear this fact in mind when making disposition of articles bearing even remote relation to the early pioneers and their history.

The professors at the University have the immediate care of the collections pertaining to their respective departments.

BIOLOGY

The biological laboratories are located in that portion of University Hall formerly occupied by the museum. The laboratories are convenient and well-lighted and the equipment is such as is required for modern instruction and research in the biological sciences. The library and apparatus are well selected and adapted to the region and the courses offered.

The collections possessed by this department form a very important part of its equipment. The herbarium consists of 12,000 sheets of mounted plants of which number 2,500 are included in the University botanical survey herbarium. The unique flora and fauna of the mountain, mesa and lowland collecting grounds in close proximity to the institution offer very attractive opportunities for instruction and research, especially along ecological lines. The Desert Botanical Laboratory of the
Carnegie Institution supplements in most admirable fashion the facilities of the University for investigation.

In addition to the above there are fifty cases of insects, a large case of seeds, articulate and disarticulate human skeletons, plaster and papier-mache models of the important structures of the human anatomy, and duplicate material for study and dissection.

CHEMISTRY

The chemical laboratories are two in number. That used for beginners in the study of general chemistry and qualitative analysis is on the second floor of University Hall and is equipped for the experimental and theoretical study of chemical science.

The laboratory for qualitative analysis is on the first floor of University Hall. It is provided with analytical and bullion balances of the latest model and is equipped for the teaching of volumetric and gasometric analysis, blow-pipe analysis, metallurgical chemistry, and wet and fire assaying, including apparatus for the electrolytic determination of metals. A portion of the room formerly used as an assembly hall has been fitted up as a balance room.

The chemical apparatus and collections are adequate and the equipment is good, but the increase in the number of students has overcrowded the laboratories.

The laboratory of the Experiment Station occupies three rooms on the first floor, being devoted to analytical work and chemical investigations relating to agriculture. Though not intended for the use of students, it is of incidental value to the institution through the investigations which are here conducted.

MINERALOGY

The laboratory for quantitative analysis is used for determinative mineralogy and blow-pipe analysis. The laboratory is supplied with necessary apparatus for student work including glass and wood models for the study of crystallography, hand and reflecting goniometers for the measurement of the angles of crystals, and a polariscope for the study of the optical properties of minerals, and a type set of 600 minerals.

PHYSICS

Three rooms on the first floor are set apart for the teaching of physics. The facilities for experimental demonstration of all important phenomena are very complete. The lecture room is fitted with shutters so that it can be darkened. A beam of
sunlight directed by a fine clock heliostat outside may be thrown steadily across the lecture table for experiments in light, or used in connection with the solar lantern for a variety of other work. Adjacent to the lecture room are the laboratory and the apparatus room. Both lecture room and laboratory are supplied with water and gas.

An eight-inch Willyoung induction coil with storage and X-Ray accessories is used in the study of light-tension electricity.

This department has also a double dissolving arc-light Ideal Stereopticon, which is used by various other departments of the University.

ENGINEERING

In a partly developed territory like Arizona the engineer is called upon for the solution of a great variety of problems in the various lines of civil, hydraulic, mechanical and mining engineering, and in many difficult situations he must depend upon his knowledge and inventive ingenuity to supplement a meager equipment. To prepare the engineering student for such experiences the apparatus in this department has been chosen with a view to giving him the greatest familiarity with the theory, construction and use of those instruments and machines which observation has shown to be of universal adoption in practical engineering work. This apparatus embraces surveyors' and engineers' chains; standard field and pocket tapes; plain and solar compasses and transits; mining transits; engineers' levels; stadia, level and transit rods; aneroid barometers; odometer; automatic water-registers; hook-gauges; three forms of current-meter; stop-watch; meteorological instruments; drafting instruments; mechanical calculators; blue-print apparatus; a four and one-fourth inch astronomical telescope with equatorial mountings and accessories; celestial sphere; pumps, steam-guages; indicators; planimeter and calorimeter.

AGRICULTURE AND HORTICULTURE

Because of the situation of the Territorial University the educational work in agricultural and horticulture has taken peculiar form, being largely conducted on the correspondence plan, particularly through the “Timely Hints for Farmers” issued under the auspices of the Experiment Station, but of distinct educational value. Three thousand farmers of the Territory are reached regularly twice a month by timely publications on subjects of vital interest. The Twenty-second Legislature having made provision for a conductor of Farmers’ Institutes, announcement will soon be made in regard to
this work, which will probably take the form of short courses in agriculture.

Small and well selected agricultural libraries of slight cost have been forwarded to a considerable number who have expressed a willingness to receive them.

It is believed that this method of dealing with our situation will become increasingly useful.

The equipment for agricultural instruction is good, consisting of an excellent seed collection, a green-house and gardens for experimental purposes containing many rare and interesting plants, and a well-selected agricultural library.

MINING AND METALLURGY

The assay laboratory is equipped with assay furnaces for crucible work, for scorifying and cupeling, and for retorting mercury from amalgam, besides all needed appliances for assaying by dry and wet methods, including electrolysis. The laboratory also has desks and fittings for the chemical work required in the metallurgical and mineralogical investigation and analysis of ores and mineral fertilizers, and in qualitative tests of minerals.

MECHANIC ARTS

The mechanic arts building, provided largely through the generosity of the Copper Queen Consolidated Mining Company, has a total floor area of 7,900 square feet, divided as follows: Power room and draughting room, each 1,200 square feet; wood-working shop, forge shop and machine shop, each 1,400 square feet; wash room, 600; model room, 400, and store room 300 square feet.

Each shop provides working space for twenty-four students at benches or forges and ample space for machines and tool rooms. The draughting room accommodates thirty-six students.

The power room contains an engine, a new 15-horse-power motor, a blower and exhauster.

The wood-working shop is equipped with a full assortment of hand tools, four wood-turning lathes, a universal wood-worker, a dimension sawing machine and other modern wood-working appliances.

The forge room contains twenty-four down-draught forges, twenty-four anvils, a blacksmith drill-press and all necessary small tools.

The machine shop contains three 14-inch engine lathes, one 24-inch engine lathe, one 16-inch shaper, one 24-inch planer, one 24-inch drill, one universal milling machine, one
grinding machine, several small machines, vises and a complete outfit of small tools.

The entire building is well lighted and ventilated and the draughting room is heated by steam.

**MILITARY**

Room O in University Hall is used as an armory. It is fitted with the necessary gun racks and accessories. The equipment includes 150 old style Springfield rifles, 100 Springfield cadet rifles with complete accoutrements, eight swords and belts, one 3-inch muzzle-loading rifle with carriage and complete equipment, together with necessary musical instruments and signal flags.

**THE GYMNASIUM**

Herring Hall, the new gymnasium, has been fully equipped for the use of the students for the purposes of physical culture and athletics. The equipment, procured from the Narragansett Machine Co. of Providence, R. I., at an expense of about $1,500, includes 96 lockers, chest weights, dumb bells, bar bells, Indian clubs, a Medart vaulting-horse, parallel bars, a horizontal bar, a quarter-circle, an abdominal chair, striking bag and drum, wrestling machine, wrist machine, finger machine, chest developer, chest expander, climbing-rope, flying rings, traveling rings, jump and vaulting stands, fencing foils and masks, basket ball and goals, five large mats, and a set of anthropometric apparatus. In the bath-room a heater and large reservoir provide hot water for the five shower-baths.
GENERAL INFORMATION

The departments and courses of study of the University are arranged as follows:

I. COLLEGE OF AGRICULTURE AND MECHANIC ARTS.
   A literary course leading to the degree of Bachelor of Philosophy.
   A scientific course leading to the degree of Bachelor of Science.
   An engineering course leading to the degree of Bachelor of Science in Engineering.
   An agricultural course leading to the degree of Bachelor of Science in Agriculture.
   A chemistry course leading to the degree of Bachelor of Science in Chemistry.

II. SCHOOL OF MINES.
   A mining engineering course leading to the degree of Bachelor of Science in Mining.
   A two years' course in mineralogy and assaying.
   A bureau of mines and assaying.

III. AGRICULTURAL EXPERIMENT STATION.

IV. SUB-COLLEGIATE DEPARTMENT.
   English, classical and scientific subjects.
   Manual training and domestic science.
   Bookkeeping and stenography.
COLLEGE OF AGRICULTURE AND MECHANIC ARTS

The courses offered in the College of Agriculture and the Mechanic Arts provide a liberal training for young men and women along literary and scientific lines, and for young men along engineering, mechanical and agricultural lines. Great latitude of election is given in the literary and scientific courses, but the course in engineering is more rigid in its requirements. Full details of the various courses follow. In all the courses the aim is to combine the practical with the theoretical in instruction. The needs of a young and growing commonwealth are kept in mind, and in all courses some instruction is provided which has for its aim the making of good citizens.

ARIZONA SCHOOL OF MINES

The School of Mines is designed for the education and training of young men in the arts and sciences directly involved in the industries of mining and metallurgy. Special attention is given to the sciences of mathematics, physics, chemistry, mineralogy, geology, and their applications. The two years' course in Assaying is designed to prepare students as assayers only. The Bureau of Mines and Assaying, while not directly connected with the work of instruction, affords, with its laboratory and the influx of new material, a valuable object lesson to the advanced students of mining and metallurgy.

REGISTERING

All students are required to register on registration day at the beginning of the year and at the beginning of the second semester, in the president's office. A matriculation fee of $5.00 is required of all students upon entering the University. No student will be registered until the matriculation fee has been paid. After this fee is once paid no further fee is required for registration. After registration no change in classes can be made without the consent of the committee on registration.

TUITION

Tuition is free to students from Arizona. For all non-resident students, tuition is $10 for each semester. No reduction will be made for late registration or for early withdrawal.
RECORDS

The class standing of each student is determined by the instructor in charge. The method of ascertaining the student's record is left to the instructor, and his report in all cases is final.

Reports of standing in classes are sent every two months from the president's office to parents or guardians. Such persons are urgently requested to co-operate with the president and faculty in securing from the students steady attention to University duties, and a high grade of work.

DISCIPLINE

The disciplinary policy of the University in all its departments is based upon the assumption that the students are young gentlemen and young ladies, who come to the institution with a high determination to utilize to the full the opportunities offered, and with a keen sense of duty, honor, and courtesy to each other and to the faculty. Formal and explicit prohibitions and rules are few, but those will be rigidly enforced, with adequate penalties, and good order and discipline maintained. The University is a civil, rather than a military, community, and such liberty as will not be abused will be allowed all classes of students. In aggravated cases, such as cheating in University work, frequenting saloons, gambling houses, and other objectionable places, and serious breaches of peace or order, the faculty will not hesitate to proceed to the extreme measure of expulsion. In cases of expulsion, the student is required by regulations of the Regents and faculty to leave the campus immediately, and by Territorial statute to surrender his cadet uniform to the University. In all matters of discipline the faculty and president will strive for fairness, equity, and efficacy rather than uniformity.

Students or classes desiring to make requests of the faculty should file their petition in the president's office before the hour of faculty meeting; class petitions must be presented at least two days before the time of meeting.

VACATIONS AND HOLIDAYS

A short recess (see calendar, page 2) is taken at Christmas time. The long summer vacation begins about June first and continues until the middle of September. The Thanksgiving recess extends from the close of the regular exercises on the Wednesday before Thanksgiving to the next Monday morning.

All legal holidays are observed by the cessation of ordinary University work.
Appropriate exercises, in which the students will be expected to join, may be arranged by the faculty for any legal holiday.

Arbor day has been formally adopted by the University Regents as the regular anniversary on which shall be celebrated the founding of the institution, in connection with the ceremonies of tree planting.

**LIVING ACCOMMODATIONS**

Provision is made as far as possible for furnishing board and rooms to students of both sexes upon the University grounds. All students who have rooms in the dormitories are required to take their meals at the Dining Hall. Students who do not lodge in the dormitories may board at the Dining Hall.

Young men have excellent quarters in South Hall, a new dormitory building. North Hall, the home of the young ladies, is in charge of an experienced and capable preceptress who has constant supervision of those rooming there.

Both dormitories are lighted by electricity. Rooms contain a clothes-press, and are provided with single bedsteads, table, chairs, mirror, wash-bowl, pitcher and slop-jar. Students will supply their own mattresses, pillows, sheets, blankets, towels, rugs, brooms, and such other articles as they may desire for their rooms. They will care for their own rooms under the direction of the instructor in charge of the dormitory.

**FEES AND EXPENSES**

<table>
<thead>
<tr>
<th>Item</th>
<th>Highest</th>
<th>Lowest</th>
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<tbody>
<tr>
<td>Tuition, free to students from Arizona</td>
<td>$10.00</td>
<td>$10.00</td>
</tr>
<tr>
<td>&quot; students non-resident in Arizona</td>
<td></td>
<td></td>
</tr>
<tr>
<td>semester</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matriculation (paid but once)</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Laboratory and shop fees, varying according to courses, per annum</td>
<td>1.00</td>
<td>30.00</td>
</tr>
<tr>
<td>Mining excursions, for advanced students</td>
<td>20.00</td>
<td>50.00</td>
</tr>
<tr>
<td>Books, per annum</td>
<td>5.00</td>
<td>20.00</td>
</tr>
<tr>
<td>Board, per month</td>
<td>16.00</td>
<td>20.00</td>
</tr>
<tr>
<td>Lights per room, per month</td>
<td>.50</td>
<td>1.50</td>
</tr>
<tr>
<td>Napkins</td>
<td>.50</td>
<td>.50</td>
</tr>
</tbody>
</table>

By resolution of the Board of Regents of the University, board is to be paid in advance on the first day of each month. Checks, postoffice or express money orders should be made payable to the president. No reduction will be made for absence for a period of less than one week, except by special arrangement.

Students leaving the University before the end of the semester will receive no rebate from fees.
Text-books required are obtained directly from the publishers through a book association managed on the co-operative plan under the direction of the faculty.

Members of the cadet companies will be required to provide themselves with the prescribed uniform, which will be ordered by the University. The cost of uniform, which must be deposited in advance, during the present year has been $16.25. This uniform has shown better wearing qualities than a civilian suit of equal cost, and parents are urged to consider the matter of uniform when supplying their sons with clothing for the approaching University year. It may be worn on all occasions, and thus will remove the necessity for additional expenditure for outer clothing other than overcoats. When the warm weather of the spring comes, the students are expected to purchase the regulation khaki uniform and campaign hat, the total expense being about $6.

Provision has been made to a limited extent for the self-support of students, preference being given to students from Arizona, who have already spent some time in the University.

**RAILROAD RATES**

The Southern Pacific, the Maricopa, Phoenix & Salt River Valley, the Santa Fe, Prescott & Phoenix, and the Gila Valley, Globe & Northern railways have all generously allowed students in attendance upon the University half rates when journeying to and from their homes. This applies only to those parts of these railroads in Arizona. In the case of students coming to the University, these half rates may be secured by notifying the president of the University at least two weeks in advance, to enable him to secure the permits from the proper authorities. Tickets may then be obtained by the student on application to his own local railroad ticket agent, or to the nearest agent of the designated road, within the Territory. Students at the University may secure transportation to their homes and return at vacation time by making application at the office of the president of the University. In case of any misunderstanding with the ticket agent, the student should pay full fare, take the agent's receipt and report the matter to the University authorities. The University cannot undertake to secure rebates from the railroad companies in cases where the regular permits have not been issued.
REQUIREMENTS FOR ADMISSION

Applicants for admission to any department of the University will be required to furnish satisfactory evidence of good moral character, and a certificate of graduation or of honorable dismissal from the schools with which they were last connected.

Beginning with September, 1904, for admission to the Freshman class, applicants must be at least sixteen years of age and must satisfy requirements in subjects sufficient to give sixteen credits as described below. A credit is understood to be the equivalent of one study pursued satisfactorily for one year, one period a day, as ordinarily taught in high schools.

Students coming from approved high schools, and presenting a detailed official statement of work completed from the principals of such schools, may be excused by the committee on registration from entrance examinations in those subjects covered by the credentials.

For admission to the course leading to the degree of Bachelor of Philosophy the subjects upon which examinations must be passed, and the credits assigned each, are:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics</td>
<td>2</td>
</tr>
<tr>
<td>History and Civics</td>
<td>2</td>
</tr>
<tr>
<td>Elective</td>
<td>1</td>
</tr>
<tr>
<td>Latin</td>
<td>3</td>
</tr>
<tr>
<td>Greek, French, German or Spanish</td>
<td>2</td>
</tr>
<tr>
<td>Science</td>
<td></td>
</tr>
</tbody>
</table>

For admission to the course leading to the degree of Bachelor of Science, including the degrees of Bachelor of Science in Mining, Engineering, Chemistry or Agriculture, the subjects upon which examinations must be passed, and the credits assigned each, are:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>General History and Civics</td>
<td>2</td>
</tr>
<tr>
<td>Elective</td>
<td></td>
</tr>
<tr>
<td>French, German or Spanish</td>
<td>2</td>
</tr>
<tr>
<td>Science (Physics required)</td>
<td>3</td>
</tr>
</tbody>
</table>

The scope of work required in these various subjects is as follows:

ENGLISH—(a) English classics. An acquaintance with the works named below. These works are divided into two classes, those intended for thorough study and those intended for general reading. The portion of the examination devoted to the former class will be upon subject matter, form and structure. In addition, the candidate may be required to answer questions involving the essentials of English grammar, and the leading facts in those periods of English literary history to which the prescribed books belong. In the portion of the examination devoted to the latter class, the candidate will be required to present evidence of a general knowledge of the
subject matter, and to answer simple questions on the lives of the authors. The form of examination will usually be the writing of a paragraph or two on each of several topics, to be chosen by the candidate from a considerable number—perhaps ten or fifteen—set before him in the examination paper. The treatment of these topics is designed to test the candidate's power of clear and accurate expression, and will call for only a general knowledge of the substance of the books. In preparation for this part of the requirement, it is important that the candidate shall have been instructed in the principles of writing English. A knowledge of grammar is presupposed. (b) English composition. This requirement can be met only by examination of the candidate or by his presenting satisfactory composition books on themes certified by a former teacher as original uncorrected work. The examination will take the form of a theme of five hundred words on some subject familiar to the candidate and will be a practical test of his ability to express himself in writing clearly and consecutively. No candidate will be accepted whose work is notably defective in point of neatness, spelling, punctuation, idiom, or division into paragraphs. Those found lacking in composition will be required to make good the deficiency at once in a special class organized for that purpose.

No student will be admitted without examination, except on the certificate from his former instructors that the entire requirement has been fulfilled. Substantial equivalents, properly certified, will be accepted.

For thorough study: For 1902, 1903, 1904, 1905, Shakespeare's Macbeth; Milton's L'Allegro, L'Il Penseroso, Comus, Lycidas; Burke's Speech on Conciliation with America; Macaulay's Essays on Milton and Addison.

For general reading: For 1903, 1904, 1905, Shakespeare's Merchant of Venice and Julius Caesar; the Sir Roger de Coverley Papers in "The Spectator"; Goldsmith's Vicar of Wakefield; Coleridge's Rime of the Ancient Mariner; Scott's Ivanhoe; Carlyle's Essay on Burns; Tennyson's The Princess; Lowell's Vision of Sir Launfal; George Eliot's Silas Marner.

MATHEMATICS—Arithmetic as covered in White's Advanced Arithmetic to the appendix, but these subjects will be omitted in the entrance examinations; longitude and time, present worth, stock investments, exchange, equation of payments, compound proportion, partnership and cube root. Algebra, through quadratic equations, as given in Wells's Essentials of Algebra, or Wentworth's New School Algebra. Plane geometry as treated in the latest editions of Wentworth or Wells.

HISTORY AND CIVICS—As much as is included in Adams's European History and Hinsdale's American Government, or text books covering equivalent ground. To meet these requirements a large amount of reference work is ex-
pected. In place of General History the following will be accepted: History of Greece and Rome as contained in Myer's histories of Greece and Rome or an equivalent, and Coman and Kendall's or Larned's History of England.

*GREEK—As covered by Gleason and Atherton's Beginners' Greek Book, Xenophon's Anabasis, four books, Homer's Iliad, three books, with composition and the use of Hadley and Allen's or Goodwin's Greek Grammar.

*LATIN—As covered by Collar's First Latin Book and Viri Romae, together with Allen and Greenough's Grammar and texts; sight reading; Caesar, four books or an equivalent; Cicero, four orations; Vergil, six books; sight reading from Nepos, Cicero and Gellius; Daniell's or Bennett's Prose Composition.

*FRENCH—As covered by Whitney's French Grammar, parts I and II; composition; Suppe's French Reader; Halévy, L'Abbe Constantin; Mérimée, Colomba; Molière, Le Maître malgré lui and Le Bourgeois Gentilhomme, and at least 500 pages from five different authors.

*SPANISH—De Tornos, Combined Spanish Grammar; Worman's First and Second Spanish Readers, Loiscaux, Elementary Spanish Reader; Valois, Jose; Maratín, El si de los Niños; Alarcón, El Capitán Veno; Galdós, Doña Perfecta; Cervantes, Don Quijote.

*GERMAN—As covered by Kellner's German Grammar; composition; Guerber's Malerchen und Erzaehlungen, together with Riehl, Der Fluch der Schoenheit; Schiller, Marie Stuart and Jungfrau von Orleans; Goethe, Hermann und Dorothea, Iphigenia; Lessing, Minna von Barnhelm.

SCIENCE—Under this head may be offered the required number of credits in the following subjects: physical geography, physiology, botany, chemistry, physics, elementary astronomy. At least half the preparation in science should consist of laboratory work. Note-book, covering such laboratory work as has been performed by the student, should be presented for examination.

ELECTIVE—The remaining credits required may be made up from additional subjects ordinarily taught in high schools.

ADVANCED STANDING AND CREDENTIALS

Students from other institutions of equivalent rank may be admitted to the higher classes upon the presentation of properly authenticated certificates showing to the satisfaction of the faculty that they are qualified to proceed with the desired work.

* If any language is offered it must be to the extent of two credits, since a single year's study of a language is not considered of sufficient educational value to be entitled to credit.
Arrangements have been made with the Arizona Normal School at Tempe, and the Northern Normal School at Flagstaff, whereby students from these institutions may have their record transferred to the books of the University with proper credit, upon presentation of a certificate duly signed by the principal. Students of this University may also obtain the equivalent privilege at the Normal Schools by presenting the proper certificate of standing, signed by the president.

The faculty desires to establish such relations with high schools and other educational institutions as will enable it to accept their certificates without question. To this end presiding officers are respectfully requested to correspond with the president.
All facilities and privileges of the University are open to qualified persons of both sexes.

The University offers four-year courses of study leading to the degrees of Bachelor of Philosophy and Bachelor of Science, and to those degrees specialized as shown on page 29. In each course the work is partly required and partly elective, as described by schedules later. Each student doing full work is required to take four hours of recitation work each day. In laboratory work a period of from two to two and one-half hours is considered the equivalent of one recitation hour.

Persons of mature age and with sufficient preparation who are not candidates for a degree will in some cases be admitted to regular classes as special students, provided, however, that in all such cases they show to the satisfaction of the instructors in charge that they can take the course with profit to themselves and without detriment to the regular class.

The faculty reserves the right to omit classes in any course of instruction unless a suitable number of students register for the course.

Students who have completed satisfactorily the required work, and the specified amount of elective work as shown in the accompanying schedules will be given the degree of Bachelor of Philosophy or Bachelor of Science. The special character of any course of study may be indicated by adding to the degree the name of the department, as: Bachelor of Science in Mining, or Bachelor of Science in Chemistry.

The advanced degrees of Master of Science and Master of Arts will be conferred upon Bachelors, graduates from this University of from institutions of equivalent grade, who have successfully pursued at the University a course of study marked out by the faculty and requiring not less than one year.

The following schedule shows the courses in which instruction is offered. The courses themselves are explained later.

Military science and tactics or physical culture is required during the Freshman and Sophomore years. If for any reason a student is excused from these exercises, an additional subject having a minimum of three recitation hours per week will be required.
Ordinary numbers within parentheses indicate hours of recitation per week; when no number is given five hours per week is understood.

Ordinary numbers within brackets indicate the number of units of credit toward a degree given by any course. For explanation of the unit system, see next page.

Numbers outside parentheses are the numbers of the courses as outlined on page 30 and following.

**FRESHMAN YEAR.**

<table>
<thead>
<tr>
<th>Units</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>[4] Physical Culture (5)</td>
<td>[8] Spanish 1, 2</td>
</tr>
<tr>
<td>[8] English 1, 2</td>
<td>[8] History 1, 2 (4)</td>
</tr>
<tr>
<td>[8] Mathematics 1, 2</td>
<td>[8] Botany 1, 2</td>
</tr>
<tr>
<td>[8] Latin 1, 2</td>
<td>[8] Mechanic Arts 1, 2</td>
</tr>
<tr>
<td>[8] French 1, 2</td>
<td>[8] Chemistry 1, 2</td>
</tr>
<tr>
<td>[3] Public Speaking 1, 2</td>
<td>[4] Artistic Drawing 1, 2 (2)</td>
</tr>
</tbody>
</table>

**SOPHOMORE YEAR.**

<table>
<thead>
<tr>
<th>Units</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>[4] Physical Culture (5)</td>
<td>[8] Chemistry 9, 10</td>
</tr>
<tr>
<td>[8] French 3, 4 (4)</td>
<td>[8] Engineering 1, 2</td>
</tr>
<tr>
<td>[8] Latin 3, 4 (4)</td>
<td>[6] Physics 1, 2 (3)</td>
</tr>
<tr>
<td>[8] Botany 3, 4</td>
<td></td>
</tr>
</tbody>
</table>

**JUNIOR YEAR.**

<table>
<thead>
<tr>
<th>Units</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>[2] Physical Culture (4)</td>
<td>[4] History 5, 6 (3)</td>
</tr>
<tr>
<td>[4] English 5, 6 (3)</td>
<td>[4] History 7, 8 (2)</td>
</tr>
<tr>
<td>[4] English 7, 8 (2)</td>
<td>[4] Sociology 1, 2 (3)</td>
</tr>
<tr>
<td>[8] Zo-ology 1, 2</td>
<td></td>
</tr>
</tbody>
</table>
SENIOR YEAR.

Units.

[4] English 9, 10 (2)
[4] English 11, 12 (3)
[4] Psychology 1
[4] Pedagogy 2
[4] History 9, 10 (3)
[4] History 11, 12 (3)
[8] Geology 1, 2

Credits.

[4] Logic 1 (4)
[4] Logic 2—
[3] Ethics 2 (3)
[8] Chemistry 7, 8
[8] Engineering 5, 6 (4)
[8] Engineering 7, 8 (4)
[4] Engineering 9, 10 (3)

CREDIT TOWARD DEGREES

Credit toward degrees is given by means of a unit system which assigns to each course of instruction offered a certain number of units of credit. One hundred twenty-eight units besides eight units in Military Science and Tactics and Physical Culture are necessary for obtaining a degree in any course.

Any candidate for a degree may present as part fulfillment of requirements for graduation an acceptable thesis embodying the results of a special study of some subject within the range of the course pursued. The subject of the thesis must be submitted for the approval of the faculty at the opening of the Senior year, and the completed thesis must be presented not later than three weeks before commencement day. The credit value will be determined by the faculty at the time the subject is approved.

The number of units of work offered in different subjects is shown in the following scheme:

<table>
<thead>
<tr>
<th>GROUP A.</th>
<th>GROUP B.</th>
<th>GROUP C.</th>
<th>GROUP D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>..........</td>
<td>Botany</td>
<td>..........</td>
</tr>
<tr>
<td>..........</td>
<td>..........</td>
<td>Zoology</td>
<td>..........</td>
</tr>
<tr>
<td>Mathematics</td>
<td>24</td>
<td>Chemistry</td>
<td>..........</td>
</tr>
<tr>
<td>Latin</td>
<td>..........</td>
<td>Met. Chem. and Ass'ng.</td>
<td>10</td>
</tr>
<tr>
<td>French</td>
<td>..........</td>
<td>Geology</td>
<td>..........</td>
</tr>
<tr>
<td>German</td>
<td>..........</td>
<td>Mineralogy</td>
<td>..........</td>
</tr>
<tr>
<td>Spanish</td>
<td>..........</td>
<td>Physics</td>
<td>..........</td>
</tr>
<tr>
<td>History</td>
<td>28</td>
<td>Photography</td>
<td>..........</td>
</tr>
<tr>
<td>Economics</td>
<td>..........</td>
<td>Mechanic Arts</td>
<td>20</td>
</tr>
<tr>
<td>Philosophy</td>
<td>19</td>
<td>Engineering</td>
<td>..........</td>
</tr>
<tr>
<td>Sociology</td>
<td>8</td>
<td>..........</td>
<td>40</td>
</tr>
</tbody>
</table>

The units necessary for the degree of Bachelor of Philosophy are as follows:
I. Required—English, 24 units; Philosophy, 15 units; History and Economics, 8 units.

II. Group Electives—From Group A, 32 units; from Group C, 16 units.

III. Free Electives—33 units.

The units necessary for the degree of Bachelor of Science are as follows:

I. Required—English, 8 units; Mathematics, 16 units.

II. Group Electives—From Group B, 4 units; from Group C and D, 56 units.

III. Free Electives—44 units.

To obtain the degree of Bachelor of Science in Mining the following courses must have been elected:

Mechanic Arts, 1, 2; Engineering, 1, 2; Engineering, 3, Engineering, 5, 6; Engineering, 7, 8; Mineralogy, 1, 2; Geology, 1, 2; Chemistry, 9, 10; Metallurgy, 1, 2.

To obtain the degree of Bachelor of Science in Chemistry the students shall have received 32 units in Chemistry and 8 in Mineralogy.

To obtain the degree of Bachelor of Science in Engineering the student must complete Mechanic Arts, 1, 2, 3, 4, 5, 6 and 32 units in Engineering.

To obtain the degree of Bachelor of Science in Agriculture the following course is required:


Sophomore Year—Higher Algebra, Analytic Geometry, Meteorology, Chemistry, Surveying, Botany, Drawing, Farm Equipment, Soil and Irrigation.

Junior Year—Farm Crops, Breeds of Live Stock, Botany, Anatomy, Zo-ology, Entomology, Floriculture, Landscape Gardening, Forestry, Horticulture.

Senior Year—Stock Breeding and Feeding, Dairying, Veterinary Medicine, Geology, Fruits and Fruit Culture, Vegetables and Vegetable Culture.
EXPLANATION OF COURSES OF INSTRUCTION

Courses having odd numbers are given in the first semester. Those having even numbers, in the second semester. The hours mentioned show the number of periods per week.

ENGLISH

PROFESSOR HALL

The purpose of the courses outlined below is to give a general knowledge of English literature from the sixteenth century to the present time. Chief stress is placed upon the study of a few authors of the most important periods, though the history of our literature is also traced from age to age.

The course in composition aims to develop accurate thought and clear, vigorous expression.

ENGLISH 1, 2. NINETEENTH CENTURY PROSE, CRITICISM AND BRIEF HISTORY. (a)—Appreciative, sympathetic criticism of the chief novelists and essayists of the nineteenth century, based upon careful study and comparison; lectures and discussions; frequent short themes upon assigned and chosen subjects. (b)—A brief survey of the history of English literature, with reading, lectures and discussions. Open to all students. Five hours. [8]

ENGLISH 3, 4. RHETORIC AND COMPOSITION—Expository and argumentative composition; briefs, themes, essays. Lectures and discussions. Text-books, MacEwan’s Essentials of Argumentation, Genung’s Practical Rhetoric and Rhetorical Analysis, Baker’s Specimens of Argumentation (modern). Open to students who have taken English 1, 2. Three hours. [6]

ENGLISH 5, 6. ELIZABETHAN LITERATURE—Shakespeare, selected plays; other Elizabethan dramatists, especially Jonson and Marlowe; Spenser’s Faerie Queene and shorter poems. Lectures and discussions. Open to students who have taken English 1, 2. Three hours. [4]

ENGLISH 7, 8. EIGHTEENTH CENTURY LITERATURE—From the death of Dryden to the publication of The Lyrical Ballads, 1700-1798; special attention given to the Queen Anne period and the early romantic revival. Lectures and discussions. Open to students who have taken English 1, 2. Two hours. [4]

ENGLISH 9, 10. SEVENTEENTH CENTURY LITERATURE—From the closing of the theaters to the death of Dryden, 1642-1700. Lectures and discussions. Open to students who have taken English 1, 2. Two hours. [4]
ENGLISH 11, 12. NINETEENTH CENTURY POETRY—
From the publication of the Lyrical Ballads to the death of Tennyson, 1798-1892. Lectures and discussions; Macmillan’s Globe editions. Open to students who have taken English 1, 2. Three hours. [4]

LATIN

INSTRUCTOR STANLEY

The courses below are open to students who have completed the first two years of Latin in the sub-collegiate department, or an equivalent. Constant, thorough drills are given in technical grammar and prose composition. In reading, the matter is subjected to grammatical, metrical, rhetorical and historical explanation. The study of the text is made the means of mental discipline, of developing the faculties of observation and critical judgment, and of acquiring habits of thoroughness and accuracy.

LATIN 1, 2. CICERO AND VERGIL—Cicero’s Orations, the four Catilinarian; Vergil’s Aeneid, six books. Allen and Greenough’s texts. Sight-reading from Nepos, Gellius and Cicero; Daniell’s Prose Composition throughout the year. Five hours. [8]

LATIN 3, 4. LIVY, HORACE, CICERO—Livy, book XXI; Horace, selected Odes, Satires; Cicero, De Amicitia and De Senectute; Latin prose composition and sight reading. Open to students who have taken Latin 1, 2. Four hours. [8]

MODERN LANGUAGES

PROFESSOR DEWALSH

The object of the following courses is to make the student acquainted with the grammatical structure, phonology and choice literature of the respective languages. As much as possible the language is spoken in the class-room. Frequent reference is made to the principles of comparative philology.

GERMAN

GERMAN 1, 2. Collar’s Shorter Eysenbach Grammar, Mueller-Wenkebach “Glueck Auf!”; Auerbach “Brigitta; Rosegger “Waldheimat.” Colloquial exercises. Lectures on German life. Open to all students. Five hours both semesters. [8]

special reference to Lessing’s “Hamburgische Dramaturgie.” Open to students who have taken German 1, 2. Four hours both semesters. [8]

GERMAN 5, 6. Das Nibelungenlied. Lectures on the Great German Epic and on conditions in ancient and medieval Germany. Open to qualified students at special appointment with the instructor.

FRENCH

FRENCH 1, 2. Bacon’s New French Course; Daudet “L’enfant Espion”; Mérimée “Colomba”; Colloquial exercises. Lectures on French life. Open to all students. Five hours both semesters. [8]

FRENCH 3, 4. Erckmann-Chatrian “Madame Thérèse” Racine “Iphigène”; Rostand “Les Romanesques”; Hugo “Les Misérables.” Colloquial and grammatical exercises. Lectures on French literature. Open to students who have taken French 1, 2. Four hours both semesters. [8]

SPANISH

SPANISH 1, 2. Garner’s Spanish Grammar; Loiseaux’ Elementary Spanish Reader; Moratin “El Sí de las Niñas”; Mario y De Santoval “Tocino del Sielo.” Colloquial exercises. Open to all students. Five hours both semesters. [8]

SPANISH 3, 4. Alarcón “El Capitán Veneno”; Galdós “Doña Perfecta”; Cervantes “Don Quijote.” Grammatical and colloquial exercises. Lectures on Spanish literature. Open to students who have taken Spanish 1, 2. Four hours both semesters. [8]

HISTORY, POLITICAL SCIENCE AND PHILOSOPHY

PROFESSOR BABCOCK
INSTRUCTOR BUTTERFIELD
INSTRUCTOR STACEY

In the work in history emphasis is placed on the social and political development, the relation of cause and effect and the unity of history. The laboratory method is used wherever possible and individual work insisted upon. In political science the historical method is used, and the subject rather than any one writer’s presentation of it is treated. After a brief presentation of pure economics, the course deals with practical questions. The course in philosophy is arranged with especial attention to the needs of teachers. Upon its completion graduates of the University will receive Territorial Teachers’ certificates.
HISTORY

HISTORY 1, 2. ENGLISH HISTORY—Green’s Short History of the English People used as a basis; much assigned reading. A thesis is required. Open to all students. Four hours. [8] (Miss Butterfield.)

HISTORY 3, 4. AMERICAN COLONIAL HISTORY—A detailed study of the American colonies under Great Britain, and of the United States to the adoption of the Constitution. Lectures and assigned reading. A thesis is required. Open to students who have taken History 1, 2. Two hours. [4] (Professor Babcock.)

*HISTORY 5, 6. ECONOMIC HISTORY OF THE UNITED STATES—A study of the causes and development of the economic history of the United States. Lectures and assigned reading. A thesis is required. Open to students who have taken History 1, 2. Three hours both semesters. [4]

*HISTORY 9, 10. CONSTITUTIONAL HISTORY OF THE UNITED STATES—A detailed study of the formation of the Union and of the political and constitutional history of the United States, based on letters and speeches of American statesmen, public documents and special histories. A thesis is required. Open to students who have taken History 3, 4. Three hours. [4] (Professor Babcock.)

POLITICAL SCIENCE

ECONOMICS 1, 2.—A study of the general principles and laws of political economy. Text-book, Walker’s Advanced Political Economy. Open to Juniors and Seniors. Two hours both semesters. [4]

PHILOSOPHY

PSYCHOLOGY 1—A special consideration of the subject as applied to teaching. Lectures, recitations and collateral reading. Open to Juniors and Seniors. Five hours. [4]. (Mr. Stacey.)

PEDAGOGY 2—An account of educational evolution, both as a culture fact in the history of civilization and as a foundation for professional work; lectures, giving a brief but comprehensive outline of the school systems of ancient, mediaeval and modern countries with a special study of leading educators such as Socrates, Commenius, Pestalozzi, Froebel, Mann and others the present trend of pedagogical thought and practice, methods of teaching, school management, art of questioning

* Not given in 1903-4
and school law. Arrangements have been made with the Tucson city schools to use the Holliday school as a practice school for this class. Open to students who have taken Psychology 1. Five hours. [4] (Mr. Stacey.)

LOGIC 1—Text-book, Jevons's Logic; reading from Mill, Hamilton, Thompson and others. Open to Juniors and Seniors. Four hours first semester. [4] (Mr. Stacey.)

ETHICS 2—Theoretical and practical ethics; view of the historical development of the science; origin and development of the moral consciousness; application of the principles of ethics to the problems of life. Lectures, discussions and assigned reading. Open to Juniors and Seniors. Three hours. [3] (Mr. Stacey.)

**SOCILOGY**

**INSTRUCTOR STACEY**

**SOCILOGY 1. ELEMENTS OF SOCIOLOGY**—A study of the characteristic concepts of sociological thought, designed to acquaint the student with the current theories of social interpretation. The course will include a discussion of the elements of association underlying social relations and institutions; the result of race, group, and individual competition; and some of the conditions of social progress. Fairbank's Introduction to Sociology will be used as a guide, and supplemented by lectures, collateral reading, and reports. Open to Juniors and Seniors. Three hours. [2]

**SOCILOGY 2. CHARITIES AND CRIME.** A consideration of social pathology, including an examination of the origin and nature of the dependent, defective, and delinquent classes. A study will be made of the principles and methods of relief; causes of crime; prison systems; juvenile offenders; preventative measures, etc. Guide: Warner's American Charities. This course is intended to be a continuation of Sociology 1, and will alternate with Sociology 4. Prerequisite, Sociology 1. Three hours second semester. [2]

**SOCILOGY 3. PUBLIC OPINION**—After examining the concept of the Social Mind, a study will be made of the growth, and guidance of public opinion, the psychology of fashion and fads, the psychology of epidemics, the psychology of crowds or mobs, and the function of public opinion in the guidance of national life. Lectures, reading and reports. Open only to advanced students. Prerequisite, Sociology 1. Not given in 1903-04. [2]

**SOCIOPY 4. THE FAMILY**—A study of domestic institutions in lower and higher civilizations. Attention will be given to the social ethics of the family, and to the legal, industrial, educational and religious problems of the family.
Westermark’s History of Human Marriage will be used as a text. To alternate with Sociology 2. Prerequisite, Sociology 1. Three hours second semester. Not given in 1903-04. [2]

**MATHEMATICS**

**PROFESSOR WOODWARD, PROFESSOR SMITH**

It is the aim of the work in mathematics to train the student to the habit of logical and vigorous courses of reasoning, to show the wonderful breadth of application of higher mathematics, to display the beauties and pleasures of the demonstrations, methods, and results of higher geometry and calculus, and to give such practice in the use of these agents as will enable students who pursue the higher branches of engineering to use them naturally and easily in those numberless applications where they are indispensable.

**MATHEMATICS 1. PLANE AND SPHERICAL TRIGONOMETRY**—Text-book, Wells’ Complete Trigonometry. Prerequisite, advanced algebra and solid geometry. Four hours. [4]

**MATHEMATICS 2. COLLEGE ALGEBRA**—Text-book, Wells’ College Algebra. Four hours. [4]

**MATHEMATICS 3. ANALYTIC GEOMETRY**—Text-book, Nichols’ Analytic Geometry. Prerequisite, Mathematics 1, 2. Four hours. [4]


**BIOLOGY**

**PROFESSOR THORNBER**

The courses which follow are calculated to articulate with the work done in biology in average western high schools.

The Desert Botanical Laboratory of the Carnegie Institute of Washington, D. C., has been located in the Tucson mountains adjoining Tucson, with Dr. W. A. Cannon, recently of the New York Botanical Garden, as resident director. In this laboratory, the southwest with its unique and as yet little investigated flora, gains what is destined to be one of the im-
important centers of active, scientific research. The research facilities of the laboratory are all that could be desired, and the investigations upon the desert flora will appeal to students of botany from all quarters. In the light of the above, the importance of the Desert Botanical Laboratory to the University of Arizona and especially to the department of botany will be apparent.

**BOTANY 1, 2. GENERAL BOTANY**—Botany 1 treats of the general principles of the histology and physiology of plants. Botany 2 completes the year’s work with a general survey of plant types from Protophyta to Spermatophyta; also the elementary principles of field botany. Guide, Bessey’s Essentials of Botany, supplemented with other texts and lectures. The laboratory studies will form the basis of all the work. Open to all students. Five hours, or an equivalent, both semesters. [8]

**BOTANY 3, 4. ADVANCED BOTANY**—The second year’s work is not definitely outlined, but is purposely left open to be formulated as the needs of the students applying appear to demand. Courses in general morphology of the fungi, morphology of the fungi with special reference to forms injurious to vegetation in the Southwest, also histology, physiology, and the taxonomy and ecology of the native flora and allied subjects are offered here. Opportunities are offered for research work. Open to all students who have taken Botany 1, 2. Five hours, or an equivalent, both semesters. [8]

**ZOOLOGY 1, 2.** Conducted along lines corresponding very closely to those followed in Botany 1, 2. Laboratory studies as in that course are made the main feature of the work which is based upon living, native material where such is available; but some groups are necessarily studied by the aid of preserved specimens. In the study of the Mammalia constant reference is made to human anatomy, so that this portion is made in part a review of the course in anatomy and physiology offered in the sub-collegiate department. Textbook, Parker and Hazwell’s Manual of Zoology. Open to all students. Five hours, or an equivalent, both semesters. [8]

**PHYSICS**

**PROFESSOR SMITH**

The object of this course is to acquaint the student with the physical principles which underlie the higher courses of chemistry, mechanics and engineering. Special attention is therefore given to the study of force and energy, the physics of liquids and gases, and heat. One-third of the course will be devoted to the study of electricity.

**PHYSICS 1, 2.** Lectures, recitations and laboratory work. Open to students who have taken a course in elementary
physics and mathematics. Three hours, or an equivalent, both semesters. [6]

CHEMISTRY

PROFESSOR GUILD, MR. PROUT

The instruction in chemistry has two main objects in view: first to promote general culture; and secondly, to introduce students to technical work, especially in mining. The first two years' work in general chemistry, qualitative and quantitative analysis, places the student in a position to take up advantageously the study of mining, agricultural chemistry or metallurgy.

CHEMISTRY 1. GENERAL CHEMISTRY—Lectures illustrating the chemical properties of the elements and their compounds, supplemented by recitations and laboratory practice. Text-book, Remsen's Briefer Course. Open to all students. Five hours, or an equivalent. [4]

CHEMISTRY 2. QUALITATIVE ANALYSIS—Practical work in the laboratory, including the analysis of alloys, commercial products, minerals, and like substances. The course is accompanied by lectures and recitations. Text-book, Eliot and Storer's Qualitative Analysis, and various reference books. Open to students who have taken Chemistry 1. Five hours, or an equivalent. [4].

CHEMISTRY 3. QUANTITATIVE ANALYSIS—Laboratory practice with lectures and recitations; the work will be chiefly in gravimetric methods of analysis. Text-books, Classen's Quantitative Analysis. Open to students who have taken Chemistry 2. Five hours, or an equivalent, first semester. [4]

CHEMISTRY 4. VOLUMETRIC ANALYSIS AND FIRE ASSAYING—A continuation of the work in Chemistry 3, special attention being given to the methods of assaying employed in the West. Five hours or an equivalent, second semester. [4]

CHEMISTRY 5. METALLURGICAL CHEMISTRY—The greater part of the time in this course is given up to the cyanide process for the extraction of gold. The analysis of metallurgical products also receives attention. Open to students who have taken Chemistry 4. May be taken as a three or five hour course, first semester. [2 or 4]

CHEMISTRY 6. SPECIAL QUANTITATIVE ANALYSIS. —The analysis of water, gases, oils, minerals. Open to students who have taken Chemistry 4. Five hours, or an equivalent, second semester. [4]

CHEMISTRY 7, 8. ORGANIC CHEMISTRY—Lectures on the carbon compounds; laboratory work in organic analysis and the preparation of organic compounds; vapor density and molecular weight determination. Open to students who
have taken Chemistry 3, 4. Four hours or an equivalent, both semesters. [8]

CHEMISTRY 9. SYNTHETIC CHEMISTRY.—The preparation of pure chemical compounds from the crude mineral products. Open to students who have taken Chemistry 4. Three hours, or an equivalent, first semester. [2]

CHEMISTRY 10. PHYSICAL CHEMISTRY—Lectures Historical introduction leading up to a discussion of modern chemical theories. Open to students who have taken Chemistry 3. Two hours, second semester. [2]

CHEMISTRY 11, 12. CHEMISTRY OF THE RARE ELEMENTS—The analysis and synthesis of uranium, molybdenum, tungsten, vanadium and cerium compounds. Open to students who have taken Chemistry 6 and 9 and German 4. Four hours, or an equivalent, both semesters.

MINERALOGY

PROFESSOR GUILD

The main object of the course in mineralogy is to familiarize the students with facts and methods that will enable him to determine the character of an ore or mineral by an observation of its physical properties and by the performance of a few simple tests with the blow-pipe. The value of such a course cannot be over-estimated, since these quick methods of analysis are frequently needed in the field and mine when recourse cannot be had to a well-equipped chemical laboratory. The course is of value also to the student of general science, since it adds to the pleasure of a day in the mountains or field, and is necessary to a full appreciation of the study of geology. The course is not only practical, but the theoretical side of the subject receives attention in mineral optics, crystallography and similar topics.

MINERALOGY 1, 2—Lectures and recitations in crystallography and the classification and uses of minerals; laboratory work in blow-pipe analysis and determinative mineralogy; work with the reflecting goniometer in measuring the angles of crystals, and with the polariscope in studying the optical properties of minerals; the study of a type collection of 600 minerals arranged and classified according to Dana. Textbooks, Dana’s Text-Book of Mineralogy and Brush’s Manual of Determinative Mineralogy and Blow-Pipe Analysis. Open to students who have taken Chemistry 2. Five hours, both semesters. [8]

MINERALOGY 3. Advanced crystallography and microscopic study of the rock-forming minerals. Open to students who have taken a course in elementary geology, Mineralogy 2, and Physics 2. Three hours or an equivalent, first semester. [2]
MINERALOGY 4. PETROLOGY—The preparation of thin section of rocks for microscopic study, rock analysis, and the study of a type selection of rocks. Text-book, Harker’s Petrology for Students. Open to students who have taken Mineralogy 3. Three hours, or an equivalent, second semester. [2]

PHOTOGRAPHY
ASSOCIATE PROFESSOR SKINNER

PHOTOGRAPHY 2. The course in photography is designed to meet the needs of mining and engineering students. No attempt is made to teach the subject as an art; but the student is instructed in the use of the camera, the various processes of the development and making of photographs, and the uses and applications of photography in the applied sciences. Lectures are given upon the chemical and physical action of light, and photographic optics, and a survey of the University campus is made by the photographic method. The course presupposes an elementary knowledge of chemistry and physics. Open to members of the Sophomore, Junior, and Senior classes, and to such special students as are qualified to take the work. Lectures one hour, laboratory work two to four hours, second semester. [2]

ASTRONOMY
PROFESSOR BLAKE

A short course of instruction in astronomy is given as an introduction to the study of geology. In this course the relations of the earth to the solar and stellar systems are considered as also are the forms of the earth and its motions in their relations to climate and geologic changes. The astronomy being considered a part of geology is granted no independent credit toward any course of study. Open to Seniors. Lectures and recitations.

GEOLOGY
PROFESSOR BLAKE

The objects of the course of instruction in geology are chiefly general culture and practical advantages gained in agriculture and mining. The student is instructed regarding the changes that have taken place upon the globe; in the formation of rocks, soils and mineral deposits, and in the progress of life and the environment of humanity.

GEOLOGY 1. General Geology—Astronomical introduction. (See Astronomy, above.)
Geology. Geognosy—The formation and composition of the crust of the earth, rock-forming minerals, crystalline and mechanically and chemically formed rocks;

Dynamic Geology—Erosive agencies, transportation and deposition of rock-forming materials; the origin of soils and their distribution; volcanic formations, metamorphism;

Structural Geology—Stratification and the movements to which strata have been subjected; uplifts and depression; folding and compaction; origin of mountain chains;

Historical Geology—The sequence of formations—the geologic record; origin and progress of life; theories of selection and evolution; paleontology.

Five hours, first semester. [4]

GEOLOGY 2. Economic Geology—In the second semester a course of lectures is given upon the nature and origin of mechanically-formed deposits; upon the various theories of origin and the systems of classification, followed by a description in detail of the form of occurrence of useful minerals and ores as shown in the following outline list:


Building and brittle materials—granite, sandstone, tufas, limestone, cements, gypsum, clays, marble, onyx and other ornamental stones. Abrasives and gems, including emery, corundum, diamonds and garnet. Soluble salts; as salt, nitre, borax, natron and Thenardite.

Lectures illustrated by ores and specimens from the museum, by maps and sections of mines, drawings and original notes and descriptions of the most important mineral deposits and mines of North America; especially of the Comstock and other lodes in Nevada; of the copper mines in Arizona, including the United Verde, Copper Queen, and others; the gold mines of the Appalachians, California, Alaska and Arizona, including the mines of Tombstone, Congress, Pearce and Fortuna, the Cananea copper mines and other mines in Mexico. Text-book, Kemp's Ore Deposits of the United States. Open to Seniors and special students who have taken chemistry, mineralogy and geology 1. Five hours, second semester. [4]
EXPLANATION OF COURSES OF INSTRUCTION

MECHANIC ARTS
PROFESSOR HOLMES

The mechanic arts courses comprise the elements of drawing and shop work. The work consists of lectures, recitations, drawing and tool and machine work. The courses are designed with special regard for the needs of the students in engineering.

MECHANIC ARTS 1. (a) Free hand lettering, one month; Reinhardt’s slanting and upright styles; titles and tabulated data. (b) Mechanical drafting, one month; care and use of instruments; Reinhardt’s “Technic of Mechanical Drafting”; geometrical construction; tracing; blue printing. (c) Descriptive geometry, Church’s seventeen problems on lines and planes, two months. Required of students in Engineering. Five hours, or an equivalent, first semester. [4]

MECHANIC ARTS 2. (a) Forging, one month; properties of iron and steel, methods of manufacture; care of fire; use of forging tools; tool-making and tempering. (b) Bench work in wood, two months; characteristics and properties of wood; care and use of wood-working tools; principles of joinery. (c) Wood turning, one month; care and use of wood lathe and tools; application of wood turning in pattern making. Five hours, or an equivalent, second semester. [4]

MECHANIC ARTS 3, 4. (a) Bench work in iron, one month; wrought and cast iron; use of hammer, file, chisel, and scraper. (b) Machine work in iron, two months; use of engine lathe in turning, boring and thread cutting; drilling machine. (c) Planing and milling machines, one month; special study of comparative efficiency of each in producing similar work. Required of engineering students. Open to students who have taken Mechanic Arts 1, 2. Two hours, or an equivalent, both semesters. [4]

MECHANIC ARTS 5, 6. Descriptive Geometry; this course is a continuation of Mechanic Arts 1. Church’s Descriptive Geometry is the text-book used. The work covers shade, shadow and perspective. Required of engineering students. Open to all students who have taken Mechanic Arts 1, 2. Two hours, or an equivalent, both semesters. [4]

NOTE—Graphical Statics and Kinematics are taught in connection with the engineering courses.

ENGINEERING

PROFESSOR WOODWARD, PROFESSOR SMITH

The courses offered under this head are selected with reference to the local conditions and the needs of the Territory. While they are made as technical as is possible without sacri-
facing in other directions, yet the fact is constantly borne in mind that engineering practice changes from year to year, and that a graduate who is thoroughly grounded in the principles of his profession will readily acquire the technical side. The former is necessary; the latter desirable.

ENGINEERING 1, 2. SURVEYING—Use and care of instruments, including plain and solar compasses, levels, transits; plane land surveying; United States system of land surveys; city, topographical and mine surveying; earthwork computations; determination of azimuth, latitude, longitude and time by observations on the circum-polar stars and on the sun. One full half-day each week is devoted to field practice; plots are made of field surveys and a topographic map of some area in the vicinity of Tucson is executed by each student. Lectures, recitations, drawing and field work. Text-book, Raymond's Surveying. Open to students who have taken Trigonometry. Three hours both semesters and Saturday forenoons. [8] (Smith.)

ENGINEERING 3. MINE ENGINEERING—Prospecting; exploratory workings; boring with percussion and diamond drills; hand and machine rock drills; explosives; blasting, laying out of workings; timbering; methods of winning the ore; hoisting and hoisting engines; underground transportation; mine ventilation. Text-book, Ihleng's Manual of Mining supplemented by lectures. A portion of the time is devoted to drawing engineering structures such as shaft timbering and steel headframes. Open to students who have taken, or are taking, Mathematics 5, 6. Four hours first semester. [4] (Smith.)

ENGINEERING 4. RAILROAD ENGINEERING—Preliminary and location surveys; simple and easement curves; turnouts and switches; principles of economic location as based upon cost of construction, operating expenses; alignment and grades; maintenance-of-way. The field work consists of the surveys for a line of railroad of sufficient length to secure familiarity with the methods of actual practice. Each student makes a complete set of notes, maps, profiles, calculations and estimates of cost. Open to students who have taken Engineering 1, 2. Four hours until April, two hours and Saturdays through April and May. [4] (Smith.)

ENGINEERING 5, 6. (a) Materials of construction, one-third year; their properties, preparation, and use; stone, brick, lime, cement, concrete, timber, iron and steel. (b) Engineering construction one-third year; masonry construction; dams, retaining walls, bridge abutments and piers, arches; graphical investigation of stability; pile foundations; caissons. (c) Hydraulics one-third year; velocity and discharge from orifices, weirs, tubes, and pipes; flow in sewers, ditches, canals, and rivers; energy of a jet; measurement of water power; water wheels of various types. Text-book, Merriman's
Hydraulics. Lectures, recitations and laboratory work. Open to students who have taken Mathematics 5, 6. Four hours both semesters. [8] (Smith.)

ENGINEERING 7. STATICS—A treatment of the subject by both analytic and graphic methods. Text-book, Johnson's Statics. Prerequisite, Physics 1. Two hours, one of which is a drawing-room conference. [2]

ENGINEERING 9. KINEMATICS OF MACHINERY—Text-book, Jones' Machine Design, Vol. I. The time will be spent largely in the drawing room. Prerequisite Mechanics Arts 4. Two hours, one of which is a drawing room conference. [2]

ENGINEERING 8. THERMODYNAMICS—Lectures and recitations covering the theory of the steam engine, and the production and use of compressed air. Prerequisites, Mathematics 5 and Physics 1. Two hours [2]

ENGINEERING 10. STEAM ENGINES AND BOILERS—A descriptive course with drawing room work, visits of inspection, and tests. Prerequisites, Mathematics 6, Engineering 8, 9. Two hours. [2]

ENGINEERING 11. PRINCIPLES OF IRRIGATION—A study of the present condition of irrigation development in the United States; irrigation legislation; methods of establishing rights to water; a brief reference to the engineering principles relating to the construction and maintenance of canals and reservoirs and the various means of diverting and measuring water for use in irrigation. Prerequisite, Engineering 2. One hour. [1] (Woodward.)

The value of the engineering courses, especially in designing, is enhanced by a collection of blue-prints of actual constructions. The University is indebted to Fraser & Chalmers of Chicago and the Union Iron Works of San Francisco for gifts of blue-prints of mining machinery, including roasters, smelters, converters, hoisting frames and engines, and stamp mills.

The Cambria Steel Company of Johnstown, Pa., has recently presented to the institution a collection of the different grades of iron and steel, giving all the chemical and physical data regarding each, and also a series of samples, each six inches long, of structural steel shapes.
MINING EXCURSIONS

In connection with the courses in Engineering 3, Metallurgy 1, 2, and Mineralogy, two trips will be made to mining districts of Arizona and Sonora, one in December and one in March. These trips are required of all candidates for the degree of B. S. in Mining.

The purposes of these trips is to afford the mining students an opportunity for close study and inspection of mining and metallurgical plants, and of rock formations and minerals of commercial value. The students are accompanied by two professors, and every effort is made to make the trips of the greatest practical value. The visits are carefully scheduled, and notes, with sketches, measurements and photographs are taken, and elaborated into a comprehensive report by each student after the return. These trips are of incalculable assistance to the lecture, text-book and draughting room work.

The subjects of special consideration are transportation, both above and below the surface, mine surveying, methods of stoping and timbering, the best treatment for each ore, assaying and furnace charges, smelting practices, concentration of low grade ores, power generation, pumping and water supply, and mill construction.

During 1903-04 the mining districts of Tombstone, Bisbee, and Cananea, and the metallurgical plants at Douglas were visited in this way. The thanks of the University are due to the superintendents of the various plants visited for their efforts and care in acquainting the students with the works under their management. Special thanks are also due to Supt. H. J. Simmons and Col. Epes Randolph for free transportation over the E. P. & S. W. R. R. and the C. R. Y. & P. R. R.
EXPLANATION OF COURSES OF INSTRUCTION

PUBLIC SPEAKING
INSTRUCTOR GORBY

The object of these courses is to give instruction and training in the principles of expression. Special attention is paid to developing the voice, to strengthening all the powers of the voice and body and to bringing these powers into perfect harmony, that the student may adequately express his ideas. The training is to afford means for general culture, to induce more careful study of and a deeper insight into the meaning and purpose of the great masters of literature.

PUBLIC SPEAKING 1, 2—Study of the philosophy of expression, analysis of voice, quality, force, stress, pitch, besides thorough training in the art and practice of extempore speaking. Text-book, Fulton and Trueblood’s Practical Elocution. Two hours both semesters. [3]

PUBLIC SPEAKING 3, 4. ADVANCED COURSE—Analysis and interpretation of higher forms of literature. Study of great orators and their productions. Preparation and delivery of original orations. To achieve the best results a student must have a knowledge of rhetoric, logic, psychology and English literature. Lectures and class drill. Open to Juniors and Seniors who have completed Public Speaking 1, 2. Two hours, both semesters. [3]

NOTE—Students may obtain an additional unit of credit for work in Public Speaking by making special arrangements with the instructor.

PHYSICAL CULTURE
DIRECTOR O. A. KATES

This department is organized to supply the opportunity for such physical work as experience has shown to be necessary under modern conditions, to counteract the deleterious effects of close application to mental work and to favor the attainment by the student body of a high state of physical efficiency.

The work is organized under these heads.

(a) HYGENIC: To aid function, to develop form, to correct undeveloped or deformed parts, to supply recreation.

(b) EDUCATIONAL: To perfect nervous control, to develop physical courage, to gain mental and moral self control, to develop muscular strength and endurance.

In order that these needs may be adequately supplied a complete variety of work, hygienic, recreative, corrective, and competitive, is offered in regularly organized classes in calisthenics, gymnastics and athletics. Advanced classes will, when warrantably desired, be organized, in all gymnastic and athletic specialties.
REQUIREMENTS

Class work in Physical Culture is required of all preparatory students, and of freshmen, two periods per week.

PHYSICAL EXAMINATION

It is intended that a thorough physical examination, including an examination of the eyes, heart and lungs, shall preface the work of every student in physical culture. This examination will be made as soon as possible after the student enters the University and at intervals during his or her course for safety and for determining the results of the work. On the basis of information gained from these examinations, suggestions for work and advice on health topics will be given each individual. Anthropometric cards and charts are platted for students when desired.

In special cases the University reserves the right to require a complete physical examination by a designated physician at the expense of the student.

ATHLETICS

In addition to the regular class drill a certain part of which consists of training and contests in athletic sports, the University is represented by teams in football, baseball, track and field, tennis, basketball, basquette, hand-ball, and indoor-gymnasm work. No student is allowed to become a member of an Athletic team who is seriously deficient in his studies.

Every facility is provided for track and field athletics. The field on the campus contains gridiron, baseball diamond, tennis and basket-ball courts, sprinting path, jumping and vaulting pits.

WOMEN'S DEPARTMENT

The course consists of systematic exercises for the harmonious development of the entire body, besides a course for the development of grace of movement and the production of symmetry of physique. Class drills are usually carried on to music and the value of fancy steps and dancing is appreciated. Special corrective machinery is supplied for this department, so that even the weakest student may be given proper and healthful exercise. The course includes gymnastic nomenclature, applied Delsarte, calisthenics, fancy marching, and the use of regular gymnasium apparatus.

Those pursuing this course are required to provide themselves with a gymnasium suit, consisting of a blouse-waist and divided skirt with the regulation gymnasium shoes. The
suit requires four yards of double width, 54-in. dark blue serge. The waist has a sailor collar trimmed with white braid. The Butterick pattern may be used or ready-made suits may be had at the Gymnasium for $3.75.

MEN'S DEPARTMENT

The plan of this department is three-fold: general graded class work, corrective work and elective athletic work. The athletic work is taken in combination with the class work in order that the student by this combination may obtain the best possible development. The corrective work is given under special supervision to all those who are in need of special development, and, also, to those who are unable to do the regular class work.

The decision of the Director upon the examination of the men will be either:
1. Advisory, indicating what course of hygiene and exercise will best sustain and improve the health of the student, or
2. Mandatory, requiring the students to pursue the course of hygiene, and physical exercise necessary for the proper care of health and the discharge of their duties as students.

The students doing work in the Gymnasium are required to wear the regulation gymnasium shoes and suit. The average cost of this suit is about $3.75.

MILITARY SCIENCE AND TACTICS

CAPTAIN MAXON

PRACTICAL COURSE—Exercises on the drill ground covering (a) Infantry exercises in the schools of the soldier, company and battalion; extended order movements, target practice, reviews and parades. (b) Military signaling with flag; telegraphy. Required of all able-bodied male students throughout the Freshman and Sophomore years, except that students who have satisfactorily completed four years of drill at the end of Freshman year may be excused from further work in the department. Elective during the remainder of the course. Juniors who elect this course may receive credit to the extent of two units. Three hours both semesters.

THEORETICAL COURSE—Recitations covering the Infantry drill regulations with lectures on military law, discipline, military history, and allied topics. Required of all commissioned and non-commissioned officers. Two hours.

Students claiming exemption from drill will be required to secure a certificate of disability from a physician designated by the faculty unless the disability is apparent. Those so excused will be required to elect a subject in place of this course.
The officers will be appointed from an eligible list determined by examination, both scholarship and class standing being taken into account.

Each member of the military organization will be required to provide himself with the required uniform within six weeks after his entrance. A deposit covering the cost of the uniform should be made upon registration. The uniform consists of cap, coat and trousers of cadet gray cloth trimmed with black braid and closely resembles the undress uniform of the United States Military Academy at West Point.
SHORT COURSE OF INSTRUCTION IN MINERALOGY AND ASSAYING

In order to meet the needs of persons who desire to learn the art of assaying the common ores and who have not the time required for a full four years' course of study the Board of Regents has approved a short course of instruction in practical assaying, mineralogy, metallurgy, and allied subjects.

This course commences with the first semester in each year and requires at least two years; students are advised, however, to take the regular course in engineering and mining, if possible, since in two years they cannot expect more than to make a beginning in these subjects.

REQUIREMENTS FOR ADMISSION

Those desiring to take this course are required to be at least eighteen years of age, to have good health, and to have a knowledge of English, physics and algebra to quadratics, sufficient to enable them to pursue the course with advantage. This knowledge will be tested by examinations.

The fees and tuition are the same as for other departments. (See p. 20.) Each student is required to pay the cost of materials, glassware, and apparatus used by him. For this purpose a deposit of ten dollars will be required in advance each semester and any balance will be refunded.

The right is reserved to vary this course according to the aptitudes or necessities of those concerned.

FIRST YEAR

General chemistry, one semester.
Qualitative analysis, one semester.
Mathematics, two semesters.
English or Spanish, two semesters.
Practical free-hand drawing and shopwork, or physics, two semesters.

SECOND YEAR

Mineralogy and blow-pipe analysis, two semesters.
Assaying, one semester.
Qualitative analysis and wet assaying, one semester.
Mathematics, two semesters.
Geology, two semesters.
TEXT-BOOKS

The following text-books and others are used:
Chemistry—Remsen, Eliot & Storer, Fresenius.
Assaying—Ricketts, Brown, Furman, Aaron.
Mineralogy—Dana; Brush, Determinative Mineralogy, revised by Penfield.
Geology—Dana, LeConte, Giekie; Kemp, Ore Deposits.
A separate department of the School of Mines, under the name of "The Bureau of Mines and Assaying" has been established to receive and work ores, and to make assays and analyses of ores, minerals, mineral waters and petroleum.

In accordance with the act of the Legislature of the Territory, approved March, 1897, and amended in March, 1899, assays of ores and minerals are made for the prospectors and miners of Arizona, and for others, at fixed rates established by the law, and tabulated below. To meet the requirements of this work a special laboratory building of brick has been erected and maintained. It is fitted up as a complete assay office, and is provided with a double large brick coke-furnace, a melting furnace and gasoline furnaces in a fire-proof room. There are in addition, a parting and wet assay room, a balance room, and office, as shown upon the accompanying plan.

Extreme accuracy and excellence of work are considered of more importance than pecuniary profits. All assays are made in duplicate and if not accordant are repeated. A special expert assayer is employed, and the assays are not made by students, who receive their instruction in the regular laboratories of the University.

The money received for assaying is deposited monthly to the credit of the assay fund which is used to pay the assayer and the cost of materials and apparatus.

**SCHEDULE OF RATES**

In accordance with the Legislative enactment approved March 3, 1899, the rates for assaying heretofore in force under the law of 1897, have been changed. The fifty-cent rate is no longer in force. Former circulars and schedules of rates are revoked and withdrawn. Under the provisions of the new law, the Regents of the University of Arizona have established the following rates for assaying ores taken from deposits and mines in the Territory of Arizona:

**ASSAYING ORES FROM ARIZONA**

<table>
<thead>
<tr>
<th>Assay Description</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silver and Gold, or either</td>
<td>$1.00</td>
</tr>
<tr>
<td>Silver, Gold and Copper</td>
<td>2.00</td>
</tr>
<tr>
<td>Copper</td>
<td>1.00</td>
</tr>
<tr>
<td>Lead</td>
<td>1.00</td>
</tr>
<tr>
<td>Zinc</td>
<td>1.00</td>
</tr>
<tr>
<td>Iron</td>
<td>1.00</td>
</tr>
<tr>
<td>Gold, Silver, Copper and Lead</td>
<td>2.50</td>
</tr>
<tr>
<td>Gold, Silver, Copper and Iron</td>
<td>2.50</td>
</tr>
<tr>
<td>Gold, Silver, Copper and Zinc</td>
<td>2.50</td>
</tr>
</tbody>
</table>
The following rates have been established by the Board of Regents for assaying ores taken from deposits or mines without the Territory of Arizona:

ASSAYING ORES FROM WITHOUT THE LIMITS OF ARIZONA

<table>
<thead>
<tr>
<th>Metal</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silver and Gold, or either alone</td>
<td>$1.00</td>
</tr>
<tr>
<td>Copper</td>
<td>1.00</td>
</tr>
<tr>
<td>Lead</td>
<td>1.00</td>
</tr>
<tr>
<td>Zinc</td>
<td>2.50</td>
</tr>
<tr>
<td>Iron</td>
<td>2.00</td>
</tr>
<tr>
<td>Silica</td>
<td>1.50</td>
</tr>
<tr>
<td>Alumina</td>
<td>5.00</td>
</tr>
</tbody>
</table>

And for other determinations and analytical work sue rate as the Director of the School of Mines may in each instance fix.

PAYMENT IN ADVANCE REQUIRED

The Director is required, in all cases, to hold the assay until the fee or charge therefor is paid. Remittances may be made by check or money order; or the money, securely wrapped, may be sent with the sample.

RATES FOR SAMPLING AND WORKING ORES

<table>
<thead>
<tr>
<th>Description</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lots of 100 pounds or less, including assays of three metals</td>
<td>$5.00</td>
</tr>
<tr>
<td>Each additional 100 pounds, to 500 pounds</td>
<td>1.00</td>
</tr>
<tr>
<td>Over 500 pounds, to 1 ton</td>
<td>10.00</td>
</tr>
<tr>
<td>Each additional ton</td>
<td>4.00</td>
</tr>
<tr>
<td>Ordinary stamp mill test and plate amalgamation for first ton or fraction of a ton</td>
<td>20.00</td>
</tr>
<tr>
<td>From 1 to 2 tons</td>
<td>30.00</td>
</tr>
<tr>
<td>Pan amalgamation, including crushing and assays, ton</td>
<td>20.00</td>
</tr>
</tbody>
</table>

Large lots proportionately less; small lots more in proportion.

CYANIDE PROCESS

The School of Mines is prepared to make experimental tests of ores and tailings by the cyanide process, in large or small quantities, at rates to be agreed upon with the Director. Working tests and experiments by other processes may
be undertaken at rates to be agreed upon in each instance, depending upon the amount of materials, time and labor required.

CONCENTRATING (INCLUDING ALL ASSAYS)

Wet or dry test of small lot (under 500 pounds) $15.00
500 pounds to 1 ton 20.00
Each additional ton 7.00

GRATUITOUS QUALITATIVE TESTS

The determination of the nature of rare and peculiar minerals, not requiring a chemical analysis, or an assay, is made gratuitously. Samples sent for this purpose should be in their original condition as broken out, and not crushed to a powder or pulp. Tests requiring determination of the presence of gold or silver must be paid for at assay rates. Samples may be sent by mail at the rate of one cent per ounce. They should be distinctly labeled inside the package with the name of the sender, and a letter should be posted at the same time giving the full name and address, and inclosing a stamp for the reply. This offer of free examination is intended to apply to minerals unknown to the sender and does not cover special tests for precious metals or for any metal the presence of which is usually determined by an assay.

BULLION ASSAYS

Special attention is given to the retorting and melting of bullion and the assays of gold bars for shipment.

ANALYSIS OF WATER

The Bureau in co-operation with the chemists of the Agricultural Experiment Station, is prepared to undertake the analysis of ordinary or mineral waters.

HOW TO SEND SAMPLES

For small samples, under four pounds in weight, the most expeditious and cheapest way is to send by the ordinary mail. The express company does not deliver parcels at the University, hence delay often results from sending by express. Delays also result from the want of identification. Sometimes the only clue to the name of the sender is the comparison of the handwriting upon the sample and that upon the letter. The postal laws permit the name of the sender to be written
and inclosed in the package. Each sample should be labeled by a slip of paper, inside, giving the name and locality of the claim and the name of the sender.

The name of the claim is desired in order that the value and distribution of the mineral wealth of the territory may be better known.

Special rates for freight on consignments to the "Direct of the School of Mines," are granted by the Southern Pacific railroad from points in Arizona. Ask the agent at shipping point for particulars.

All business communications, checks and money orders should be addressed to the

ARIZONA SCHOOL OF MINES,
WM. P. BLAKE, Director.

Tucson, Pima Co., Arizona.
THE AGRICULTURAL EXPERIMENT STATION

STATION STAFF

THE PRESIDENT OF THE UNIVERSITY
R. H. FORBES, M. S. - - Director and Chemist
A. J. McCLATCHIE, A. M., - Agriculturist and Horticulturist
T. F. McCONNELL, - - Animal Husbandman
JOHN J. THORNBER, A. M., - - - Botanist
W. W. SKINNER, M. S., - - - Associate Chemist
T. D. A. COCKERELL, - - Consulting Entomologist
S. M. WOODWARD, A. M., - Consulting Meteorologist
E. G. LEE, - - - - Clerk

ORGANIZATION AND WORK

The Agricultural Experiment Station is a legally constituted department of the University, whose purpose is "to aid in acquiring and diffusing useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and application of agricultural science."

With the above objects in view, the organization of the Station includes the departments of administration, agriculture and horticulture, animal husbandry, botany and chemistry, the whole or a major portion of the time of one or more members of the Station staff being devoted to each department of the Station work. Provision is made for meteorological and entomological work also, though to a less degree.

Owing to the wide variation in agricultural conditions in Arizona, it has been found of advantage to distribute the work so that each department is located, so far as possible, in the situation most favorable to the accomplishment of its own special results. According to this principle, the various lines of Experiment Station work have been distributed as follows.

The Director's office and the departments of botany and chemistry are maintained at Tucson in the University buildings. Through this arrangement, the Experiment Station profits by the buildings and libraries of the University, while the University is benefited from time to time by the teaching ability of members of the Station Staff. It has been found that from this base of operations the three great agricultural districts of the Territory—Salt River Valley, the lower Colorado, and the upper Gila—are accessible with equal convenience for field work and observations.
On the same grounds—fitness of location for the work undertaken—the Experiment Station farm has been maintained and strengthened at Phoenix. Salt River Valley is intermediate in elevation, in situation, and in mean yearly temperature between the other two important farming districts above mentioned, and for this reason the agricultural and horticultural results obtained there are capable of the most general application in the Territory at large.

On the same principle again, the date palm orchard is located in the alkaline district south of Tempe, where a successful demonstration of this palm as a commercial fruit producer will be of the greatest value, creating use for great areas of alkaline land in the arid Southwest.

The range station also, for the study of worn-out range country with a view to its reclamation to usefulness, is located in a typical district near Tucson, and is conducted under the auspices of the department of botany, co-operating with the United States Department of Agriculture.

The services of specialists in various subjects, such as entomology, meteorology, and soil survey work have also been secured from time to time.

The results of the Experiment Station work are made public at frequent intervals in the bulletins and reports of the Station. These publications are made in two series: first, the longer and more technical bulletins, stating in considerable detail the investigations as they mature, and secondly, the “Timely Hints for Farmers,” which are brief writings issued at the time when they will be most useful, written in plain language, and presented in popular form. The annual reports also are for the most part written popularly, and afford a convenient and reliable summary of each year’s work as it comes to completion.

The Experiment Station work conducted and published on the lines indicated above has a two-fold value. In the first place, the suggestions made or derived from the investigations of the Station are of direct material profit to the agricultural public and are intended to be immediately applied to advantage in the betterment of agricultural practice. In the second place, these writings are intended to serve an educational purpose, inasmuch as they are so presented as to constitute lesson sheets for the benefit of the careful reader. It may therefore be considered that the Experiment Station reaches a class of some thirty-five hundred readers in the Southwest at frequent intervals by means of its “Timely Hints” and other publications. The operations of the range study tract at Tucson, the Experiment Station farm at Phoenix, the date palm orchard at Tempe, and the sugar beet plots on the upper Gila serve also as an object lesson to the adjacent public.

It is believed that this distributed and mobile organization is especially effective, not only for the purpose of the
Experiment Station, but also for those of the University as well, since it allows the Station to conduct its work in localities suitable for the accomplishment of results; and again, it causes the public to become better acquainted with the Territorial University, of which the Station is a department.

An appropriation of eleven thousand dollars, made for the use of the Station by the Twenty-second Legislature, very satisfactorily attests the estimation in which the work of the Station is held. This appropriation is intended for the improvement of the date orchard, for purchasing livestock and buildings for the farm, and for issuing publications and holding farmers' institutes and short courses of instruction throughout the Territory.

 Provision, therefore, is made for the symmetrical development of this work in the Territory, both experimentally and educationally; and, prospectively, “the farmers' college” bids fair to increase in usefulness to the growing agricultural interests of the Territory.
SUB-COLLEGIATE DEPARTMENT

INSTRUCTORS
KENDRIC CHARLES BABCOCK, Ph. D., President.
SHERMAN MELVILLE WOODWARD, A. M., Geometry.
DAVID HULL HOLMES, B. S., Shopwork and Drawing.
GEORGE EDSON PHILIP SMITH, B. S., C. E., Physics.
JOHN JAMES THORNBER, A. M., Botany, Biology.
FAUST CHARLES DeWALSH, A. B., French, German, Spanish.
HATTIE FERRIN, B. S., English, Latin.
MABEL GRAY HOOVER, Domestic Science.
MARION CUMMINGS STANLEY, B. A., Latin, English.
JOHN WILLIAM GORBY, M. A., Public Speaking, Greek.
ALICE OLIVIA BUTTERFIELD, B. A., Physical Culture, History.
GEORGE MARK EVANS, LL. B., Mathematics.
JOHN W. PROUT, JR., Chemistry.
ELBERT JOHN HOLLINGSHEAD, Bookkeeping, Civics, Commercial Law.
ANNA BEARD, Stenography, Typewriting.

GENERAL INFORMATION
In this department the University offers the work of a well-organized High School, with the added advantages of shopwork and drawing and of domestic science. The general library and the gymnasium are open to all students in this department.

The equipment of the scientific laboratories is available for use in this sub-collegiate work, whenever it can be used advantageously, and makes possible strong work in elementary science. The instructors in this department are assisted by the professors of the college department, several of whom regularly conduct sub-collegiate classes. By reference to the course of study which follows, it will be seen that it offers a comprehensive training for those who may not be able to pursue their studies farther, while it gives a good preparation for college.

ADMISSION
Admission to regular standing in the first year of the sub-collegiate course presupposes the completion of the work of the eighth grade of the public or parochial schools. Students who
do not bring certificates showing the completion of this work, must take examination to test their ability to pursue profitably the work of the first year.

ALL STUDENTS ENTERING THE PREPARATORIY DEPARTMENT WILL BE REQUIRED TO TAKE AN EXAMINATION IN ORAL READING. To remedy notable deficiency in this subject, the University will require extra work in addition to other studies.

In all cases in which the preparation of a student in a particular subject has been insufficient, the University reserves the right to require the student to secure at his own expense the help of an approved coach until the insufficiency is remedied.

COURSE OF STUDY

The following course of study will be required of all students who fit themselves at the University for entrance to the Freshman class in 1904. Such variations from it will be made during the next year as will adapt it to the case of students already in the sub-collegiate department.

Military drill or physical culture is required of all able-bodied students throughout the course. The young men have drill three times per week and exercise in the Gymnasium twice. The young women have physical culture.

The language begun in the second or third year must be pursued for at least two years in order to secure credit toward graduation.

While the subjects are for convenience grouped by years in the following schedule, yet the departmental method will be followed. In the description of courses following, the subjects are arranged by groups or departments in the consecutive order in which they are taken up and students will be required to take them in this order. Aside from this sequence the ability of each student must determine what subjects are pursued at any given time, due regard being given to the proper balance of subjects. The wishes of parents will always be given careful consideration in making up the schedule of work for each student, but the final decision in the matter must rest with the committee on registration, which is composed of persons who have had long experience in secondary and collegiate teaching. Individual attention will be given to the needs of each student.

To each student who completes the studies of this course, a certificate stating that fact will be given, which certificate will entitle the holder to admittance to the University courses of instruction without examination.
FIRST YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>5</td>
</tr>
<tr>
<td>Algebra</td>
<td>5</td>
</tr>
<tr>
<td>Greek and Roman History</td>
<td>2</td>
</tr>
<tr>
<td>Physical Geography</td>
<td>3</td>
</tr>
<tr>
<td>Drawing and Shopwork or Domestic Science</td>
<td>5</td>
</tr>
</tbody>
</table>

SECOND YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>3</td>
</tr>
<tr>
<td>*Drawing and Shopwork or Domestic Science</td>
<td>5</td>
</tr>
<tr>
<td>Algebra</td>
<td>5</td>
</tr>
<tr>
<td>General History</td>
<td>4</td>
</tr>
<tr>
<td>*Bookkeeping</td>
<td>5</td>
</tr>
<tr>
<td>*Latin</td>
<td>5</td>
</tr>
<tr>
<td>*German (first year)</td>
<td>3</td>
</tr>
<tr>
<td>*French (first year)</td>
<td>5</td>
</tr>
<tr>
<td>*Spanish (first year)</td>
<td>5</td>
</tr>
</tbody>
</table>

THIRD YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>5</td>
</tr>
<tr>
<td>Plane Geometry</td>
<td>5</td>
</tr>
<tr>
<td>*Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>*Drawing and Shopwork</td>
<td>5</td>
</tr>
<tr>
<td>*Latin</td>
<td>4</td>
</tr>
<tr>
<td>*Greek</td>
<td>5</td>
</tr>
<tr>
<td>*Stenography</td>
<td>5</td>
</tr>
<tr>
<td>*French, first year</td>
<td>5</td>
</tr>
<tr>
<td>” second year</td>
<td>4</td>
</tr>
<tr>
<td>*German, first year</td>
<td>5</td>
</tr>
<tr>
<td>” second year</td>
<td>4</td>
</tr>
<tr>
<td>*Spanish, first year</td>
<td>5</td>
</tr>
<tr>
<td>” second year</td>
<td>4</td>
</tr>
</tbody>
</table>

FOURTH YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>5</td>
</tr>
<tr>
<td>Civics</td>
<td>3</td>
</tr>
<tr>
<td>Physiology</td>
<td>2</td>
</tr>
<tr>
<td>*Greek</td>
<td>4</td>
</tr>
<tr>
<td>*Solid Geometry and Algebra</td>
<td>4</td>
</tr>
<tr>
<td>*Public Speaking</td>
<td>2</td>
</tr>
<tr>
<td>*French (second year)</td>
<td>4</td>
</tr>
<tr>
<td>*German</td>
<td>4</td>
</tr>
<tr>
<td>*Spanish</td>
<td>4</td>
</tr>
<tr>
<td>*Public Speaking</td>
<td>2</td>
</tr>
<tr>
<td>*Physics</td>
<td>5</td>
</tr>
<tr>
<td>*Parliamentary Practice</td>
<td>1</td>
</tr>
<tr>
<td>*English History</td>
<td>4</td>
</tr>
</tbody>
</table>

Numerals indicate number of recitations per week. Subjects marked * are elective. One elective must be chosen in the second year; two in the third year, and two in the fourth year.

PUBLIC SPEAKING

A course of one year in laws of health, respiration, voice culture, articulation, orthoepy, physiology of the voice, cure of faults of voice and manner; gesture, rendition, emphasis, grace, deportment. Various styles of recitations committed to memory by each student for delivery before the class. Textbook, McIlvaine's Elocution.

HISTORY

The aim of all the work in history is to lead the pupil to see the development of races and nations along political, social and religious lines, and to arouse in him a love for the subject and a habit of broad and discriminate reading.
The work of the first year will consist of a survey of the development and characteristics of the Greek and Roman civilizations. A text such as Wolfson's or West's will be supplemented by collateral reading and a notebook.

The work of the second year includes mediaeval and modern history. The aim is to give the student an idea of the essential unity of history and the leading facts in the political development of races and nations. Adams’s European History is used supplemented by the reading of references contained therein.

Hinsdale’s American Government is the text-book in civics. The historical development of the subject is made prominent while practical problems, such as taxation and municipal government, are made the subjects of special investigation and study.

Coman and Kendall’s or Larned’s History of England is used as the text-book in the fourth year.

LATIN, GREEK, FRENCH, SPANISH AND GERMAN

For an outline of the courses in Latin and Greek see page 22, under requirements for admission.

For an outline of the courses in French, Spanish and German see pages 31 and 32.

MECHANIC ARTS

This work consists of both drawing and shop work, between which subjects the student’s time is about equally divided. The course covers three years and is designed to furnish a thorough elementary knowledge of Manual Training as taught in the sub-collegiate schools of the country.

FIRST YEAR. Drawing—Freehand sketching in perspective and orthographic projection. Reinhart’s lettering, freehand working drawings.

Shopwork—"Sloyd" including wood-carving, care and use of wood-working tools.

SECOND YEAR. Drawing—Mechanical drawing, geometrical problems, first seventeen problems in Church’s descriptive geometry.

Shipwork—Forging, joinery, wood-turning.

DOMESTIC SCIENCE

The course in domestic science is arranged to give instruction in the science and art of home economies, and to raise home making to a higher plane. In includes all branches of home science, hygiene, chemistry of cooking and cleaning,
preparation of all food stuffs, both fancy and elementary, nursing and food for the sick, marketing, management of servants.

Two courses are offered in sewing. The first year include fancy needle work, and the second year drafting, cutting and dressmaking. Social duties and customs of society are considered with particular care. The students have access in the domestic science library to all the best authorities.

BOOKKEEPING, STENOGRAPHY AND TYPEWRITING

Bookkeeping is taught by the modern budget system. The work is individual and each student may progress as fast as his time and ability permit. The course is thorough in all the details of office practice. The course includes instruction in commercial law. A complete course in stenography is offered, the Pitman system being used. The department is equipped with Remington typewriters.

Special students in bookkeeping and stenography will not be received. All students taking these courses must show proficiency in English and English composition, represented by the English work of the year of the course preceding the year in which the elective is offered.

PARLIAMENTARY PRACTICE AND DEBATE

The two higher classes in the sub-collegiate department devote one period of each week to work in parliamentary practice and debate. The classes are organized under a regular constitution and by-laws. Instruction is given in parliamentary law, Roberts's Rules or Order being used as a text-book. The members are required to introduce resolutions and prepare debates upon them. They are also given practice in performing the duties of secretary and in presiding in the meetings.

SCIENCE

It is the object of the courses in science to initiate the student into the processes and methods used in laboratory work; to teach close observation, careful manipulation and logical deduction; to acquaint the student with the fundamental facts of the various branches of science and to give full practice in the use of good English in describing various observations and experiments. To insure better results in the notebooks, they will all be passed upon by one of the instructors in English.

PHYSICAL GEOGRAPHY. This course, combining the laboratory method with the text-book, aims to give the pupils training in exact observation of familiar phenomena, like
distance, weight, pressure of liquids and gases, temperatures, winds, clouds and the habits of plants and animals. The natural forces producing erosion, formation of soils and rocks, the processes of nature as seen in seed germination and plant growth (with demonstrations with the microscope) will be discussed, with frequent experiments and field excursions.

CHEMISTRY. A year’s work with the text and in the laboratory.

PHYSICS. A thorough course consisting of three recitation periods and four laboratory periods per week, carried on along the lines laid down for the senior year in secondary schools.

PHYSIOLOGY. This course aims to combine careful laboratory instruction, with application of the knowledge to practical personal hygiene. This work will be co-ordinated with that of the department of Physical Culture. For part of the instructions the young men and women will meet in separate sections.

MATHEMATICS

In algebra special attention is given to the transition from arithmetic to algebra, to the fundamental operations and especially to factoring. The course includes as much as is found in any good text-book of algebra through quadratic equations.

Plane geometry occupies one year. This is so taught as to develop orderly habits of thinking and of investigation. To that end much original work is required, including practical problems involving the application of the principles learned.

ENGLISH

The English of the sub-collegiate course is based upon what are known as the entrance requirements of New England colleges. The work is in general divided into three parts: classics, studied in class, composition and grammar work done partly in class and part outside, and supplementary reading done largely outside the class-room. All these parts of the work may be carried on at the same time, as the circumstances of the class seem to require, the classics and supplementary reading forming the basis of a large part of the work in grammar and composition. Throughout the course, however, a primary aim is to develop the student’s individual power of expressing himself in words. The time allotted to these three phases of English varies from year to year, increasing attention being paid to the appreciative and critical faculty as the course advances. In the fourth year a brief outline history of English and American literature occupies about one-third of the year’s work in English.