

THE
UNIVERSITY

OF A RIZONA.

Sixth Annual Register,

1896-97.

WITH

Announcements for 1897-98.

Tucson, Arizona.

1897.

THE
UNIVERSITY
OF ARIZONA.

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CALENDAR, 1897-98.

1897.

March 19, Friday Second Term ended
 March 23, Tuesday Third Term began
 June 1, Tuesday Third Term ended
 June 2, Wednesday Commencement Day
 September 20 and 21, } Entrance Examinations at University
 Monday and Tuesday }
 September 22, Wednesday Registration Day
 September 23, Thursday First Term begins
 November 25 and 26, Thursday and Friday } Thanksgiving
 Recess
 December 22, Wednesday First Term ends

1898.

January 3, Monday } Registration Second Term,
 Second Term Begins
 February 4, Friday Arbor Day
 February 22, Tuesday Washington's Birthday
 March 18, Friday Second Term ends
 March 22, Tuesday Third Term begins
 June 1, Wednesday Third Term ends
 June 2, Thursday Commencement Day





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FACULTY, ETC.

(Arranged in groups in order of appointment).

HOWARD BILLMAN, A.M.,
President, Professor of Civics.

WILLIAM PHIPPS BLAKE, Ph., B., A. M.,
*Professor of Geology, Metallurgy and Mining. Director
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cultural Experiment Station.*

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mandant of Cadets. Irrigation Engineer and Meteor-
ologist Agricultural Experiment Station.*

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Professor of English. Librarian.

ROBERT HUMPHREY FORBES, B. S.,
*Professor of Chemistry. Chemist Agricultural Experi-
ment Station.*

WILLIAM STOWE DEVOL, B. Agr.,
*Professor of Agriculture. Director Agricultural Experi-
ment Station.*

JOHN A. ROCKFELLOW, A. M.,
*Professor of Mathematics. Principal of Preparatory De-
partment.*

SHERMAN M. WOODWARD, A. M.,
Professor of Physics and Mechanics.

GERTRUDE B. HUGHES WOODWARD, (Gr. N.E.Cons.)
*Instructor in English Branches, Elocution and Physical
Culture.*

ANNIE GRAHAM ROCKFELLOW, (Mass. Inst. Tech.)
Instructor in Preparatory Department.

*Absent on leave during year 1897-98.

CHARLES E. VAN BARNEVELD, M. E.,
Assistant in Mineralogy and the School of Mines.

MARY BERNARD AGUIRRE,
Instructor in History and Spanish.

MONTFORD MENDENHALL,
Instructor Stenography and Commercial Branches.

HERBERT BROWN,
Curator of Territorial Museum.

MRS. S. A. BUELL,
Matron of Dormitory.

STANDING COMMITTEES OF THE FACULTY.

PREPARATORY DEPARTMENT:—Profs. Rockfellow, Hall,
Miss Rockfellow.

ENTRANCE REQUIREMENTS TO UNDERGRADUATE DEPARTMENT:—Profs. Toumey, Boggs, Hall.

COURSE OF STUDY:—Profs. Blake, Devol, Forbes, Rockfellow, Hall.

SPECIAL STUDENTS IN UNDERGRADUATE DEPARTMENT:—Profs. Boggs, Forbes, Woodward, Devol, Blake.

PROGRAM:—Profs. Toumey, Rockfellow, Woodward.

ATHLETICS:—Profs. Woodward, Van Barneveld, Forbes.

ASSEMBLY AND PUBLIC EXERCISES:—Profs. Hall, Devol,
Mrs. Woodward.

LOCATION, CLIMATE, ETC.

The University of Arizona is located near Tucson, the county seat of Pima county, and one of the largest towns in the Territory.

Tucson is on the main line of the Southern Pacific railway, 312 miles west of El Paso, Texas, and 500 miles east of Los Angeles, Cal. It is easily reached from east and west without change and has railway connections with the central and northern portions of the Territory *via* Maricopa, and with the northeastern States *via* Deming. The town lies in a broad, flat valley, at an elevation of 2400 feet above the sea level, and is surrounded by mountains. Its dry and healthful situation with its mild and equable climate have made Tucson a famous health resort, particularly for pulmonary patients.

The climate is as fine as can be found in the arid region of Western America, which is justly celebrated for its excellence. The winter climate is especially good. Its temperature is cool and strengthening without being severe. The lowest temperature recorded during the average year is about 20 degrees above zero Fahrenheit. Snow has fallen in the town only once in a long series of years, although the surrounding mountains are covered with snow every winter. But little rain falls during the winter; fogs are unknown; cloudy days are rare, the percentage of sunshine throughout the winter being greater than that recorded at any other place in the United States. In summer the temperature ranges high, but the dry heat of this region differs greatly from the moist and oppressive heat of the eastern and gulf 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. Of this amount fully one half falls during July and August; yet the amount is so small as not to materially increase the atmospheric humidity, and the summers are found to be remarkably healthy. In general the climate may be described as well suited to nearly all people, but is particularly beneficial to the young, and to those who cannot endure with comfort or safety the extremes of temperature and the sudden changes of northern climates.

The University was established by an act of the Territorial Legislative Assembly passed in 1885. A tract embracing

forty acres of land lying just outside the city limits was selected as a site and was donated by citizens of Tucson. A contract for erecting the main building was let in October, 1887, but owing to financial delays the building was not opened to students until October 1, 1891.

The site selected is upon high ground about a mile from the business center of the city. On every side it commands a view of mountain scenery of remarkable extent and grandeur. The location cannot be surpassed for healthfulness.

The University possesses its own water system. The supply is drawn from a well on the premises 100 feet deep, and is of unusually good quality.

BUILDINGS.

The main building is two hundred feet by one hundred and five feet, two stories in height, the lower story of gray stone, the upper of red brick, and is completely surrounded by a wide two-story veranda. This building contains the offices, recitation rooms, laboratories, and apparatus rooms of the various departments; an assembly room, the libraries of the University and Experiment station, and the Territorial Museum.

Adjoining the main building is the mining annex, eighty by sixty feet, filled with metallurgical machinery.

Three cottages have been built. They are of brick, two stories in height, and were intended to accommodate each two families. Originally designed as homes for instructors, owing to the pressure for accommodation for students on the University grounds, two of these have been converted into homes for young ladies and furnish excellent accommodation for twenty-five persons.

A dormitory built of a fine quality of gray stone, two-stories in height, has been provided as a home for male students. It contains a students' dining room, kitchen connected therewith, and twenty rooms, each large enough to furnish accommodation for two students.

Other buildings are the boiler-house, which also contains the well and pumps whereby the water supply for irrigation and general purposes is obtained; the new green-house eighty by twenty-one feet, built wholly of glass; the old green-house, now used as a propagating house, also of glass; and the cottage occupied by the Assistant Horticulturist.

EQUIPMENT.

AGRICULTURE.

The Agricultural Department occupies two rooms upon the first floor and near the central part of the University building, facing west. The equipment has been greatly augmented during the past year. There have been imported from Europe several of the best Azoux models of portions of the domestic animals, showing normal and morbid conditions; also several cases of products of the vegetable kingdom. A very large collection of garden and farm seeds has been secured and arranged in jars and properly labeled. There is also a selection of garden tools, and instruments used in veterinary surgery. Recently there has been imported from Germany a collection of charts illustrating the anatomy and physiology of some of the fruits and grains. Specimens of the best fruits, grains and other farm products are constantly received for examination; also specimens of an abnormal nature. The old green-house, about fourteen by twenty feet in area, is used as a propagating house, and a new one has just been built, twenty-one by eighty feet in size, constructed of glass throughout. Laboratory work is provided for in these green-houses and field work upon the University grounds. To the agricultural department of the general library have been added many of the standard and most valuable of the recent publications upon agriculture in its various branches, and the sciences upon which it is based.

The Arizona Agricultural Experiment Station headquarters are located in the rooms of the Department of Agriculture of the University, and all the bulletins and reports of the Experiment stations of the United States and foreign countries are on file in the Station library, and the principal agricultural and horticultural journals are upon the table of the reading room.

BIOLOGY.

The three rooms occupied by the Department of Biology are located in the southwest half, second floor of the south wing of the University building. These rooms are piped for gas and water and liberally provided with apparatus for research and for giving instruction in biological subjects. Students pursuing histological work are provided without ex-

pense with simple and compound microscopes, as the nature of their work demands. The laboratory is equipped with microtomes, culture baths, oven and other accessories used in modern methods of research.

An herbarium, containing nearly ten thousand sheets of plants, mostly indigenous to the southwest, a large percentage being from Arizona, is an important factor in our equipment. Some fifty cases of insects including one large cabinet is of value in giving instruction in Entomology and to illustrate the economic insects of Arizona. The work in general and systematic Zoology is greatly facilitated by the Herbert Brown collection of birds and by other zoological material which has been brought together during the past five years.

To aid in the study of human and comparative anatomy and physiology we are provided with articulate and disarticulate human skeletons, plaster and *papier-mache* models of the important organs and microscopical preparations illustrating the structure of the various tissues. Our equipment also includes special apparatus for use of advanced students in this department.

THE CHEMICAL LABORATORIES.

The Chemical Laboratories are two in number. The smaller one on the upper floor of the main building is for the use of students and is equipped for teaching the theory and practice of Chemical Science. The room for laboratory work is well lighted, provided with gas, water, working desks, ventilating hoods, an abundance of apparatus and chemicals with which to carry on experimental work, and can be made to accommodate about twenty-four students. Adjoining the large room is a small store room stocked with apparatus for demonstrating the principles of chemistry and containing well selected collections of chemical substances.

The Experiment Station Laboratory occupies three large working rooms and two small store rooms on the lower floor of the main building. This laboratory is devoted to analytical work and chemical investigations relating to the agricultural interests of the Territory. It is excellently equipped for the special lines of investigation in which it is engaged, and although not primarily intended for the use of students, it has educational value to those who desire to witness the operations of a working laboratory. The equipment includes chemical balances, chemical apparatus and supplies, machinery for preparing samples, and special appliances for the analysis of milk, agricultural products, tanning materials, and soils.

QUANTITATIVE CHEMISTRY.

Instruction is provided for the benefit of those students who desire training in quantitative analysis. The facilities include a properly furnished laboratory, balances and other quantitative apparatus. By means of references the students are made familiar with various authorities and the text books are supplemented by laboratory instruction. In connection with this subject attention is given to the calculation of chemical problems.

These courses are of more especial value to students of mining and metallurgy and are taught with a particular view to their utility in that connection.

CIVIL AND HYDRAULIC ENGINEERING.

Recognizing the fact that the first actual engagement secured by the Civil Engineering student will be either in the field with a surveying party or in the drafting office, the equipment of this department has been chosen with a view to developing the highest skill in these fundamental lines of work. Already liberal, it is constantly being enlarged. It embraces surveyors' and engineers' chains; standard field and pocket tapes; plain and solar compasses and transits, engineers' levels; pocket levels; stadia, level and transit rods; aneroid barometers; odometers; pedometers; automatic water registers; hook-gages; three forms of current meters; 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, etc.

In addition to the large number of technical books and periodicals contained in the general library, this department possesses a considerable number of valuable reference works concerning its special lines of investigation.

LIBRARY.

The University library contains 2600 bound volumes of which about 1300 are recent works upon natural and applied sciences taught in the courses, 600 are works of standard English literature, 200 are text books and 400 are government publications. In addition to these, there are about 100 volumes of the latest dictionaries and cyclopædias. The reading room contains about fifty periodicals of scientific and general nature.

MINING AND METALLURGY.

The Arizona School of Mines is well equipped for giving both theoretical and practical instruction in the arts of mining, metallurgy and assaying in all its branches.

Attached to the main building is an annex or mill, containing machinery and appliances for crushing, sampling, concentrating, amalgamating, leaching, chlorinating, cyaniding and the electrical treatment of various kinds of ore in large or small lots. The student has access to this apparatus and is required to familiarize himself with its manipulation. Power is furnished from a seventy horse-power boiler, detached from the main building, the steam being carried underground to the engine-room, which contains a thirty-five horse-power engine, built by the Walburn-Swenson Manufacturing Co., of Fort Scott, Kan., and a sixteen horse-power Westinghouse automatic engine, the latter being used for running the dynamo.

The mill building has a storage capacity for ore of fifty to one hundred tons. From the bins the ore passes to the crushing floor above. A seven inch by ten inch Blake crusher is used for coarse crushing, and a Dodge crusher for finer work. Beneath the Blake crusher is a set of fourteen-inch by twenty-inch Cornish rolls, from which the ore passes by a conveyor to the main elevator, which carries it up thirty-one feet to the top of the mill. By means of slides and chutes the crushed ore may be sent at will to various machines to be tested by different methods. For concentration there are provided revolving sizing screens giving facilities for preparing six sizes, besides hydraulic separators for classifying slimes into three grades. The coarser sizes may be worked upon full-sized jigging machines of the Hartz pattern, the finer sizes being jigged upon slide motion machines, and the slimes being worked upon a double Rittinger percussion table, or otherwise, as desired. A small apparatus, run by electric motor, is also provided for dry concentration. Amalgamation tests may be made upon a working scale by different methods, including plates and riffles, pans and settlers, etc. A five stamp gold mill with silvered plates and aprons of the latest and most approved construction by Fraser & Chalmers of Chicago, has recently been added to the mill, thus permitting the working of free-milling gold ores by the usual methods and on a large scale. Several lots of ore have been successfully worked and returns made in gold bullion, thus familiarizing the mining students with all the details of feeding, stamping, cleaning up, retorting, smelting and assaying.

In addition to the five stamp mill a smaller prospecting mill of three stamps has been added so as to work small lots of ore of from 100 to 2000 lbs.

A sampling mill permits of rapid crushing and mixing large samples, preparatory to assaying.

Above the engine-room is the Electrical Laboratory, containing a seventy-five light Mather incandescent dynamo, from which six circuits are distributed to different parts of the University Building. Of these, two circuits are for lighting purposes; one extends to the hoisting motor; another to the motor which runs to the concentrating machinery; another circuit to the fan motors used for ventilating purposes, and the sixth branch goes to the storage batteries which provide current for electrolytic work in the Assay Laboratory.

The Assay Laboratory is one of the most complete in the West in its appointments. This is equipped with assay furnaces for crucible work, for scorifying and cupelling, and for retorting mercury from amalgam. An adjoining room, supplied with water, gas and electric current, has a roomy hood for work involving fumes, with tables and desks for student work, 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, mineral fertilizers and qualitative tests of minerals.

A reagent and assay-supply store-room adjoins this room, and also a balance room with balances of the highest grade and accuracy.

The school is thus prepared to give instruction and at the same time to work ores by the ton, and also to determine the nature and value of obscure and little known mineral substances, specimens of which are received by mail from all parts of Arizona and beyond it, and are examined gratuitously.

PHYSICS.

Three large rooms in the basement of the University Building 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 instantly darkened. A beam of sunlight, directed by a very fine clock heliostat outside, may be thrown steadily across the lecture table for experiments on light, or used in connection with the solar lantern for a variety of other work. The lecture table is sup-

plied with gas, water, electric currents from primary and storage batteries, and from the large dynamo.

Adjacent to the lecture room is the apparatus room where are kept the many fine instruments owned by the University, among which may be mentioned: An Atwood's machine; Kater's pendulum; whirling table; many balances; barometers; an air pump and accessories; a hand dynamo; a 75-light Mather dynamo (not in apparatus room); many motors; six storage cells; a large number of primary batteries; induction coils; Deprez-D'Arsonval tangent, and sine galvanometers; rheostats; Wheatstone's bridges; a fine testing set; a Wimhurst electric machine; Leyden jars; Geisslers' & Crooke's tubes; diapsons; a sonometer; lenses, prisms, and mirrors of all kinds; a polariscope; steam gauges; indicators; calorimeters; and great quantity of other apparatus, costing in all over \$3000.00.

Both these rooms open into the large physical laboratory, where the students must verify for themselves the laws set forth in text-books and lectures.

REQUIREMENTS FOR ADMISSION, ETC.

Candidates for admission to the University are required to furnish satisfactory testimonial respecting character; and --if they come from other colleges--certificates of regular dismissal, together with an official statement, if possible, of the work previously done.

For admission to the Freshman Class, applicants must be at least 16 years of age,* and must pass satisfactory examinations in studies required in the Preparatory Course with the exception of Elementary Biology, Elocution and Physical Culture.

Examination for the Freshman Class will include the following studies:

MATHEMATICS—Arithmetic, entire, including the Metric System; Algebra, through quadratic equations, including factoring, the greatest common divisor, and the least common multiple, as treated by Wentworth or Wells; Geometry, all of plane (Wentworth or Wells).

ENGLISH—A competent knowledge of the elements of English grammar, composition, the elements of rhetoric, and

*In Special cases of students unusually capable and well prepared, this regulation may be abrogated by vote of the Faculty.

the following English classics or acceptable equivalents: Longfellow's *Miles Standish*, *Evangeline*; Burrough's *Birds and Bees*, *Sharp Eyes*; Scott's *Lady of the Lake*; Whittier's *Snow-Bound*.

HISTORY—Ancient, Mediaeval and Modern. (The text-book in use in the Preparatory Department is "Myers' General History"); United States History; and the Science of Government.

NATURAL SCIENCE—Geography, political and physical, as included in "Frye's Complete Geography;" Physics, as much as is contained in "Gage's Introduction to Physical Science." Note-books covering such laboratory work as has been performed by the student should be presented for examination.

LATIN—As comprehended in "Collar & Daniells' Beginners Latin Book" or an equivalent.†

For admission to the First Year Preparatory Class, applicants must have attained the age of 14 years,‡ and must pass satisfactory examinations in Reading, Writing, and Arithmetic as far as percentage, (including fractions and compound quantities), and otherwise show ability to pursue the work outlined.

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

Arrangements have been made with the Arizona Territorial Normal School, at Tempe, whereby students from that Institution may have their record transferred to the books of the University with full credit, upon presentation of a certificate duly signed by the Principal. Students of this University may also obtain the equivalent privilege at the Normal School 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.

†Candidates from other schools not prepared in Latin may substitute German, French or Spanish, in which the requirements will be elementary grammar and ability to translate simple prose.

‡In special cases of students unusually capable and well prepared, this regulation may be abrogated by vote of the Faculty.

REGISTRATION OF STUDENTS.

All students are required to register on registration day of each term, in the President's office. A matriculation fee of \$5.00 is required of all students. Each will receive a card indicating the classes which he is to attend, and a receipt for the matriculation fee, when paid. No class card will be issued until all dues are paid. This card must be presented to the several Professors before enrollment will be permitted. No changes in registration can be made without the consent of the Faculty.

Permission of the Faculty is necessary to register at any time after registration day.

No student shall be permitted to register in the Spring Term of the Senior Year, as a candidate for a degree, who has not previously made up all failures and "conditions" in subjects required for the degree.

TERM RECORDS.

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

MONTHLY REPORTS OF STUDENTS.

Reports of standing in classes in Preparatory Department are regularly sent each month to parents and guardians from the President's office. Those to whom these reports are addressed are urgently requested to examine each with care and to spur up delinquent students, or commend those who are diligent, as the case may be. Without such hearty co-operation, good results cannot be anticipated.

FACULTY MEETINGS.

Regular meetings of the Faculty are held weekly.

Students' individual petitions must be in the hands of the President before the hour of Faculty meeting in order to receive attention the same week. Petitions from classes, or from any two or more students, will not be acted upon by the Faculty unless presented in writing to the President, at least two days before the meeting at which action is desired.

THE HUGO ZECKENDORF PRIZES.

A gold medal and a silver medal have been offered as

prizes by Mr. Hugo Zeckendorff, of Tucson, on the following conditions:

1.—The Senior student who presents the best essay upon some subject relating to the duties of citizenship, will be awarded the gold medal.

2.—The student who maintains the best class record throughout the Junior year will be awarded the silver medal.

Both awards are subject to the regulations of the University Faculty.

The awards of these prizes on Commencement Day, 1897, were:

The Gold Medal, for best Senior essay, to Mark Walker Jr., of Tucson.

The silver Medal, for best Junior record, to Granville Malcom Gillett, of Phoenix.

VACATIONS, ACCOMMODATIONS, ETC.

VACATIONS AND HOLIDAYS.

Short vacations (as per Calendar on page 3) are taken at the Holidays and between the Winter and Spring Terms. The long Summer vacation begins about June 1st and continues until near the close of September.

All legal Holidays are observed by the cessation of ordinary University work, and the Thanksgiving Recess extends from the close of regular exercises on the preceding Wednesday until the Monday morning following.

Appropriate exercises may be arranged by the Faculty for any of the legal Holidays, in which the students will be expected to join, if required.

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

LIVING ACCOMMODATIONS AND EXPENSES.

Provision is made as far as possible for furnishing board and rooms for students, of both sexes, upon the University grounds.

Young men have excellent quarters in the new dormitory building.

A separate home for young ladies is in charge of Mrs. S. A. Buell, an experienced and capable matron, who, as last

year, will have constant supervision of those rooming in "Ladies Hall."

There is no charge for tuition in the University, except for instruction in Commercial branches.

All students are required to pay once only (upon entrance), a Matriculation Fee of five dollars.

Charges will be made for material actually consumed by students in the laboratories.

The expense for board and room rent will amount to about \$15.00 per month. By resolution of the Board of Regents of the University, board is to be paid in advance at the beginning of each term. No reduction will be made for absence for a period of less than one week.

Students will be provided with simple furniture, including single bedstead, mirror, wash-bowl, pitcher and slop jar. They will supply their own mattress, pillow, bed-clothing, towels, etc. They will care for their own rooms, and the halls, staircases, and study rooms of their respective dormitories under the direction of the person in charge.

Text-books required may vary in cost between five and ten dollars in different years of the course.

Economical students should readily go through the year with \$150.00 to \$160.00, excluding clothing.

Members of the battalion will be required to provide themselves with the prescribed uniform. During the past year the cost of uniform with cap, and including transportation charges, has ranged from \$11.40 to \$12.90 according to size. While this uniform has shown better wearing qualities than a civilian suit of equal cost, it is hoped that in future a much more serviceable grade of material can be secured at a slightly advanced cost. Students will thus have choice of grades of material and cost. Parents are urged to consider the matter of uniform when supplying their sons with clothing for the approaching school year. It may be worn on all occasions, and thus will remove the necessity for the usual expenditures for outer clothing other than overcoats.

Provision has been made for the self-support of students to a limited extent.

LITERARY SOCIETY.

The Philomathean Society, an organization of students open to all, holds its meetings in the Assembly room of the University on Friday evenings. Its work embraces general literary exercises and parliamentary usage, and is a valuable adjunct to the regular college course.

MILITARY TRAINING.

Appreciating the importance of military drill as a physical exercise and as an aid to discipline, provision has been made for a course in Military Science and Tactics.

Military drill is required of all male students throughout the Preparatory Course and as far as the end of the Sophomore year unless excused by the Faculty for sufficient cause, and is optional through the remaining years. Students claiming exemption from drill by reason of physical disability will be required to secure from a physician designated by the Faculty, a certificate of incapacity, except when the disability is apparent. In general the officers and non-commissioned officers will be chosen from the higher classes, scholarship as well as proficiency in drill being considered in making promotions.

Each member of the military organization will be required to provide himself with the prescribed uniform within six weeks after his entrance. The uniform consists of cap, coat and trousers of Cadet gray cloth trimmed with black braid and closely resembles the undress uniform worn at the U. S. Military Academy at West Point. Black shoes and white cotton gloves are also required. A uniform vest is prescribed. The purchase of this garment is optional as it is not required to be worn unless the coat is worn unbuttoned. A committee of the Faculty will protect the interests of students by inspecting all uniforms as received from the makers in order to secure good materials and workmanship at a minimum cost.

Owing to the necessity for training officers and non-commissioned officers as well as recruits no attempt has been made during the past year to progress further than the school of the company. Early in the fall term of 1897 the battalion formation will be perfected. By this means a considerable number of cadets will receive instruction and perform the duties of commissioned officers.

A gold medal, presented by the Commandant for the best drilled cadet, and a silver medal offered by Prof. Devol for the best drilled recruit, will be competed for on Commencement Day.

An equivalent of the time occupied in military drill will be devoted by female students to physical culture and instruction in the rudiments of hospital practice and prompt relief of the injured.

COURSES OF INSTRUCTION.

The facilities and privileges of the University are open to all qualified persons of either sex, without charge.

The course of study followed may be either *regular* according to a prescribed sequence of studies, requiring examinations and leading to a degree, or *special* for such students as wish to take only a partial or selected course of study without regard to graduation or a degree,

Five regular courses are offered as follows:

I.—General.

II.—Agriculture and Horticulture.

III.—Civil Engineering.

IV.—Mechanical and Electrical Engineering.

V.—Mining and Metallurgy.

The nature and sequence of studies in each of these courses for each term for four years are shown in the following tabular statements.

Students who have obtained full credit for the required work in either of these courses during four years, will be given the degree of Bachelor of Science (B. S.).

Each candidate for graduation is required to present an acceptable thesis embodying the results of a special and thorough 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 not later than the opening of the second Term of the Senior year, and the completed thesis must be presented not later than three weeks before Commencement Day.

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

The degrees of Civil Engineer, Mining Engineer, Irrigation Engineer and Electrical Engineer are open to graduates properly prepared, who have pursued special lines of post-graduate work in accordance with Faculty regulations.

I. THE GENERAL COURSE.

This course is here presented as a proper curriculum for the average student, as it embodies the judgement of the Faculty regarding what is most suitable for the broad general culture demanded by modern life. All students who are young enough to delay their technical preparation until after its completion are strongly urged to register in this course.

A careful perusal of the scheme will show that this course includes, practically, the elementary work of the general principal departments of the University. The branches of Mathematics required are only those which will be assigned in any event, as a condition for graduation from the University. Thus nothing is required which a regular student can afford to miss, and those who may afterward decide to pursue a particular technical course will have lost little by beginning this course.

This is not the course for those who must quickly acquire a technical training to fit them for the professions at once; but it cannot be too strongly asserted that the time spent in this preliminary general training will be more than made up in the increased capacity for effective work in any field in the years to follow.



GENERAL COURSE.

FRESHMAN YEAR.

FIRST TERM.	Hrs.	SECOND TERM.	Hrs.	THIRD TERM.	Hrs.
English.....	5	English.....	5	English.....	5
Ancient or Modern Language.....	5	Ancient or Modern Language.....	5	Ancient or Modern Lang. age.....	5
Solid Geometry and Conics.....	5	Higher Algebra.....	5	Higher Algebra.....	5
Drawing (Freehand).....	2	Drawing (Freehand).....	2	Drawing (Freehand).....	2

SOPHOMORE YEAR.

English.....	5	English.....	5
Ancient or Modern Language.....	5	Ancient or Modern Language.....	5
Trigonometry.....	5	*Chemistry; Botany.....	5
Chemistry.....	5		5

JUNIOR YEAR.

History 2, English 3.....	5	History 2, English 3.....	5
Physics.....	5	Physics.....	5
Political Economy.....	3	Political Economy.....	3
Anatomy and Physiology.....	5	Zoology.....	5

SENIOR YEAR.

Logic.....	5	Psychology.....	5
Constitutional History.....	5	History of Civilization.....	5
Geology.....	5	Ethics.....	5
		History of Philosophy.....	5
		Civics.....	5
		Astronomy.....	5
		Thesis.....	5

*Chemistry ½ term; Botany ½ term.

II. COURSE IN AGRICULTURE.

It is the aim of the University to present a course in Agriculture that will equip the student with a knowledge of the theory and practice of modern Agriculture, such as will enable him to fill positions of trust and importance in the Agricultural Experiment Stations or among the scientific workers for the U. S. Department of Agriculture, as well as to engage successfully in the pursuit of any one or more of the several branches into which the profession of agriculture is now divided.

The first two years in the Agricultural course embrace, with but few exceptions, the studies prescribed for the General Course, and follow still more closely the other Technical courses. In order to secure the greatest benefit from instruction in the special studies in Agriculture, Horticulture and Veterinary Science it is essential that the student shall have had instruction in several of the sciences upon which the proper practice of Agriculture depends. In the course presented here the aim has been to provide such preliminary instruction as is thought most necessary to that end. No text-books have yet been prepared in which the several branches taught are treated in full, comprehensive and thorough manner, so there is a constant reference to numerous publications for collateral reading, including the most important books published upon the respective branches, and the reports and bulletins of the Experiment Stations. Teaching is by means of lectures and recitations from text-books, supplemented by field work, laboratory practice and clinics. The studies required and the time each occupies in this course are set forth in the following schedule:



COURSE IN AGRICULTURE.

FRESHMAN YEAR.

FIRST TERM	Hrs.	SECOND TERM.	Hrs.	THIRD TERM.	Hrs.
Solid Geometry	5	Higher Algebra	5	Higher Algebra	5
English	5	English	5	English	5
Modern Language	5	Modern Language	5	Modern Language	5
Drawing and Shopwork	5	Drawing and Shopwork	5	Drawing and Shopwork	5

SOPHOMORE YEAR.

Trigonometry	5	Analytical Geometry	5	Meteorology	3
Chemistry	5	Chemistry ($\frac{1}{2}$ term)	5	Chemistry	5
Surveying	5	Farms and Farm Equipment	5	Soils and Irrigation	5
Drawing (Instrumental)	3	Botany ($\frac{1}{2}$ term)	5	Botany	5
				Photography	2

JUNIOR YEAR.

Farm Crops	5	Farm Crops	5	Breeds of Livestock	5
Botany	5	Botany	5	Entomology	5
Anatomy and Physiology	5	Zoology	5	Forestry	3
Floriculture	3	Landscape Gardening	3	Horticulture and Plant Breeding	5

SENIOR YEAR.

Stock Breeding	5	Stock Feeding	5	Dairying	5
Veterinary Medicine	5	Veterinary Medicine	5	Veterinary Surger	5
Geology	3	Geology	3	Geology	5
Fruits and Fruit Culture	5	Vegetables and Vegetable Culture	5	Thesis	3

III. COURSE IN CIVIL ENGINEERING.

This course is designed for young men intending to become civil engineers and surveyors. It provides for thorough training in Mathematics, for instruction in the principles which form the common foundation of all branches of the engineering profession, and for the practical application of these principles to certain lines of technical work. It aims to prepare students for immediate usefulness as subordinates in the field or drafting office, and for positions of greater responsibility after a reasonable amount of experience in the routine of actual practice. Especial prominence is given to those subjects which are the most important factors in the development of the arid region.



COURSE IN CIVIL ENGINEERING.

FRESHMAN YEAR.

FIRST TERM.	Hrs.	SECOND TERM.	Hrs.	THIRD TERM.	Hrs.
Solid Geometry	5	Higher Algebra	5	Higher Algebra	5
English	5	English	5	English	5
Modern Language	5	Modern Language	5	Modern Language	5
Drawing and Shopwork	5	Drawing and Shopwork	5	Drawing and Shopwork	5

SOPHOMORE YEAR.

Trigonometry	5	Analytic Geometry	5	Analytic Geometry	5
Chemistry	5	Chemistry	5	Chemistry	5
Surveying	5	Surveying	5	Surveying	5
Instrumental Drawing	3	Instrumental Drawing	5	Inst. Drawing and Photography	5

JUNIOR YEAR.

Calculus	5	Calculus	5	Calculus	5
Physics	5	Physics	5	Physics	5
Mineralogy	5	Mineralogy	5	Mineralogy and Assaying	5
Political Economy	5	Photographic Surveying	5	Masonry Construction	5

SENIOR YEAR.

Mechanics	5	Mechanics	5	Mechanics	5
Geology	5	Geology	5	Geology	5
Water Supply	5	Irrigation Engineering	5	Municipal and Sanitary Engineering	5
Bridge Stresses	5	Bridge Designing	5	Thesis	5

IV. COURSE IN MECHANICAL AND ELECTRICAL ENGINEERING.

This course aims to fit young men in the most practical manner for the professions of Mechanical or Electrical Engineer. It is expected that students completing it will be qualified to enter upon practical work in the drawing office or shop with every prospect of success.

Attention is paid to Mathematics; the Natural Sciences; Drawing; Shop Practice; Machine Design; Installation of Plants; Steam Engines; Dynamos, etc. Practical tests of machinery will be undertaken during the Senior year.

Students in Electrical Engineering will devote their time, in the laboratories and drawing room, to the study of electrical machinery.



COURSE IN MECHANICAL AND ELECTRICAL ENGINEERING. FRESHMAN YEAR.

FIRST TERM.	Hrs.	SECOND TERM.	Hrs.	THIRD TERM.	Hrs.
Solid Geometry.....	5	Higher Algebra.....	5	Higher Algebra.....	5
English.....	5	English.....	5	English.....	5
Modern Language.....	5	Modern Language.....	5	Modern Language.....	5
Drawing and Shopwork.....	5	Drawing and Shopwork.....	5	Drawing and Shopwork.....	5

SOPHOMORE YEAR.

Trigonometry.....	5	Analytic Geometry.....	5	Analytic Geometry.....	5
Chemistry.....	5	Chemistry.....	5	Chemistry.....	5
Surveying.....	5	Surveying.....	5	Surveying.....	5
Instrumental Drawing.....	5	Instrumental Drawing.....	5	Inst. Drawing and Photography.....	5

JUNIOR YEAR.

Calculus.....	5	Calculus.....	5	Calculus.....	5
Physics.....	5	Physics.....	5	Physics.....	5
Mineralogy.....	5	Mineralogy.....	5	Mineralogy and Assaying.....	5
Political Economy.....	5	Kinematics and Materials of Construction..	5	Machine Design.....	5

SENIOR YEAR.

Mechanics.....	5	Mechanics.....	5	Mechanics.....	5
Steam Engine and other Motors.....	3	Steam Engine and other Motors.....	3	Steam Engine and other Motors.....	3
Electricity and Magnetism.....	2	Dynamo and Electric Machinery.....	3	Dynamo Electric Machinery.....	3
Geology.....	5	Geology.....	5	Geology.....	5
Designing and Drawing.....	5	Designing and Drawing.....	5	Thesis.....	5

V. COURSE IN MINING AND METALLURGY.

The course of instruction in Mining and Metallurgy is designed to fit young men for the theory and practice of mining and metallurgy and for the superintendence or management of mines, mills or metallurgical works. It extends over a period of four years and provides for a liberal and special education. The studies for the first two years are nearly the same as those prescribed for the General and Engineering Courses.

The instruction includes lectures and laboratory and mill practice. The various laboratories of the University and of the School of Mines are open to the students of this course. Provision is made for instruction in English, Mathematics, Physics, Chemistry, Mineralogy, Assaying, Mining Methods, Mining and Milling Machinery and Metallurgical Works; besides Surveying, Drawing and Shop-work, as shown in detail in the following tabular scheme:



COURSE IN MINING AND METALLURGY. FRESHMAN YEAR.

FIRST TERM.	Hrs.	SECOND TERM.	Hrs.	THIRD TERM.	Hrs.
Solid Geometry.....	5	Higher Algebra.....	5	Higher Algebra.....	5
English.....	5	English.....	5	English.....	5
Modern Language.....	5	Modern Language.....	5	Modern Language.....	5
Drawing and Shopwork.....		Drawing and Shopwork.....	5	Drawing and Shopwork.....	5

SOPHOMORE YEAR.

Trigonometry.....	5	Analytic Geometry.....	5	Analytic Geometry.....	5
Chemistry.....	5	Chemistry.....	5	Chemistry.....	5
Surveying.....	5	Surveying.....	5	Mine Surveying.....	5
Instrumental Drawing.....	5	Instrumental Drawing.....	5	Inst. Drawing and Photography.....	5

JUNIOR YEAR.

Calculus.....	5	Calculus.....	5	Calculus.....	5
Physics.....	5	Physics.....	5	Physics.....	5
Mineralogy.....	5	Mineralogy.....	5	Mineralogy and Assaying.....	5
Shopwork and Physical Laboratory.....	5	Kinematics and Materials.....	5	Shopwork and Physical Laboratory.....	5

SENIOR YEAR.

Mechanics.....	5	Mechanics.....	5	Mining.....	5
Steam Engines and other Motors.....	3	Steam Engine and other Motors.....	3	Steam Engine and other Motors.....	3
Electricity and Magnetism.....	2	Metallurgy and Assaying.....	5	Metallurgy and Assaying.....	5
Geology.....	5	Geology.....	5	Geology.....	5
Designing and Drawing.....	5	Designing and Drawing.....	5	Dynamo Electric Machinery.....	5
				Thesis.....	2

SPECIAL COURSES.

In addition to the foregoing regular courses of study students will be received for special courses, without regard to a degree, in the following subjects: Agriculture and Horticulture, Biology (Botany and Zoology); Chemistry; Civil and Hydraulic Engineering; Drawing, freehand and mechanical; Elocution and Physical Culture; English Language and Literature; Geology and Mineralogy; History and Civics; Mathematics; Mechanical Engineering; Mining and Metallurgy (Mill-work, etc.); Assaying; Modern Languages; Physics.

Besides these subjects, thorough instruction is also provided in Music (Vocal and Instrumental) and in all the branches of a complete business education, including Stenography, Typewriting, Penmanship and Commercial studies.

EXPLANATORY OF COURSES OF STUDY.

AGRICULTURE.

AGRICULTURE: The subject is taken up the second term of the Sophomore year, with lectures and recitations upon the selection of a farm and farm equipment. The text-book is Thomas' Farm Implements and Machinery. The next term the subjects of soils and irrigation are studied in field work, lectures and recitations. The text-books are King's The Soil, and Wilcox's Irrigation Farming. Agriculture in the first term of the Junior year embraces the study of farm crops, general and special, from field work, lectures and recitations from Wilcox's Irrigation Farming and Morrow and Hunt Soils and Farm Crops. Breeds of livestock are studied from lectures and recitations daily for one term, Sanders' Breeds of Livestock, Curtis' Horses, Cattle, Sheep and Swine and Burpee's Poultry Yard being consulted as text-books.

STOCK BREEDING. Lectures and recitations daily during the first term of the Senior year. Miles' Stock Breeding is the text-book.

FEEDING LIVESTOCK is taught by lectures and recitations for one term, with Armsby's Cattle Feeding as the text-book.

DAIRY FARMING is taught during the last term of the Senior year by means of lectures and recitations. Gurler's American Dairying is to be used as the text-book.

HORTICULTURE begins with the Spring term of the Junior year, embracing this term a brief history of horticulture and the subject of plant breeding. The teaching is by means of laboratory work in the greenhouse, lectures and recitations. The text-books are Slade's Evolution of Horticulture, Bailey's Plant Breeding and Fuller's Propagation of Plants.

FRUIT CULTURE is taught by lectures and recitations, the text-book being Wickson's California Fruits, with especial studies from works upon particular fruits.

VEGETABLE GARDENING. Lectures, recitations and field work are used in teaching this term. Henderson's Gardening for Profit is consulted most.

FORESTRY is taught three days a week during the Spring term of the Junior year, chiefly by recitation from Fuller's Practical Forestry.

LANDSCAPE GARDENING occupies one term of the Junior year, twice a week, with lectures and recitations from Elliot's Landscape Forestry.

FLORICULTURE requires one term, with Henderson's Practical Floriculture as text-book, but lectures and field work occupy most of the time.

VETERINARY SCIENCE, including medicine and surgery, requires daily recitations throughout the Senior year. Law's Veterinary Adviser is used as a text-book, but the recitations are supplemented by lectures and clinic.

ASTRONOMY.

I.—GENERAL ASTRONOMY.—Recitations and Field Practice. The subject is treated in a popular and non-mathematical form according to Young's General Astronomy.

The University possesses a 4 $\frac{1}{4}$ inch equatorial telescope of excellent quality. This instrument under the clear skies of Arizona affords many very interesting views of the heavenly bodies.

2.—ASTRONOMY AND GEODESY.—Lectures, Recitations and Field Practice, embracing the elements of Spherical Astronomy with applications to Geodetic Surveying.

BIOLOGY.

ANATOMY AND PHYSIOLOGY.—Lectures and recitations on human anatomy and physiology supplemented by laboratory work, students making drawings and notes illustrative of their work.

1. **BOTANY, STRUCTURE AND MORPHOLOGY OF PLANTS.** Students study living specimens selected from the local flora. The work is largely of laboratory character supplemented by lectures and recitations from Borgen's Elements of Botany and Gray's Lessons.

2. **SYSTEMATIC BOTANY.**—A study of specimens representative of the different groups of the vegetable kingdom with special reference to the flowering plants. Lectures are given once a week on the economic plants of the families studied.

3. **PHYSIOLOGICAL BOTANY.**—A study of the minute structure and vital functions of plants. The work is largely with the compound microscope.

4. **CRYPTOGAMIC BOTANY AND VEGETABLE PATHOLOGY.**—In this work the student is mostly occupied in the laboratory in the study of the lower orders of plant life. Special attention is given to rusts and smuts and allied forms in their relation to plants of economic importance.

ENTOMOLOGY.—Special attention is given to insects of economic importance. Lectures are given upon the anatomy of insects, their development, transformations, geographical distribution and classification.

ZOOLOGY.—Lectures and text-book work on the principles of classification of animals; their structure and development. Laboratory work is given considerable attention.

CIVIL ENGINEERING.

1. **LAND SURVEYING.**—Recitations, Field Work and Drawing. The elements of general surveying including the use of field instruments and mapping of surveys. Special attention is given to the United States system of public lands surveys.

2. **RAILWAY SURVEYING.**—Recitations, Field Work and Drawing. Methods of reconnaissance, preliminary and location surveys for railways and canals, calculation of earth-work quantities.

3. **TOPOGRAPHIC SURVEYING.**—Recitations, Field Work and Drawing. Consideration of the various methods of mapping topography covering extended lines or compact areas.

4. **PHOTOGRAPHIC SURVEYING.**—Field work and Drawing. A study of modern methods of photo-topography, particularly as developed in the Canadian governmental surveys.

5. **MASONRY.**—Recitations and Drawing. Materials for masonry construction; foundations, bridge piers, retaining walls, dams and arches.

6. **BRIDGE STRESSES.**—Recitations and Drawing. Determination of stresses in bridges, roofs, derricks and cranes, plate-girders, arches, etc., by analytic and graphic methods. Johnson, Bryan and Turneure's Theory and Practice of Modern Framed Structures is used as a text-book in this and the following subject.

7. **BRIDGE DESIGNING.**—Recitations and Drawing. Treats of designing bridges, roofs and other framed structures; calculation of bills of material and estimate of cost.

8. **WATER SUPPLY.**—Lectures and Recitations, Hydrography and Meteorology; run-off from water-sheds; the construction of water-works for cities and towns.

9. **IRRIGATION ENGINEERING.**—Lectures. General consideration of irrigation projects; storage and diversion dams, head-works, regulators and other appliances; construction of canals and other conduits, etc.

10. **MUNICIPAL SANITARY ENGINEERING.**—Lectures. Laying out towns and additions; pavements and sidewalks; plumbing and house drainage; construction and operation of sewers, etc.

DRAWING.

1. **FREE HAND.**—Drawing from copies; from geometrical models, perspective, shading and machine sketching.

2. **INSTRUMENTAL.**—Linear drawing, round writing, lettering, tracing and blue printing.

3. **DESCRIPTIVE GEOMETRY.**—Recitations and drawing; projections, shades and shadows, perspective, tinting.

ENGLISH.

FRESHMAN YEAR. Prose writers of the 19th century, especially DeQuincey, Macaulay, Carlyle; English classics.

SOPHOMORE YEAR, Advanced rhetoric and rhetorical analysis, argumentative and expository composition; Burke, Webster; in the Spring term Elizabethan literature; Lowell.

JUNIOR YEAR, Shakespeare; early 19th century poets; Tennyson; Milton

RHETORICALS: The appearance once during each term in public rhetorical exercises, suited to their position in the course, is required of all students taking courses leading to a degree and of students taking English or Elocution, unless excused by vote of the Faculty. Deficiency in rhetorical is ranked as a deficiency in any other subject; failure to appear on date assigned is regarded as total failure.

ANCIENT AND MODERN LANGUAGES.

The Board of Regents at its meeting in June elected Prof. Frank Yale Adams to the chair of Ancient and Modern Languages, thereby making additional work possible in this Department. Instruction will hereafter be given in French and German, together with the regular courses in Spanish and Latin as heretofore.

MECHANICAL ENGINEERING.

1. **DESIGNING OR DRAWING:** The designing, drawing and blue printing of machine details and of complete machines.

2. **DYNAMO ELECTRIC MACHINERY.**—Theory of Dynamos and Motors

3. **ELECTRICITY AND MAGNETISM.**—A detailed study of the theory and laws. Reference: Fleming's Alternate Current Transformer, Bedell and Crehose's Alternating Currents.

4. **ENGINEERING LABORATORY.**—Calibration of gauges, indicators, weirs, meters and thermometry, valve setting, indicator practice and efficiency tests of engines and boilers.

5. **KINEMATICS.**—Construction on the drawing board of curves, cams, gear teeth, etc., and the study of machine motions of various kinds.

6. **MACHINE DESIGN.**—Lectures on the design of machinery. Reference: Unwin's Machine Design.

7. **MECHANICS OF ENGINEERING.**—Statics, dynamics, strength of materials and hydraulics. Text-book, Church's Mechanics of Engineering.

8. **SHOP PRACTICE.**—Practice in carpentry, wood turning, pattern making, molding, forging and machine work.

9. **STEAM AND OTHER MOTORS.**—Lectures and recitations on Thermodynamics, theory of various prime movers, the design and proportions of motive machinery. Reference: Thurston's Manual of the Steam Engine.

MILITARY SCIENCE AND TACTICS.

1. **INFANTRY DRILL.**—Practical training in all movements of the infantry drill regulations of the U. S. Army which are applicable to the battalion, including guard duty, ceremonies, etc.

2. **TACTICS.**—Recitations. A systematic study of the drill regulations of the U. S. Army, by cadet officers and non-commissioned officers.

3. **MILITARY SCIENCE.**—Lectures and Recitations. A study of military topics, forms of official reports and other documents, and the elements of the art and science of war. For cadet commissioned officers.

PHOTOGRAPHY.

The multitude of applications of photography in modern engineering practice has caused provision to be made for practical instruction in this subject, with special reference to its use in general engineering and in topographic surveying.

PHYSICS.

1. **ELEMENTARY PHYSICS.**—Lectures, recitations and laboratory work. Text-book, Gage's Introduction to Physical Science.

2. **PHYSICS.** Lectures and recitations. Text-book: Barker's Physics.

3. **LABORATORY WORK.**—Experiments in the accurate estimation of length, mass and time; preliminary work in mechanics, sound, heat, light and electricity.

4. **LABORATORY WORK.**—Electrical measurements, tests of instruments, efficiency tests of dynamos and motors, photometry, thermometry and calorimetry.

MUSIC.

Little or no attention having been paid hitherto in our public schools to instruction in music, we plan to give such

general instruction as will enable students to read music at sight, and otherwise prepare them to participate in Assembly exercises, and enter upon chorus work.

BOOK-KEEPING AND STENOGRAPHY.

Arrangements have been made to give a course of instruction in Book-keeping and Stenography to such students as may desire to take up these branches in connection with other work in the University. For this special instruction a fee of eight dollars per term of ten weeks will be charged.

PREPARATORY COURSE.

The Preparatory Course, occupying three years, has been especially designed for those who have not had sufficient training to enter the classes of the Freshman Year. It is not the intention to make this an equivalent to the High School, but simply a preparation for actual University work. Thus all the work of the Preparatory years is arranged with an idea of progression from this School through any of the University courses.

It is not the desire of the Faculty to engage in any work which can as well be done in the Public Schools of the Territory, but we have found it impracticable to dispense with classes designed to prepare students for the routine work of the University.

Although this course affords thorough training, as far as it goes, and provides a good foundation for future studies, it is not in any sense complete in itself. One of its main objects is to give training in the best methods of study, to teach pupils to think. In many cases, students lacking neither in zeal nor ability, are at a disadvantage in not knowing how best to direct their energies to the matter in hand. It will be the constant aim of the Instructors in the Preparatory School to overcome this difficulty, which has heretofore been the most serious hinderance to educational progress in the West.

PREPARATORY COURSE.

FIRST YEAR.

FALL TERM.	Hrs.	WINTER TERM.	Hrs.	SPRING TERM.	Hrs.
Arithmetic (Wentworth).....	5	Arithmetic (Wentworth).....	5	Arithmetic (Wentworth).....	5
English.....	5	English.....	5	English.....	5
Geography (Frye).....	5	Geography (Frye).....	5	U. S. History (Haggleston).....	5
Elocution and Physical Culture.....	5	U. S. History (Haggleston).....	5	Elocution and Physical Culture.....	5
		Elocution and Physical Culture.....	5		

SECOND YEAR.

Algebra (Wentworth).....	5	Algebra (Wentworth).....	5	Algebra (Wentworth).....	5
English.....	5	English.....	5	English.....	5
Civil Government.....	5	General History.....	5	General History.....	5
Drawing (Freehand).....	3	Drawing (Freehand).....	3	Elementary Biology.....	2
Elocution and Physical Culture.....	2	Elementary Biology.....	2	Elocution and Physical Culture.....	2
		Elocution and Physical Culture.....	2		

THIRD YEAR.

Algebra (Wentworth).....	5	Geometry (Wentworth).....	5	Geometry (Wentworth).....	5
Latin (Collar & Daniels).....	5	Latin (Collar & Daniels).....	5	Latin (Collar & Daniels).....	5
English.....	2	English.....	5	English.....	5
General History.....	3	Elocution and Physical Culture.....	2	Elocution and Physical Culture.....	3
Elocution and Physical Culture.....	3	Physics (Gage).....	3	Physics (Gage).....	3

AGRICULTURAL EXPERIMENT STATION.

STATION STAFF.

HOWARD BILLMAN, A. M.,	.....	<i>President.</i>
WM. STOWE DEVOL, B. Agr.,	.....	<i>Director, Agriculturist</i>
	.....	<i>and Horticulturist.</i>
EDWARD MARSHALL BOGGS,	.....	<i>Irrigation Engineer and</i>
	.....	<i>Meteorologist.</i>
JAMES W. TOUMEY, B. S.,	.....	<i>Botanist and Entomologist.</i>
ROBERT H. FORBES, B. S.,	.....	<i>Chemist.</i>
MARK WALKER, JR.,	.....	<i>Assistant Chemist.</i>

STATION COUNCIL.

The Board of Regents, the President of the University (President) and Director of the Station, together with the members of the Station Staff.

ESTABLISHMENT AND OBJECT.

The Agricultural Experiment Station is established according to an Act of Congress, and by the Territorial Legislature has been made a part of the University.

The function of the station is to aid in developing the agricultural and horticultural resources of the Territory, by solving as completely and rapidly as possible some of the complex problems with which the farmers, fruit growers and stock raisers are confronted. In aid of this the National Government has appropriated the sum of \$15,000 to be paid annually to the Board of Regents for this specific purpose.

The lines along which the work of the station runs, embrace the investigations of the conditions of climate, soil and water-supply in the various parts of Arizona, and the adaptability of the conditions found to the growth of different agricultural and horticultural crops; the range of climate suited to the production of these crops; the maximum, minimum and mean amount of water; the successful cultivation of different farm and garden crops; water storage and the development of water from other sources; the best means of applying water; methods of culture; the best season for planting; breeds of farm animals and their improvement to meet local conditions; the introduction of new fruits, vegetables and farm crops and the distribution of plants and seeds; the develop-

ment of forest tree culture; the investigation of diseases affecting the plants and animals of the Territory and the remedies best suited to prevent or eradicate them; the publication of bulletins upon investigations undertaken, and the results obtained. These bulletins are issued periodically and sent free to all who apply for them. The range of the work of the station is only limited by the needs of the Territory and the funds available for use in making the investigations. Those questions which are thought of greatest importance to the Territory come first in the line of work pursued,

To further the ends of the Station in extending its usefulness the co-operation of all interested in its work is earnestly solicited. Suggestions will be gratefully received and inquiries answered cheerfully, wherever possible, by the members of the Staff, each for his own department. No charge is made for answering these questions, and when qualitative chemical analyses or other investigations, of general public interest and benefit are requested, they will be undertaken if possible, and without cost. For quantitative analysis, involving more labor and expense, a small charge is made.

The location of the Experiment Station at the University, is of great benefit, directly and indirectly, to the students in the University. The specialists in the Station work are available as professors in their respective branches in the University, thus affording a larger corps of teachers specially equipped in the several departments. The Station investigations also provide opportunities to students in agriculture and other special branches, for the study of special conditions and methods of peculiar interest to the Territory, which would not otherwise be available,

All communications respecting Station matters should be addressed to:

DIRECTOR EXPERIMENT STATION.

Tucson, Arizona.

THE ARIZONA SCHOOL OF MINES.

This department of the University is provided with a mill for working ores in large or small lots and for sampling ores in large or small quantities from a few pounds weight to a ton or more. Mill tests can be made by either the small three stamp mill or by the large five stamp battery. There are rolls for roller crushing and jigs and Rittinger tables for concentrating ores.

Assaying is taught in the assay and chemical laboratories. Commercial assaying is conducted on a considerable scale in special laboratories and furnaces for the purpose.

There are also facilities for teaching mineralogy and the use of the blowpipe.

In order to promote knowledge of the mineral wealth of Arizona and to disseminate accurate information regarding the minerals and rock formations, and their distribution, qualitative tests or determination of the nature of mineral substances not requiring an assay are made gratuitously upon samples sent by mail or delivered to the Institution without charge.

When quantitative determinations or analyses are required, or when assays showing the quantity and value of a metal or metals are necessary, a charge is made under the provisions of the Territorial law of March, 1897, regulating the prices or fees to be charged for an assay at the University. These rates are shown in the following schedule:

UNIVERSITY OF ARIZONA.

ARIZONA SCHOOL OF MINES.

TUCSON, ARIZONA.

Schedule of Rates for Assaying and Working Ores.

In accordance with the Legislative enactment of March 18th, 1897, 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.

Silver and Gold, or either.....	\$.50
Silver, Gold and Copper.....	1.00
Copper.....	.50
Ores containing more than three common metals.....	1.50

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.

Silver and Gold, or either alone.....	\$1.00
Copper.....	1.00
Lead.....	1.00
Zinc.....	2.50
Iron.....	2.00
Silica.....	1.50
Alumina.....	5.00

And for other determinations such 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.

Rates for Sampling.

Lots of 100 pounds or less, including assays of three metals.....	\$5.00
Each additional 100 pounds, to 500 pounds...	1.00
Over 500 pounds to 1 ton.....	10.00
Each additional ton.....	4.00

Reducing to Metal by any Process, as Below.

Ordinary Stamp Mill test and plate amalgamation, for first ton or fraction of a ton....	\$20.00
From 1 to 2 tons.....	30.00
Pan Amalgamation, including crushing and assays, per ton.....	20.00
Large lots, proportionately less, per ton; small lots more in proportion.	

Cyanide Process.

The School of Mines is prepared to make experimental tests of ores and of 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

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 of the package by the name of the sender, and a letter should be posted at the same time giving the full name and address, and enclosing a stamp for the reply. The fee for the assay may be wrapped in paper and sent with the sample.

Samples for assay may also be most conveniently and cheaply sent by mail if under four pounds in weight. Each sample should be labeled by a slip of paper, inside, giving the name and locality of the claim and the address of the sender.

As the express company does not deliver parcels at the University there is a delay of a day or more in the reception of samples sent by express. Unless otherwise directed the certificate of the results of an assay will be forwarded by mail to the consignor of the sample.

Special rates of freight on consignments to the "DIRECTOR of the SCHOOL of MINES," are granted by the Southern Pacific R. R. from points in Arizona. Ask the agent at shipping point for particulars.

All business communications should be addressed to the
ARIZONA SCHOOL OF MINES,
WM. P. BLAKE, Director.
TUCSON, Pima Co., Arizona.

THE TERRITORIAL MUSEUM.

The Arizona Legislature, Session 1893, passed an Act establishing a general Museum at the University. The object of this is to collect materials of all kinds illustrating the resources and development of the region, and particularly to preserve historical relics, including those pertaining to the aboriginal inhabitants.

Donations of specimens and collections will be received and acknowledged with thanks; but no provision has yet been made by the Legislature for the support of this department, aside from the appropriation of \$100 per annum for the salary of a Curator for two years.

A collection has been bequeathed by the late Edward Rose, of Pleasant Valley, Gila county, and the nucleus of additional collections will come from duplicates of the material obtained by members of the Faculty in their annual tours of scientific investigation in the Territory. The collection of minerals made by Mr. Sorin, at the World's Fair, in 1893, is also placed with the foregoing. Historical records of much value are being gradually accumulated 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. All records and data of any nature which can be gleaned are worthy of preservation, and we earnestly desire to have them placed in the University where they will always be accessible for reference.

A large and valuable collection of skins of the birds of Arizona has been deposited by Mr. Herbert Brown in the Museum.

It is desired to make the collection of ores and minerals fully represent the great mineral resources of Arizona, and specimens from all of the mines will be thankfully received and acknowledged.

All business communications should be addressed to
HERBERT BROWN, *Curator*.

SPECIAL NOTICE.

REDUCED RAILROAD RATES TO AND FROM THE UNIVERSITY.

The Southern Pacific, the Maricopa, Phoenix & Salt River Valley Railway Company and the G. V. G. & N. Railway from Bowie to Solomonville, have all very generously allowed students in attendance upon the University half rates when journeying to and from their homes. In the case of students coming to the University these half rates may be secured by notifying the President of the University a sufficient length of time in advance to enable him to secure from the proper authorities the permits. Students at the University may secure transportation to their homes and return, at any time, by making application at the office of the President of the University. The railroad authorities have very kindly supplied a quantity of blanks to be filled out and presented to the proper ticket agents. It is hoped and expected that like concessions may be secured over all the roads in the Territory, as students may desire to travel over the various lines in coming to the University.

LIST OF STUDENTS, 1896-1897.

SENIORS.

FISH, CLARA (General Course).....	<i>Tucson</i>
HILZINGER, GEORGE (Mining and Metallurgy).....	<i>Tucson</i>
WALKER, MARK JR. (Chemistry).....	<i>Tucson</i>

JUNIORS.

FERRIN, HATTIE (General Course).....	<i>Tucson</i>
GILLETT, GRANVILLE MALCOM (Electrical Eng.) ..	<i>Phoenix</i>
WATTS, MINNIE RUTH (General Course).....	<i>Congress</i>
YOUNG, JOHN DESHA (Civil Eng.).....	<i>Sacaton</i>

SOPHOMORES.

GARNETT, ROBERT F. (Mining and Metallurgy) ...	<i>Phoenix</i>
MILLER, ERIC REX (Electrical Engr.).....	<i>Prescott</i>
MORTON, ROBERT L. (Mining and Metallurgy)	<i>East Randolph, N. Y.</i>

FRESHMEN.

DRAKE, WILLIAM LORD.....	<i>Tucson</i>
FLOOD, IDA CLARISSA.....	"
HAYNES, FELIX GRUNDY.....	<i>Sacaton</i>
HILZINGER, LULU.....	<i>Tucson</i>
HUGHES, JESSIE.....	"
LOGAN, HARRY GAYLORD.....	<i>Phoenix</i>
MOORE, MARY ROSALIE.....	<i>Wilcox</i>
RICHMOND, CHARLES PIERCE.....	<i>Phoenix</i>
SPARKS, RALPH WALDO.....	"
SEARGEANT, JOHN WILLIAM.....	"
WALTERS, LORENZO.....	<i>Saric, Sonora, Mexico</i>
WELLES, FLORENCE 'RUSSELL.....	<i>Florence</i>

THIRD PREPARATORY.

ANDERSON, JAMES DAVID.....	<i>Tucson</i>
BROWN, STEPHEN.....	"
CASTANEDA, RUDOLPH.....	<i>Benson</i>
DRACHMAN, ALBERT PHIL.....	<i>Tucson</i>
FERRIN, CLARA.....	"
GAFF, JOHN HENRY.....	"
GRIJALVA, ARTURO OCHOA.....	<i>Benson</i>
KATZENSTEIN, LULU.....	<i>Tucson</i>
LEWIS, ROSA MAY.....	"
MONTOYA, FRECIA ROCA.....	"

RIGGS, LUCY.....	<i>Dos Cabezas</i>
RIESGO, DOLORES.....	<i>Tucson</i>
ROBERTSON, ETHEL MAUDE.....	<i>Tombstone</i>
STEELE, EDWARD.....	<i>Willcox</i>
VAUGHAN, LILLY AWRY.....	<i>Benson</i>
WELLES, PHILIP JUSTICE JR.....	<i>Florence</i>
WILKINSON, INA EUGENIE.....	<i>Tucson</i>

SECOND PREPARATORY.

BROWN, RUTH.....	<i>Tucson</i>
BURR, LILLIE BELL.....	<i>Bisbee</i>
COLBATH, JAMES SOLLITT.....	<i>Taylor</i>
CULVER, EMMA.....	<i>Tucson</i>
DRAKE, ALFRED GARFIELD.....	"
EARLEY, CLINTON CLAUDE.....	<i>Phoenix</i>
FINLEY, WILLIAM JAMES.....	<i>Tucson</i>
HERRICK, HENRY CLAY.....	<i>Fairbanks</i>
HUGHES, NELLIE LURINE.....	<i>Bisbee</i>
HUGHES, THOMAS.....	<i>Tucson</i>
JOHNSON, EMMA A.....	"
KOHLER, BERNIE.....	"
LONG, JAMES MARCUS.....	<i>Phoenix</i>
McKENNA, STEPHEN S.....	<i>Tucson</i>
MANSFELD, SAMUEL JACOB.....	"
ORNDORF, SETH BUFORD.....	"
PENDLETON, ALEXANDER GARLAND.....	<i>Globe</i>
PRIEST, GERTRUDE ELIZABETH.....	<i>Yuma</i>
RICHARDSON, BERYL.....	<i>Tucson</i>
RIGGS, BARNEY KEMP.....	<i>Dos Cabezas</i>
SCHMID, ARNOLD.....	<i>Bisbee</i>
TOWNER, NORA.....	<i>Albuquerque</i>
WATTS, CARRIE MABEL.....	<i>Congress</i>
WALKER, JOHN HENRY.....	<i>Dragoon Summit</i>
WALKER, SARAH JANE.....	"
WAKEFIELD, WALTER JAMES.....	<i>Tucson</i>
WOOD, IDA EVELYN.....	<i>Forest Grove</i>
YOUNG, LEVERING.....	<i>Sacaton</i>

FIRST PREPARATORY.

ALEXANDER, ANDREW CHARLES JR.....	<i>Fort Huachuca</i>
ARMITAGE, FANNY.....	<i>Benson</i>
ARMSTRONG, CARRIE.....	<i>San Francisco</i>
ARMSTRONG, VIOLET AGNES.....	"
BARR, NORMAN STIRRIT.....	<i>Tombstone</i>
BERNARD, ALLEN CHARTAN.....	<i>Tucson</i>
BROWN, HERBERT FREDERICK.....	<i>Bisbee</i>

BROWN, OWEN.....	<i>Tucson</i>
CASTANEDA, HENRY.....	<i>Benson</i>
CHEYNEY, BERENICE.....	<i>Tucson</i>
CONNELL, FRANCES SAFELY.....	"
COOPER, ALFRED F. LUDWIG.....	"
DIAL, JOSEPH H.....	<i>Safford</i>
DODGE, LILLIAN.....	<i>Tucson</i>
ELDRIDGE, MAUD.....	<i>Fort Grant</i>
FOURR, ROBERT NEWTON.....	<i>Dragoon Summit</i>
FELIX, ARTHUR.....	<i>Tucson</i>
FINLEY, CHARLES.....	"
GROESBECK, FRANK BENNETT.....	<i>Safford</i>
GOLDTREE, LEO.....	<i>Tucson</i>
HASSELGREN, HARRY WILLIAM.....	<i>Tombstone</i>
HARRISON, HARRY S. R.....	<i>Tucson</i>
HELLER, RUBY.....	<i>Thomas</i>
HERNDON, THOMAS AUSTIN.....	<i>Parkville, Mo.</i>
HILL, GEORGE VERNON.....	<i>Tombstone</i>
HOFF, MARY AMELIA.....	<i>Tucson</i>
HUGHES, ATANASIA.....	"
HUGHES, EDWIN ALVIN.....	<i>Bisbee</i>
LEVIN, CHARLES.....	<i>Tucson</i>
LIKES, AURELIA MAE.....	<i>Fairbanks</i>
MALONE, MARY JOSEPHENE.....	<i>Lordsburg, N. M.</i>
OWENS, MARY ELLA.....	<i>Safford</i>
ORNDORF, LEE HICKERSON.....	<i>Tucson</i>
PARKS, MADGE LESLIE.....	"
RIGGS, JOSEPHENE D.....	"
RIGGS, LULU K.....	"
SATTERWHITE, CLINTON MELVILLE.....	"
SCHAFFER, JOSEPH PETER.....	<i>Dos Cabezas</i>
STRAUSS, RUTH.....	<i>Tucson</i>
SEELEY, PEARL.....	"
STEINFELT, ALBERT LESTER.....	"
SIEWERT, ELSIE.....	"
TREVILLIAN, THOMAS.....	<i>Globe</i>
WARNER, ROBERT ELMORE.....	<i>Tombstone</i>
WEIR, MARTHA MCLAIN.....	<i>Tucson</i>
WOOD, LAURA CARMEL.....	<i>Fort Grant</i>
WOOD, PAULINE CLIFTON.....	<i>Tucson</i>
WOODWARD, DEAN.....	<i>Phoenix</i>
VANDERWALKER, GEORGE WILLIAM.....	<i>Dos Cabezas</i>
VANDERWALKER, JOHN HENRY.....	"

SPECIAL.

BAIRD, JOSEPH FRANCIS (Agriculture).....	<i>Concho</i>
BALCOM, WILLIAM ELDER (Assaying).....	<i>Santa Paula, Cal.</i>

CAMPBELL, ROBERT A. (Botany)	<i>Hanover, N. H.</i>
CARTY, HARRY AGUSTUS (Agriculture)	<i>Holbrook</i>
COSGROVE, JAMES (Assaying)	<i>Bisbee</i>
DARMS, HARRY (Bookkeeping)	<i>Tucson</i>
DRACHMAN, MYRA (General Course)	"
DELANO, CORA KATHRYN (Bookk'g & Stenography)	"
DWIGHT, HENRY EDWARDS (Spanish)	<i>Evanston, Ill.</i>
EVANS, FRANCES MAUD (Elocution)	<i>Tucson</i>
FREDLEY, IDA MAY (Bookk'g and Stenography)	<i>Yuma</i>
FISCHER, LUDWIG FRIEDRICK (Assaying) <i>San Francisco, Cal.</i>	
HESS, CHARLES (Assaying)	<i>Bisbee</i>
HEATON, CHARLES EDWARD (General Course)	<i>Tucson</i>
HILL, CORNELIA LOUISA (Bookk'g and Stenography)	"
HOWARD, OZORA W. (Assaying)	<i>Los Angeles, Cal</i>
HOLLADAY, LULU MAUDE (Bookk'g and Steno.)	<i>Tucson</i>
LUCE, ROBERT FOSCUE (Assaying and Metallurgy) ..	<i>Yuma</i>
MENDENHALL, MONTFORD	<i>Tucson</i>
MCDUFFIE, WILLIAM C.	"
NOON, EDWARD E.	" <i>Oro Blanco</i>
RIGGS, LIZZIE (Bookkeeping)	<i>Tucson</i>
RUTHERFORD, JOHN C. (Assaying)	<i>Clifton</i>
SERVOSS, WALTER E.	<i>Willcox</i>
SMITH, LAMBERT ROBERTSON (Assaying) ..	<i>Tucson</i>
SIEWERT, EDITH MARGRETT A. (Spanish)	"
SULTAN, WILLIAM SIMON (Assaying)	<i>Globe</i>
TAYLOR, EDWARD C. (Bookkeeping)	<i>Tucson</i>
WETHERELL, CHARLES E. (Mech. Engnr'g)	"
WOLFGANG, HARRY G. (Agriculture)	"
WOOD, EVA M (Latin)	<i>Fon-du-Lac, Wis.</i>
ZABRISKIE, VICTOR HUGO (Bookk'g and Steno.)	<i>Tucson</i>
ZIEGLER, ALBERT HENRY	"
ZUCK, MYRTLE (Botany)	<i>Holbrook</i>
Seniors	3
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Sophomores	3
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Total	151

MILITARY ORGANIZATION, 1896-97.

OFFICERS AND NON-COMMISSIONED OFFICERS.

Commandant of Cadets.....PROF. EDWARD M. BOGGS

First Lieutenant.....GRANVILLE MALCOM GILLETT
Second Lieutenant.....WILLIAM LORD DRAKE

Quartermaster Sergeant.....LUDWIG FRIEDRICK FISCHER
Chief Trumpeter.....WILLIAM SIMON SULTAN

First Sergeant.....JOHN DESHA YOUNG
Sergeant.....CHARLES PIERCE RICHMOND
Sergeant.....ERIC REX MILLER
Sergeant.....FELIX GRUNDY HAYNES
Sergeant.....ROBERT FISHER GARNETT
Sergeant.....GEORGE OJEDA HILZINGER
Corporal.....HARRY GAYLORD LOGAN
Corporal.....ALBERT PHILLIP DRACHMAN
Corporal.....JAMES MARCUS LONG
Corporal.....CHARLES EDWARD HEATON
Corporal.....HARRY THOMAS RUPKEY
Corporal.....JUSTUS PHILIP WELLES, JR.

WINNERS OF MEDALS, MAY 31st, 1897.

Commandant's Gold Medal for best drilled Cadet, won by Sergeant Charles P. Richmond.

The Devol Medal for best drilled recruit, won by First Sergeant John D. Young.

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