The University of Arizona.

Eighth Annual Register, 1898-99.

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Announcements for 1899-1900.

Tucson, Arizona,

1899.

FOR TABLE OF CONTENTS SEE END OF REGISTER.
CALENDAR 1899-1900.

1899.

September 18 and 19, \{ Entrance Examinations at University. Monday and Tuesday \}
September 20, Wednesday. \{ Registration Day. \}
September 21, Thursday. \{ Recitations Begin. Thanksgiving \}
November 30 and Dec. 1, Thursday and Friday. \{ Recess. \}
December 21, Thursday. \{ First Term Ends. \}

1900.

January 2, Tuesday. \{ Recitations Resumed. \}
February 1, Thursday. \{ First Semester Ends. \}
February 2, Friday. \{ Arbor Day. \}
February 5, Monday. \{ Second Semester Begins. \}
March 16, Friday. \{ Second Term Ends. \}
March 20, Tuesday. \{ Third Term Begins. \}
May 29, Tuesday. \{ Recitations End. \}
May 30, Wednesday. \{ Decoration Day. \}
May 31, Thursday. \{ Commencement Day. \}
BOARD OF REGENTS.

Ex-Officio.

Hon. N. O. Murphy...........................................Governor of Arizona.
Hon. R. L. Long................................................Superintendent of Instruction.

Appointed by the Governor of the Territory.

Hon. William Herring, Esq., Chancellor..........................................................Tucson.
Hon. H. W. Fenner, M. D. Secretary..............................................................Tucson.
Hon. Herbert B. Tenney, Treasurer...............................................................Tucson.
FACULTY, ETC.

MILLARD MAYHEW PARKER, A. M.,
President and Professor of Civics.

WILLIAM PHIPPS BLAKE, Ph. B., A. M.,
Professor of Geology, Metallurgy and Mining. Director
School of Mines.

JAMES WILLIAM TOUMEY, M. S.,
Professor of Biology. Botanist and Entomologist, Agricultural Experiment Station.

HOWARD JUDSON HALL, A. B.,
Professor of English. Librarian. Governor of Barracks.

ROBERT HUMPHREY FORBES, M. S.,
Professor of Chemistry. Chemist Agricultural Experiment Station.

SHERMAN MELVILLE WOODWARD, A. M.,
Professor of Mathematics. Meteorologist Agricultural Experiment Station.

FRANK YALE ADAMS, A. M.,
Professor of Ancient and Modern Languages and History.
Commandant of Cadets.

FRANK NELSON GUILD, B. S.,
Professor of Mineralogy. Assayer.

C. S. PARSONS,
Director Agricultural Experiment Station. Irrigation Engineer.
ALFRED JAMES McCLATCHIE, A. M.,
Professor of Agriculture and Horticulture.

DAVID HULL HOLMES,
Shopwork and Drawing.

MRS. MARY BERNARD AGUIRRE.
Instructor in History and Spanish.

MARGARET Bairde Randal,
Instructor in English Branches, Elocution and Physical Culture.

JAMES OLIN TURNER, A. B.,
Instructor in Preparatory Department.

MRS. EMMA MONK GUILD.
Instructor in Preparatory Department.

JOHN N. SUMMERS, B. S. D.,
Principal Preparatory Department. Instructor in Commercial Branches and Mathematics.

NORA TOWNER,
Stenography.

CHARLES PIERCE RICHMOND.
Military Instructor.

HERBERT BROWN.
Curator of Territorial Museum.

MRS. IMOGEN LA CHANCE.
Matron of Dormitory.
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 north-eastern states via Deming. 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 health resort, particularly for pulmonary patients.

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. 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 the 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 materially to 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 the 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 one hundred feet deep, and is of unusually good quality.

BUILDINGS.

The main building is two hundred by one hundred 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. They were originally designed as homes for instructors, but owing to the pressure for accommodation for students on the University grounds, two of the cottages have been converted into homes for young ladies and furnish excellent accommodations for twenty-five persons, while the third is used as a residence for the president.

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 accommodate two students.
A substantial brick building contains a suite of rooms for the use of the assaying department, and also a carpenter shop. The assay rooms contain a large smelting furnace with necessary muffle furnaces and other accessories, while the carpenter shop has an engine for power work, with lathes and other machinery for convenient operation.

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; the cottage occupied by the assistant horticulturist; and a temporary wooden building used as a young men’s dormitory. It is expected that in the near future the University will be able to add another wing to the stone dormitory, nearly doubling the present dormitory accommodations, and thus relieving the pressing demands in that direction.

EQUIPMENT.

LIBRARY.

The library is a department of the University that is increasing in efficiency with the growth of the institution. The books have been selected with great care, with a view both to the requirements of the various departments of instruction and also to the building up of a well-balanced, symmetrical collection of books. All the books are new and standard. The scientific works represent the highest and latest authority while the literary and historical works are the writings of the best known and most thoroughly tried authors. A main object in making the selection has been to furnish students with books of the highest class and to encourage them in habits of careful reading. Complete bound sets of the leading American periodicals, both literary and scientific, are being collected every year, so that the library is already valuable as a means of research in present-day problems.
The latest editions of the best cyclopædias and dictionaries are constantly at the students’ disposal. The leading American scientific and literary publications as well as the territorial newspapers are found in the reading-room. The reading-room and library are open to students for an average of eight hours each day.

Aside from government publications and pamphlets the library contains 3600 bound volumes of which 500 have been added during the present year. Of the whole number about three-fifths are scientific works, the remaining belonging to general literature, biography and history.

A complete card catalogue of authors and title is maintained.

CHEMISTRY.

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.

BIOLOGY.

The biological laboratories occupy three rooms in the south-west half, second floor of the south wing of the main building. These rooms are piped for gas and water and liberally provided with apparatus for research and for giving instruction on biological subjects. Students pursuing histological work are provided without expense 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 south-west, a large percentage being from Arizona, is an important factor in the equipment. Some fifty cases of insects, including one large cabinet, are 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 there are provided articulate and disarticulate human skeletons, plaster and papier-mache models of the important organs, and microscopical preparations illustrating the structure of the various tissues. The equipment also includes special apparatus for use of advanced students in the department.

AGRICULTURE AND HORTICULTURE.

Two rooms upon the first floor and near the central part of the main building are used for the work in the study of agricul-
ture and horticulture, and for the Agricultural Experiment station headquarters. The equipment is fairly complete. 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 in field work upon the University grounds. The general library contains many of the standard and most valuable of the recent publications upon agriculture in its various branches, and the science upon which it is based. 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.

ENGINEERING.

Recognizing the fact that the first actual engagement secured by the engineering student will be either in the field with a surveying party or in the shop or 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; stadia, level, and transit rods; aneroid barometers; odometers; pedimeters; 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; a 75-light Mather dynamo; a Westinghouse high speed engine; pumps, steam gauges, indicators, calorimeters, etc.

MINING AND METALLURGY.

The Department of Mining and Metallurgy 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, chloriding, cyaniding, and the electrical treatment of various kinds of ore in large or small lots. Power is furnished from a seventy horse-power boiler, detached from the main building, the steam being carried under-ground 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 jiggling machines of the Hartz pattern, the finer sizes being jigged upon bottom discharge machines, and the slime worked upon a double Rittinger percussion table, or otherwise as desired. A small apparatus, run by an 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 seeding, 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 500 pounds. A sampling mill permits of rapid crushing and mixing large samples preparatory to assaying.

The assay laboratory 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.
Three large rooms in the basement of the main 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 darkened. A beam of sunlight, directed by a 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 supplied with gas, water, electric currents from primary and storage batteries, and from the large dynamo:

Adjacent to the lecture room are the physical laboratory and the apparatus room in which are kept the many 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; 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 Wimshurst electric machine; Leyden jars; Geissler’s and Crooke’s tubes; diapasons; a sonometer; lenses, prisms, and mirrors of all kinds; a polarscope; steam gauges; indicators; calorimeters; and a full equipment of simple pieces of apparatus for the use of elementary classes.

REQUIREMENTS FOR ADMISSION, ETC.

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

For admission to the freshman class, applicants must be at least sixteen years of age and must pass satisfactorily exam-
institutions in subjects sufficient to give nine credits as described below. One study pursued satisfactorily for one year, one period a day, as ordinarily taught in high schools, entitles a student to one credit. The subjects upon which examinations must be passed and the credits assigned, are:

Mathematics, including arithmetic, algebra, and plane geometry—3 credits.

English—2 credits.

History and Civics—1 credit.

Elementary Science—1 credit.

Latin, German, French or Advanced Science—2 credits.

The scope of work required in the various subjects is indicated below.

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 the following English classics or acceptable equivalents: Longfellow's Evangeline; Irving's Sketch Book; Scott's Ivanhoe and Lady of the Lake; Whittier's Snow-Bound; Shakspere's Julius Caesar and Merchant of Venice; George Eliot's Silas Marner.

History—Ancient, Mediaeval and Modern. (The textbook in use in the preparatory department is Meyers's General History.) United States History and the Science of Government.

Elementary 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’ First Latin Book” and four books of Cæsar’s “Gallic War” or an equivalent.

**Advanced Science**—Two years’ creditable work in biological science, or chemistry, or physics, at least one-half of which has been laboratory work, the quality and scope of which must be shown by the original laboratory note books.

Beginning with September, 1900, the entrance requirements will be increased to twelve credits, including:

*Drawing and Manual Training*, or additional text-book subjects—3 credits.

If any language is offered it must be to the extent of two credits, as a single year’s study of a language is not considered to have sufficient educational value to be entitled to credit.

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.

**Registration of Students.**

All students are required to register on registration day at
the beginning of the year 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 or she is to attend, and a receipt for the matriculation fee, when paid. No class card will be issued until all dues are paid. No change 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 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.

DISCIPLINE.

It is understood that students enter the institution with serious purposes and that they will cheerfully conform to such regulations as may be made by the faculty. It is the aim of the faculty to maintain a high standing of integrity and a strict regard for truth. Any attempt on the part of a student to present as his own the work of another, or to pass any test or examination by unfair means is considered a most serious offense. Any conduct harmful to the moral standing of the school will, after due admonition, render a student liable to dismissal.

PRIZES.

Two prizes were awarded on commencement day, 1898, as follows:

A gold medal offered by Mr. Hugo Zeckendorf, of Tucson, for the best forensic discussion, to Nott E. Guild.

A silver medal, offered by the Faculty, for the second best forensic discussion, to Charles P. Richmond.

VACATIONS, ACCOMMODATIONS, ETC.

VACATIONS AND HOLIDAYS.

Short vacations (as per Calendar on page 3) are taken at Christmas and Easter. 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 dormitory building.

A separate home for young ladies is in charge of an experienced and capable matron, who has constant supervision of those rooming in "ladies' hall."

There is no charge for tuition in the University. 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; charges for fuel and lights will be made to cover cost. By resolution of the Board of Regents of the University, board is to be paid in advance at the beginning of each term. Checks, P. O. 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.
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 are obtained direct from the publishers through a book association managed on the co-operative plan under the direction of the Faculty, and may vary in cost to a student between five and ten dollars in different years of the course.

Economical students should readily go through the year with $150.00 to $175.00 excluding clothing.

Members of the batallion 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 been $15.50. 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 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 SOCIETIES.

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

The Lescha, a secret society of limited membership, open only to students of college grade, conducts regular meetings at the University. Its purpose is to promote the literary taste
and attainments of its members by rigid and serious work, special attention being paid to the art of debating, as also to gaining familiarity with parliamentary usages by constant practice.

**ATHLETICS.**

Encouragement is given to athletics and athletic organizations are under the immediate care of a committee of the faculty. Membership in these organizations is subject to forfeiture for failure in any regular line of school work.

**MILITARY TRAINING.**

Appreciating the importance of military drill as a physical exercise and as an aid to discipline, and in compliance with law, 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 of 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 re-
ceived from the makers in order to secure good materials and workmanship at a minimum cost.

An equivalent of the time occupied in military drill will be devoted by female students to physical culture, vocal 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.

Three regular four-year courses of study leading to a degree are offered, viz:

Literary and Scientific.

Engineering and Mining.

Agriculture.

In each course the work is partly required and partly elective as shown in schedules later. Four hours of recitation a day are required in each course as full work. In laboratory work two to two and one-half hours are 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, without having taken the required work of the lower years of the course; provided, however, that in all such cases they show to the satisfaction of the instructor giving the course that they can take the work with profit to themselves and without detriment to the work of the regular class.

Work is offered in the following lines: English language and literature, Latin, Spanish, French, German, history and
civics, mathematics, physics, chemistry, biology, mineralogy and geology, drawing and shop work, engineering, mining.

The exact scope and nature of the various courses are shown in detail later.

Students, who have completed satisfactorily the required work and the specified amount of elective work in either of the four year courses, 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 and requiring not less than one year.

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COURSES OF STUDY 1899-1900.

LITERARY AND SCIENTIFIC. ENGINEERING AND MINING.

FRESHMAN YEAR.

<table>
<thead>
<tr>
<th>Required—</th>
<th>Required—</th>
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<tbody>
<tr>
<td>English 1, 2.</td>
<td>English 1, 2.</td>
</tr>
<tr>
<td>Elective—</td>
<td>Mathematics 1, 2.</td>
</tr>
<tr>
<td>Mathematics 1, 2.</td>
<td>Shopwork 1, 2.</td>
</tr>
<tr>
<td>Latin 1, 2.</td>
<td></td>
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<tr>
<td>French 1, 2.</td>
<td>French 1, 2.</td>
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<tr>
<td>German 1, 2.</td>
<td>German, 1, 2.</td>
</tr>
<tr>
<td>History 1, 2.</td>
<td>Spanish 1, 2.</td>
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<td>Spanish 1, 2.</td>
<td>History 1, 2.</td>
</tr>
<tr>
<td>Drawing 1, 2.</td>
<td></td>
</tr>
</tbody>
</table>
SOPHOMORE YEAR.

<table>
<thead>
<tr>
<th>Required—</th>
<th>Required—</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective—</td>
<td>Surveying 1, 2.</td>
</tr>
<tr>
<td>Mathematics 3, 4.</td>
<td></td>
</tr>
<tr>
<td>Latin 3, 4.</td>
<td></td>
</tr>
<tr>
<td>French 3, 4.</td>
<td></td>
</tr>
<tr>
<td>German 3, 4.</td>
<td></td>
</tr>
<tr>
<td>Spanish 3, 4.</td>
<td></td>
</tr>
<tr>
<td>Chemistry 1 \ Chemistry 2</td>
<td></td>
</tr>
<tr>
<td>History 3, 4.</td>
<td></td>
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</tbody>
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<th>Elective—</th>
<th></th>
</tr>
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<tr>
<td>Mathematics 3, 4.</td>
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<td>Latin 3, 4.</td>
<td></td>
</tr>
<tr>
<td>French 3, 4.</td>
<td></td>
</tr>
<tr>
<td>German 3, 4.</td>
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<tr>
<td>Spanish 3, 4.</td>
<td></td>
</tr>
<tr>
<td>Drawing 3, 4.</td>
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<tr>
<td>History 3, 4.</td>
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</tbody>
</table>

JUNIOR YEAR.

<table>
<thead>
<tr>
<th>Elective—</th>
<th>Required—</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics 5, 6.</td>
<td></td>
</tr>
<tr>
<td>Political Economy 1, 2.</td>
<td></td>
</tr>
<tr>
<td>Anatomy and Physiology 1.</td>
<td></td>
</tr>
<tr>
<td>Zoology 1.</td>
<td></td>
</tr>
<tr>
<td>Mineralogy 1, 2.</td>
<td></td>
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<table>
<thead>
<tr>
<th>Elective—</th>
<th>Required—</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mineralogy, Assaying 1, 2.</td>
<td></td>
</tr>
<tr>
<td>Chemistry 3, 4.</td>
<td></td>
</tr>
<tr>
<td>Political Economy 1, 2.</td>
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<tr>
<td>Drawing 5, 6.</td>
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SENIOR YEAR.

<table>
<thead>
<tr>
<th>Elective—</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Psychology 1, History of Education and Pedagogy 1.</td>
<td>Physics and Mechanics 1, 2.</td>
</tr>
<tr>
<td>Geology 1, Astronomy 1.</td>
<td></td>
</tr>
<tr>
<td>Logic 1, Ethics 1.</td>
<td></td>
</tr>
<tr>
<td>And other electives not previously taken.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Elective—</th>
<th>Required—</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metallurgical Chemistry 1, 2.</td>
<td></td>
</tr>
<tr>
<td>Mining and Metallurgy 1, 2.</td>
<td></td>
</tr>
<tr>
<td>And other electives not previously taken.</td>
<td></td>
</tr>
</tbody>
</table>

TABULAR VIEW.

The following list comprises both required and elective subjects arranged by semesters (half years) and periods of recitation. Unless otherwise stated five recitations per week are required in each subject. The Arabic numerals refer to courses as outlined elsewhere. Subjects to which a * is prefixed will be taught in 1899-1900 and each alternate year thereafter. Those to which a † is prefixed will be taught in 1900-01 and each alternate year thereafter. Those not thus designated are taught each year. Students are required to make such choice as will avoid conflict.
### PERIOD I.

**First Half Year**
- English 1.
- French 3.
- German 3.
- Mathematics 5.
- Psychology 1.
- Spanish 3.

**Second Half Year**
- English 2.
- French 4.
- German 4.
- History of Education 1.
- Spanish 4.

### PERIOD II.

**First Half Year**
- Drawing 1 M. W. F.
- Elocution 1 Tu. Th.
- English 3.
- Economics 1.
- History 3.
- Mining and Metallurgy.

**Second Half Year**
- Drawing 2 M. W. F.
- Elocution 2 Tu. Th.
- English 4.
- Economics 2.
- History 4.
- Mining and Metallurgy 2.

### PERIOD III.

**First Half Year**
- Drawing 3.
- Drawing 5.
- Elocution 3 Th.
- English 5.
- Logic 1.
- History 1.
- Mathematics 1.

**Second Half Year**
- Drawing 4.
- Drawing 6.
- Elocution 4 Th.
- English 6.
- Ethics 1.
- History 2.
- Mathematics 2.

### PERIOD IV.

**First Half Year**
- Astronomy 1.
- Drawing 3.
- Drawing 5.
- French 1.
- German 1.
- Mathematics 3.
- Spanish 1.

**Second Half Year**
- Drawing 4.
- Drawing 6.
- French 2.
- Geology 1.
- German 2.
- Mathematics 4.
- Spanish 2.
## PERIOD V.

<table>
<thead>
<tr>
<th>First Half Year</th>
<th>Second Half Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy and Physiology 1</td>
<td>Botany 1.</td>
</tr>
<tr>
<td>Chemistry 1 Tu. Th.</td>
<td>Chemistry 2 Tu. Th.</td>
</tr>
<tr>
<td>Chemistry 3 M. W. F.</td>
<td>Chemistry 4 M. W. F.</td>
</tr>
<tr>
<td>Latin 1.</td>
<td>Latin 2.</td>
</tr>
<tr>
<td>Metallurgical Chemistry 1 M. W. F.</td>
<td>Metallurgical Chemistry 2 M. W. F.</td>
</tr>
<tr>
<td>Mineralogy &amp; Assaying 1 Tu. Th.</td>
<td>Mineralogy and Assaying 2 Tu. Th.</td>
</tr>
<tr>
<td>Physics and Mechanics †</td>
<td>Physics and Mechanics 2.</td>
</tr>
<tr>
<td>†Surveying 1 M. W. F.</td>
<td>†Surveying 2 M. W. F.</td>
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</table>

## PERIODS VI & VII.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Anatomy and Physiology 1</td>
<td>Botany 1.</td>
</tr>
<tr>
<td>Chemistry 1 Tu. W. Th.</td>
<td>Chemistry 2 Tu. W. Th.</td>
</tr>
<tr>
<td>Chemistry 3 M. F.</td>
<td>Chemistry 4 M. F.</td>
</tr>
<tr>
<td>Metallurgical Chemistry 1 M. F.</td>
<td>Metallurgical Chemistry 2 M. F.</td>
</tr>
<tr>
<td>Mineralogy and Assaying 1 Tu. W. Th.</td>
<td>Mineralogy and Assaying 2 Tu. W. Th.</td>
</tr>
<tr>
<td>†Surveying 1 M. F.</td>
<td>†Surveying 2 M. F.</td>
</tr>
</tbody>
</table>
EXPLANATORY OF COURSES OF STUDY.

ENGLISH.—Prof. Hall.

The object of the work in English is, first, to promote a taste for literature as a means of pleasure and of culture, and secondly, by means of the study of eminent authors to cultivate a correct standard of literary judgment and taste. With these objects in view the method of work is intensive rather than extensive. A few authors are chosen for careful study, and sufficient time is spent upon these to acquire accurate ideas of their individual merits and style.

In that part of the work devoted to composition the aim is to teach a direct, vigorous style as the outgrowth of clear-cut, accurate thought.

ENGLISH 1, 2, I—LITERATURE; NINETEENTH CENTURY PROSE.—Freshman Year.—A few of the leading prose writers of the nineteenth century are studied chiefly as a basis for appreciative, sympathetic criticism. The following authors and works will occupy the greater part of the time: Macaulay, select essays; Carlyle, Heroes and Hero-Worship; DeQuincey, Confessions. Minto’s Manual of English Prose is used as a guide.

ENGLISH 3, 4, II—RHETORIC AND COMPOSITION.—Sophomore Year.—Genung’s Practical Rhetoric and Rhetorical Analysis and Baker’s Specimens of Argumentation (modern) are used as text-books. One-third of the time is devoted to composition, chiefly expository and argumentative, briefs and finished papers being required once a week of each student at that stage of the work.

ENGLISH 5, 6, III—LITERATURE.—Junior Year.—Shakspeare, at least five plays; Milton, minor poems and Paradise
Lost; Wordsworth, Keats, Shelley and Tennyson are studied as extensively as time will allow.

**LATIN.—Prof. Adams.**

The aim of the work in Latin will be to produce in the student the ability to read the original with an appreciation of its meaning and beauty without conscious translation into the vernacular. Incidentally and of no less value, it is expected that his power of observation, mental ability, and knowledge of the use of English will be greatly strengthened. The instruction throughout the course will be shaped with the above ends in view. The laboratory method will be used in part, giving to each pupil the opportunity of doing as much work as his strength and knowledge of the subject will allow.

**SUB-COLLEGIATE.**

**LATIN A—FIRST YEAR**—Special attention will be given to vocabularies; an accurate knowledge of all inflectional forms will be insisted upon, and the student will be led to investigate and discover the underlying laws and principles on which these are based. Attention will be paid to the Latin sentence structure, and the comparison of this with English sentence structure, and in translation from Latin to English, idiomatic English will be insisted upon, while in translation from English into Latin, attention will be called to the English grammatical structure and its comparison with the Latin. In the latter part of the year easy Latin, like Viri Romae, will be read. Textbook: Collar's First Latin Book.

**LATIN B—SECOND YEAR**—An introduction to the study of Roman literature. Selections from Cæsar, the Lives of Nepos, and similar Latin will be read with much sight reading. The text will be studied critically with translation into idiomatic English. Prose composition will be continued throughout the
year with incidental study of history and geography. Textbooks: Allen and Greenough's Grammar and texts; Daniell's or Bennett's Prose Composition.

COLLEGIATE.

Latin 1, 2, V.—Third Year—Cicero's Orations and Vergil's Aeneid will be read. While the same principles will govern the work as in the second year, more attention will be paid to sight reading and to the reading of the original with an appreciation of its meaning in the same way that English is read. In connection with the reading of Cicero a thorough study will be made of the Roman system of government and the customs and occupations of the people. In connection with the Aeneid a similar study will be made of Latin poetry and the scansion of the hexameter, also of the religious rites and beliefs of the ancients together with the principal mythological characters. Throughout the course attention will be paid to word study and English derivatives of Latin words.

Latin 3, 4, V.—Fourth Year—The work will consist of selections from Livy, Book XXI, Cicero De Senectute and De Amicitia, Horace, Odes and Satires, with sight reading. The student will be taught to appreciate the selections read as literature. Careful attention will be given to syntax and idiom, but the aim will be facility in reading. The contemporary literature will also be studied.

FRENCH AND GERMAN.—Prof. Adams.

The work in the modern languages will in general have the same end in view as that in Latin, and will be made an exact equivalent for the work in Latin as far as possible.

French 1, 2, German 1, 2, IV—First Year—Careful at-
tention will be given to fixing correct habits of pronunciation together with thorough drill in forms and syntax. Constant attention will be paid to translation at sight and at hearing, and to some extent to conversation. Text-books: French; Grandgent's Shorter Grammar, Super's French Reader, Heath's Texts. German; Collar's Shorter Eysenbach, Joynes-Meissner's German Grammar, Harris' German Composition, Heath's texts.

SECOND YEAR—French 3, 4, I—Standard prose will be read, selections being taken from Dumas, Hugo, and Moliere, together with sight translations and composition. As far as possible French will be made the language of the class room. German 3, 4, I—The same general plan will be followed. Standard prose and a play of Schiller will be read, German being the language of the class room.

HISTORY, CIVICS AND PHILOSOPHY.

HISTORY 1, 2, III—Freshman Year—History of England. Green's Short History will be made the basis of the work, but the laboratory method will be followed. Especial stress is laid upon the development of institutions and constitution, the relation of cause and effect and the unity of history. Original sources will be consulted as far as possible. A thesis is required.

HISTORY 3, 4, II—Sophomore Year—American history throughout the year. After a brief survey of the colonial period a detailed study is made of the formation of the Union and the political and constitutional history of the United States. Letters and speeches of American statesmen, public documents and special histories will constitute the basis of the work. A thesis is required.

ECONOMICS 1, 2, II—Junior Year—Political Economy and Civics. The historical method is used and the subject rather than any one writer's presentation of it is treated. The instruc-
tion includes recitations, prescribed collateral reading, classroom discussion, with occasional lectures. Much attention is paid to the discussion of practical cases while the subject of banking and finance is fully treated. Thesis and review exercises are required.

**Psychology 1, I—First Semester**—Lectures, recitations, and collateral reading, with special consideration of the subject as applied to teaching. Text-book: James' Briefer Course.

—Prof. Woodward.

**History of Education—Pedagogy 1, I—Second Semester**—Lectures giving a brief but comprehensive outline of the school system of ancient, mediaeval, and modern countries, with special study of leading educators, such as Socrates, Comenius, Pestalozzi, Froebel, Mann, etc. The course will also cover the present trend of pedagogical thought and practice including methods of teaching and school management.

—Prof. Adams.

**Spanish.—Mrs. Aguirre.**

A thorough course of instruction in Spanish grammar and in reading, writing, and speaking the language.

**Spanish 1, 2, IV—Freshman Year**—De Tornos' Combined Spanish Method is used as the basis of the work. Much attention is given to writing and speaking Spanish. During the latter part of the year selections from Cartillas Historicas are read.

**Spanish 3, 4, I—Sophomore Year**—The aim of this course will be to teach the student to read and speak the Spanish language with a fair degree of fluency. Much practice in composition and letter writing will be given and various selections from different authors read in class. Spanish will be the language of the class room.
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 multitudinous applications where they are indispensable. The courses in mathematics depend upon each other to such an extent that they can be taken only in the order in which they are printed.


MATHEMATICS 3, 4, IV—Higher Algebra—One-third sophomore year.


MATHEMATICS 5, 6, I—Calculus—Junior Year—Lectures and recitations covering differential and integral calculus, with special reference to their use in the various branches of engineering. Some notice is also taken of the modern branches of higher mathematics which are led up to and investigated by means of the calculus. Text-book: Hall's Differential and Integral Calculus.

Surveying 1, 2, V, VI, VII—Sophomore Year—Recitations and field work using the level, compass, and transit, cover-
ing the elements of land, topographical, railroad, and mine surveying. Text-book: Raymond’s Plane Surveying.

CHEMISTRY.—Prof. Forbes.

The instruction in chemistry has two main objects in view—first, to promote general culture; and second, to introduce students to technical work, especially in mining. The first year’s work in general chemistry and qualitative analysis places the student in an advantageous position to take up the study of mining and metallurgy.

CHEMISTRY 1, 2, V, VI, VII—GENERAL CHEMISTRY—First Semester—Sophomore Year—The subject is introduced by a course of lectures and experiments by the instructor, and this is supplemented by recitations and laboratory practice. Emphasis is laid on the laboratory work, and special effort is made to secure its full value both as a source of information and as a means of training students in habits of careful observation and skillful manipulation. Text-book: Remsen’s Briefer Course.

QUALITATIVE ANALYSIS—Second Semester—Sophomore Year—This subject is pursued with careful attention both to the principles of the science and its technical execution. At the end of the course a fairly bright student is expected to be able to determine the composition of any unknown substance submitted to him for examination. Text-book: Eliot and Storer’s Qualitative Analysis, and various reference books.

CHEMISTRY 3, 4, V, VI, VII—QUANTITATIVE ANALYSIS—Junior Year—This course has technical value in connection with the mining and metallurgical courses besides training the student in habits of thorough and accurate work.

PHYSICS AND MECHANICS.—Prof. Woodward.

PHYSICS AND MECHANICS—Senior Year—First Semester.—Lectures, recitations, laboratory work, and drawing. Mechanics of solids, liquids and gases; statics and dynamics; elementary
graphical statics applied to simple roof and bridge trusses with dead, moving, wind, and snow loads; friction and efficiency of machines.

Second Semester—Heat and a study of the steam engine. A knowledge of calculus is necessary for this course. Textbooks: Hall & Bergen's Physics and Trautwine's Engineer's Pocket-Book.

BIOLOGY.—Prof. Touney.

In addition to the elementary work provided in the preparatory course, as elsewhere stated, this department offers three lines of work, viz: botany, zoology, anatomy and physiology.

Botany 1, V, VI, VII—The preparation for the work in botany consists of the course in elementary biology given in the preparatory department, or its equivalent. The work is of elementary character, covering in a general way the histology, physiology, morphology, and systematic relationships of the more important types of plant life. The instruction is in the form of laboratory work with occasional lectures covering the subjects under investigation. Bessey's Botany, advanced course, is used as a text-book, supplemented by the following as necessary reference books: Gray's Structural Botany, Sach's Physiology of Plants; Goebel's Outlines of Classification and Special Morphology. The botanical library contains the more important literature bearing upon the systematic botany of this region.

Zoology 1, V, VI, VII—In the course in zoology attention is given to the principles of classification; the structure and development and the comparative anatomy of types of animal life. Considerable time is occupied in laboratory work, making dissections and in microscopical study of animal histology. Orton's Comparative Zoology is the text-book in use.

Anatomy and Physiology, 1, V, VI, VII—One full course is given in human anatomy and physiology. That this sub-
ject may be represented in a creditable manner the laboratory is provided with articulate and disarticulate human skeletons, casts representing the vital organs and numerous charts. Martin's Human Body, advanced course, is used as a text book, the daily recitations being supplemented by lectures and laboratory investigations.

In addition to the courses as given above, this department offers facilities for more advanced work or original research in botany to those qualified to pursue the same.

MINERALOGY AND GEOLOGY.

MINERALOGY AND ASSAYING, 1, 2, V, VI, VII—Junior Year
—A year's course of lectures, recitations, and laboratory work covering (a) crystallography, (b) blow-pipe analysis and determinative mineralogy, and (c) fire assaying. At the end of the course the student is expected to know at sight all the common ores and minerals, and to be able to determine and classify, by the use of the blow-pipe and a few simple reagents, any less common mineral he may meet. A study is also made of the occurrence, uses, and distinctive characters of the most important minerals.

—Prof. Guild.

METALLURGICAL CHEMISTRY 1, 2, V, VI, VII—Senior Year.
This work is intended to fit the student accurately to make determinations of gold, silver, and lead in bullion, ores, and furnace products, by the furnace method, and to become familiar with the standard methods used in this country for the determination of all the metals of economic metallurgical importance. The course also includes instruction in the complete analysis of alloys, ores, slags, mattes, etc. The text-books required are Fresenius' Quantitative Analysis or some similar standard work, and Furman's Manual of Practical Assaying.

—Prof. Guild.

GEOLOGY 1, 2, IV—Senior Year. Lectures, recitations and examination of specimens from the large collections in the
museum, covering the subjects of dynamic, historical, and economic geology. Text and reference books: Dana, Le Conte, Geike.

—Prof. Blake.

**DRAWING AND SHOPWORK.**

The drawing course is designed to be helpful to the study of the arts and sciences wherever graphic representation of the subject is possible. Historical ornament is studied in connection with the history course. Sketches of apparatus are made in connection with the courses in physics and chemistry. Accurate instrumental drawings are made of the exercises in the courses of geometry, descriptive geometry, shop work and all the branches of engineering. The application of useful drawing is thus apparent at every stage of the student's development.

**Drawing 1, 2, II—Freshman Year**—Drawings involving plane and solid geometry, shop drawings, tracing, geographical drawing preparatory to plain surveying.

**Drawing 3, 4, III, IV—Sophomore Year**—Descriptive geometry, scenographic projection. Free hand sketching of simple outlines from observation, memory and original ideas.

**Drawing 5, 6, III, IV—Junior Year**—Graphics, civil and mining engineering drawings, architectural drawing, stereotomy.

**Shop-work 1, 2, VI, VII—Freshman Year.**—The purpose of the shop-work is to furnish the student a knowledge of the principles involved in wood and metal manufactures. It is the aim to make the shops particularly useful to the mining course. The student learns by experiment the necessity of all the details and technical terms of the modern shop. All work is executed from drawings and as far as possible the conduct of the shop conforms to the most approved shop practice of the day.
AGRICULTURAL COURSE.


JUNIOR YEAR—Farm Crops, Breeds of Live Stock, Botany, Anatomy, Zoology, Entomology, Floriculture, Landscape Gardening, Forestry, Horticulture.

SENIOR YEAR—Stock Breeding and Feeding, Dairying, Veterinary Medicine, Geology, Fruits and Fruit Culture, Vegetables and Vegetable Culture.

SPECIAL COURSES.

In addition to the foregoing regular courses the special courses enumerated below have been established by the Board of Regents in response to the demand for them.

SHORT COURSE OF INSTRUCTION IN ASSAYING.

In order to meet the needs of many young men who are desirous of learning the art of assaying the common ores and metals, and who are not able to give the time required in the full course of study for graduation and the degree of mining engineer, the Board of Regents has approved of a short course of instruction in practical assaying, metallurgy, etc., to be given in the laboratories and mill.

This course commences with the first college term in each year and requires at least two years of time, but students are advised to take the full 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.

Young men desiring to take this course are required to be at least eighteen years of age, to have good health, and to have a sufficient knowledge of English and arithmetic. They must agree to observe the rules and regulations of the University.

Instruction is gratuitous, but each student is required to pay the regular entrance or matriculation fee of five dollars, and to pay the cost of materials, glassware, and apparatus used by him. For this purpose a deposit of ten dollars will be required each term in advance, and any balance will be refunded.

If for good reasons students are unable to enter at the commencement of the year, they may be received at a later date, upon passing a satisfactory examination upon the studies already passed over by the other students in the course.

Experience with special students in assaying during their stay in the University, and observation of their careers after leaving the institution have shown the following course of study to accomplish fair results with bright students.

Although the right is reserved to require this course of study of those special students who are in full attendance, it may be varied according to the aptitudes or necessities of those concerned.

TWO YEARS COURSE IN ASSAYING.

FIRST YEAR.

General chemistry (1½ terms); Qualitative analysis (1½ terms).
Mathematics (3 terms).
English or Spanish (3 terms).
Practical free-hand drawing and shop-work (3 terms) or Physics (3 terms).
SECOND YEAR.

Mineralogy and blow pipe analysis (2 terms); Fire assaying (1 term).
Quantitative analysis (1 term); wet assaying (2 terms).
Mathematics (3 terms).
Geology (2 terms); Economic geology (1 term).

TEXT-BOOKS.

The following text-books and others are used:
Chemistry—Remsen, Eliot & Storer, Fresenius and others.
Assaying—Ricketts, Brown, Furman, Aaron.
Mineralogy—Dana, Brush's Determinative Mineralogy, Dana's How to Study Minerals.
Geology—Dana, LeConte, Geikie.

COMMERCIAL COURSE.—Prof. Summers.

In order to meet the present demands, it is thought best to establish a two years' course in the following Commercial Branches: Bookkeeping, taught by the modern budget system, Commercial Law, Commercial Arithmetic, Business Correspondence, Commercial Geography, Civics, Spelling and Penmanship.

The course offered is thorough in all the details of office practice. The system that we now use and the methods which we employ will eminently fit the students for thorough, intelligent accountants and for citizenship.

Typewriting and stenography may be pursued simultaneously with the regular commercial branches and upon the completion of both a certificate setting forth the fact will be granted.
SUB-COLLEGIATE DEPARTMENT.

In this department the University carries on the work of a model High School, with the added advantages of the shopwork and drawing of the manual training department.

Students of sufficient age who have finished the study possible to them in their home schools are enabled to continue their preparation for college, at the University, under most favorable circumstances.

The splendid equipment of the scientific laboratories is available for use in this sub-collegiate work, wherever it can be used advantageously, thus rendering strong work in elementary science possible.

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 curriculum for those who may not be able to pursue their studies beyond this, while it gives a good preparation for college.

Especial attention is called to the manual and industrial features of the course whereby students of either sex may receive instruction in the principles of industrial drawing, while the shops and laboratories afford the young men an excellent opportunity to study practical mechanics and assaying.

Arrangements are being made to introduce a course in domestic science for the young ladies, which shall embrace at least instruction in plain sewing, dress making and cooking. The general usefulness of manual training is no longer a matter of doubt. Whenever there is a wise coordination of instruction in manual and in scholastic work, the product is an education by which its possessor is fitted for profitable and efficient service in the realm of business activity.
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 higher courses of the University without examination.

**SUB-COLLEGIATE COURSE OF STUDY.**

Numerals indicate number of recitations per week.

<table>
<thead>
<tr>
<th>FIRST YEAR</th>
<th>SECOND YEAR</th>
<th>THIRD YEAR</th>
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<tbody>
<tr>
<td>Algebra</td>
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<td>Geometry</td>
</tr>
<tr>
<td>English</td>
<td>5</td>
<td>English</td>
</tr>
<tr>
<td>Elementary Science</td>
<td>5</td>
<td>Civics</td>
</tr>
<tr>
<td>Drawing</td>
<td>4</td>
<td>Latin, or</td>
</tr>
<tr>
<td>Shopwork</td>
<td>6</td>
<td>German, or</td>
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<tr>
<td></td>
<td></td>
<td>French, or</td>
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<td></td>
<td>Drawing</td>
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<tr>
<td></td>
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<td>Shopwork</td>
</tr>
</tbody>
</table>

**AGRICULTURAL EXPERIMENT STATION.**

**STATION STAFF.**

MILLARD M. PARKER...........................................President.
C. S. PARSONS...............................................Director.
JAMES W. TOUHEY...........................................Botanist.
ROBERT H. FORBES........................................Chemist.
A. J. McC LATCHIE......................................Agriculturist and Horticulturist.
S. M. WOODWARD........................................Meteorologist.

MARK WALKER, JR...........................................Assistant Chemist.
ANGUS McBRIDE...........................................Stenographer.
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 development 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 to be 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.

In addition to the facilities for general instruction in the arts of mining, metallurgy and assaying, this department of the University is provided with a mill for working 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.
In accordance with the Legislative enactment approved March 3rd, 1899, the rates for assaying heretofore in force under the law of March, 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>Commodity</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>

All assays are made in duplicate and in the most careful and thorough manner.

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>Commodity</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 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. 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.

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
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, ton................................. 20.00
Large lots proportionately less; 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 labelled 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. 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.

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. If samples or letters containing the postal order are sent by registered mail, a delay of from one to three days is caused, as notice of arrival is given first and then the registered parcel must be sent for. A similar delay results from sending by express. The express company does not deliver parcels at the University. Delays often 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 enclosed in the package. Each sample should be labelled by a slip of paper, inside, giving the name and locality of the claim and the address 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 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, checks and money orders 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 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 at 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, the Santa Fe, Prescott and Phoenix railway, and the G. V. G. & N. railway from Bowie to Globe, have all 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 various lines in coming to the University.

THE TUCSON STREET RAILWAY.

Street cars make frequent and regular trips to the University grounds from the business center of the city, affording convenient transportation to and from the University.
MILITARY ORGANIZATION, 1898-99.

Commandant of Cadets, Prof. Frank Yale Adams.

COMPANY A.

Captain and Military Instructor.......................... Charles Pierce Richmond
1st Lieutenant...................................................... Rudolph Castaneda
2nd “ ................................................................. George Millard Parker
1st Sergeant......................................................... William Pennypacker Reid
Sergeant............................................................... Philip Matthew Reilley
“ “ ................................................................. Charles Signor Stout
“ “ ................................................................. Lee Hickerson Orndorff
“ “ ................................................................. Arnold Schmid
Corporal............................................................. James Newton Robinson
“ “ ................................................................. Lester Albert Steinfeld
“ “ ................................................................. Allen Chartan Bernard
“ “ ................................................................. George Martin

Chief Trumpeter.................................................... Stephen Sosa McKenna
Musician Corporal................................................... Henry E. Castaneda

ALUMNI ASSOCIATION.

Organized June 2nd, 1897.

CONSTITUTION.

In order to promote the interests of the University, to
secure unity among its graduates, and to foster an attachment to our Alma Mater, we do hereby constitute ourselves an association to be known as the ALUMNI ASSOCIATION OF THE UNIVERSITY OF ARIZONA.

I.

All persons who have received a degree from the University of Arizona are members of this association.

II.

All members of the faculty are honorary members of this Association.

III.

The officers of this Association shall be a president; one vice-president from each successive group of five classes, provided that when the last group shall number three classes it shall thereafter be entitled to a vice-president, a secretary and a treasurer.

IV.

There shall be an executive committee to consist of the following persons: The secretary and treasurer of the association, and three others chosen by the association, one of whom shall be designated as chairman of the committee.

V.

It shall be the duty of the executive committee to arrange the programmes for Alumni Day and other public occasions, to regulate the finances of the Association, to perform such other duties as may be imposed upon them, and to attend to all business of the Association not otherwise provided for.
VI.

The president shall be ex-officio a member of all committees. At each annual business meeting he shall appoint a committee of two persons to audit the treasurer's accounts.

VII.

The officers and the executive committee shall be elected by ballot at the annual business meeting to be held on Alumni Day, a majority of all votes cast being necessary for election.

VIII.

Any proposition to alter or amend these articles of Association must be made at a regular meeting, and have the assent of two-thirds of the members present.
LIST OF STUDENTS 1898-99.

SENIORS.

Morton, Robert Lee.................................................. East Randolph, N. Y.

JUNIORS.

Flood, Ida Clarissa.................................................. Tucson
Haynes, Felix Grundy................................................. Sacaton
Miller, Eric Rex...................................................... Phoenix
Richmond, Charles Pierce................................................ "
Seargeant, John W...................................................... "
Welles, Florence Russell............................................ Tucson

SOPHOMORES.

Castaneda, Rudolph................................................... Benson
Ferrin, Clara............................................................ Tucson
McBride, William A.................................................... Phoenix
Parker, George Millard................................................ Tucson
Steele, Edward.......................................................... Willcox

FRESHMEN.

Baker, Ellis Maria...................................................... Spokane, Wash.
Brotherton, Theodore Willard, Jr................................ Los Angeles, Cal.
Brown, Ruth............................................................... Tucson
Jones, Ewing Llewellyn................................................. Los Angeles, Cal.
MacChesney, Nathan W................................................. Chicago, Ill.
Orndorff, Seth Buford................................................ Tucson
Parker, Grace Miles.................................................... "
Reilley, Philip Matthew............................................. New York City, N. Y.
Schmid, Arnold.......................................................... Bisbee
Smith, Bessie............................................................. Tucson
Wakefield, Walter James................................................ "
Watts, Carrie May........................................................ Congress

THIRD PREPARATORY.

Armstrong, Carrie....................................................... Tucson
Armstrong, Violet........................................................ "
Culver, Emma............................................................. "
Horn, Guy W............................................................... Mesa
SECOND PREPAREDATORY.

Barkley, Hassie May ...........................................................Mesa
Bernard, Allen Chartan ..................................................Tucson
Brown, Owen ......................................................................Tucson
Castaneda, Henry ..........................................................Benson
Cheyney, Bernice ..............................................................Tucson
Fish, Florence .....................................................................
Hasselgren, Harry William ..............................................Tombstone
Hoff, Mary Amelia ...........................................................Tucson
Katzenstein, Alma Fanny ...................................................Tucson
Lapham, Ina O. ...................................................................
Likes, May Arelia ...............................................................Tombstone
Martin, George ..................................................................Tucson
Martin, Madge ...................................................................
Martin, Willie B. ...............................................................Tucson
McGuirk, Clara ...................................................................
Orndorff, Lee Hickerson .....................................................Kingman
Potts, Lallah Zaff ...............................................................Kingman
Richardson, Beryl .............................................................Tucson
Robinson, James Newton .................................................Safford
Roberts, Norman John ......................................................Benson
Roletti, Alberti Ralph ........................................................Tucson
Soldini, Constance Rosalie ................................................Tucson
Wood, Gwendolyn ..............................................................Tucson

FIRST PREPAREDATORY.

Adams, Edward Rue ............................................................Tucson
Olney, William Thomas ......................................................Solomonville
Stevens, George H. Jr. ............................................................
Whipple, William D. ...........................................................Clifton
Wilkinson, Reuben Earle ......................................................Tucson

SPECIAL.

Brown, Stephen (Mining and Assay) ......................................Tucson
Bauman, Samuel Frank (Spanish) ...........................................
Barber, Fred Arthur (Algebra and Spanish) ..................................... Newton, Mass.
Bird, Ruth Vivian (Commercial) .................................................. Tucson
Colbath, James Sollitt (Mining) .................................................... Holbrook
Cooley, Mrs. F. C. (French and English) ..................................... Tucson
Doan, Frank Wilson (Mining and Assay) ..................................... Florence
Drew, Helen (Spanish) ............................................................... Tucson
Dykes, Geo. N. (Commercial) ...................................................... Mesa
Felix, Arthur (Commercial) ....................................................... Tucson
Fleishman, Heerman Charles (Commercial) .................................. "
Guild, Roy E. (Commercial) ........................................................ "
Goodfellow, Emma L. (Commercial) ............................................ "
Goodwin, Lillie M. (Commercial) ................................................ "
Harley, Fannie (Commercial) ..................................................... Globe
Hadsell, Walter E. (Mining) ......................................................... Buckeye
Hunter, Lillian L. (Commercial) .................................................. Mason, Texas
Hughes, Annie (Commercial) ..................................................... Tucson
Hornbeck, Charles (Commercial) ................................................ Mesa
Leon, Antonio (Commercial) ..................................................... Tucson
Lopez, George P. (Commercial) ................................................... "
Micha, Claude (Commercial) ..................................................... Florence
Marrin, Catherine (Commercial) ................................................ Tucson
Merriman, Laurena (English and Physics) .................................... San Jose, Cal.
Montoya, Frecia (Commercial) .................................................... Tucson
Nutter, Beatrice (Elocution) ....................................................... "
Pearce, William (Commercial) .................................................... "
Pittock, Jennie P. (Elocution and Drawing) ................................. Nevilton, Pa.
Potts, Louise Francis (Commercial) ............................................. Kingman
Reynolds, William Graham (Spanish) ....................................... San Mateo, Cal.
Riggs, Lulu (Commercial) ........................................................ "
Scholey, Edward D. (Commercial) .............................................. Mayer
Scholey, Charles K. (Mining and Assay) .................................... "
Stevens, Elisa (Commercial) ..................................................... Tucson
Sullivan, Nora (Commercial) ..................................................... "
Towner, Nora (English) ............................................................ "
Trevillian, Thomas (Commercial) ................................................ "
Warren, Willis J. (Mining and Assay) ........................................ Phoenix
Whittle, Callie (Commercial) ..................................................... Tucson
Wilbur, Mary Strange (Commercial) .......................................... "
Williams C. D. M. (Spanish) .................................................... "
Winton, William R. (Commercial) .............................................. "

UNCLASSIFIED.

Amado, Alberto F. ................................................................. Tucson
Arevalo, Miguel D. ............................................................ Tucson
Arriaga, Alfredo ................................................................. Santa Cruz, Mex.
Brown, Maugh Southwood .................................................. Clifton
Bagley, Charles Francis ..................................................... Mesa
Cabral, John Jr. ...................................................................... La Colorada, Sonora
De la Ossa, Alberto ............................................................. Lochiel
De la Ossa, Osbaldo .............................................................. "
Davila, Leobaldo .................................................................. Magdalena, Sonora
Elías, Francisco ................................................................... Hermosillo, "
Ferreira, Jose ........................................................................ "
Fiske, Fannie May ................................................................. Globe
Federico, Elisa C. .................................................................. Tucson
Hamilton, Loyal ..................................................................... "
Mayer, Wilbur J. .................................................................... Mayer
Moyer, Charles Calvin .......................................................... Bonita
Pascoe, Benjamin Franklin ................................................. Thatcher
Patton, Jose ............................................................................ Redington
Reynolds, Ella Margarette ...................................................... Tucson
Riordan, Marie Elizabeth ....................................................... "
Steele, Fred Z. ....................................................................... Willcox
Santa Cruz, Edgardo ........................................................... Hermosillo, Sonora
Santa Cruz, Jose .................................................................... "
Suarez, Benito G. ................................................................. Solomonville
Suarez, Conrado F. ............................................................... Hermosillo, Sonora

GRADUATE STUDENTS.

Foucar, Louisa Henriette (Botany) ........................................ N. Woburn, Mass.
Walker, Mary Flint (Commercial and Spanish) ..................... Tucson

SUMMARY.

Graduate Students ................................................................. 2
Seniors ................................................................. 1
Juniors ................................................................. 6
Sophomores ............................................................... 5
Freshmen ................................................................. 12
Third Preparatory ........................................................... 12
Second ................................................................. 23
First ................................................................. 5
Special ................................................................. 42
Unclassified ............................................................... 25
Total ................................................................. 133
## INDEX.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accommodations</td>
<td>19</td>
</tr>
<tr>
<td>Admission</td>
<td>14</td>
</tr>
<tr>
<td>To Advanced Standing</td>
<td>16</td>
</tr>
<tr>
<td>To Regular Courses</td>
<td>14</td>
</tr>
<tr>
<td>Examinations for</td>
<td>14</td>
</tr>
<tr>
<td>Requirements for</td>
<td>14</td>
</tr>
<tr>
<td>Agricultural Experiment Station</td>
<td>42</td>
</tr>
<tr>
<td>Agriculture and Horticulture Equipment</td>
<td>10</td>
</tr>
<tr>
<td>Agriculture, Course in</td>
<td>37</td>
</tr>
<tr>
<td>Algebra, Requirements for Admission</td>
<td>15</td>
</tr>
<tr>
<td>Anatomy and Physiology, Instruction in</td>
<td>34</td>
</tr>
<tr>
<td>Arbor Day</td>
<td>19</td>
</tr>
<tr>
<td>Assaying, Instruction in</td>
<td>35</td>
</tr>
<tr>
<td>Assaying, Short Course in</td>
<td>39</td>
</tr>
<tr>
<td>Assaying, Schedule of Rates for</td>
<td>44</td>
</tr>
<tr>
<td>Assay Laboratory, Equipment for</td>
<td>13</td>
</tr>
<tr>
<td>Athletics</td>
<td>21</td>
</tr>
<tr>
<td>Biology, Equipment</td>
<td>10</td>
</tr>
<tr>
<td>Biology, Instruction in</td>
<td>34</td>
</tr>
<tr>
<td>Board, Cost of</td>
<td>19</td>
</tr>
<tr>
<td>Board of Regents</td>
<td>3</td>
</tr>
<tr>
<td>Book-keeping</td>
<td>39</td>
</tr>
<tr>
<td>Botany, Instruction in</td>
<td>34</td>
</tr>
<tr>
<td>Botanical Laboratory</td>
<td>10</td>
</tr>
<tr>
<td>Brown, Herbert, Collection of Birds, etc</td>
<td>10</td>
</tr>
<tr>
<td>Buildings</td>
<td>7</td>
</tr>
<tr>
<td>Calendar</td>
<td>2</td>
</tr>
<tr>
<td>Certificates of High School</td>
<td>16</td>
</tr>
<tr>
<td>Chemistry, Equipment</td>
<td>9</td>
</tr>
<tr>
<td>Chemical Laboratory</td>
<td>9</td>
</tr>
<tr>
<td>Chemistry, Instruction in</td>
<td>33</td>
</tr>
<tr>
<td>Civil Engineering, Equipment of</td>
<td>11</td>
</tr>
<tr>
<td>Climate</td>
<td>6</td>
</tr>
<tr>
<td>Commercial Law</td>
<td>39</td>
</tr>
<tr>
<td>Concentration of Ores, rates for</td>
<td>44</td>
</tr>
<tr>
<td>Courses of Instruction</td>
<td>22</td>
</tr>
<tr>
<td>Literary and Scientific</td>
<td>23</td>
</tr>
<tr>
<td>Agriculture</td>
<td>37</td>
</tr>
<tr>
<td>Topic</td>
<td>Page</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Engineering and Mining</td>
<td>23</td>
</tr>
<tr>
<td>Commercial</td>
<td>39</td>
</tr>
<tr>
<td>Short Course in Assaying and Mining</td>
<td>37</td>
</tr>
<tr>
<td>Sub-Collegiate</td>
<td>40</td>
</tr>
<tr>
<td>Courses, Special</td>
<td>37</td>
</tr>
<tr>
<td>Degrees given in the University</td>
<td>23</td>
</tr>
<tr>
<td>Discipline</td>
<td>18</td>
</tr>
<tr>
<td>Dormitories</td>
<td>7</td>
</tr>
<tr>
<td>Drawing, Instruction in</td>
<td>36</td>
</tr>
<tr>
<td>Employment for Students</td>
<td>20</td>
</tr>
<tr>
<td>English, Instruction in</td>
<td>27</td>
</tr>
<tr>
<td>English, Requirements for Admission</td>
<td>15</td>
</tr>
<tr>
<td>Equipment</td>
<td>8</td>
</tr>
<tr>
<td>Examinations for Entrance</td>
<td>15</td>
</tr>
<tr>
<td>Examinations for Entrance, Dates of</td>
<td>2</td>
</tr>
<tr>
<td>Expenses</td>
<td>19</td>
</tr>
<tr>
<td>Experiment Station, Agricultural</td>
<td>41</td>
</tr>
<tr>
<td>Faculty Meetings</td>
<td>17</td>
</tr>
<tr>
<td>Faculty, Members of</td>
<td>4</td>
</tr>
<tr>
<td>Fees and other Expenses</td>
<td>19</td>
</tr>
<tr>
<td>Founding of University</td>
<td>7</td>
</tr>
<tr>
<td>French, Instruction in</td>
<td>29</td>
</tr>
<tr>
<td>Furniture in Rooms</td>
<td>20</td>
</tr>
<tr>
<td>Geography, Requirements for Admission</td>
<td>15</td>
</tr>
<tr>
<td>Geology, Instruction in</td>
<td>35</td>
</tr>
<tr>
<td>Geometry, Requirements for Admission</td>
<td>15</td>
</tr>
<tr>
<td>German, Instruction in</td>
<td>29</td>
</tr>
<tr>
<td>Graduation, Requirements for</td>
<td>23</td>
</tr>
<tr>
<td>Herbarium</td>
<td>10</td>
</tr>
<tr>
<td>High Schools, Certificates from</td>
<td>16</td>
</tr>
<tr>
<td>History of Education, Instruction in</td>
<td>31</td>
</tr>
<tr>
<td>History, Requirements for Admission</td>
<td>15</td>
</tr>
<tr>
<td>Holidays, Vacations and</td>
<td>18</td>
</tr>
<tr>
<td>Instruction, Courses of</td>
<td>22</td>
</tr>
<tr>
<td>Laboratories</td>
<td></td>
</tr>
<tr>
<td>Assay</td>
<td>13</td>
</tr>
<tr>
<td>Biological</td>
<td>10</td>
</tr>
<tr>
<td>Chemical</td>
<td>9</td>
</tr>
<tr>
<td>Metallurgical</td>
<td>12</td>
</tr>
<tr>
<td>Physical</td>
<td>14</td>
</tr>
<tr>
<td>Laboratory Fees</td>
<td>19</td>
</tr>
<tr>
<td>Latin, Requirements for Admission</td>
<td>15</td>
</tr>
<tr>
<td>Latin, Instruction in</td>
<td>28</td>
</tr>
<tr>
<td>Library</td>
<td>8</td>
</tr>
</tbody>
</table>
terary Societies ................................................................................. 20
ation of the University........................................................................ 6
thematics, Instruction in.................................................................... 32
thematics, Requirements for Admission.............................................. 15
etrication, Fee for............................................................................... 19
anical Engineering, Equipment.......................................................... 11
allurgy, Instruction in......................................................................... 35
ilitary Training...................................................................................... 21
eralogy, Instruction in......................................................................... 35
ing Annex.............................................................................................. 7
ing and Engineering, Course in.......................................................... 23
ing and Metallurgy, Equipment.......................................................... 12
ing, Short Course in............................................................................ 38
onthly Reports of Students................................................................. 17
iscum, The Territorial.......................................................................... 47
ormal School, Certificate of............................................................... 16
itions from Students........................................................................... 17
anship:................................................................................................. 39
ysics, Equipment................................................................................ 14
ysical Culture....................................................................................... 22
ysics, Instruction in............................................................................. 33
iology, Instruction in.......................................................................... 34
paratory Course..................................................................................... 41
izes........................................................................................................ 18
ychology, Instruction in...................................................................... 31
ualitative Determinations of Minerals............................................... 46
uantitative “ ”...................................................................................... 43
road Rates, Reduced........................................................................... 49
duction of Ores, Schedule of Rates for............................................... 44
ents, Board of..................................................................................... 3
istration of Students......................................................................... 16
erts of Students, Monthly.................................................................. 17
uirements for Admission...................................................................... 14
idences................................................................................................. 7
ampling Ores, Schedule of Rates........................................................ 45
chool of Mines..................................................................................... 43
ience, Requirements for Admission.................................................... 15
op Work, Instruction in........................................................................ 36
ort Course in Assaying and Mining...................................................... 37
ieties, Literary..................................................................................... 20
ish, Instruction in................................................................................. 31
pecial Courses..................................................................................... 37
pecial Students.................................................................................... 38
anding of Students.............................................................................. 16
<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Station, Agricultural Experiment</td>
<td>41</td>
</tr>
<tr>
<td>Stenography</td>
<td>36</td>
</tr>
<tr>
<td>Students, Monthly Report of</td>
<td>17</td>
</tr>
<tr>
<td>Students, List of</td>
<td>53</td>
</tr>
<tr>
<td>Students, Summary of</td>
<td>56</td>
</tr>
<tr>
<td>Students, Self Support of</td>
<td>20</td>
</tr>
<tr>
<td>Term Records</td>
<td>17</td>
</tr>
<tr>
<td>Territorial Museum</td>
<td>47</td>
</tr>
<tr>
<td>Text-Books, Cost of</td>
<td>20</td>
</tr>
<tr>
<td>Thesis, Requirements</td>
<td>23</td>
</tr>
<tr>
<td>Tuition</td>
<td>19</td>
</tr>
<tr>
<td>Type-writing</td>
<td>19</td>
</tr>
<tr>
<td>Uniforms</td>
<td>20</td>
</tr>
<tr>
<td>University Anniversary</td>
<td>19</td>
</tr>
<tr>
<td>University Buildings</td>
<td>7</td>
</tr>
<tr>
<td>University, Location of</td>
<td>6</td>
</tr>
<tr>
<td>University, Equipment of</td>
<td>8</td>
</tr>
<tr>
<td>University, Founding of</td>
<td>6</td>
</tr>
<tr>
<td>Vacations and Holidays</td>
<td>18</td>
</tr>
<tr>
<td>Zoology, Instruction in</td>
<td>24</td>
</tr>
</tbody>
</table>