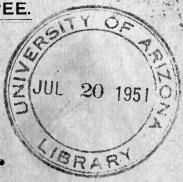
TUITION FREE.

THE



UNIVERSITY

OF ARIZONA.

- 1. The University Proper. Instruction for all.
- II. The Bureau of Mines. Testing Works, Etc.
- III. The Agricultural Experiment Station. For Investigation and Development.

Third Annual Register, 1893-4.

ANNOUNCEMENTS FOR 1894-5.

Tucson, Arizana.

VERSITY OF ARIZONAL August, 1894.

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University of Arizona.

"'Tis not in mortals to command success; but we'll do more, Sempronius—we'll deserve it."
—Addison.

Third Annual Register, 1893-94

WITH

ANNOUNCEMENTS FOR 1894-5.

TUCSON, ARIZONA, AUGUST, 1894.



BOARD OF REGENTS.

EX-OFFICIO.

HON. C. M. BRUCE, Secretary of the Territory. HON. F. J. Netherton, Superintendent of Public Instruction.

Appointed by the Governor of Arizona.

Rochester Ford, LL. B., Chancellor	Tucson
Merrill P. Freeman, Secretary	. Tucson
Selim M. Franklin, Ph. B., Treasurer	. Tucson
Herbert B. Tenney	Tucson

37 8.791 A71H 1893 CALENDAR, 1894-95.

March 7, Tuesday
March 8, Wednesday
May 31, WednesdaySpring Term ended
Sept. 20, Thursday, September 24, 25, Monday, Tuesday, At the University.
September 26, Wednesday REGISTRATION DAY
September 27, Thursday
November 29, Thursday to Thanksgiving Recess December 2, Sunday,
December 21, Wednesday
January 2, Wednesday REGISTRATION, WINTER TERM
January 3, Thursday Winter Term begins
February 8, Friday
February 22, Friday
March 15, Friday
March 20, Wednesday REGISTRATION, SPRING TERM
May 28, Tuesday Spring Term closes
May 29, Wednesday Commencement Day

^{*}Entrance Examinations (unless otherwise announced) will be held Thursday September 20, at Prescott, Flagst ff, Phoenix, Yuma, Tombstone, Willcox, Globe and Florence; and at other towns in Arizona, upon request.



FACULTY OF THE UNIVERSITY

AND INSTRUCTORS.

THEODORE BRYANT COMSTOCK, D. S., PRESIDENT.

Professor of Mining.

EDWARD MARSHALL BOGGS,

Professor of Civil and Hydraulic Engineering.

JAMES WILLIAM TOUMEY, B. S.,

Professor of Biology.

HOWARD J. HALL, B. S.,

Professor of English.

Librarian.

GEORGE L. HOXIE, M. E,

Professor of Physics and Mechanics.



ROBERT HUMPHREY FORBES, B. S., Professor of Chemistry.

Professor of Agriculture.

MEADE GOODLOE, Assistant Professor of Assaying.

Principal Preparatory School, Assistant Professor of History and Ancient Languages.

W. M. FOSS, B. M., Instructor of Music.

GERTRUDE B. HUGHES, (Gr. N. E. Cons.)

Instructor of Elocution and Physical Culture.

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

Instructor of Commercial Branches.

Instructor of Modern Languages.

Instructor of Stenography and Typewriting.

^{*}To be appointed as required.

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-	Horticulture
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LOCATION, CLIMATE, ETC.

The University buildings are situated upon high ground about one mile from the business center of Tucson. They occupy a tract of forty acres, in a most healthy location, commanding a view of attractive mountain scenery upon all sides. The water supply is of unusually pure quality, being drawn from a large well on the premises, 100 feet in depth.

Tucson has become a noted health resort, particularly for pulmonary patients, owing to the dryness of the climate and its freedom from sudden changes. The following data are taken from the records of the U. S. Weather Bureau office, by the courtesy of Mr. Wm. Burrows, Observer, and Director of the Arizona Weather Service.

"The climate here is so uniform that a record for any one month would afford a very reliable indication of what might be expected in the same month of every year. Precipitation is the only element which is subject to any great irregularity of periodic recurrence. The mean annual rainfall for ten years is a little less than thirteen inches, fully one-half of which ordinarily falls in July and August, although occasional rains may occur in any month, and a much larger proportion than here indicated of the total for the year has been known to fall in December and January. Violent or destructive winds are unknown here."



HISTORY AND GOVERNMENT.

The organic law of the University of Arizona was passed by the Territorial Legislature in 1885. Under the provisions of this act the Board of Regents accepted a tract of land outside the limits of Tucson and formally located the institution thereon. The present Main Building, originally known as the School of Mines Building, was begun in October, 1887, but owing to insufficient funds, was not completed until 1891.

The endowment now available for educational purposes consists of two separate funds, as follows:

I. The Territorial Tax, annually levied, to pay interest on bonds pledged to the University. The surplus, after paying interest and charges, comes to the University. At present, this surplus is about \$4,500 annually. From such appropriations as may be made by the Territorial Legislature, all cost of buildings, repairs and general running expenses must be covered.

II. The Agricultural and Mechanical College Appropriation from the National Congress, increasing annually from \$15,000, to \$20,000 for the year 1894-1895, with provision for

continued yearly increase of \$1000, until it becomes \$25,000 annually. Restricted to use for salaries and equipment, with limited scope.

The successive Territorial Legislatures since 1885 have with some exceptions, made specific appropriations for buildings, several of which have been erected, and the nucleus of a fund for a Dormitory has thus been obtained. There are still needs for which the present financial status does not provide.

The University has also Congressional grants of land, which has been judiciously located, principally in the timber belt of Northern Arizona, but which will not become available until statehood is secured. The proceeds of these lands can be used without special restrictions.

In the fall of 1889, steps were taken by the Board of Regents of the University to comply with the laws regarding the acceptance by the Territory of the grant for an Agricultural Experimental Station, and at the same time the College of' Agriculture was established, the Director of the Experiment Station being made Professor of Agriculture in the University.'

This fund of \$15,000 per annum is applied by the Board of Regents in such manner as to give students in Agriculture added facilities for investigation and practical work. Efforts are being made also to secure similar advantages for the School of Mines by national endowment.

No classes were taught until October, 1891, when the University was opened for students with two of the "five Departments" contemplated in the organic law fully established. The School of Agriculture, with Professor F. A. Gulley, as Dean, and the School of Mines, with Dr. Theo. B. Comstock, as Director, were then conducted as equal colleges, independent in certain respects, but combining their resources for purposes of instruction.

At a meeting of the Board, held June 15, 1893, Dr. Comstock was elected President of the Faculty, with duties and au-

thority similar to that of the President of other educational institutions, and at the same time the positions of Director of the School of Mines and of the Agricultural Experiment Station were formally re-assigned to Professors Comstock and Gulley, respectively.

The Board of Regents, on May 30, 1894, provided for a complete reorganization of the Institution by unanimously electing Dr. Theo. B. Comstock President of the University, with extended powers, placing him at the head of all branches of the University, including the educational and investigating departments.

The University of Arizona is practically conducted under three Divisions:

- I. The University proper;
- II. The Bureau of Mines;
- III. The Agricultural Experiment Station.

The President of the University is, ex officio, President of each of these branches, and the chief executive officer of the Institution.

The educational work is under the direction of the University Faculty, and the practical work of investigation undertaken by the Bureau of Mines and the Agricultural Experiment Station, is managed by the respective Councils thereof. The Agricultural Experiment Station and the Departments of instruction particularly relating to Agriculture and the Mechanic Arts are liberally provided for by Congressional appropriations. The Bureau of Mines, aside from its technical relations to Mechanic Arts, has not received an equivalent amount of support.

Correspondence upon all matters relating to any of the aforementioned Divisions should hereafter be addressed to the President of the University

UNIVERSITY ORGANIZATION

The ultimate control of the University, in all its branches, for instruction and investigation, is vested by law in a Board, appointed by the Governor, of four Regents, one of whom is chosen Chancellor.

The President of the University is charged with the assignment of work to the different departments and with the supervision of the buildings and grounds of the University. The educational policy and the executive work of the whole Institution are in his hands.

The General Faculty is composed of the President and all the Professors, Acting Professors and Assistant Professors. For purposes of administration, Advisory Standing Committees, or Sub-Faculties, are appointed by the President to act upon matters particularly affecting their cognate work and to report upon such questions as may be referred to them by the General Faculty.

The Instructors in the School of Art and in the School of Business are not members of the General Faculty. These Schools are at present managed by separate Councils, made up of the Instructors, with the President of the University as Director of each Council.

The Preparatory School is managed by the President of the University, assisted by the Instructors in that School.

The General Faculty legislates for all students, including Preparatory students and those rated as Specials in Art and Business courses.

COURSES OF STUDY.

The experience of the last three years has shown that the

demands from Arizona students for instruction are various and more or less conflicting with hard and fast lines, or general courses. The Faculty has, therefore, devised a plan which is believed to be in keeping with modern educational requirements, and, in its flexibility, also well adapted to the peculiar demands in Arizona and the great West.

In brief, the idea is to allow every student considerable latitude in electing his own studies, but with such wholesome restrictions as will prevent abuse of the system.

(See, also, the "Combined Course," on another page, which provides for students who desire to pursue a general Literary and Scientific course.)

The Departments at present established, are as follows:

I. Agriculture. (Including Horticulture, Irrigation, etc).

II. Chemistry.

III. Mining and Metallurgy.

IV. Mathematics.

V. Biology. (Botany and Zoology, etc).

VI. Civil and Hydraulic Engineering.

VII. English Language and Literature.

VIII. History and Civics.

IX. Physics and Electrical Engineering.

X. Drawing,

XI. Geology and Mineralogy.

XII. Modern Languages.

XIII. Ancient Languages.

XIV. The Schools of Art.

XV. The Schools of Business.

CLASSES OF STUDENTS.

Provision is made for two classes of Students: I. Under-GRADUATE, and II. GRADUATE. I. Undergraduate Students may be Regular or Special.

All Regular Students are required to pursue enough subjects to occupy at least three hours per day of class-room work, or the equivalent of laboratory work. Two hours of laboratory work, or of field work, are counted equal to one hour of recitation.

Regular Students, in the Freshman and Sophomore years, may elect a *Principal subject*, which must then be pursued under the direction of the Professor in charge of that Department. This Professor shall then assign to each student under his immediate authority, enough work, in or out of his own Department, to occupy two-thirds of the student's required time. The remaining one-third is to be assigned by the Faculty at the beginning of each term.

In the Junior and Senior years, one-half of the work may be assigned by the Professor in charge of the *Principal Subject*, and one-half elected by the Student, subject to the approval of the Faculty.

All students who are candidates for degrees must secure full credits in all studies pursued, and must also have successfully pursued such subjects as may be announced in the Register, as leading to the particular degree desired. In the *Principal subject* a higher standard is exacted than in assigned work of the student's course.

In each of the Schools of the University, there are provided distinct Courses, as outlined beyond. In every Department there are arranged:

- 1. A Preliminary, or Introductory, Course for beginners and for students who need only a general knowledge of a given subject.
- 2. A series of graded Technical Courses for those who make the subject their *Principal* study, and
 - 3. Flexible Courses to meet the needs of Special Students.

The requirements of Special Students are:

- 1. That they be at least eighteen years of age, and furnish proof that they are, for some good reason, unable to register as Regular Students.
- 2. They must matriculate and pay the fee of \$5.00 upon entrance, and be subject in all particulars to Faculty control and to the authority of the particular instructor under whom they work.
- 3. All students in the School of Art and the School of Business are classed as *Special*, and are subject to requirements 1 and 2, above. They are also required to pay the additional fees prescribed in the particular Department in which they receive instruction.
- II. GRADUATE STUDENTS from this or other similar Institutions are admitted to particular Courses of advanced study by special vote of the Faculty in individual cases.

Fellows are graduates pursuing such study, who receive a limited compensation in consideration for work of instruction with the lower classes.

GOVERNMENT OF STUDENTS.

The facilities provided at the University are freely offered for the benefit of all earnest students, and it is the purpose of the Faculty to give full liberty of action, within necessary limits, to those who show themselves worthy of confidence. 'There is no petty system of espionage or rigid restraint. Young men and women who are capable of self-control are welcome to the privileges afforded, but such as prove unworthy will be promptly dismissed before their examples can do harm to others.

The friendship and sympathy of the professors are always extended according to merit, and rules are laid down only as they become necessary. So far as they will do it properly, the

students are allowed to govern themselves.

The Students' Association, an organization to which all are eligiblé, has been formed by the undergraduates. This is working harmoniously, and with good results in the direction of self-government.

Frequent Assembly Exercises, including Public Rhetoricals, with addresses by members of the Faculty and invited speakers, serve to inculcate moral truths and to set forth clearly the principles of right living. Students in the Preparatory School are subject to more direct supervision by the Preparatory Council.

In cases of serious infraction of discipline, demerits are given, and any student who obtains 150 demerits in any one year is subject to suspension at the discretion of the Faculty.

Parents should understand that all unexcused absences and tardiness are causes for demerits. No excuse will be accepted unless presented at the first appearance afterward of the student at the given exercise, and all excuses must be in writing, signed by parent or guardian, and must indicate the cause of the absence or tardiness.

REQUIREMENTS FOR ADMISSION, ETC.

Applicants for admission to the Freshman Class in the University must be at least 16 years of age,* and must pass satisfactory examinations in English Grammar, Geography, U.S. History, Arithmetic and the rudiments of Algebra.

Admission to the Senior Preparatory Class is open to those Students, at least 15 years of age,* who successfully pass examinations in Elementary Grammar, Geography, U.S. History and Elementary Arithmetic.

^{*}In special cases of Students unusually capable and well prepared, this regulation may be abrogated by vote of the Faculty.

For admission to the Junior Pieparatory Class pupils must be not less than 14 years of age, and be able to read and write satisfactorily, and otherwise show ability to pursue the work laid down in this Register.

ENTRANCE EXAMINATIONS.

The facilities and privileges of the University of Arizona are open to all qualified persons of either sex. Examinations for admission to the University and the Preparatory School will be held on Monday and Tuesday, September 24 and 25, 1894, in the University building. Similar examinations may be held in prominent towns of Arizona, on or about September 22, (Saturday) at times and places to be announced in the local papers, provided that requests be filed with the President of the University on or before September 5, 1894. This procedure will enable persons living near Prescott, Phoenix, Yuma, Tombstone, Willcox, Florence, Globe, Williams, Flagstaff, etc., to save the expense of a trip to Tucson until they know if they are able to enter.

Regular examinations for entrance at the beginning of the Winter and Spring terms will be held only at the University, but if applications are received early enough from other places, arrangements may be made to meet the wants of such as desire to be examined elsewhere.

CONDITIONED STUDENTS.

Those who fail to pass in one subject only may be admitted with a "condition," which must be made up at the next regular Entrance Examination, or earlier. Conditioned students will be required to pursue the subject in which they are delinquent with a regular class in the University or the Preparatory School.

ADMISSION TO ADVANCED STANDING.

Students from other institutions of equivalent rank may be admitted to the higher classes upon 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 of each term, in the President's office. Each will receive a card indicating the classes which he is to attend, and a receipt for the matriculation fee, when paid. No class card will be issued until all dues are paid. This card must be presented to the several Professors before enrollment will be permitted. No changes in registration can be made without the consent of the Faculty.

Permission of the Faculty is necessary to register at any time after Registration Day.

TERM RECORDS.

The class standing of each student is determined by the instructor in charge. Regular Term Examinations (or Final Examinations) have been abolished by vote of the Faculty. 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 and in Deportment 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.

It is essential that students in the University do a certain amount of studying outside of the University. Distractions which prevent this should not be countenanced under any condition.

PRIZES OFFERED.

THE HUGO ZECKENDORF PRIZES.

A gold medal and a silver medal have been offered as prizes by Mr. Hugo Zeckendorf, of Tucson, on the following conditions:

- 1. The Senior student who presents the best essay upon some subject relating to the duties of citizenship, will be awarded the gold medal.
- 2. The student who maintains the best class record throughout the Junior year will be awarded the silver medal.

Both awards are subject to regulations of the University Faculty.

The first award of the silver medal was made May 29, 1894, to Miss Mary Walker, of the Junior class.

DEGREES CONFERRED.

Students who have obtained full credit for the required

work during four years (36 credits), will be given the degree of Bachelor of Science (B. S.) or Bachelor of Arts (A. B.) according to the character of the work done.

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

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

These will be demanded of all candidates for advanced degrees.

MISCELLANEOUS.

Under this head are given such items of imformation as are constantly demanded from parents and students. A careful perusal will avoid much correspondence, and save annoyance. Any points which are not covered by these statements will be cheerfully explained upon request.

VACATIONS AND HOLIDAYS.

Short vacations (as per Calendar on Page 7) are taken at the Holidays and between the Winter and Spring Terms. The long Summer vacation begins about June 1st and continues until near the close of September.

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

Appropriate exercises may be arranged by the Faculty for any of the legal Holfdays, in which 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 foundation of the Institution, in connection with the ceremonies of tree planting.

FACULTY MEETINGS.

Regular meetings of the General 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 of the 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.

LIVING ACCOMODATIONS.

Provision is made this year for furnishing board and rooms for students, including young ladies, upon the University grounds.

Young men will be given excellent quarters in the Main building, and will take their meals at "Ladies Hall," where both

meals and dormitory for the ladies are provided.

Room and board for students, male or female, will not exceed \$5 per week, and may be reduced materially below this amount. Only actual cost will be charged.

Bills must be necessarily be settled in advance, Term by

1 Term.

The Ladies Dormitory is in charge of Mrs. S. A. Buell, an experienced and capable matron, who will have constant supervision of the students rooming there.

It is hoped that the young men's Dormitory may be in the care of an officer of the U. S. Army, as commandant. Salu-

tary, but considerate, discipline will be maintained, at all events.

STUDENTS' EXPENSES.

There is no charge for tuition in any of the Departments of the University, except in the Schools of Art and Business, where Instructors' Fees are exacted.

All Students, including those in the Auxiliary Schools, are required to pay *once only* (upon entrance), a Matriculation Fee of Five dollars,

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

Board and room will be furnished at cost, Each Student, before assignment to quarters, will deposit money enough to cover cost of these items and laundry for one Term in advance. It is estimated that the amount required for the Fall Term will be about sixty dollars, and fifty dollars for each of the other Terms; but an effort will be made to materially reduce these rates.

Students will be provided with simple furniture, including single bedstead. They will supply their own mattress, pillow, bed-clothing, towels, etc.; also mirror, wash-bowl, pitcher and slop-jar.

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

Economical students should readily go through the year with from \$170 to \$200, excluding clothing.

SPECIAL NOTICE.

Invalids cannot be received in the Dormitory, nor is it possible to make any provision for self-support of students, except to a very limited extent.

Further particulars, if needed, may be freely obtained by correspondence with the President.

It is especially requested that those who may desire instruction in Ancient Languages, Music, Painting and the branches raught in the Business Schools, will give early notice of their need, in order that we may know in advance what demands we shall have to meet this year.

Address all correspondence to

Theo. B. Comstock,
President of the University,
Tucson, Arizona.





DEPARTMENTS AND COURSES OF STUDY.

The several Colleges, Schools and Departments, which together constitute the University, are not independent organizations, but convenient divisions for the administration and specialization of the work of the corps of instructors. Certain of the Schools belong to two different Colleges, but no Department is included in more than one School.

In the following pages the Colleges are arranged in the order of their establishment in the University.

The legislative enactment which established the University provided that "the University shall consist of five Departments:

FIRST-The Department of Science, Literature and the Arts.

SECOND—The Department of Theory and Practice, and Elementary Instruction.

THIRD-The Department of Agriculture.

FOURTH-The Normal Department.

FIFTH—The Department of Mineralogy and the School of Mines."

Subsequent legislation is chiefly responsible for the existing arrangement of Courses and for the prominence given to particular Departments.

The Department of "Science, Literature and the Arts," which usually registers the largest number of students, is practically comprised in the Colleges of Natural Science and of Letters. The Combined Course has been arranged by the Faculty as a judicious combination of studies from both these Colleges to cover the ground contemplated under "First," in the organic act. This course is recommended to all whose object is to acquire a well-rounded general education, and it may be taken as an excellent preparation for a technical or professional course.

The Department of "Elementary Instruction" is amply provided in the Preparatory School, which has been heretofore a necessary adjunct to the University. As the High Schools of the Territory become more abundant and well adapted to do this work of preparation, the Faculty desires to be able to abandon this branch of the University. The "Theory and Practice" contemplated by the act quoted, naturally goes with the Fourth Department, otherwise provided for by law at a later session of the Legislature.

The Department of "Agriculture," owing to several endowment acts of the National Government, has much more ample support than any other division of the University. The provision, in these endowments, for instruction also in Mechanic Arts and the ordinary English branches, enables the University to extend the facilities in certain other of the "five Departments," which have never received direct aid from the Territorial Legislature.

In addition to the proceeds of the Agricultural College Fund, the sum of \$15,000 is annually appropriated by Congresss for the support of the Agricultural Experiment Station, all of which fund is expended in investigation for the benefit of Agriculture, Horticulture and the Stock-growing interests of Arizona. Students in the College of Agriculture receive direct benefit from this work, and when duly qualified, they are given a share in it.

The "Normal Department," having been established independently at Tempe by the Legislature, and the resulting Territorial Normal School having received all the appropriations ever granted for such purpose, the Regents and Faculty of the University have been well content to make reciprocal arrangements for the exchange of students, thus avoiding unecessary and expensive duplication of this work.

The "Department of Mineralogy and the School of Mines," received the first direct appropriation from the Territorial Legislature, in the shape of funds for the erection of the "School of Mines Building," (now known as the Main Building) on the University grounds. In various ways subsequent legislatures have expressed warm interest in the growth of this School, but no money whatever has been directly appropriated at any time for its maintenance. In connection with this division, the Bureau of Mines is maintained for investigations of the mineral resources of Arizona and for the study of the best means for their development. Students in the College of Mines have the advantage of direct contact with this work.





I. THE COLLEGE OF AGRICULTURE.

Liberal provision has been made by the National Government for instruction in the sciences relating to the several branches of Agriculture. The appropriations received heretofore by the Territory of Arizona have been wisely expended, and there is no reason now for those students who desire this training to go elsewhere to obtain it. The Professors in this College have been specially chosen for their work, and in connection with the Agricultural Experiment Station they are constantly engaged in such practical studies as will give their pupils opportunity to learn the best methods of procedure, as well as the particular needs of Arizona in their line of work.

Without losing sight of the practice of the art, the courses open to Students are so arranged that the elements of a liberal culture will not be neglected, and at the same time much latitude of individual choice is allowed, as in other Colleges of the University.

As befits the region, especial attention is given to the important subjects of Irrigation and Water Supply.

The distinctive Schools are those of Agriculture, Horticul ture and Irrigation, to which are added the adjunct Schools of Chemistry and Biology.

The demand is growing for trained men as foremen and managers of large agricultural enterprises, and in the College of Agriculture particular attention is given to the imparting of the peculiar knowledge necessary for successful practice in Arizona.

Students intending to fit themselves to supervise the construction and operation of irrigation canals and reservoirs, or to conduc important work of any kind relating to cultivation of the land or the growth of crops, should register in this course.

SCHOOL OF AGRICULTURE.

PROFESSOR -

The Departments in this School are Agriculture and Horticulture.

AGRICULTURE.

The equipment comprises the grounds of the several Experimental Stations, with the machinery and appliances used in working them, work animals and other live stock, besides tools and instruments required for illustrative purposes. All these are of the best in use.

Courses of Lectures, with recitations and field and laboratory practice, comprise the methods of instruction, which are held to the high standard set by the best Universities.

In the lectures are discussed the general principles of farming, dairying, stock-breeding, cultivation of food and forage plants, the proper use of fertilizers, the rotation of crops, and the application of economical methods of tillage and marketing of produce.

The field and laboratory studies are eminently practical, bringing the student face to face with problems of daily occurrence in ordinary farming. The pupil is made responsible for actual work upon a plot of ground assigned him, by means of which he acquires accurate knowledge of cause and effect in his own experience.

WINTER TERM .- Ten hours per week.

Required of all Students graduating in Agriculture.

PREPARATION REQUIRED:—Mathematics, thorough Trigonometry and Surveying; Botany I, II; Zoology I; Physics I, III; Chemistry I, Ia, III, IV, V, VI; Geology I.

HORTICULTURE.

This Department is well equipped for its purposes, having at command the growing plants of the Experiment Station and its implements. Students are afforded every possible opportunity to study the practical operations of propagating trees and producing thrifty growth. The various fruit crops and their proper preparation for market, the prevention and cure of insect ravages and prevalent diseases are amply illustrated and the student acquires actual familiarity with this work in the orchard, nursery and greenhouse.

Course I.—Class-room and Laboratory work, embracing the study of the plants of the orchard and garden; their nature, habits of growth, care, cultivation, propagation and management when grown on a large scale; practical methods of treatment for insects and other enemies.

Spring Term:—Ten hours per week in Class-room, Field and Laboratory.

Required of all Students graduating in the College of Agriculture.

PREPARATION REQUIRED:—Botany II; Physics, III; Mathematics, through Algebra.

Course II.—Continuation of preceding Course, designed to give the student a good knowledge of the principles of Horticulture, with practical work in propagating and growing plants, fruit culture and preparing fruits for market.

FALL TERM:—Ten hours per week in Class-room and Laboratory.

Required of all Students graduating in the College of Agriculture.

PREPARATION REQUIRED:—Botany I, II, IV; Physics I, III; Chemistry I, Ia, III, IV, VII; Horticulture I.

SCHOOL OF IRRIGATION.

PROFESSOR BOGGS.

The University of Arizona was one of the first educational institutions to recognize the importance of Irrigation in America, and to provide the means for a thorough training in this science. Irrigation is no longer an unproved theory or an expensive and hazardous experiment. Engineers of high standing have made Irrigation Engineering one of the recognized specialties of the profession. Successful irrigation works are now planned, constructed and managed by men of special training for such work.

As the visible supply of water has been gradually absorbed by appropriation, questions concerning the apportionment and higher duty of water, the storage of surplus waters, and the development of artesian and other phreatic sources of supply have grown to the utmost importance. A large and still growing demand has thus been created for men of training and ability to serve as Engineers for the design and construction of canals and reservoir systems, and to manage them when in operation.

In planning these Courses particular attention has been given to the needs of practical work. They include a theoretical and practical study of the principles of Engineering in general, and make special features of Hydraulics, modern Irrigeneral.

gation practice, design and construction of Canals and Reservoirs, gauging of streams and Canals, Meteorology as pertaining to Irrigation law and management, etc.

Throughout the Courses due attention is given to field work whereby students receive thorough practical training in the use, care and adjustment of surveying instruments, current meters, water registers, etc.

The equipment of this Department is liberal; it includes plain and solar compasses; level, stadia and ranging rods; Engineers' chains; steel tapes; Price current meter, with electric register; Colorado current meter; automatic water registers; hook gauges; aneroid barometers; chronometer; odometer; planimeter; slide rule; drafting instruments; blue-print apparatus; meteorological instruments, etc.

In addition to the miscellaneous books in the University Library there are many standard works and technical periodicals which have been selected expressly for the use of Engineering students.

The Professor in charge also serves as Irrigation Engineer and Meteorologist to the Arizona Agricultural Experiment Station, and this connection presents opportunities to students to gain a practical knowledge of this line of investigation.

The Courses of study are as follows:

Course I.—Rainfall and Water Supply.—Discussion of climatic and other conditions affecting rainfall and local drainage; topographic and other surveys required for irrigation and water supply projects; Irrigation Law and water rights; general principles of Irrigation practice.

ONE TERM.—Five hours per week.

Required of all Students graduating in the College of Agriculture.

PREPARATION REQUIRED:—Physics I; Chemistry II, IIa (or I, Ia); Mathematics, through Trigonometry and Surveying.

COURSE II.—Hydraulics.—Lectures and field work, embracing the principles of hydrostatics and hydrodynamics, including units of measure, pressure of water, transmission of pressure, flow through pipes and orifices, over weirs, and in rivers, conduits, canals and sluices; measurement of water, guaging of streams, etc.

ONE TERM. - Ten hours per week.

Required of all Students graduating in the College of Agriculture and School of Mines.

PREPARATION REQUIRED. — Pure Mathematics, through Calculus; Applied Mathematics, through Topographical Surveying; Physics II, III; Chemistry I, Ia, III, IV, V.

Course III.—Irrigation Engineering.—Lectures and practice; collection and storage of water; laying out and operating tanks, canals, waste-weirs, reservoirs, etc.; principles and practice o designing and constructing earth-works, masonry dams, reservoir walls and other structures; maintenance of plant and distribution of water.

Two Terms.—Ten hours per week.

Available to students who have had Irrigation I, II.





II. THE COLLEGE OF ENGINEERING.

The future wealth of Arizona, as in the past, must depend very largely upon the success of the industries calling for the application of engineering skill and training. Accordingly very much attention has been given to the engineering courses in the University. The acts of Congress donating funds provide specifically for instruction in the Mechanic Arts, as well as in Agriculture. While these constitute the bulk of our endowment, it will be necessary to give prominence to those branches which relate most closely to this Division. But the appropriations are also applicable to instruction in Mathematical, Physical, Natural and Economic Science and their applications. broad scope enables the Faculty to offer the usual Courses given in other technical Colleges, and with the equipment and personnel of the several Schools, the work performed by the University of Arizona is admitted by the ablest authorities to be on a par with that of the older American Institutions.

The qualities which pertain to the make-up of a successful engineer are largely those of natural endowment, and no Insti-

tution can guarantee the success in practice of any who have received the benefits of instruction. We can only promise the best possible work in the way of training.

The Distinctive Divisions of the College of Engineering are the School of Mines, the School of Civil Engineering and the School of Mechanical Engineering. Electrical Engineering is taught as an important branch of the School of Mechanical Engineering. The Adjunct Schools are those of Physics, Chemistry, Geology and Industrial Drawing.

SCHOOL OF MINES.

DR. COMSTOCK.

Assistant Professor Goodloe.

The School of Mines has ample facilities for illustration of the various processes employed in mining work and of the principal methods of ore-treatment. Attached to the Main Building is an Annex, containing machinery and appliances for crushing, sampling, concentrating, amalgamating, leaching, chlorinating, and the electrical treatment of various kinds of ore in large or small lots. The student has access to this apparatus and is required to familiarize himself with its manipulation. Power is furnished from a seventy horse-power boiler, detached from the main building, the steam being carried underground to the engine-room, which contains a thirty-five horse-power engine, built by the Walburn-Swenson Manufacturing Co., and a sixteen horse-power Westinghouse automatic engine, the latter being used for running the Jynamo.

The mill building has a storage capacity for ore of fifty to one hundred tons. From the bins the ore passes to a chute from which it is elevated, by means of a three horse-power Mather electric motor, to the crushing floor above. A seven inch by ten inch Blake crusher is used for coarse crushing, and

a Dodge crusher will be used 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-five feet to the top of the mill. By means of slides and chutes the crushed ore may be sent at will to various machines to be tested by different methods. For concentration there are provided revolving sizing screens, giving facilities for preparing six sizes, besides hydraulic separators for classifying slimes into three grades. The coarser sizes may be worked upon full-sized jigging machines of the Hartz pattern, the finer sizes being jigged upon slide-motion machines, and the slimes being worked upon a double Rittinger percussion table, or otherwise, as desired. A small apparatus, run by electric motor, is also provided for dry concentration. Amalgamation tests may be made upon a working scale by different methods, including a five-stamp battery, with plates and riffles, pans and settlers, and special machines. Above the engineroom is the Electrical Laboratory, containing a seventy-five light Mather incandescent dynamo, from which circuits are distributed to different parts of the University Building. Of these, two circuits are for lighting purposes; one extends to the hoisting motor; another to the motor which runs the concentrating machinery; another circuit goes to the fan motors used for ventilating purposes, and the sixth branch to the storage batteries, which provide current for electrolytic work in the Assay Laboratory.

The Assay Laboratory is one of the most complete in the West in its appointments. This is equipped with assay furnaces for crucible work, for scorifying and cupelling, and for retorting mercury from amalgam. An adjoining room, supplied with water, gas and electric current, has a roomy hood for work involving fumes, with tables and desks for student work, besides all needed appliances for assaying by dry and wet methods, including electrolysis. This room also contains an experimental desk and fittings for making working analyses of all

kinds required in this department. A store-room for supplies adjoins this room, and a balance-room with fittings for the storage of pulp samples is convenient to this laboratory and to the main office. The balances and other special apparatus are of the highest grade, and they are rigidly set upon tables free from vibration, having no connection with any part of the building.

MINING ENGINEERING.

Field work and excursions to mines are made part of the training. Memoirs of practical character upon assigned subjects are required of students sufficiently advanced to prepare them.

Course I.—Mine Surveying.—Lectures, Recitations and Field Work.—History, uses and adjustments of instruments; solar compass and solar attachments; practical problems involving the running of surface and underground lines; connection of surveys above and below the surface; practice of U. S. Deputy Mineral Surveyors. Details of mine surveys; setting of bench-marks; running lines in shafts, drifts, stopes, etc.; maps, plans, sections; keeping of records. Surveys required to select locations for test-boring, shafts, adits, etc.; methods of reconnoitering.

ONE TERM.—Ten hours per week.

Required of Students graduating in Mining Engineering.

PREPARATION REQUIRED:—Pure Mathematics, through Trigonometry; Applied Mathematics, through Topographic Surveying; Physics II, III; Drawing I, II.

Course II.—Mining Attack.—Methods of Exploration and development of veins and other deposits; tools, implements, machinery and explosives, with principles governing their use. Methods of boring, sinking and driving through hard, soft, wet, dry, loose and compact materials. Means of overcoming difficulties arising from dislocations and obstructions, such as faults, rolls,

swells, caves, etc. Advantages and drawbacks in the English, Austrian, German, French, Belgian and American systems of excavation. Critical studies of the famous tunnels of the world. Variations required by differences in the objects sought.

ONE TERM.—Five hours per week, with extra problems and drawings.

Required of Students graduating in Mining Eugineering.

PREPARATION REQUIRED.—Mathematics, through Mechanics; Physics II, III; Chemistry I, Ia, III, IV, V, VI; Drawing I, II; Geology I, II, III, IV; Mineralogy I, II.

Course III.—Exploitation.—Support: objects and methods of timbering; framing, fitting, bracing. Winning of ores, coal and other materials; overhand and underhand stoping; winzes and intermediate levels. Drainage: pumps, pumping, sumps, ditches; drainage of working shafts and inclines. Ventilation: means and applianees; laws of various States and countries; discussion of fundamental principles and practical applications, with results. Transportation above and below ground: motors, cars, tracks, switches; cables, cages, safety attachments; haulage in inclines, "man-engines," etc.; tail-rope and other systems. Hoisting apparatus, air compressors and special mining machinery.

Two Terms.—Five hours per week, besides problems and drawings.

Requiried of Students graduating in Mining Engineering.

PREPARATION REQUIRED:—Mathematics, through Mechanics; Physics II, III; Mining Engineering II; Assaying (Metallurgy I); Strength of Materials.

Course IV.—Administration.—Designing and construction of mining plant; setting, arranging, adjusting; preservation and operation; general economy. Organization of working force; economy of management; secondary superintendence; system of reports; divis-

ion of labor and adjustment of responsibility. Prevention of accidents. Letting and measuring contracts; preservation of maps, plans and records. Mine bookkeeping; accounts, forms, analyses, pay rolls, cost sheets, etc.

ONE TE-M. - Five hours per week.

Required of all Students graduating in Mining Engineering.

PREPARATION REQUIRED: - Mining Engineering I, II, III.

METALLURGY.

Visits to nills and metallurgic works and the preparation of practical memoirs by the students form important parts of the training.

Course I.—Assaying.—A complete practical Course, preceded by preliminary lectures. The student learns to prepare his own samples and to perform all the operations, from the making of the fire to the weighing of the bead, etc., in the fire assays, and from the start to the finish in the wet assays. The course is carefully graded so as to give the best results.

ONE TERM. - Ten hours per week.

Required of all Students graduating in Mining and Metallurgy.

PREPARATION REQUIRED:—Physics II, III; Chemistry I, Ia, II, III, V.

Course II.—Ore Dressing.—Assorting, sampling, concentration; full discussion of principl s, machinery and methods. Practical work in the mill.

PREPARATION REQUIRED: Physics II, III; Metallurgy I.

Course III.—Etements of Metallurgy.—Lectures and Laboratory practice. Analysis and discussion of fuels, fluxes, etc., general conditions affecting economical results. Outlines of the Metallurgy of the principal metals. (Introductory to Course IV.).

ONE TERM .- Ten hours per week.

Required of all Students graduating in Mining Engineering and Metallurgy.

PREPARATION REQUIRED:-Metallurgy I, II.

Course IV.—Metallurgy.—Advanced Course of Lectures, with Practice; detailed study of Metallurgic processes in general use for the reduction of ores of all kinds. The student is made familiar with actual work on a commercial scale. In connection with this, he is required to design working plants and to make detailed reports of operations in the mill of the School of Mines.

ONE TERM. — Teu hours per week.

Required of all Students graduating in Metallurgy.

PREPARATION REQUIRED:—Mathematics, through Mechanics; Drawing I, II; Metallurgy I, II, III.

SCHOOL OF CIVIL ENGINEERING.

PROFESSOR BOGGS

By means of special Courses provision is made for students desiring to follow either of the several branches of Civil Engineering. The time devoted to the work in Geodetic and Topographic Surveying and the important departments of Railroad and Hydrographic Engineering, is here substituted for much of the Chemistry and Geology and the other technical work of the Mining Courses.

The equipment of this School is fully up to the requirements, comprising compasses, transits, levels, rods, chains, tapes, solar compasses and attachments, and a variety of aids to calculation, besides requisite drawing instruments of high grade, and facilities and apparatus for the reproducing of drawings.

COURSE I.—Topographic Surveying.—Theory and adjustment of instruments; problems in measurements of areas, distances of inaccessible points, methods of U. S. Deputy Surveyors, etc. Use of stadia, plane table, transit and level. Practical field work.

ONE TERM.—Ten hours per week.

Required of all students graduating in Civil Engineering, and in Mining Engineering.

PREPARATION REQUIRED:—Mathematics, through Trigonometry and Land Surveying; Drawing I, II; Physics II, III; (in special cases, Physics I).

Course II.—Railroad Engineering.—Principles and practice of economic location; laying out of curves, tangents, crossings and switches; caculation of earth work, etc. Students are required to make actual surveys and to present notes, drawings and computations, as in regular practice.

ONE TERM.—Ten hours per week.

Required of students graduating in Civil Engineering.

PREPARATION REQUIRED:—Mathematics, through Calculus; Civil Engineering I.

Course II.—Geodesy.—Methods and formulæ of barometire and trigonometric leveling; measurement of base lines; selection and construction of stations, triangulation, running of meridians and parallels, map projection, etc.

ONE TERM. — Ten hours per week.

Required of students Graduating in Civil Engineering.

PREPARATION REQUIRED:—Mathematics, through Calculus; Astronomy; Civil Engineering I.

Course IV.—Bridge Analysis and Construction.—Calculation of strains in bridges and framed structures; designing of road and railroad bridges, etc.

ONE TERM—Ten hours per week.

Required of students Graduating in Civil Engineering.

PREPARATION REQUIRED:—Mathematics, through Mechanics; Strength of Materials; Drawing I, II; Physics, II, III.

Course V.—Hydraulics and Masonry Coustruction.—[For

the present, Civil Engineering students will take Course II (Hydraulics) and a part of Course III (Itrigation Engineering) in the School of Irrigation. These cover practically the same ground as this Course].

Equivalent of one Term:—Ten hours per week.

Required of students Graduating in Civil Engineering.

PREPARATION REQUIRED:—Mathematics, through Mechanics; Strength of Materials; Drawing I, II; Physics II, III; Chemistry I, II, III.

SCHOOL OF MECHANICAL ENGINEERING

PROFESSOR HOXIE.

The industries of Arizona are constantly demanding more and better training of those who are to be entrusted with the mechanical details connected with the development of our resources. It is the purpose of the School of Mechanical Engineering to meet this growing want. The facilities afforded in the elementary work are all that could be desired, and new equipment for the advanced students is being added as rapidly as required. The pumping plant and the engines of the mill of the School of Mines, as well as the extensive electric plant of the University, are also available for instruction.

Students who may select this work will take full courses in Drawing, Physics, Mathematics (pure and applied), and later in their progress will receive instruction by lectures and in the laboratory on subjects relating to their profession.

Among the topics falling to be discussed in this series of lectures are: Materials of Engineering; Principles of Mechanics; Designing of Machines; Steam Engines and other Motors; Dynamos, etc.; Hydraulic and Wind Engines, and the Study of Mill Work and Machinery.

Detailed Courses, as in other Schools of the College of Engineering, are provided to cover the necessary work. These

will be made known upon application to the Professor of Mechanics and Physics.

In the Department of Electrical Engineering, qualified students will receive careful training in the theory and practical operation of electric apparatus and machinery. The equipment in this Department is excellent and rapidly increasing.

SCHOOL OF MATHEMATICS.

PROFESSORS BOGGS, HOXIE AND -----

As a means of mental discipline, the work assigned by the Faculty includes a liberal amount of the Pure Mathematics. The Engineering courses especially require thorough training in these branches and in Applied Mathematics.

PURE MATHEMATICS.

The range of work done in Pure Mathematics is indicated by the following outline:

Course I .- Algebra (completed).

[Algebra is begun and carried two terms as a Preparatory study.]

FALL AND WINTER TERMS .- Five hours per week.

Required of all Regular Students in the University, Freshman Year.

PREPARATION REQUIRED:—University Entrance Examinations in full.

COURSE II .- Geometry .- Plane Geometry.

Spring Term.—Five hours per week.

Required of all Regular Students in the University, Freshman Year.

PREPARATION REQUIRED .- Mathematics I.

Course III .- Solid Geometry.

FALL TERM .- Five hours per week.

Required of all Regular Students, Sophomore Year.

PREPARATION REQUIRED:—Mathematics I, II.

Course IV .- Trigonometry .- Plane and Spherical.

WINTER TERM .- Five hours per week.

Required of all Regular Students, Sophomore Year.

PREPARATION REQUIRED.—Mathematics I, II, III.

Course V .- Analytic Geometry.

Spring Term.—Five hours per week.

Required of students in Engineering Courses, Sophomore Year.

PREPARATION REQUIRED:-Mathematics I, II, III, IV.

COURSE VI .- Calculus.

FALL TERM.—Five hours per week.

Required of all Engineering Students, Junior Year.

PREPARATION REQUIRED:—Mathematics I, II, III, IV, V.

APPLIED MATHEMATICS.

Strictly speaking, much of the work of all the Engineering Schools involves the teaching of Applied Mathematics. What is here included covers only certain special branches which have been omitted elsewhere as being general in their application.

Course I.—Mechanics.

Required of Students Graduating in the College of Engineering, and in the School of Irrigation, College of Agriculture.

PREPARATION REQUIRED:—Pure Mathematics I, II, III, IV, V, VI.

COURSE II .- Materials of Engineering.

Required of all Engineering Students, as with Course I. PREPARATION REQUIRED:—Pure Mathematics I, II, III, IV, V, VI; Applied Mathematics I.

Course III. - Strength of Materials.

Required of Students as in Course II.

PREPARATION REQUIRED:-Same as in Course II.

Course IV .- Astronomy.

Required of Graduates in Civil Engineering and Mining Engineering.

PREPARATION REQUIRED:—All five Courses in Pure Mathematics; Physics I, II, III; Geology I, II.

SCHOOL OF INDUSTRIAL DRAWING.*

PROFESSOR HOXIE.

The equipment of Drawing Tables, Instruments and Models is very complete. A progressive course of instruction is given in the use of instruments, line drawing, lettering, projection drawing, tracing and blue printing.

Course I.—Instrumental Drawing.

It is expected that the student who successfully completes this Course will be competent to undertake any of the ordinary work of a drawing office, detail drawing, etc.

All the Year.—Nine, ten or more hours per week.

Required of all Engineering students, throughout the Freshman Year; of Agricultural students two terms, Freshman Year.

^{*}For instruction in Free Hand Drawing see under Schools of Art, beyond.

PREPARATION REQUIRED:—Course in Free-hand Drawing, unless by special exemption, for good cause shown.

Course II.—Descriptive Geometry.

ONE TERM. - Five hours per week.

Required of Engineering students.

PREPARATION REQUIRED:-Mathematics I, II, III.

COURSE III.—Kinematic Drawing.—The study of Kinematics, the drawing of cams and the study of machine motions of different kinds on the drawing board.

ONE TERM-Nine or ten hours per week.

Required of Students graduating in Mechanical Engineering.

PREPARATION REQUIRED:-Industrial Drawing I, II;





III. THE COLLEGE OF NATURAL SCIENCE.

Modern life has derived its impetus and maintained its progress in very large measure from the cultivation of the sciences. Aside from the advantages arising from a knowledge of the facts, experienced educators now generally recognize that the methods of science afford by far the best training for those whose object is to get broad culture as a preparation for business or the prefessions.

The Distinctive Schools of the College of Natural Science are Chemistry, Physics, Biology and Geology and Mineralogy, Regular students who elect one of these as a principal subject will have such courses laid out by the Professor in charge, or by the Faculty, as will give a well rounded training. It is expected that the majorty will register in this College and in the College of Letters, from which a combined General Course of study is made up and elsewhere presented,

SCHOOL OF CHEMISTRY.

PROFESSOR FORBES.

This School offers a series of courses designed to meet the

needs of all classes of students. Its equipment is thorough and complete in every particular.

The Chemical Laboratories occupy the first floor and half of the second story of the south wing of the Main Building. The Chemical Laboratory of the Experiment Station, fitted with gas, water, ventilating hoods and a complete equipment for all kinds of analytical work, is on the first floor. These rooms are used by advanced students in quantitative work, who thus have the great advantage of being in a laboratory where practical work is carried on.

The Lecture room for qualitative and quantitative work is so arranged that students may pass from recitation seats to laboratory desks to perform the experiments which illustrate the lecture or recitation. Each student is provided with ample desk room on which are gas, water, reagent bottles and pneumatic trough. Ventilating hoods are provided for boiling substances which give off injurious fumes. The rooms are well lighted and thoroughly ventilated. A complete set of apparatus for illustrating General Chemistry has been carefully selected for the instruction and use of students.

The Chemistry of the Combined Course corresponds practically to Courses I, Ia, II and IIa below, which were more fully outlined on Pages 51-52 of the Annual Register of the University for 1892-93.*

The work during the Fall and Winter terms consists of lectures and laboratory work in Inorganic Chemistry. During the Spring Term a brief course is given in Organic Chemistry, consisting of lectures and laboratory work. This general Course will serve as an introduction to advanced work in Chemistry, and it is also designed to give discipline in the study of science.

In addition, the six following Courses are open to sudents who select Chemistry, Agriculture or Metallurgy as a *Principal* subject.

^{*}Some minor changes may be made after the arrival of Professor Forbes, but these will not materially affect the general scope of the work

COURSE I.—Elementary Inorganic Chemistry.—Lectures (with Experiments) and Recitations. Designed to acquaint the student with the general principles of the science.

FALL TERM .- Five honrs per week.

Required of all Students graduating in the Colleges of Agriculture, Engineering and Natural Science; also in Combined Course, Sophomore Year.

PREPARATION REQUIRED:—University Entrance Examinations.

Course Ia.—General Chemistry.—(Laboratory work.) Designed to illustrate Course I and to give an introduction to laboratory work in Chemistry.

FALL TERM.—Five hours per week.

Required of all Students graduating in the Colleges of Agriculture, Engineering and Natural Science; also in Combined Course, Sophomore Year.

PREPARATION REQUIRED:—University Entrance Examinations.

COURSE II.—Elementary Organic Chemistry.—Lectures and Recitations.

WINTER TERM .- Five hours per week.

Required of Students graduating in the College of Natural Science; also in Combined Course, Sophomore Year.

PREPARATION REQUIRED:-Chemistry I.

COURSE IIa.—Laboratory work in Elementary Organic Chemistry.—To supplement Course II (with experiments performed by the student).

WINTER TERM.—Five hours per week.

Required of Students graduating in the College of Natural Science; also in Combined Course, Sophomore Year.

PREPARATION REQUIRED:—Chemistry I.

Course III.—Inorganic Chemistry (Advanced). Two Terms,—Five hours per week.

Course IV.—Qualitative Analysis.
Two Terms.— Ten hours per week.

Course V.—Volumetric Analysis.
One Term.—Five hours per week.

Course VI.—Quantitative Analysis.
Two Terms.—Ten hours per week.

Course VII.—Organic Chemistry (including Laboratory work).

THREE TERMS.—Five hours per week.

LABORATORY WORK .- THREE TERMS .- Ten hours per week.

Course VIII.—Agricultural Chemistry; Lectures. Two Terms.—Five hours per week.

SCHOOL OF PHYSICS.

PROFESSOR HOXIE.

This occupies three large rooms on the ground floor of the University building.

The Physical Laboratory, in which the students work, is in the northeast corner. Adjoining this on the west are two rooms, one of which is used as a lecture and class room, the other as a store room for apparatus.

The Physical Laboratory is provided with tables set through the floor, giving a firm foundation for delicate instruments. Some pieces of apparatus, as Atwood's machine, pendulums, etc., are permanently fixed in this room, but more is brought in as needed.

The Lecture room is provided with all the accessories needed for experimental demonstration, such as gas, water, solar and electric lanterns, electric currents of any desired strength, etc-The windows are provided with shutters, making it possible to darken the room whenever experiments require it. The collection of apparatus available for instruction in this School is of the most complete modern description, especially that pertaining to Electricity. It includes a large Mather dynamo (of 7½ H. P., 75 lights); small hand dynamo; motors of different sizes; Wimshurst Electric Machine; a very fine Helmholz-Gaugain galvanometer; Deprez-D'Arsonval reflecting galvanometer; portable testing set for measuring resistances; several galvanometers for students' use; Wheatstone's bridges: Ampere's table; large air pump, with accessories; hydraulic ram; whirling table; photometer; lenses; prisms; mirrors; and a large list of other instruments.

Course I.—Elementary Physics.—[For general students, who do not require more than a cursory view of the subject.]

Comprises the whole range of the science in outline, covering the divisions of Mechanics and Heat, Electricity and Magnetism, Sound and Light. This course is intended to meet the needs of those who have not the time to pursue more extended study. It may also be taken with advantage by those who wish thereby to lay the foundation for a more thorough course.

· FALL TERM. - Five hours per week.

Required of students graduating in the College of Letters, and of those who pursue the "Combined Course."

PREPARATION REQUIRED:—University Entrance Examinations.

Course II.—Engineering Physics.—Lectures and Recitations in which all the more important phenomena are fully illustrated by experiments. The subjects pursued are the same as in Course I, but the treatment is much more thorough, as the time is correspondingly increased.

FALL, SPRING AND WINTER TERMS.—Five hours per week.

Required of students Graduating in the Colleges of Agriculture and Engineering.

PREPARATION REQUIRED:—Mathematics, through Algebra, and preferably through Trigonometry.

Course III.—Physical Laboratory.—Actual work and experiments by the students in all branches of Physics. Full notes of observations, with written report on each experiment, are required.

WINTER AND SPRING TERMS.—Ten hours per week.

Required of all Graduates in the College of Engineering and in the School of Irrigation in the College of Agriculture.

PREPARATION REQUIRED:—Physics I; or Fall. Term of Physics II.

SCHOOL OF BIOLOGY.

PROFESSO. TOUMEY.

The Biological Class-room and Laboratory are in the southwest half, second story, of the south wing of the Main building. The rooms are supplied with gas and water, cases and cabinets for insects and herbarium and complete equipment for histological work, both in the University and Experiment Station. The herbarium contains several thousand specimens of American plants, and is rapidly increasing. Human skeletons, anatomical casts, microscopes, section cutters and other accessories comprise a part of the equipment.

BOTANY.

Course I .- Structure and Morphology of Plants.

Students in this Course study living specimens selected from the local flora. Each student is provided with a stand microscope, and studies the specimens directly under the eye of the Instructor. This work is largely of Laboratory character, supplemented by lectures and by recitations from Gray's Lessons in Botany.

Spring Term.—Five hours per week (besides two hours per week of Laboratory work).

Course II.—Systematic Botany.

Special study is given to the flowering plants, especially in regard to distribution and classification. Considerable attention is given to field work, and lectures are given once a week on the economic plants of the families studied.

Reference books: Coulter's Botany of Western Texas, Warner & Watson's Botany of California and Gray's Synoptical Flora of North America.

FALL TERM.—Two and one-half hours per week, (alternating with Chemistry).

Other Courses, including Physiological and Anatomical Botany, Cryptogamic Botany, advanced work in Systematic Botany, and the study of forage plants and forestry, are offered to special students and those selecting Botany as a *Principal* subject.

ZOOLOGY.

COURSE I.—Anatomy and Physiology.—Lectures and Recitations on Human and Comparative Anatomy and Physiology. The study is supplemented by Laboratory work, students making drawings and notes illustrative of their work.

Text book: Martin's Human Body.

FALL TERM.—Three hours per week, (alternating with English).

WINTER TERM.— Two hours per week (alternating with Geology). [One hour per week of Laboratory work in addition, throughout the entire course.]

Course II.—Zoology.—Lectures and text book work on the principles of classification of animals, their structure and development. Laboratory work is given considerable attention. Some time is given to making dissections and to the study of Animal Histology.

Text book: A. S. Packard's Zoology.

Spring Term.—Five hours per week, (two hours of Labora-tory work per week, extra).

Other Courses, including Entomology, are also offered in the Department of Zoology to qualified students.

SCHOOL OF GEOLOGY AND MINERALOGY.

PRESIDENT COMSTOCK, (temporarily). Assistant Professor Goodloe.

The Courses provided in this School are arranged to meet the needs of both general and professional students.

MINERALOGY.

The Museum of Geology and Mineralogy is intended to properly represent the ores and minerals of Arizona, so as to provide a place for the deposit of everything illustrative of the practical working of the mines, mills and furnaces. A beginning was made in the donation of a valuable collection by Professor Blandy, formerly Territorial Geologist, and by the deposit of the collections of Dr. Comstock. These last comprise many rare minerals from other regions, from which exchanges will be made with institutions and individuals, so as to materially increase the variety of specimens.

The University has also received the collections made at the World's Fair in 1893 by Commissioner T. R. Sorin, including material of great interest and importance for students' use.

The equipment is ample for all present purposes, and additions are constantly being made. The collections include fine samples of the modes of occurrence and of variations in the forms of minerals. This material is rapidly increasing by donations, and by gleanings from all parts of the Territory, a region unsurpassed as a field for the study of the important science of Mineralogy.

Instruction in Mineralogy comprises thorough courses in Crystallography, Determinative Mineralogy, and Blow-pipe analysis. Special attention is given to Laboratory work, in which the students are made familiar with a great variety of minerals.

COURSE I—Physical Mineralogy and Blow-pipe Analysis,—Crystallography, and Physical and Chenical properties of minerals; Determination of Minerals, etc., by means of the blow pipe.

WINTER TERM.—Five hours per week.

Required of students graduating in Mining and Metallurgy.

PREPARATION REQUIRED:—Mathematics, (except in special cases), through Solid Geometry; Physics II, (or I); Chemistry I, Ia, (more will be advantageous); Drawing, (as much as possible of Projection Drawing).

Course II.— Determinative Mineralogy.—Laboratory work, involving the determination of the rare, as well as common, minerals.

Spring Term.—Ten hours per week.

Required of students graduating in Mining Engineering and Metallurgy.

PREPARATION REQUIRED: -- Mineralogy I.

Course III.—Petrography.—Study of the intimate structure of rocks; preparation of thin slices; microscopic examination, etc.

FALL TERM: Ten honrs per week.

Available to Students who have had Mineralogy I, II, and Geology I, II.

GEOLOGY.

The instruction in Geology comprises both Class-room and Laboratory work, with which is combined a large amount of practical field work. Instruction will also be provided in Microscopic Petrography. A Geological survey of the Territory is in progress under the auspices of the School of Mines, and competent students will be afforded opportunity for instruction in the methods of field work, Geologic and Topographic.

Collections of rocks and fossils are well selected for illustration, and the Museum is particularly well supplied with Arizona types collected by Dr. Comstock and others. Besides these there are many specimens from other States and countries

and constant accessions are made by gift, purchase and exchange. Donations of specimens of rocks, fossils, minerals,

etc., will be thankfully acknowledged.

The subject of Engineering Geology, or the relations of Geology to engineering work, is made especially prominent in the technical Courses. Special lectures on Agricultural Geology are also given.

Course I - Physiography. - Forms of relief in the earth's surface; Phenomena of Currents of Air and Water; general physical features and their distribution.

ONE TERM. - Five hours per week!

Required of Students Graduating in all Colleges of the University.

PREPARATION REQUIRED .- Physics I (or equivalent); Chemistry I, Ia.

Course II .- Structural and Dynamic Geology .- Review of Geognosy, and of the Agencies of change in the earth's crust; Earthquakes, Volcanoes, Thermal Springs, Geysers; Atmospheric and Sub-Aerial factors in structure, Earth Sculpture and Metamorphism.

Required of Graduates in Mining Engineering, Civil En-

gineering and Agriculture.

PREPARATION REQUIRED:-Mathematics, through Trigonometry; Geology I; Physics II; Mineralogy I, II.

Course III .- Stratigraphic Geology .- Review of the successive stages of Geologic History; method of reading the record; progress in the development of life on the earth.

Required of Students Graduating in Mining Engineering and in the College of Natural Science.

PREPARATION REQUIRED .- Geology I, II; Botany I, II; Zoology III.

COURSE IV.—Engineering (Economic) Geology.—Practical relations of Geology to Agriculture, to the Arts and to the different branches of Engineering; Distribution of ores, rocks and other deposits of economic value.

Required of those who Graduate in Mining Engineering.

N. B. This Course is advised for other Engineering Students, who may, in some cases, be allowed to take it with less preparation than is prescribed below, or to pursue a portion only of this allotted work.

PREPARATION REQUIRED:—Geology I, II, III; Applied Mathematics, through Mechanics and Strength of Materials.

• Course V.—Paleontology.—Ancient Life on the earth. Systematic review of Possil Botany and Invertebrate and Vertebrate Paleontology, with particular reference to Stratigraphy and Historical Geology.

Available to Students who have taken Geology I, II, III; Botany I, II, IV, V; Zoology.





IV. THE COLLEGE OF LETTERS.

The several Schools which together make up this College, are what would ordinarily be termed the Literary Division of the University. They comprise the three great Sub-divisions of Literature, History and Civics.

Students who contemplate engaging in the practice of the Law and those who desire to prepare for the Ministry as an ultimate profession will naturally select their *Principal* subjects from one or the other of these Schools. For such as may look forward to Journalism or to a political career, the College of Letters presents the best means of preparation, also. As elsewhere announced, the University Faculty has made, from this College and from the College of Natural Science, a Combined Course, which is recommended for those whose minds are not clear as to their future avocations.

The Distinctive Schools of the College of Letters are: The School of English; the School of Ancient Languages; the School of Modern Languages; the School of History; the School of Civics.

SCHOOL OF ENGLISH.

PROFESSOR HALL.

Work in English is required of all students in the University, excepting Special Students, at some part of their Course. The School will grow in Library equipment and in other ways as rapidly as the demands of students.

Instruction in the English language or Literature extends through both years of the Preparatory course and each year of the University Combined course. The aim of the instruction in this department is two-fold: to give students that training which will enable them to express their own thoughts with correctness and ease in writing and speaking; and to create and stimulate a love for the literature of our own language, which will be of lasting pleasure and benefit.

The preparation required for English in the Combined course is found in the Preparatory course; this consists in a thorough knowledge of English Grammar and the elements of composition. The text-books used are Whitney & Lockwood's English Grammar and Lockwood's Lessons in English; students entering the Combined course directly cannot be too thoroughly prepared on all the exercises and forms of composition required by the latter.

In the Freshman year English occupies five hours each week. The first term's work consists in the study of the lighter masterpieces of English and American authors, with the special purpose of cultivating a taste for reading; in the third and fourth terms Elementary Rhetoric is taught and the work of the first term continued.

American prose writers are studied one hour each week for the first two terms of the Sophomore year, and the study of argumentative composition is taken up in the third term, five hours each week. In the Junior year English Literature and English History are studied on alternate days throughout the three terms.

In the first two terms of the Senior Year two or three hours each week are occupied with a critical study of the works of English writers.

Throughout the Course, one public declamation, essay or speech is required in each term, the nature of the exercise depending upon the student's position in the course.

Students desiring special training in English Literature will be given courses suited to their requirements.

For those who elect English as a *Principal* subject, a full Course of four years is provided, as below:

Course I.—Rhetoric.—Aims, First, to give ease and force in the expression of ideas, particularly in exposition and persuasion; Secondly, to present in outline form that history of the English Language and Literature which all English-speaking persons should possess.

FALL AND WINTER TERMS .- Five hours per week.

Required of all Graduates from the University, Freshman Year.

PREPARATION' REQUIRED:—University Entrance Examinations.

COURSE II.—English Literature.—Continuation of Course I.

Spring Term.—Five hours per week.

Required of all Graduates, Freshman Year.

PREPARATION REQUIRED:-English I.

Course III.—Prose Writers of Nineteenth Century.— Text-book, with Lectures and Discussions. Students will be required to choose works for individual study from the writings of the authors considered in class, reporting periodically.

FALL TERM.—Five hours per week.

Required of Graduates in the College of Letters, Sophomore Year.

PREPARATION REQUIRED:—English I, II.

COURSE IV.—Literature of Eighteenth Century.—Same method as in Course III.

WINTER TERM .- Five hours per week.

Required of Graduates in the College of Letters, Sophomore Year.

PREPARATION REQUIRED:-English I, II, III.

Course IV.—Elizabethan Literature.—Method same as in Course III.

SPRING AND FALL TERM. - Five hours per week.

Required of Graduates in Letters, Sophomore and Junior Years.

PREPARATION REQUIRED:-English I, II, III, IV.

Course VI—American Literature.—Students will provide themselves with some of the works of the most prominent authors. It is expected that a large amount of outside reading will also be done in connection with this Course.

WINTER AND SPRING TERMS.—Five hours per week.
Required of Graduates in Civics, Junior Year.
Available to those who have taken English I.

Course VII.—Translations from Ancient Literature.— Studies of the best translations of the most celebrated works of Grecian and Roman writers,

FALL AND WINTER TERMS.—Five hours per week. Available to those who have had English I.

Course VIII.—Ancient Classical Drama (translations).
Spring Term.—Five hours per week.

Available to Students who have pursued English I, II, III, IV, V.

Course IX.—Elizabethan Drama.
FALL AND WINTER TERMS.—Five hours per week.

Available after English I, II, III, IV, V.

Public speeches will be required of all Juniors and Seniors at least twice each year.

SCHOOL OF ANCIENT LANGUAGES.

Provision has been made for instruction in Latin to cover the ground ordinarily exacted as a requirement for entrance to the leading Universities. There has been no attempt to carry the work of this School beyond this point, simply because no demand has yet been made for such advanced tuition. Persons desirous of receiving instruction of higher grade in this language should correspond with the President of the University, by whom arrangements may be made to meet all demands of this nature.

No instruction in Greek has yet been given in the University, for reasons similar to that stated in the preceding paragraph. We are prepared to start students in this language and to prepare for entrance to the Classical Colleges, but work more advanced than this is not practicable at present.

SCHOOL OF MODERN LANGUAGES.

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The instruction in French, Spanish and German is eminently practical, the object being to impart quickly a speaking knowledge and to enable the student to converse with ease. That this is readily feasible is proved by the experience of those who have been trained by this Natural Method. Classes will be formed for instruction according to requirements at the beginning of the year, and the conditions for admission will be made known at that time. Special fees may be exacted of students who elect a language as a specialty, instead of taking it as an adjunct to other work in the University.

In the Combined Course, and in other courses laid out by individual Professors, a certain amount of study of one or othe Modern Language is obligatory, usually with the option of Latin as a full equivalent.

SCHOOL OF HISTORY.

PROFESSOR ----

A good foundation in history is provided in the Preparatory School. Advanced work in this branch is provided in the Combined Course, and all reasonable demands can be met by special training under the guidance of professors of related branches. With the means at our disposal and the limited request for such instruction, progress must needs be less rapid than in some other directions.

Much attention is being given by the University to the collection and preservation of the material of the local history of Arizona.

SCHOOL OF CIVICS.

THE PRESIDENT AND FACULTY.

The term Civics, as here used, implies those principles which relate to the rights and duties of citizenship. In one sense it cover much the same ground as is ordinarily included in College course of "Political Science." At the same time the object of the instruction is largely to inculcate patriotism and interest in public questions; to place before the students the highest possible idea of our Republican institutions, and to formulate the correct methods of eradicating existing defects in our system.

For the present, the work of this School will be largely in the hands of President Comstock, who will deliver a course of lecture at stated intervals to all students in the University. Instruction is Civics is also given as a part of the routine work in two terms of the Senior Year, Combined course. President Comstock is one of the

Faculty of the American Institute of Civics, a non-partisan, patriotic organization in which several other members of the University Faculty act as Councillors. This organization affords hearty co-operation, and enables us to offer additional facilities.

The Hugo Zeckendorf gold medal, (see Page 19 of this Register), and the Hall prizes of the American Institute of Civics, are open for competition by students of this University.

The lectures given by the Professors each day in Morning Assembly, and the addresses delivered weekly in Public Assembly have partaken largely of the character of instruction in Civics. Particular attention is also given in the Senior Year to such cognate subjects as the History of Civilization, Constitutional History and Political Economy, (see Combined course immediately following).





THE COMBINED COURSE.

The experience of the three years of operation of the University has clearly manifested the need of one fixed Course of study suited to the wants of students who do not come to us with their life-worl planned, but who require liberal culture as a preparation for useful ness in various avecations of a business or professional character.

Those courses which are strictly technical it is must necessarily be made less flexible, and perhaps more irksome to certain pupils than is conducive to the best success in training each student according to his individual make-up.

The Combined course is here presented as a proper curriculum for the average student, as it embodies the judgment of the Faculty regarding what is most suitable for the broad general culture demanded by modern life. All students who are young enough to de lay their technical preparation until after its completion are strongly urged to register in this Course. In some cases, this action may be required as a condition precedent to matriculation, it being the pur

pose of the Faculty to place each student in the position best calculated to develop his or her talents and to most fully cultivate the power to think independently.

After a successful trial of one year, the Faculty has materially improved the original skeleton course, so that now it may be confidently recommended throughout as the model course for the majority of the students.

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

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

COMBINED COURSE.*

FRESHMAN YEAR.

FALL TERM.—Algebra, 5; English, 5; Physics, 5.
WINTER TERM.—Algebra (completed), 5; English, 5;
Free-hand drawing, 2; Physics, 3.

Spring Term.—Geometry, 5; English, 5; Botany, 5.

SOPHOMORE YEAR.

FALL TERM.—Geometry, 5; English, 1; Chemistry, 2½; Systematic Botany, 2½; Modern or Ancient Language, 5.

^{*}The numbers given with each subject refer to the recitation hours per week. I wo hours of laboratory work or of drawing count as one recitation hour

WINTER TERM.—Chemistry, 5; English, 1; Trigonometry, 5; Modern or Ancient Language, 5.

Spring Term.—Chemistry, 5; English, 5; Modern or Ancient Language, 5.

JUNIOR YEAR.

FALL TERM.—History, 2; English, 3; Anatomy and Physiology, 5; Modern or Ancient Language, 5.

WINTER TERM.—History, 2; English, 3; Zoology, 5; Modern or Ancient Language, 5.

Spring Term.—History, 3; English, 2; Geology, 5; Modern or Ancient Language, 5.

SENIOR YEAR.

FALL TERM.—History of Civilization, 2; English, 3; Psychology, 5; Modern or Ancient Language, 5.

WINTER TERM.—History of Civilization, 2; English, 2; Civics, 1; Political Economy, 5; Modern or Ancient Language, 5.

Spring Term.—Astronomy, 5; History of Philosophy, 3; Civics, 1; Constitutional History, 1; Modern or Ancient Language, 5.





V. THE PREPARATORY SCHOOL

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

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

There is needed better foundation than the majority of applicants have hitherto possessed. The power of independent thought is essential to progress in University classes, and

this is too commonly lacking in those who present themselves at the Entrance Examinations,

Much of this defect could be readily overcome, if parents would kindly aid the instructors by informing themselves fully as to the need for study at home and insist upon the daily performance of this duty. It is manifestly impossible for pupils to maintain good class records and devote time out of school to excessive indulgence in social diversions.

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

Preparatory students are subject to somewhat more rigid discipline than those in the University classes. They are amenable to the General Faculty, but come under the immediate supervision of the Preparatory Council, consisting of the President and the Instructors in the School. Pupils study, as well as recite, under the eye of a teacher, and, generally, the methods of the School room, as distinct from those of the College, are followed.

SYNOPSIS OF THE COURSE.

Below is given detailed information regarding the work of this School, after which appears the two years' Course in full. None of the work is elective, as in the University courses.

ENGLISH.—This subject is taught during every term of the Preparatory Course, its forms and methods being suited to the developing powers of the student During the first terms the instruction consists largely in language lessons and composition,

special attention being paid to the expression of ideas, with a view to bringing out the student's powers in this direction. Through the middle terms more attention is given to the structure of the sentence, together with composition. In the later terms the history and growth of the English language, and the main elements of which it is composed, are briefly considered; narrative and descriptive writing and the study of figures of speech and variety of expression being the principal features of this later work. Meanwhile, English classics will be read, an Javerage of one hour each week being devoted to their study, twhich will be varied to suit the comprehension of the student.

HISTORY.—American History occupies two terms. Durning the first term Colonial life is studied. The habits and manners of the people are made the subject of daily familiar talks for the purpose of bringing the social life and the ideas of the colonists before the student, as much as to give him a knowledge of historical facts. The work of the second term, embracing the period since the Revolution, aims to give a clear view of the growth of the nation and the development of the ideas which have brought it to its present position. General History in outline occupies two terms. The first term covers the period from the earliest times to the fall of the Roman Empire. The actual life, the civilization of the common people is made an important feature, especially while studying the history of Greece and Rome. The second term covers in the same manner the history of Europe to the present time.

GEOGRAPHY.—This subject is presented during the first term for the purpose of giving an idea of the resources of the United States, their population and industries, the peculiar advantages and conditions of different sections, and the climatic and physical peculiarities of each. Foreign geography is considered chiefly as a secondary feature.

GOVERNMENT OF THE UNITED STATES.—The short time devoted to this subject is, of course, not sufficient to give a sci-

entific knowledge of the operations of our government, nor is the student at this stage prepared for such study. The subject is studied here for the purpose of widening the general knowledge of the student, as well as to prepare him for the study of General History and Civics.

MATHEMATICS,—Arithmetic occupies four terms, the first term being devoted to Mental Arithmetic and the three following terms to Written Arithmetic. The analytic method of study is strictly followed throughout the Course, for the purpose of developing the reasoning powers. Algebra occupies two terms, during which the student receives a firm grounding in literal notation. The work is very careful and thorough, original exercises for the student forming an important feature. The two terms' work will cover the subject to Quadratic Equations.

Other Features.—It is impossible to outline completely the nature of the daily drill and personal influence brought to bear upon the student. Parents naturally desire assurance that their sons and daughters will receive the best of care in these particulars during the years when the most important part of character forming is going on. We aim to make this, above all, the primary consideration, and those interested will always be welcomed as visitors to the School room. The discipline, while strict and thorough, is ever friendly and adapted to the individual needs of the pupils. Lofty ideals of character are inculcated and enforced in practice, but no attempt is made to fit growing minds into ready-made grooves. The constant effort is to draw out and develop to the utmost the peculiar talent of each youth, and to show him how best to utilize his own individuality.

FEES.—Preparatory Students will pay the same fees as University Students, but the Matriculation fee of \$5 paid for this school will *not* be credited as payment of the University Matriculation Fee in a later year,

COURSE OF STUDY.

JUNIOR PREPARATORY.

FALL TERM.

English. Language and Composition. Reading of English Classics.

Mental Arithmetic.

Geography, Especially Resources and Physical condition of the United States.

WINTER TERM.

English. Language and Composition.

Arithmetic. Begun.

United States History. Colonial.

SPRING TERM.

English. Composition and Grammar. Arithmetic. Continued. United States History.

SENIOR PREPARATORY.

FALL TERM.

English. 'Composition and Grammar.

Arithmetic. Completed.

United States History. Brief Descriptive Course.

WINTER TERM.

English. Lockwood's Lessons, or an equivalent. Ancient History.

Algebra. Begun.

SPRING TERM.

English. Lockwood, continued.

Mediæval History.

Algebra. To Quadratics.



VI. MISCELLANEOUS SCHOOLS.

To meet the expressed wishes of a considerable number of applicants, the Board of Regents, in 1893, authorized the President to establish certain Schools for instruction in Art and in Business. These, for the present, are necessarily conducted upon a different basis from the regular University Classes.

The Masters in these Schools rank as Instructors in the University, and, as such, they are members of the Councils in which they work. All students who register for work in these schools are listed as Specials, being thus amenable to the General Faculty, in a measure.

In addition to the Matriculation Fee exacted of all students upon entrance, Instructors' Feess are required of those who elect work in any of the Miscellaneous Schools, excepting when such work is prescribed as part of a University Course. These fees are payable in advance, term by term.

The University has no specific appropriation from which such Schools may be supported, and it is therefore necessary to make the fees mainly pay the expense of maintenance. Such arrangements have been made, however, as will reduce these fees to the lowest possible limits

The facilities offered this year are comprised in two groups known as the Schools of Art and the Schools of Business.



THE SCHOOLS OF ART.

In this group four Schools will probably be maintained, whenever enough encouragement shall be given in the number of pupils. The President of the University, however, reserves the right to defer the founding of one or other Department until such time as the applications will warrant its foundation upon a secure footing.

Music and Elocution were taught last year to all students, with gratifying success, and similar arrangements will be made for the year 1894-95, if it be possible with our present lack of funds.*

SCHOOL OF MUSIC.

INSTRUCTOR FOSS.

Instruction in Vocal and Instrumental Music, including the singing by the students, has been in charge of an experienced and

^{*}The University has been seri usly crippled this year in the matter of funds available for these particular uses, owing to circumstances which have held back receipt of monies actually appropriated.

accomplished Instructor, graduated from the New England Conservatory of Music, Boston, whose success hitherto is ample guarantee of the high character of the work done in these Departments.

It is hoped that Professor Foss may continue to give such general instruction as may be required for the ordinary Assembly exercises, to all students. No fees will be charged for this work, but any further training desired is subject to special fees, as per the Schedules of Rates announced below. This special work, under University auspices, is open to all students who pay the special fees.

VOCAL MUSIC.

The subjects of Voice, Technic and Counterpoint are all given due attention. The Students, as a body, are given occasional practice in singing for the regular exercises in which they are expected to join. Selected persons will be taken for the choir and for solo singing on occasions demanding such performances. The latter will usually come from the number of those who take special work in Music, for which Instructor's fees are paid.

It is also hoped that enough talent will be developed to make it feasible to organize a University Glee Club during the current year.

SCHEDULE OF RATES.

Voice Culture and Development, two Lessons per week,
Term of ten weeks \$20.00
Sight Reading and Tecnnic, two Lessons per week, Term of
ten weeks 5.00
Class and Chorus Study, two Lessons per week. Term of
ten weeks 5.00
Fees payable to the President, invariably One Term in Ad-
vance.

INSTRUMENTAL MUSIC.

Complete instruction in the use of the Piano and Organ is given by Professor Foss. This being, of necessity, individual in character, Students taking the work are amenable to fees. The

charges given below are for the instruction alone. A moderate fee will also be charged for use of instrument for practice, where this is provided for the pupil.

SCHEDULE OF RATES (for Piano or Organ).

Per Term of ten weeks, one lesson per week
Per Term of ten weeks, two lessons per week 20.00
Per Term of ten weeks, three lessons per week 27.00
Fees payable to the President, invariably One Term in Ad-

Fees payable to the President, invariably One Term in Advance.

SCHOOL OF DRAWING.

Free hand Drawing is taught as a University and Preparatory study by Professor Hoxie.

The Courses comprise Drawing from flat copies placed on the blackboard; Elementary Perspective; Model and Object Drawing, both in outline and shaded. This work is prescribed for most students, and in such cases, it may be taken without the payment of special fees. Advanced work in designing and technical Free-hand drawing, when provided, will be subject to charges for Instructor's fees, as in other Departments in the School of Art.

SCHOOL OF PAINTING.

If enough applications be made, instruction in Crayon and Water Colors will be available to Special Students and to such Regular Students as may obtain permission from the University Faculty. In all cases the following Instructor's fees must be paid before engaging in the work:

SCHEDULE OF RATES.

One Lesson per week, Term of ten weeks	10,00
Two Lessons per week, per Term of ten weeks	17.00
Three Lessons per week, per Term of ten weeks	
Four Lessons per week, per Term of ten weeks	34 00

SCHOOL OF ELOCUTION.

INSTRUCTOR MISS HUGHES.

Last year much of the work undertaken in Elocution was required of all Regular Students, and for this no fees were charged. The Instructor, an honor graduate from the New England Conservatory of Boston, also drilled students for the ordinary exercises in which they appeared publicly. Upon occasions of Prize Contests, and for special performances where wholly voluntary exercises were given, such drill was also available, but only by payment of Instructors' fees, according to an established schedule of rates.

At the time of going to press with the Register it is impossible to state whether provision can be made for regular instruction of this character. But, where desired, private instruction is available, as heretofore, upon payment of the special fees.

The two Departments of Voice Building and Physical Culture are comprised in this School.

VOICE BUILDING.

The School of Elocution designs to make a thorough and systematic training of the voice a marked feature of its work.

The first year is one of continuous drill in all the elements of Vocal Expression; Vocal Physiology; Vocal Technique; Economy of the Breath; Methods of Delivery; Vocal Hygiene and Health Principles; Defects of Speech; Articulation and Pronunciation; Modulation; Inflection; Emphasis; Pitch; Quantity and Movement; Qualities; Application oi Tone Effects; Analysis; Gesticulation; Physical Expression.

The second year's work will comprise one hundred and eighty Emotional Studies; Classification and Description of Groups of Emotions; Dramatic Analysis of Shakespeare's plays; Range and and Strength in Delivery; Flexibility of Voice; Light and Shade Effects in Tone; Pause Effects; Cultivation of the Imagination; Facial Expression; Principles of Gesticulation; Mechanics and Application of Gestures; Pose and Counterpoint.

PHYSICAL CULTURE.

The Course includes drills in

- 1. Light Gymnastics.
- 2. Aesthetic Gymnastics.

The Gymnastic drills are designed to give health, tone and vigor to the body, and to attain ease, precision and harmony in action.

TERMS FOR PRIVATE LESSONS.

One Lesson per week, per Term of ten weeks\$10.00
Two Lessons per week, per Term of ten weeks 17.00
Three Lessons per week, per Term of ten weeks 25.00
Four Lessons per week, per Term of ten weeks 34.00
Payable to the President, invariably One Term in Ad-





THE SCHOOLS OF BUSINESS.

The instruction contemplated in the Business Schools is comprised under the divisions of Book-keeping and Penmanship; Stenography; Typewriting; Telegraphy, and Photography (dependent upon the demands of Students).

Persons desiring instruction in any of these branches should make application early to the President of the University. The number of applicants since the establishment of these Schools has not been as great as seemed probable from the prior requests for such instruction. Any demand which may arise hereafter will be adequately met.

SCHOOL OF BOOK-KEEPING (and Penmanship).

Writing Lessons may be taken with the Preparatory Classes by such persons as are authorized by the Faculty. Except in particular cases, no special fees will be exacted for this work.

Institution in Book-keeping is open to Special Students

registering in this School upon payment of Instructor's fees, which will be Ten Dollars per term of ten weeks. This subject will be taught during one or two terms of the Collegiate year, and Students must begin with the Class.

Heretofore many persons applying for this instruction have been insufficiently prepared in Arithmetic. This may be taken with the classes in the Preparatory School without extra charge for tuition.

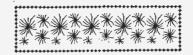
SCHOOL OF DICTATION.

Phonography (Stenography), or "Short-hand" may be taken alone or in connection with Lessons in Typewriting. Instructor's fees will be exacted in addition to the Matriculation Fee of Five Dollars upon entrance. Students using the typewriter will pay a small extra fee for the same.

OTHER BUSINESS SCHOOLS.

It is not believed that the demand for instruction in Telegraphy or Photography will justify the establishment this year of these Schools. If, however, any person should require work of this character, we shall be prepared to afford the necessary facilities for all applicants, our equipment of instruments and appliances in both Departments being especially complete and of the latest patterns. Further particulars may be obtained upon application to the President of the University.





THE TERRITORIAL MUSEUM.

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

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

A collection has been bequeathed by the late Edward Rose, of Pleasant Valley, Gila county, and the nucleus of additional collections will come from duplicates of the material obtained by members of the Faculty in their annual tours of scientific investigation in the Territory. The collection of minerals made by Mr. Sorin, at the World's Fair, in 1893, is also placed

with the foregoing. Historical records of much value are being gradually accumulated as a part of this Museum, and an appeal is made to old settlers and others to bear this fact in mind when making disposition of articles bearing even remote relation to the early pioneers and their history. All records and data of any nature which can be gleaned are worthy of preservation, and we earnestly desire to have them at their proper place in the University, where they will always be accessible for reference. Books papers, letters, documents, implements, and records of apparently little importance, may all possess historical value. Portraits of officials and private citizens, accounts of Indian raids and every scrap or relic should be carefully saved and forwarded to the Territorial Museum.

Eventually, this branch of the University must become a most attractive and instructive feature, if the people will aid us in the proper spirit.

The Board of Regents, prior to the passage of the Act establishing the Museum (which was due to the efforts of Mr. Hunt, of Globe) had formally elected Mr. Herbert Brown as the Curator. There being no money available for the purchase of cases, but little has yet been done towards the building up of the Museum, although Mr. Brown has agreed to deposit his large and very valuable collection of native bird skins.





THE BUREAU OF MINES.

DR. THEO. B. COMSTOCK, DIRECTOR.

MEADE GOODLOE, ASSAYER.

Since the opening of the University in October, 1891, there has been maintained in connection with the School of Mines, a Department for the investigation of the mineral resources of Arizona, under the immediate direction of Dr. Theo. B. Comstock. Circulars of information have been mailed broadcast, announcing the facilities at hand for the treatment of ores on a large scale, the making of assays and the determination of the mineral character and commercial value of specimens sent in. This work has been performed very extensively for hundreds of our citizens who have availed themselves of the advantages offered, both gratuitously and, in certain cases, for fees which must necessarily be demanded,

Owing to a misconception which has arisen in some few

instances, from the use of the term School of Mines in this connection, it has been decided, upon the reorganization of the University, to adopt the more appropriate title "Bureau of Mines" to cover this important line of work, which is closely comparable in its scope to that of the Agricultural Experiment Station, though in a different field.*

The Bureau of Mines has the advantage of the complete equipment of the School of Mines and of the services of the same officers. Its purposes, however, are not educational, but experimental and investigatory. We are prepared to examine and report upon the nature and proper mode of treatment of ores; to determine minerals and their commercial value; to assay, make samples and test (on a working scale) all classes of ores by the different processes in use, making detailed reports of all operations.

Tests known as *qualitative*, i. e., to determine the character of a mineral and whether it contains metal or other substances of commercial value, are made without any charge.

Where the *amount* of metal in a given ore is determined, assays or analyses are made and charged for at regular rates, as below:

SCHEDULE OF RATES:

Qualitative analysis, giving composition (but not amount of each substance found)	\$3.50
Quantitative analysis, giving exact amount of each substance in combination, at prices according to work required	and

^{*}It is important that the people of Arizona should clearly understand the difference between the status of the Bureau of Mines and the Agricult Iral Exper ment Station. The latter has an adequate annual appropriation from Congress, which enables us to engage in work of public utility for he benefit of Agricultural interests; whereas, no provision whatever has been made for the support of the Bureau of Mines, as such, either by Congress or the Territorial Legislature. We are, therefore, absolutely compelled to make charges to cover the cost of tests made, and to forego altogether many interesting investigations which would be advantageous to the Mining Industry. The rates for private work are always less then at works outside of Arizona. *xcepting where (as in ordinary assaying) such prices would cause unfair competition with persons who make their living by such work.

ASSAYING.*

Silver	2.00
Gold and Silver	2.50
Lead	2.50
Copper	2,50
Zinc, tin, arsenic, antimony, bismuth, nickel, cobalt, etc., each	
SAMPLING OREST	
In lots of 150 lbs., or less, including assays of gold and silver.	
Over 150 lbs., if less than 500 lbs	5.00
Over 500 lbs., if less than 3000 lbs	7.50
In lots of 3000 lbs. and over, the sampling rates (including	
assays) is figured at 25 cents per 100 lbs., or per ton	5.00
TESTING BY ANY PRCCESS, .	

Complete Mill Tests, on a working scale, are made at the lowest possible rates. These ordinarily involve, as a necessity, the sampling of the original ore, the rehandling of the whole lot with special machinery and the sampling of tailings, besides the determination of the value of the metal saved. It is, therefore, usually necessary to make special rates for each class of ore. When the method of treatment is selected by us much useless expense may be avoided.

As an illustration, the most common demand is taken, viz., the test of the milling qualities of gold ores, to determine how they will work in the stamp mill. Our charges for such work, merely to cover the costs, is at the rate:

*Duplicate assays are always made. We will not make reports upon single determinations, which allow no opportunity for checking results.

[†]Sampling marely determines the TOTAL QUANTITY of metal in a given lot, but does not indicate what percentage can be saved by any process of treatment. To ascertain this, however, a preliminary sampling is absolutely necessary, except where a correct sample can be taken during the test of the process selected.

These prices include all charges for the necessary sampling, assaying, etc.

Bulletins are occasionally issued treating of matters of interest to miners and metallurgists. These are distributed gratuitously. Address all communications to

> Тнео. В. Сомsтоск, President, Tucson, Arizona.





AGRICULTURAL EXPERIMENT STATION

STATION COUNCIL.

Theo. B. Comstock, Dr. Sc	President and Geologist
Edward M. Boggs Irr	igation Engineer, Meteorologist
Iames W. Toumey, B. S	Botanist, Entomologist
Robert H. Forbes	Chemist
	Agriculturist, Horticulturist

The Agricultural Experiment Station is, like the Bureau of Mines, a Department devoted to investigation. Its object is to aid in developing the Agricultural, Horticultural and Stockbreeding resources of Arizona in their various branches. All questions whose solution may benefit public interests in these lines are within the scope of enquiry of the Experiment Station.

The National Congress provides a fund of \$15,000 for this specific purpose, and, by reason of the University connection, the services of the best men can be obtained, as the outlay for salaries is thus divided between the two Congressional ap-

propriations. The work undertaken at the Station is also utilized in the training of students.

• A Central, or Distributing, Station is maintained at the University, near Tucson, and other Stations will be occupied in the principal regions which present problems of importance. There is now a Station at Phœnix, and plans are maturing for the establishment of several others in different parts of the Territory, where the citizens are willing to co-operate with the University officers.

The policy of the Council will be the rigid adherence to the principle of benefitting the public. Investigations will be carried to the point of determining the possibility of commercial success, but the development beyond this must be relegated to private hands. Questions arising in relation to any subject within the scope of our work will always be cheerfully answered when possible, without any charge; and where public interests will be subserved, tests, analyses and investigations may be made for individuals.

The general lines of work intended to be covered by the experiments at the different stations are partially comprised in the following summary:

The determination of the varieties of plants and animals best suited to the climate of Arizona and to different altitudes and local conditions; the range of climate for varions crops; the amount of water actually required and the proper methods of application; the cost of irrigation and the limitations as regards the pumping of water under different conditions of derth; water supply and modes of obtaining, storing and distributing; artesian water and its availability; best breeds of sheep, swine, horses, cattle and other domestic animals and improvement of live stock; the cultivation of fruit, vegetables and other produce and the best means of marketing and preserving; nature and application of fertilizers; the stocks best suited for budding and grafting; testing of trees suitable for shade, timber and other uses; utilization of native plants and the introduction of crops not yet cultivated; study of diseases of plants and animals, and modes of

prevention and eradication of pests of all kinds; experiments in forestry and with grasses and forage plants; chemical analysis of soils, waters, silts and farm products; and, in fact, anything and everything which experience and enlightened judgment shall dictate as necessary or important to the development of Agriculture in any of its numerous branches, or to the rendering of this country habitable and prosperous.

The Station Ceuncil respectfully solicits hints, criticisms and suggestions relating to this work. We do not wish to waste energy in experiments which have been undertaken by others with conclusive results, favorable or otherwise.

Bulletins are issued quarterly, or oftener, giving results of these investigations and advice upon matters of interest. These are mailed free to all applicants.

Communications upon subjects relating to this Division of the University should be addressed to

Theo. B. Comstock, President, Tucson, Arizona.



REGISTER OF STUDENTS.

THEN, OR JUNIOR, 1 EAR.	
Rouse, Charles Oma	Cucson
Shibell, Mercedes Anna	66
Walker, Mary Flint	· ·
SECOND, OR SOPHOMORE, YEAR.	
Cameron, Brewster, JrT	ucșon
Fish, Clara Cramond	"
Fleming, Charles Sumner	"
Kitt, Stanley John	"
Noble, Fred. Scott	"
Orndorff, Bert Richard	"
Osborne, Mary	
Satterwhite, Raymond Morton	"
Winnemark, Gottfried Julius	"
Young, John DSac	enton
219042	eat(H

FIRST, OR FRESHMAN, YEAR.

Cameron, HelenT	ucson
Feldman, Alice Viola	"•
Hartwell, Byron Jefferson	"
Heaton, Charles Edward	"
Hilzinger, George	"
Katzenstein, Miriam	٠ ((
Wetmore, Irene Annette	"

IRREGULAR.

Drachman, Herbert Arizona	ucson
Garcia, Alberto C	"
Walker, Mark, Jr	"

SPECIAL.

McLean, Gordon, (Mining)Clifton
Siebelts, Otto, (Surveying)Jersey City, N. J.
Thomas, Charles E., (Assaying)Tucson

SENIOR PREPARATORY.

Carleton, Willis BlennTucson
Carrillo, Leonel Suarez
Carrillo, Arturo Suarez"
Chillson, Ivena Willett "
Daily, Gertrude MildredCarthage, Ill.
Drachman, MyraTucson
Drake, William Lord "
Ferrin, Hattie "
Hilzinger, Lulu Helena "
Holladay, Lulu Maude "
Hughes, Jessie "
Lucas, Percy RandolphSilver City, N. M.
Mansfeld, HannahTucson
Noble, Paul Alexander "
Osborne, Samuel AllenSacaton
Riecker, Frederick AustinTucson
Ziegler, Albert Henry "
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JUNIOR PREPARATORY.

'Armstrong, James ByronTuc	ean
\	.3011
Buelna, Isabel Garcia	
Driscoll, Emma	
Ferguson, Frank William	
Garrovo, Antonio Daniel	
Graham, Fred	
Harding, Adelaide	
Matas, Adelaide Anita	
Prince, Arthur Marston	
Riecker, Eugene Paul	
Roca, Agricol Gonzales	
Stevens, Thomas	
Walters, LorenzoSaric, Sonora, Mex	ico
Zabriskie, Victor HugoTues	SOH

