Other circulars are issued by the University which will be forwarded on application to the President of the University:

"Why Go to College?"

The Annual Report of the Regents

Monthly editions of the University Record, issued often in the form of broadsides, containing current news of the University.

Copies of "University Life," the student newspaper, will be sent to those who request them.

"El Suhuaro," the student annual, may be ordered through the President of the University, the price being $1.50 the copy.
University of Arizona

REGISTER

1912-13

WITH ANNOUNCEMENTS FOR

1913-14

TUCSON, ARIZONA

1913
CALENDAR

1913

Sept. 15 and 16, Mon. and Tue. Registration Days
Sept. 17, Wed. Class work begins
Sept. 27, Sat. Condition examinations
Nov. 27, Thu. Thanksgiving
Classes have regular sessions.
Fri. and Sat., Nov. 28 and 29.
Dec. 23, Tue., 11:00 a. m. Holiday recess begins

1914

Jan. 5, Mon. Instruction resumed
Jan. 10, Sat. Condition examinations
Jan. 28, 29, 30, 31 First semester examinations
Feb. 2, Mon. Second semester begins
May 16, Sat. Condition examinations
May 30, Sat. Holiday
May 31, Sun. Baccalaureate discourse
June 1, Mon. Commencement

Sept. 14, 15, Mon. and Tue. Registration Days
Sept. 16, Wed. Class work begins
OFFICERS OF ADMINISTRATION, INSTRUCTION AND INVESTIGATION

BOARD OF REGENTS

EX-OFFICIO

His Excellency, George W. P. Hunt ................. Phoenix
Governor of Arizona

The Honorable Charles O. Case ...................... Phoenix
Superintendent of Public Instruction

APPOINTED

Albert L. Waters, Chancellor and President .......... Tucson

Frank H. Hereford, Treasurer .......................... Tucson

Logan W. Wheatley ..................................... Tucson

Lewis D. Ricketts ....................................... Globe

FACULTY

Arthur Herbert Wilde, Ph. D., President. President's House
B. A. 1887, Boston Univ.; M. A. 1899, Ph. D. 1901, Harvard
Professor of History. 1911

Robert Humphrey Forbes, M. S. 105 Olive Road
B. S. 1892, M. S. 1895, Illinois
Director and Chemist, Agricultural Experiment Station. Director
of Agricultural Instruction. 1894

Frank Nelson Guild, M. S. 107 Olive Road
B. S. 1894, M. S. 1903, Vermont
Professor of Chemistry and Mineralogy. 1897

George Edson Philip Smith, C. E. 1195 Speedway
B. S. 1894, C. E. 1899, Vermont
Irrigation Engineer, Agricultural Experiment Station. 1907

John James Thornber, A. M. 109 Olive Road
B. S. So. Dak. Agr.; B. S. 1897, A. M. 1901, Nebraska
Professor of Biology; Botanist, Experiment Station. 1901

William Wheeler Henley, A. B. First St., near Vine St.
A. B. 1905, Stanford
Professor of Mechanical Engineering and Mechanic Arts. 1905

*Andrew Ellicott Douglass, Sc. D.
A. B. 1889, Sc. D. 1908, Trinity
Professor of Physics and Astronomy. 1906

*Dates following titles indicate appointment to service in the University.
ALBERT EARLE VINSON, Ph. D. 914 N. Fourth Ave.
B. S. 1901, Ohio State; Ph. D. 1905, Gottingen
Biochemist, Agricultural Experiment Station. 1905

CHARLES ALFRED TURRELL, A. M. 835 Tyndall Ave.
B. S. 1896, Nebraska; A. M. 1901, Missouri
Professor of Modern Languages. 1904

FREDERICK W. WILSON, B. S. Experiment Station Farm, Phoenix
B. S. 1905, Kansas (Agricultural)
Animal Husbandman, Agricultural Experiment Station. 1905

LESLIE ABRAM WATERBURY, C. E. 1405 Speedway
B. S. 1902, C. E. 1905, Illinois
Professor of Civil Engineering. 1907

ROBERT RHEA GOODRICH, M. S. 645 E. Third St.
B. S. (Mining) 1885, B. S. (Mechanical Eng.) 1901, M. S. 1902,
Mass. Inst. of Technology
Professor of Mining Engineering and Metallurgy. 1907

ROBERT WAITMAN CLOTHIER, M. S. 639 N. Park Ave.
B. S. 1897, M. S. 1899, Kansas (Agr.)
Professor of Agriculture. 1907

ERNEST SUTHERLAND BATES, Ph. D. 908 Speedway
A. B. 1902, A. M. 1903, Michigan; Ph. D. 1908, Columbia
Professor of English. 1908

HENRY ALFRED ERNEST CHANDLER, B. S. North Hall
B. S. 1905, Northwestern
Professor of Economics and History. 1908

HIRAM McL. POWELL. 876 E. Third St.
Captain U. S. A. 1890, West Point
Professor of Military Science and Tactics. 1909

GEORGE FOUCHE FREEMAN, B. S. 817 E. Fifth St.
B. S. 1903, Alabama Polytechnic Institute
Plant Breeder, Agricultural Experiment Station. 1909

AUSTIN WINFIELD MORRILL, Ph. B. 235 W. Monroe St., Phoenix
B. S. 1900, Ph. D. 1903, Mass. Agricultural College
Entomologist, Agricultural Experiment Station. 1909

NATHAN CESNA GRIMES, A. M. 113 Olive Road
A. B. 1906, Michigan; A. M. 1909, Wisconsin
Professor of Mathematics; Registrar. 1910

FRANCES MELVILLE PERRY, A. M. 1207 Speedway
B. A. 1891, A. M. 1893, Butler
Professor of English. 1910

CHARLES ARTHUR MESERVE, Ph. D. 432 Speedway
B. S. 1895, Mass. Inst. of Tech.; Ph. D. 1899, Univ. of Erlangen
Professor of Bacteriology and Extension Lecturer on Foods and
Food Chemistry. 1912
MARION CUMMINGS STANLEY, B. L. Center St. near Speedway
   B. L. 1900, M. L. 1909, California
   Assistant Professor of Philosophy. 1902
LEVONIA PAYNE NEWSOM, Ph. D. Fourth St. and Euclid Ave.
   A. B. 1892, Ph. D. 1895, Franklin
   Assistant Professor of Latin and Greek. 1905
WILLIAM GEORGE MEDCRAFT, A. M. 726 E. Fifth St.
   A. B. 1898, A. M. 1904, Kansas Weslayan
   Assistant Professor of Mathematics. 1905
WILLIAM LUCIUS FOWLER, B. S. South Hall
   B. S. 1909, Missouri
   Assistant Professor of Animal Husbandry. 1909
ALEXANDER McOMIE, B. S. 826 E. Fourth St.
   B. S. 1910, Utah
   Assistant Agriculturist, Agricultural Experiment Station. 1910
PAUL HENRY MALLET-PREVOST BRINTON, M. S. 115 Olive Road
   1909, Graduate of Chemisches Laboratorium Fresenius,
   Wiesbaden; B. S. 1911, M. S. 1912, Minnesota
   Assistant Professor of Chemistry. 1912
FRANK CALEB KELTON, B. S. 412 E. Fourth St.
   B. S. 1904, Arizona
   Assistant Professor of Civil Engineering. 1909
ESTELLE LUTRELL, A. B. 731 No. First Ave.
   A. B. 1896, Chicago
   Instructor in English, Librarian. 1904
IDA CHRISTINA REID, Ph. B. East Cottage
   Ph. B. 1906, Arizona
   Instructor in History and Mathematics; Principal of the Sub-
   Collegiate Department. 1906
FRANK LEWIS KLEEBERGER, B. S.
   B. S. 1908, California
   Instructor in Chemistry and Physical Training; Director of the
   Gymnasium. 1908. Resigned, December, 1912
JAMES GREENLEAF BROWN.
   Instructor in Botany. 1909
WILLIAM JAMES GALBRAITH, JR., A. B. 725 E. Fourth St.
   A. B. 1906, Stanford; J. D. 1908, Chicago
   Instructor in Law and in Physical Training. 1909
BERT AUGUSTUS SNOW, B. S., M. E. 803 E. Seventh St.
   B. S. 1907, Colorado (Agr.); M. E. 1910, Cornell
   Instructor in Electrical and Mechanical Engineering. 1910
ARTHUR HAMILTON OTIS, A. B.
   A. B. 1908, Columbia
   Instructor in Modern Languages. 1911
DONALD FORSHA JONES, B. S.  803 E. Seventh St.
B. S. 1911, Kansas (Agr.)
Assistant Plant Breeder in Experiment Station.  1911

CHARLES FRANCIS WILLIS, B. S.  721 E. Fourth St.
B. S. 1906, Mass. Institute of Technology
Instructor in Geology and Mining Engineering.  1912

HENRY PHILIP BRAEUTIGAM, B. S. in E. E.  412 E. Fourth St.
B. S. in E. E. 1909, Purdue
Instructor in Mechanical and Electrical Engineering.  1912

HOWARD ARCHIBALD HUBBARD, A. M.  925 Tyndall Ave.
A. B. 1904, A. M. 1906, Ohio Wesleyan Univ.
Instructor in Economics and History.  1912

ELSA CHAPIN, B. A.  724 E. Third St.
B. A. 1909, Wellesley
Instructor in English and in Physical Training.  1912

MABEL AENELLA GUILD.  107 Olive Road
Assistant Librarian.  1907

RAYMOND L. QUIGLEY.  E. Fifth and Vine St.
Director of Athletics.  1912

ARTHUR LUDWIG ENGER.  109 Olive Road
B. S. 1911, Illinois
Assistant Engineer, Experiment Station.  1912

CLIFFORD NORMAN CATLIN.  731 No. First Ave.
A. B. 1903, A. M. 1912, Nebraska
Assistant Chemist, Experiment Station.  1912

HENRY CHENERY WHITE, A. B.  School for the Deaf
Principal of the School for the Deaf.  1912

HARRIET TUTTLE WHITE.  School for the Deaf
Instructor in the School for the Deaf.  1912

WARREN ARTHUR GROSSETTA, B. S.  113 E. Pennington St.
Assistant Commandant of Cadets.  1912

HARRIET ESTELLA BROWN, Ph. B.  422 So. Fifth Ave.
Instructor in Evening Class in Spanish.  1912

HELEN MARY ADELYNE MILLER.  University Campus
Librarian, Experiment Station.  1912
ADMINISTRATIVE OFFICERS

Arthur Herbert Wilde, Ph. D., President. Campus

Robert Humphrey Forbes, M. S., Director of the Experiment Station. 105 Olive Road

Charles Ross Stewart, Business Manager. 1137 E. Seventh St.

Ernest Sutherland Bates, Ph. D., Secretary of the Faculty. 908 Speedway

Nathan Cesna Grimes, A. M., Registrar. 113 Olive Road

Herbert Brown, Curator of the Museum. 220 N. Court St.

John Elvin Logan, Superintendent of Grounds. Campus

Mrs. Ida Talcott Underhill, Preceptress. West Cottage

Bertha Maude Sanderson, Office Secretary. 207 E. Third St.

Carlos Cameron Cable, Office Secretary, Experiment Station. 819 No. First Ave.

Arthur W. Dunstan, Bookkeeper. 1137 East Seventh St.

FACULTY COMMITTEES FOR THE YEAR 1912-13

COMMITTEE ON REGISTRATION
Professor Grimes, Chairman; Professors Waterbury, Turrell, Chandler, Miss Reid.

COMMITTEE ON CURRICULUM
Professor Chandler, Chairman; Professors Clothier, Henley, Goodrich, Perry.

COMMITTEE ON STUDENT ENTERPRISES
Professor Bates, Chairman; Professors Guild, Fowler, Mr. Quigley, Miss Reid.

COMMITTEE ON LIBRARY
Miss Lutrell, Chairman; Professors Waterbury, Bates, Brinton.
The University of Arizona was established by Act of Legislative Assembly in the year 1885, and opened to students in October, 1891. The University is an integral part of the system of public education established by and for the State. Its general organization is in accordance with the Act of Congress of July 2, 1862, known as the Morrill Act, creating the "Land Grant Colleges." The details of its organization and government are regulated by the Act of the Legislative Assembly of the Territory of Arizona, passed in 1885, and embodied, with amendments, in the Revised Statutes of Arizona Territory, 1901, which vests the government of the institution in a corporation styled the Board of Regents of the University of Arizona, consisting of the Governor and Superintendent of Public Instruction of the State, ex-officio, and other members appointed by the Governor for a term of four years.

In creating the University, the Legislative Assembly wisely unified under one management the various schools and institutions of higher learning or investigation in Arizona,—the colleges of liberal arts, the schools of mining and engineering, the agricultural college, and the agricultural experiment station. No professional schools of law, medicine, dentistry, or music, and no normal department have been established. The University consists of

I. The College of Liberal Arts, of Agriculture, of Engineering—civil, electrical, mechanical, and mining.

II. The Agricultural Experiment Station.

III. The Preparatory or Sub-Collegiate Department.

The Sub-Collegiate Department will gradually disappear as the educational system of the State is developed by the establishment of efficient high schools; the first year of this work was discontinued in 1912-13; the second year will be discontinued after June, 1913.

The University in all departments is open to properly qualified persons of both sexes. Through the aid received from the United States and from the State, it is enabled to offer its privileges to residents and non-residents, with only very moderate charges. The number of students in any one class or section of a class is kept low, in order that each student may receive the individual attention of the instructors.

The purpose of the University of Arizona is, in the language of the organic law, "to provide the inhabitants of this Territory with the means of acquiring a thorough knowledge of the various branches of literature, science, and the arts," and so far as possible a technical education adapted to the development of the peculiar resources of Arizona.
In furtherance of this latter purpose, instruction is provided in the liberal arts and in subjects fundamental to agriculture, the mechanic arts, mining and metallurgy.

The University, by nature of its situation, is a great mining laboratory, surrounded on all sides by great mines. Some of these mines developed on a large scale are within a few miles of the city, and the number and magnitude of such enterprises are steadily increasing. The University offers exceptional advantages to the students of mining engineering who desire to see the actual operation of great mines, or the development of great enterprises, while carrying on the theoretical and experimental work of the mining course.

The advantages in civil engineering are hardly less noteworthy, for Tucson is not only a division point on the main lines of the Southern Pacific railroad and the El Paso and Southwestern railroad, with large shops, roundhouses, and engineering offices, but it has the administrative and engineering headquarters for five of the subsidiary or allied lines of the Southern Pacific system in Arizona and in Mexico, commonly known as the Randolph lines, including the great West Coast Line in Mexico. All of these lines furnish excellent opportunities for observation and vacation employment for students of civil engineering.

The University is also favorably situated for the study of agriculture. Tucson has many irrigated farms in its neighborhood, is near the great range country of southern Arizona, and occupies a central position with relation to the agricultural activities of the State. The University has kept pace with the growing interest and investment in agriculture in the State and has adapted its instruction and research in this science to the special needs of the State.

LOCATION AND CLIMATE

The University of Arizona is situated at Tucson, a city of eighteen thousand inhabitants, on the main lines of the Southern Pacific railway, and the El Paso and Southwestern (the Rock Island) System, 312 miles west of El Paso, Texas, and 500 miles east of Los Angeles, California. The city lies in a broad flat valley at an elevation of 2,400 feet above sea level and is surrounded by mountains. Its dry, mild, and equable climate has made Tucson a famous winter resort unsurpassed for healthfulness.

The winter climate is especially good; the temperature is cool and strengthening but seldom severe, the lowest temperature recorded during the average year being about twenty degrees above zero, Fahrenheit. Little rain falls during the winter; fogs are all but unknown;
cloudy days are rare. The percentage of sunshine throughout the winter is greater than that recorded at any other place in the United States. Owing to the extreme dryness of the air the highest temperatures known are less oppressive to the senses and less dangerous to the health than the summer heats of the upper Mississippi Valley states. The total amount of rainfall averages less than twelve inches.

These advantages insure to students a comfortable education and a wide range of out-door recreations throughout the college year.

The University Campus, consisting of sixty acres, is situated upon high ground about a mile from the business center of the city with which it is connected by an electric street-car line. On every side it commands a view of mountain scenery of remarkable extent and grandeur.

An abundant supply of unusually good water for household, laboratory, and irrigation purposes is drawn from a large well on the Campus from a depth of one hundred and twenty feet, thus securing immunity from the dangers of a contaminated water supply. The Campus has a complete sewer system connecting the buildings with the city mains at the University gate. The buildings are lighted by electricity.

The Campus, carefully laid out in drives, lawns, and gardens, with a large number of palms, olive, ash, umbrella, pepper, bagota, and cottonwood trees has the air of a well kept park.

BUILDINGS

The main building, University Hall, the oldest of the group, is 200 x 150 feet, two stories in height, the first of gray stone, the second of red brick. It is completely surrounded by a wide two-story veranda. The building contains recitation rooms, laboratories and apparatus rooms of various departments, an assembly room, and the office, laboratories and library of the Agricultural Experiment Station.

The Library and Museum building is a handsome structure of red brick and bedford sandstone, with a massive tile roof. The interior finish is in natural oak and pine. The library reading room, on the second floor, is a large, well-lighted room, furnished with heavy solid oak reading tables, desks and wall cases. The stack room at the rear is fitted up with modern steel racks. The Museum occupies the west half of the second floor. Fine oak and glass cases constitute the furnishings. The offices of the president and business manager of the University, a laboratory and a lecture room for the department of geology, and work rooms for the library are on the first floor.

Science Hall, a new building, of architecture harmonious with the Library, which it faces, was completed in April, 1909, at a cost of
about $40,000. Further appropriation was made in March, 1909, for furnishing and equipping the building, which was thus made ready for occupancy in September, 1909. The building, 145 x 60 feet, is of three stories, the first devoted to physics, the second to chemistry and mineralogy, and the third to chemistry and biology. The roomy attic and a superstructure on the roof are used as an astronomical observatory.

North Hall, a dormitory, two stories in height, built of gray stone, of fine quality, is occupied by college men. Besides the parlor, and rooms of the instructor in charge, it contains sixteen rooms, each large enough to accommodate two students, besides bath and toilet rooms and sleeping porch.

South Hall, a large brick building containing thirty-five rooms, besides bath and toilet rooms and store rooms, is a dormitory for college men and for male preparatory students. It is heated by a hot water system. It will accommodate sixty-six students.

A new dormitory for men was completed in March, 1913, and furnishes accommodation for about forty students. The building is a model of construction, in brick and reinforced concrete, and in every way adapted to its purpose. The rooms are unusually large, with commodious closets. A sleeping roof provides sleeping accommodations in the open air for all the residents.

West Cottage and East Cottage are the dormitories for young women,—two story brick houses with wide porches, surrounded with vines, shrubbery, lawns and trees.

The Dining Hall, built of red brick, provides boarding accommodations for all persons living on the Campus.

The Shop and Assay building is a brick structure, containing a room for mechanical and freehand drawing, a large laboratory for forge work, machine practice and carpentry, and a lecture room, instrument room, and material testing laboratory for the department of civil engineering. Two other rooms are used for lockers, and for the motor and engine. The assay laboratory and commercial assaying department occupy five rooms fully equipped with a large melting furnace, the necessary muffle furnaces, and other accessories for making complete and accurate assays.

The Mill or Mining Machinery building, situated to the northeast of the main group of buildings, is a plain wooden structure fully equipped with stamp mills, jigs, concentrating tables, separators, and other machinery necessary for the mining laboratory.

Herring Hall, the gymnasium, is 40 x 80 feet in size, and is constructed of red brick and white plaster. It was erected in 1903, the
gift of Professor James Douglas and his associates of the Copper Queen Consolidated Mining Company, through Colonel William Herring, after whom it was named, at the suggestion of Professor Douglas.

The pump house and mechanical engineering laboratory was built in 1905. By use of brick, cement and iron it is practically fire proof, thus insuring safety to the well and pumps supplying the University with water for all its uses.

A two-story brick residence is occupied by the President of the University.

Other buildings are the cottage occupied by the Superintendent of Buildings and Grounds, three greenhouses, a brick barn, and various smaller outbuildings used for shops and store rooms.

**MAINTENANCE**

The University is maintained by funds appropriated by the United States and by the State of Arizona. Fifty-seven sections of very valuable pine land in Coconino county have been set apart by the Federal government for the benefit of the University, a small sum being annually received from the leases of this land.

By the provisions of the Morrill Act of 1890, the University receives annually from the United States the sum of $25,000 “to be applied only to instruction in agriculture, the mechanic arts, the English language and the various branches of mathematical, physical, natural and economic science, with special reference to their applications in the industries of life, and to the facilities for such instruction.” This Morrill Fund is duplicated by the Nelson Fund, created by the Act of March 4, 1907, which appropriated $5,000 for the year beginning July 1, 1907, and provided for an annual increase of $5,000 until the total received by each state should be $50,000 a year from the two funds. The University receives from the same source, for the support of the Agricultural Experiment Station, $15,000 yearly from the Hatch Act of 1887; the Adams Act of 1906 for the current year yields $15,000, giving the Station $30,000 a year.

The appropriations of the Legislature for the year 1912-13 were $48,680 for maintenance; $23,320 for improvements, and $18,000 for the work of the Agricultural Experiment Station.

The endowment of $5,000 granted in 1911 by the El Paso and Southwestern Railroad for the use of the Agricultural Experiment Station in carrying on hydographic work in Sulphur Springs Valley still affords means for continuing these studies, in cooperation with property owners of the Valley.
The University also receives annually, from miscellaneous sources such as matriculation and tuition fees, etc., about $1,500. The receipts for board, light, etc., amount to about $18,000 per year.

ENDOWMENT

By the munificence of Doctor James Douglas, of New York, the University received in June, 1908, “the sum of $10,000, the annual interest or income from which is to be annually applied, devoted, expended and used by said Board of Regents, or its successors in trust, for the purchase of instruments of precision and research, or special apparatus, for scientific instruction and education in the department of mineralogy and School of Mines of the University of Arizona, but no part of said fund or income is to be used or applied to the purchase of mining or metallurgical machinery or supplies for such department or for the use of students in the chemical or metallurgical laboratories.” The fund thus created has been named by the Board the Douglas Endowment Fund.

LIBRARY

The building contains 20,000 bound volumes and several thousand unbound bulletins and reports, chiefly agricultural. The present appropriations provide for an annual increase of about 1,500 volumes. Since, of the total accessions nearly one-half has been made within the last five years the books, as a whole, have a direct bearing upon the college work now offered. Of these volumes a collection of complete sets of certain scientific and literary periodicals, to which additions are made yearly, is of special service to those interested in research. The library was made a regular depository of United States Government documents in 1907. These publications have been placed in a separate room where they are arranged by departments. The library has recently added to its catalogue the U. S. card indexes issued by the Department of Agriculture. Much of the early material therein indexed has been received through private donations and the later numbers secured by application, thus making the sets very satisfactory for use in reference work.

The books are classed by the decimal system and shelved in numerical order with a further author division according to the Cutter numbers. The catalogue is the usual dictionary card catalogue of authors, subjects and titles in one alphabetical arrangement. Printed cards from the Library of Congress are used, supplemented by typewritten cards for books reported as not in their stock.

The Reading Room is supplied with about 600 books of general reference which may be consulted by the students without any formal-
ity. All books with the exception of periodicals and books reserved for reference may be drawn for home use. The use of the books and of the periodicals within the building is free to all persons. Upon application to the Library Committee as liberal privileges, for the withdrawal of books, as are possible will be extended to those outside who are engaged in systematic study. The following is a partial list of serials and newspapers on file for the use of students.

**LIST OF SERIALS**

*Advocate of Peace,
American Architect and Building News,
American Association for the Advancement of Science, Proceedings,
American Blacksmith,
American Breeders' Association, Proceedings,
American Chemical Journal,
American Chem. Society Journal,
*American Economist,
American Electro-Chemical Society, Transactions,
American Forestry,
American Geographical Society, Bulletin,
American Historical Review,
American Institute of Mining Engineers, Transactions,
American Journal of Pharmacy,
American Journal of Science,
American Journal of Sociology,
American Labor Legislation Review,
American Library Association Booklist,
American Machinist,
American Magazine,
American Mathematical Society, Bulletin,
American Mathematical Society, Transactions,
American Naturalist,
*American Philosophical Society, Proceedings,
American Political Science Review,
American Society for Testing Materials, Proceedings,
American Society of Civil Engineers, Transactions,
Annalen der Physik,
Annales des Mines,
Architectural Record,
Archiv f. d. Studium d. neueren Sprachen,
Association of Engineering Societies, Journal,
Astrophysical Journal,
Athenaeum,
Atlantic Monthly,
Australian Mining Standard,
Bibelot,
Biedermann's Zentralblatt fur Agrrikulturchemie,
Blanco y Negro,
Book Review Digest,
*Bookbuyer,
Bookman,
Botanical Gazette,
Breeder's Gazette,
Bulletin of Bibliography,
*California Cultivator,
*California University Publications,
Canadian Entomologist,
Canadian Mining Journal,
Cassier's Magazine,
Cement,
Centralblatt f. Mineralogie,
Century,
Chemical Abstracts,
Chemical, Metallurgical and Mining Society of South Africa, Journal,
Chemical News,
Chemical Society, Journal, (London),
Chemisches Centralblatt,
Collier's Weekly,
Country Gentleman,
Country Life in America,
Craftsman,
Cumulative Book Index,
Current Opinion,
Deutsche Chemische Gesellschaft, Berichte,
Dial,
Economic Geology,
Educational Review,
Electrical Review,
Electrical World,
Engineering and Mining Journal,
Engineering Index,
Engineering Magazine,
Engineering News,
Engineering Record,
Englische Studien,
English Historical Review,
España moderna, La.,
*Farmer's Voice,
Fortnightly,
Franklin Institute, Journal,
Geological Magazine,
Geological Society of America, Bulletin
Geologisches Centralblatt,
Graphic,
Harper's Monthly Magazine,
Harper's Weekly,
Havana University, Revista de la Facultad de letras y ciencias,
Illustration,
Independent (N. Y.),
Institut de France, Paris, Académie des Sciences, Comptes rendus des Séances, International,
International Labor Office, Bulletin,
International Studio,
Irrigation Age,
Journal of American Folk-lore,
Journal of English and Germanic Philology,
Journal of Geography,
Journal of Geology,
Journal of Morphology,
Journal of Political Economy,
Ladies' Home Journal,
Library Journal,
Life,
Literary Digest,
Living Age,
*Lowell Observatory, Bulletin,
McClure's Magazine,
Machinery,
Manual Training Magazine,
Metallurgical and Chemical Engineering,
Mexican Mining Journal,
Mineral Industry,
Mineralogical Magazine,
Mines and Methods,
Mines and Minerals,
Mining and Scientific Press,
Mining Magazine (London),
*Mining Reporter,
*Mining Review,
Mining Science,
*Mining World,
Missouri Ruralist,
Modern Language Association of America, Publications,
Modern Philology,
Monist,
Moody's Magazine,
Muhlenbergia,
Musician,
Nation,
National Geographic Magazine,
National Municipal Review,
Nature,
Neues Jahrbuch f. Mineralogie,
New York Dramatic Mirror,
Nineteenth Century and After,
North American Review,
*North German Lloyd Bulletin,
*Our Dumb Animals,
Out West,
Outing,
Outlook,
Philosophical Magazine,
Philosophical Review,
Physical Review,
*Plant World,
Poet-Lore,
Political Science Quarterly,
 Popular Astronomy,
Popular Science Monthly,
Por Esos Mundos,
Power,
Practical Engineer,
*Prairie Farmer,
Public Libraries,
Publishers' Weekly,
Quarterly Journal of Economics,
Queensland Government Mining Journal,
Readers' Guide to Periodical Literature,
Review of Reviews,
Revue des deux Mondes,
St. Louis Mirror,
School of Mines Quarterly,
School Review,
Science,
Scientific American,
Scientific American Supplement,
Scribner's Magazine,
Seismological Society of America, Bulletin, 
Societe francaise de Mineralogie, Bulletin, 
Society for the Promotion of Engineering Education, Proceedings, 
Society of Chemical Industry, Journal, 
South African Mining Journal, 
Spectator (London), 
Sunset, 
Survey,

System, 
Technical World, 
Torrey Botanical Club, Bulletin, 
World's Work, 
Zeitschrift f. analytische Chemie, 
Zeitschrift f. anorganische Chemie, 
Zeitschrift f. Elektrochemie, 
Zeitschrift f. Krystallographie, 
Zeitschrift f. physikalische Chemie, 
Zeitschrift f. praktische Geologie.

NEWSPAPERS ON FILE IN THE READING ROOM

*Arizona Blade,  
*Arizona Bulletin,  
*Arizona Daily Star,  
Arizona Range News,  
Arizona Republican,  
*Arizona Silver Belt,  
Arizona Weekly Journal-Miner,  
Bisbee Review,  
Boston Transcript,  
*Copper Era,  
Douglas International,  
*Donated.

*Graham County Guardian,  
Los Angeles Times,  
Mojave County Miner,  
New York Times (Saturday ed.),  
*Oasis,  
Prescott Weekly Courier,  
Southwestern Stockmen,  
*Tempe News,  
Tucson Citizen,  
Tucson Post,  
Tombstone Epitaph,  
*Yuma Sun.

The Carnegie Library of the City of Tucson is also open to the use of the students of the University. This library also is a depository of United States Government documents.

MUSEUM

The professors of the University have the immediate care of the collections pertaining to their respective departments. The collections now displayed at the University comprise representative series of minerals, ores and rocks of Arizona. Among these may be particularly mentioned superb specimens from the mines of the Copper Queen Mining Company at Bisbee. There are also collections of typical rocks and materials for comparison, and many specimens of ores from different parts of the United States and from abroad. It is desired to make the collection of ores and minerals fully represent the great mineral resources of Arizona.

The Museum is indebted to Mr. Herbert Brown, curator, for a large and valuable collection of skins of the birds of Arizona, which he has deposited in the Museum, as well as for a collection of ancient aboriginal pottery and other relics. The fossil skull and teeth of an elephant, and other fragmentary remains of extinct animals, sent from Yuma by Mr. Brown, deserve special mention.
The Museum has been made the custodian of a rare collection of arms and military relics, chiefly from the Philippine Islands, deposited by Captain Charles C. Smith, of Fort Huachuca, Arizona.

Historical records of much value are gradually accumulating as a part of this museum, and an appeal is made to old settlers and others to bear this fact in mind when making disposition of articles bearing even remote relation to the early pioneers and their history. All records and data of any nature that can be gleaned are worthy of preservation, and it is earnestly desired to have them placed at the University, where they will always be accessible for reference.

**AGRICULTURE AND HORTICULTURE**

The University demonstration farm consists of eighty acres of Rillito Valley land. Thirty-five acres of this have been cleared; twenty acres are seeded to alfalfa. Additional acres will be used for garden crops during the summer of 1913, and the leveling and irrigation of other areas will add to the resources of the farm. An excellent well furnishes water for the farm, a number five Krogh pump being run by a twelve horse power gasoline engine.

A farm residence has been constructed at a cost of about $2,000, which is occupied by the farm foreman and his family. It contains a small office for safekeeping of farm records.

The farm has recently constructed a horse barn with room for five horses and a work shop at a cost of about $900; a modern sanitary dairy barn designed to furnish accommodations for 40 cows, at a cost of about $1,600; a water tank with a capacity of 6000 gallons and a distributing system for the whole ranch, at a cost of $500. The main distributing ditch for irrigation purposes has been constructed out of cement tile at a cost of $1100, an improvement that will soon pay for itself in the saving of water otherwise lost by percolation and evaporation.

During the summer of 1911 a dairy herd of pure bred animals was purchased and also a full equipment for laboratory and farm dairy work.

The agronomy laboratory is well equipped with apparatus for teaching soil physics; green houses furnish accommodations for laboratory work in plant culture and other horticultural subjects. Laboratory facilities are being provided for the use of classes in animal physiology. It is intended to provide full equipment for laboratory and demonstration work in poultry husbandry in the coming year.

The agricultural section of the University library contains leading reference works in agriculture, including cyclopaedias, herd books,
standard texts, and experiment station bulletins. The student is required to make much of his preparation for class by consulting the works in the library.

The laboratories of the Agricultural Experiment Station, together with its plant breeding and plant introduction gardens, located on the University campus, furnish abundant opportunity for students to observe the working out of experimental problems of vital interest to the agriculture of the State. The campus itself, with its many ornamental trees, shrubs, and flowers, all of which are peculiarly adapted to the climate of the arid Southwest, furnish excellent facilities for the study of problems of ornamentation and home building.

In addition to regular courses of instruction in agriculture and horticulture, "Timely Hints for Farmers," issued under the auspices of the Experiment Station, are of distinct educational value. Five thousand farmers of the State are reached more or less regularly by publications on subjects of vital interest. Farmers' Institutes, announcements of which are made from time to time, are supplemented by short courses in agriculture. The first Demonstration Train has been operated in the current year by the University in cooperation with the Santa Fe, Southern Pacific, and El Paso and Southwestern lines.

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

ASTRONOMY

The atmosphere of southern Arizona is perhaps the best in the United States for astronomical observation, having smaller percentage of cloud and less average wind velocity than any other locality where records have been preserved. The dry air and 2400 feet elevation give Tucson such a clear sky that faint stars may be watched till they set behind the distant horizon; the fine weather, day after day, gives opportunity for consecutiveness of observation not obtainable elsewhere; a greater portion of the year is available, with less interference from air currents.

The course in astronomy is arranged especially to draw attention to these advantages, and, at the same time, to give that understanding of the motions of the earth and planets which is important in many branches of engineering. The eight-inch Harvard telescope with its Clark glass and the four and one-fourth inch Brashear telescope of the University will always be available for closer study of the heavenly bodies. Two excellent clocks with electric connections for transmit-
ting time give opportunity for longitude, latitude and time observations.

**BIOLOGY**

The biological laboratories are located in a suite of eight rooms, convenient and well-lighted, on the third floor of Science Hall; the equipment is suited to modern instruction and research in the biological sciences. The library and apparatus are well selected and adapted to the region and to the courses offered.

The herbarium consists of 40,000 mounted specimens, of which 15,000 sheets are in the Arizona botanical survey collection. There are also 4,000 sheets in the herbarium of cultivated plants. The building up of these collections is progressing rapidly, largely by virtue of the work on the botanical survey of the State, which is being conducted by the department of biology, and which will result ultimately in the publication of a *Flora of Arizona*. The unique flora and fauna of the mountains, foothills, mesa and river valley collecting grounds, in close proximity to the institution, offer attractive opportunities for instruction and research, particularly along taxonomic and ecological lines.

In addition to the above, there are articulate and inarticulate skeletons, plaster and papier mache models of the more important structures of the human anatomy, and duplicate material for study and dissection. The department has 28 compound microscopes of the latest Spencer, Bausch and Lomb, and Leitz types, which number is being added to each year. Recently several pieces of special apparatus have been purchased, among which are a Leitz rotary microtome, a large paraffin bath, a McIntosh stereopticon, and a new photographic camera. About $400 also was invested in new plant physiology apparatus.

The Desert Botanical Laboratory of the Carnegie Institution supplements in admirable manner the facilities of the University for botanical investigation, particularly as concerns field plant physiology and plant geography.

**CHEMISTRY**

The chemical laboratories used for instruction occupy twelve laboratories, class rooms, and storerooms, on the second and third floors of Science Hall.

The laboratory used by Freshmen for the study of general chemistry and qualitative analysis is at the east end of the second floor of Science Hall. It was newly furnished throughout during the year 1910-11, with desks, hoods, and racks, and piped for both water and gas. It has accommodations for forty-eight students.
The laboratory for quantitative analysis is at the west end of the second floor of Science Hall. It is thoroughly equipped for the teaching of volumetric and gasometric analysis, and metallurgical chemistry, including apparatus for the electrolytic determination of metals. The balance room contains analytical balances of the latest models so arranged as to insure a maximum of stability and accuracy.

**METALLURGY**

A lecture and demonstration room fitted with sinks and cabinets completes an equipment of apparatus and collections adequate for comprehensive instruction in both theoretical and practical chemistry.

The laboratory of physical chemistry, on the third floor of Science Hall, has the following apparatus: Wanner’s Optical pyrometer, Chateliers pyrometer, boiling point and freezing point apparatus, Pulfrich refractometer, large wave length spectroscope made by Adam Hilger, London, thermostats, polariscope, and apparatus for conductivity work and the determination of electro-motive force.

A small laboratory on the third floor is fully equipped for electro-analysis, and another for organic chemistry and gas analysis.

The laboratories of the Agricultural Experiment Station occupy four rooms on the first floor of the Main Building. These are devoted to analytical work and to chemical investigations relating to agriculture. Though not intended for the use of students, they are of incidental value to the instructors and students through the investigations which are here conducted.

**CIVIL ENGINEERING**

The present quarters of this department are a recitation room, an instrument room and office, a materials testing laboratory, and a drafting room. The recitation and drafting rooms occupy the entire east end of the third floor of Science Hall. The materials testing laboratory is in the Shop and Assay Building.

The instrument room contains lockers in which the surveying instruments are kept. These include six transits, four levels, two plane tables, two compasses, a sextant, a considerable number of small instruments, and other equipment required for field work.

The materials testing laboratory is fitted for making physical tests of wood, iron, steel, stone, cement, concrete, and other materials used in engineering construction. The apparatus includes an Olsen 100,000 pound universal testing machine, a duplex micrometer extensometer, a Fairbanks cement testing machine, briquette molds, cube molds, molds for concrete beams, molds for specimens for testing shearing strength of concrete, a Vicat needle machine, specific gravity flasks, sieves, a moist chamber and other auxiliary equipment.
GEOLOGY

The department of Geology occupies two rooms in the Library building, one laboratory and drawing room and the other a lecture room. The laboratory has the usual drawing tables and five Loughlin Hough drawing boards, besides the necessary drawing instruments and special appliances for geological mapping. A complete set of geological and lithological specimens and geological models of various parts of the United States are used for illustration and study. For field surveying in geology, the University has an Izard Warren light mountain transit, a Bausch and Lomb alidade with plane tables, Zeiss telemeter, one Aloe barometer, two Zeiss field microscopes, one Nacchet microscope, one Gurley pocket transit, one Verschoyle patent transit, one Aloe pocket alidade, one Aloe pocket level, one Keufel and Esser liner, one Bausch and Lomb pocket transit, one Coradi planimeter, one Aloe section liner, one Short and Mason and one Cassettal barometer, slide rules, complete camping outfit and necessary carrying sacks for all instruments and outfit.

MECHANIC ARTS

The Shops and Drawing Room occupy a total floor area of about 8000 square feet, divided into a large shop and machinery room, with adjacent tool, supply and store rooms; draughting, model, pattern, and lecture rooms, and office.

The entire building is well ventilated and lighted from above as well as from the sides and is steam heated.

The wood shop has a full assortment of hand tools, twenty-four benches with a complete set of tools for each, six turning lathes, Beach scroll saw, a Whitney dimension sawing machine, a band saw, a Universal trimmer, and a large grindstone with truing device.

The forge-room contains twenty down-draught forges, twenty anvils, a combination shear and punch, a blacksmith's drill press and a full assortment of small tools and appliances. Blast is furnished by a No. 3 Sturtevant blower; smoke and gases are removed by a 70-inch exhaust fan.

The machine shop contains one 24-inch Lodge and Shipley engine lathe with taper attachment, two 14-inch Lodge and Shipley lathes, one 14-inch Pratt and Whitney lathe with taper attachment, one 12-inch Seneca Falls lathe with taper attachment, draw-in chuck, and English and Metric change gears; one 10-inch Reed speed lathe, one 16-inch Cincinnati shaper, one 24-inch by 6-foot Woodward and Powel planer, one Browne & Sharpe No. 2 Universal milling machine, one Browne & Sharpe No. 1 Universal grinder, one Prentice 24-inch drill press, one 13-inch Slate sensitive drill, one power hack
saw, one drill grinder, one emery stand, one grinding attachment for lathes, one 1½ ton portable hoist, one 1-ton triplex hoist, one ½-ton screw hoist. Each shop has its own tool room with small tools, gauges, and measuring instruments.

MECHANICAL AND ELECTRICAL ENGINEERING

The department possesses a comprehensive catalogue file containing the trade literature of about five hundred leading manufacturers of this country, together with a large collection of working drawings, and sample collection of models, machine parts, valves, electrical fittings, insulating materials, and abrasives.

The mechanical and electrical laboratory is equipped for experimental work in the study and operation of steam boilers, steam and gas engines, hydraulic and electrical machinery. Besides the machinery of the shop and mill which may be used for the study of machine design as well as for experimental work, the University has a 45 horsepower return tubular boiler, a 35 horsepower Atlas center crank engine, a 60 horsepower Chuse high speed automatic side crank engine, to be direct connected to generator, a 30 horsepower Fort Scott engine, a 10 x 7 x 10 Worthington duplex direct acting steam pump, a small duplex pump, a small Cameron boiler feed pump, an injector, a 40 horsepower Fairbanks Morse gasoline engine directly connected to a 500 gallon high pressure fire pump, a 23 k. w. Crocker Wheeler direct current generator, a 5 k. w Fort Wayne rotary convertor, a 15 horsepower Wagner variable speed induction motor, a 7 horsepower Westinghouse induction motor, a 7 k. w. Westinghouse direct current generator, direct connected to a four-cylinder gasoline engine, a 3 horsepower and a ½ horsepower direct current motor, a 5 k. w. Packard variable voltage transformer, two small testing transformers, and, for measuring instruments, two graphic recording volt meters and ammeters, several integrating watt meters, and a series of indicating meters. An 8" x 10" Gould triplex pump with its electric motor serves as part of the equipment of the mechanical-electrical laboratory and furnishes the University with its water supply. The department is well equipped with steam indicators, gauges, and weighing scales. For the testing of pumping machinery a large steel weir box overflowing into cement cistern is connected by suitable piping to the various pumps in the laboratory.

METALLURGY

The Mill or metallurgical laboratory tests the adaptability of ores for treatment by different processes both on a large and small scale.

The chief features of the equipment are a Blake crusher, 4 in. by 7 in.; a Dodge crusher, 4 in. by 6 in.; sampling rolls, 6 in. by 9 in.;
a cone and burr sample grinder; a pebble mill with a capacity of about 15 lbs. at one charge; a laboratory lightning crushe and a disc pulverizer; a 5-stamp mill, with 800-pound stamps; a 3-stamp mill, with 250-pound stamps; inside and outside amalgamation plates for the same; a 2-ft. clean-up pan; a 1-ft. amalgamation pan, and a 9-jar revolving agitator for testing samples of a few ounces; a No. 5 Wilfley table of the latest pattern, and a Hallett hand jig; a 1½ ton cyanide plant for treating sands or dry crushed ore; two 150-lb. cyanide plants for treating smaller samples; 3-ft. agitator; a 12-in., 6-chamber, flush plate and frame, washing filter press and pump for the same; a Sturtevant shaking screen; a Tullock ore feeder; a belt and bucket elevator, sampling plates, split samplers, a shaking screen, percolators, sizing screens from 1-mesh to 200-mesh, miners’ pans, bateas, retorts, etc.

The power for operating this plant is furnished by a 30 h. p. Westinghouse induction motor, type C.

The Callow Miniature Plant has been recently added, consisting of: 1 small two-compartment Harz jig, 1 small Wilfley table, 1 canvas slime table, 1 amalgamating plate, 1 set hydraulic classifiers, 1 set cyanide agitators, 1 automatic feeder. This plant is driven by a ½ h. p. motor and stands on a hopper bottom tank divided into three compartments. It is a complete ore dressing plant, gold mill—and together with the cyanide percolators described elsewhere—cyanide mill, and tests quantities of ore ranging in amounts from 25 to 400 pounds. The results from these tests should predict the performance of a full size plant. Also 1 Richards’ pulsator jig and 1 Richards’ pulsator classifier.

An International dry concentrator has just been presented to the University.

The assay laboratory is equipped with assay furnaces for crucible work, for scorifying and cupeling, and for retorting mercury from amalgam, fired with coke, gasoline, and gas, so the student becomes trained in the use of all these fuels. There are besides, all needed appliances for assaying by dry and wet methods including electrolysis. The laboratory has desks and fittings for the chemical work required in the metallurgical and mineralogical investigation and analysis of ores, in mineral fertilizers, and in qualitative tests of minerals.

MINERALOGY AND PETROGRAPHY

The laboratories for mineralogy consist of two rooms on the second floor of Science Hall, one being used for microscopic work in petrography and the other for blowpipe analysis and determinative mineralogy. The laboratory for microscopic work contains seven petrographic microscopes including both American and foreign make, one
Zeiss binocular for opaque work, models for illustrating axes of elasticity and spherical projection, a type set of rocks classified according to Rosenbusch's *Elemente der Gesteinlehre* with thin section corresponding, 120 oriented sections of minerals, and apparatus for photomicrography and projection. The laboratory for blowpipe analysis is well supplied with minerals for making the necessary tests and studying the physical properties. A type set of 600 minerals classified according to Dana is included. For the study of crystallography, there are a collection of 300 pasteboard models of crystals, numerous glass and wooden models, three two-circle contact goniometers and one two-circle reflecting Goldschmidt goniometer of the most recent type, apparatus for projection and drawing of crystals, and a model machine for cutting crystals from plaster of Paris.

**MINING**

The laboratory for practical mining is now being fitted up, principally by donations of equipment from the various manufacturers of mining machinery. The donations up to the present time have included drills of various types, pumps, hose, crushing machinery, pulleys, blowers, etc., and it is expected within a short time to have a very complete laboratory for the teaching of practical mining. Models are also being constructed which will illustrate in minute detail various branches and conditions of mining and will demonstrate methods of construction. These will include various types of head frames, mill buildings, underground timbering, ore bins, and other structures.

**PHYSICS AND ASTRONOMY**

The department of physics occupies the entire first floor of Science Hall, where facilities for the demonstration of all important phenomena are complete. A lecture room seating forty persons is fitted with modern conveniences, such as lights, water, gas, heliostat, alternating and direct currents of great range, an opaque projection lantern, elevated seats, and shutters for darkening the room. Two large main laboratory rooms supply space for mechanical and electrical work, while special rooms are devoted to heat, sound, light, magnetism and research work. A carpenter's shop, a repair and store room, a photographic dark and enlarging room, and a constant temperature room are provided. A pendulum seismograph is installed in the magnetic laboratory and a special space has been provided for a 55-foot Foucault pendulum and the study of falling bodies.

An eight-inch Willyoung induction coil with storage and X-ray accessories is used in the study of high-tension electricity. There are also a large Oudin resonator and a mercury interrupter, manufactured
by Cox, and a Tesla coil of the Elster and Geitel type. Through the generosity of the Hon. Mark J. Egan, of Clifton, the University has a fine imported set of miniature wireless telegraphy apparatus, capable of transmitting messages about two hundred feet. A Knott wireless outfit of 1/4-kilowatt power, capable of sending messages about twenty-five miles, is installed. The department possesses, also, three motor generator sets, the largest having an output of 7-kilowatts, a Leeds and Northrup potentiometer and accessories, and very complete apparatus for showing electro-magnetic phenomena, rotary fields, and stationary electric waves.

The astronomical observatory is at the top of the building where a sliding roof, 12 feet square, uncovers the telescope and discloses a clear horizon in every direction. An 8-inch Clark lens and mounting, both of the first quality, loaned to the University by the Observatory of Harvard University, Cambridge, Mass., are mounted on a cement pier supported on the main walls of the building, and give perfectly steady images. This lens is most efficient in fundamental research work. The equipment also includes a four and one-quarter inch Brashear telescope, sidereal and mean time clocks, and pier for latitude and longitude observation.

GYMNASIUM

Herring Hall, the gymnasium, is well supplied with apparatus of standard make, which includes forty chestweights, dumb-bells, barbells, wands, Indian clubs, Medart vaulting horse, parallel bars, horizontal bar, quarter-circle, abdominal chair, wrestling machine, finger machine, chest expander, chest developer, climbing rope, flying rings, traveling rings, striking bag and drum, jumping and vaulting stands, fencing foils and masks, basket balls and goals, five large mats and a set of anthropometric apparatus.

In the basement are one hundred and forty-four lockers, and five shower baths supplied with hot water from a heater with large reservoir.

The outdoor equipment consists of two baseball fields; a football field, six-lap track, and straightaway; five fine tennis courts; and a basketball court for girls.

MILITARY

A room in the basement of University Hall is used as an armory and is fitted up with the necessary gun racks and accessories. The equipment includes 150 old style Springfield rifles, 100 Krag cadet rifles with complete accoutrements, 4 model 1906 Springfield chambered for .22 for indoor practice, eight sabres and belts, musical instruments for the band, signal flags, and targets for short range practice.
Fifteen 10 x 12 army wall tents with poles, and a mess outfit, constitute the camp equipment of the department of military science and tactics for use on practice marches and annual encampments.

**REGISTRATION**

All students are expected to register on registration days at the beginning of the year and at the beginning of the second semester, in the University office or in such rooms as may be designated for the purpose. Before making choice of elective subjects the student should in every case confer with the instructors concerned and with the Registrar. All students are required to pay an incidental fee of $10.00 at the time of registration, and no student will be considered registered and entitled to attend classes unless this fee has been paid. After registration no change in classes may be made without the consent of the President or the Registrar.

After the first week of the student's attendance upon the University, his registration will be regarded as fixed and requests for change will be granted only under unusual circumstances.

No student will be permitted to take more than 18 units of work except upon petition granted by the Committee on Registration, and such petitions will not be accepted from students just entering upon their first semester in the University.

Ordinarily students are expected to continue into the second semester the courses taken in the first. A registration day is set at the end of the first semester for such revision of work in the second semester as may be advisable.

Students entering from other institutions should present to the Registrar certified copies of their records in such schools, together with certificates of graduation or of honorable dismissal. A copy of the school catalogue or course of study should be furnished with the credentials, in order to facilitate registration.

**RECORDS**

The class standing of each student is determined by the instructor in charge. The method of ascertaining the student's record is left to the instructor, and his report in all cases is final. In addition to the reports at the end of each semester, which form the permanent records of each student, each instructor makes a monthly provisional report to the office on all students registered in his courses.

**DISCIPLINE**

The disciplinary policy of the University in all its departments is based upon the assumption that students come to the institution with a high determination to utilize fully the opportunities offered, and with
a keen sense of duty, honor and courtesy to each other and to the faculty.

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

LIVING ACCOMMODATIONS

Provision is made so far as possible for furnishing board and rooms to students of both sexes upon the University grounds. Young men have comfortable quarters in South Hall, accommodating about sixty-five students, two in a room; in North Hall (for College men only), accommodating thirty-two students; and in the new Dormitory, accommodating forty students. East and West Cottages provide accommodations for young women, under the direction of a capable and experienced preceptress.

All dormitories are lighted by electricity. Rooms contain a clothes press, and are provided with single bedstead, tables, chairs, mirror, wash bowl, and pitcher. Students will supply their own mattresses, pillows, sheets, blankets, towels, rugs, and brooms, laundry bags, and such other articles as they may desire for ornamenting their rooms. They will care for their own rooms under the direction of the head of each dormitory.

The Dining Hall of the University is under the management of a paid steward who is responsible to the President and the Board of Regents. While the charge of $20 per month for board is low, it is the aim of the management to serve substantial, wholesome, appetizing meals. All students having rooms in the dormitories are required to take their meals at the Dining Hall. Students and members of the faculty who reside outside of the dormitories may board at the Dining Hall.

By resolution of the Board of Regents of the University, board is to be paid in advance on the twelfth of each month. If payment is not made before the fifteenth of each month, $21.00 instead of $20.00 will be charged for the month’s board. Checks and postoffice or express money orders should be made payable to the University of Arizona. No reduction in the bill for board will be made for a period less than one week, except by special arrangement at the office, made in advance.

TUITION

Tuition is free to students of Arizona. For all non-resident students, tuition is $15 for each semester. No reduction will be made for late registration or early withdrawal.
### FEES AND EXPENSES

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<thead>
<tr>
<th>Item</th>
<th>Low</th>
<th>High</th>
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<tbody>
<tr>
<td>Tuition free to students from Arizona</td>
<td></td>
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<tr>
<td>Tuition, students non-residents of Arizona, each semester</td>
<td>$15.00</td>
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</tr>
<tr>
<td>Incidental fee, paid annually</td>
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<tr>
<td>Mining excursions for advanced students</td>
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<tr>
<td>Military uniforms, one cadet gray, one khaki</td>
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<tr>
<td>Books, a year</td>
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</tr>
<tr>
<td>Board, a month</td>
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<tr>
<td>Dormitory fee, annual</td>
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### LABORATORY FEES

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<tr>
<th>Subject</th>
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<td>Botany, 1, 2, 3, 4, each</td>
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<td>Chemistry 1, 2, 3, 4, 5, 6, 7, each</td>
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<td>Chemistry 10</td>
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<tr>
<td>Chemistry III (Preparatory year)</td>
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<td>Civil Engineering 3, 11, 13, 14a, 14b, 15, 17, 18, 20, 22, each</td>
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<tr>
<td>Civil Engineering 1, 2, 6, 7, 8, 9, 10, 19, each</td>
<td>1.50</td>
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<td>Civil Engineering 14</td>
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<tr>
<td>Geology 5, 6 (year)</td>
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<tr>
<td>Mechanic Arts I, II, 1, 2 (each year)</td>
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<tr>
<td>Mechanic Arts—Shop courses each semester unit</td>
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<td>Mechanical and Electrical Engineering, drawing, a year</td>
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<td>Mechanical and Electrical Engineering, laboratory, semester</td>
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<tr>
<td>Metallurgy 2, (Assaying)</td>
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<tr>
<td>Metallurgy 5a, 5b, 6, each</td>
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<tr>
<td>Mineralogy 1</td>
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<tr>
<td>Mineralogy 5, 6 (year)</td>
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<tr>
<td>Physics 3, 4, 5</td>
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Text-books may be obtained through a campus book store managed under the direction of the University.

Members of the cadet companies will be required to provide themselves with the prescribed uniform, which will be ordered by the University. The uniform has shown better wearing qualities than a civilian suit of equal cost; it may be worn on all occasions, and thus will remove the necessity for additional expenditure for outer clothing other than overcoats. When the warm weather of spring comes, the students are expected to purchase the regulation khaki uniform and campaign hat. The total expense of both uniforms is about $21.00.
ASSISTANCE TO STUDENTS

Various positions about the grounds, buildings and laboratories of the University, paying from $4 to $20 per month, are filled by students who must be self-supporting. The number, however, is not large, and preference is given to students from Arizona and to those who have spent time enough in the University to demonstrate that they are earnest, capable, reliable young men, able to do this outside work and at the same time maintain a good record as students.

The Students' Loan Fund, now amounting to $630, gives temporary assistance to deserving students, men or women. The conditions under which loans are made may be ascertained on inquiry of the President of the University.

County Scholarships—By act of the legislature of 1912 a scholarship in the University was granted to each county of the state, to be assigned to that student who passed the best examination set by the University. The examination is under the direction of the County School Superintendent and is held early in the month of June. The papers are referred to the University for reading and the President certifies the results to the County Superintendent and to the successful candidate.

Candidates for county scholarships are examined upon the following subjects: English, algebra, science (either agriculture, botany, zoology, physics, chemistry, or physical geography); and two other subjects (chosen from history, Latin, French, German, Spanish, or a second science). The examination is restricted to five subjects.

The scholarship amounts to $150 a year and is payable by the State direct to the University, to be applied on the student's bills for board, room, incidental, and other fees. (The full amount of these fees may be found by referring to the index of this volume under “Expenses”.)

The scholarship is good for one year at the University and is to be held only during the student's Freshman year, except that when a given county has no other representative in the University a candidate for admission to a higher class in the institution may apply for the qualifying examination and if successful, secure the scholarship.

The Tucson Women's Club Scholarship—The Tucson Women's Club has given a scholarship during the year, to be assigned at the discretion of the President of the University to some young woman who has especially distinguished herself for excellence in scholarship. Its value is $50.

The Bennett Scholarship—The Philo Sherman Bennett scholarship is endowed by the gift of $500 to the University in 1905, through the
agency of Mrs. William Jennings Bryan, the income to be used in aiding young women to secure an education.

REQUIREMENTS FOR ADMISSION

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

For admission to the Freshman class applicants must be at least sixteen years of age and must satisfy requirements in subjects sufficient to give fifteen credits as described below. A credit is understood to be the equivalent of one study pursued satisfactorily five times a week for one year, as ordinarily taught in high school.

Students coming from approved high schools and preparatory schools, and presenting from the principals of such schools a detailed official statement of work completed, will be excused by the committee on registration from entrance examination in those subjects. Other students will be required to pass the entrance examinations.

For admission to the course leading to the degree of Bachelor of Arts or Bachelor of Science, the subjects and credits assigned each are:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>3</td>
</tr>
<tr>
<td>Algebra</td>
<td>1½</td>
</tr>
<tr>
<td>Plane Geometry</td>
<td>1</td>
</tr>
<tr>
<td>History and Civics</td>
<td>1</td>
</tr>
<tr>
<td>Elective</td>
<td>5½</td>
</tr>
<tr>
<td>Physics, Chemistry or Biology</td>
<td></td>
</tr>
<tr>
<td>Latin, Greek, French, German</td>
<td>2</td>
</tr>
<tr>
<td>or Spanish</td>
<td></td>
</tr>
</tbody>
</table>

For admission to the course leading to the degree of Bachelor of Science in Mining Engineering and Metallurgy, Civil Engineering, or Mechanical Engineering, the subjects and credits assigned each are:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>3</td>
</tr>
<tr>
<td>Algebra</td>
<td>1½</td>
</tr>
<tr>
<td>Plane Geometry</td>
<td>1</td>
</tr>
<tr>
<td>Solid Geometry</td>
<td>½</td>
</tr>
<tr>
<td>Elective</td>
<td>6</td>
</tr>
<tr>
<td>Latin, French, German or Spanish</td>
<td></td>
</tr>
<tr>
<td>Physics</td>
<td>1</td>
</tr>
</tbody>
</table>

For entrance to the course in Mining Engineering and Metallurgy applicants must have both Physics and Chemistry. This leaves but 5 electives for such students.

A student having a credit in Trigonometry not used for entrance, may waive a requirement of three units in college mathematics upon passing a satisfactory examination in that subject.

For admission to the four year course in Agriculture one may substitute two elective units for the two years of foreign language.
SCOPE OF THE ADMISSION REQUIREMENTS

ENGLISH

English—3 credits. (a) English classics. An acquaintance with the works named below. These works are divided into two classes, those intended for thorough study and those intended for general reading. The portion of the examination devoted to the former class will be upon subject matter, form and structure. In addition the candidate may be required to answer questions concerning the leading facts in those periods of English literary history to which the prescribed books belong. In the portion of the examination devoted to the latter class, the candidate will be required to present evidence of a general knowledge of the subject matter, and to answer simple questions on the lives of the authors. In exceptional cases an equivalent amount of reading and study in other than the prescribed works will be accepted as a substitute. (b) English Composition. The examination will take the form of a theme of five hundred words on some subject familiar to the candidate and will be a practical test of his ability to express himself in writing clearly and consecutively. No candidate will be accepted whose work is notably defective in point of neatness, spelling, punctuation, idiom, or division into paragraphs.

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

For thorough study, for 1913: Shakespeare’s Macbeth, Milton’s Comus, L’Allegro and Il Penseroso; Burke’s Speech on Conciliation with America, or Washington’s Farewell Address and Webster’s First Bunker Hill Oration; Macaulay’s Life of Johnson or Carlyle’s Essay on Burns.

For general reading and practice, selections will be made, at the discretion of the teacher from groups I-VI of College Entrance Requirements in English for 1912-1913.

MATHEMATICS

Algebra—1½ credits. The work required in Algebra covers the usual fundamental subjects, and extends through quadratic equations, graphical representation of equations, proportions, etc., as given in standard texts, such as Wells’ Essentials of Algebra, or Wentworth’s High School Algebra.

Plane Geometry—1 credit. A year is devoted to the subject. The course is based upon the work outlined in text books such as Robbins’
or Wentworth's Geometry, with special reference to original exercises and notebook work.

*Solid Geometry*—½ credit. A half year is given to this subject. Original exercises and notebook work are required.

**HISTORY**

To meet the requirement in History the student will be expected to have used, in preparation for each credit, a good textbook, to have done regular reference work, and to have kept a notebook with outlines, summaries, maps, and topical notes on readings, varying according to the advancement of the course.

*Ancient History*—to the year 800 A.D. 1 credit.

*Mediaeval and Modern History of Europe*—1 credit.

*History of England*—1 credit.

*History and Government of the United States*—1 credit.

**LANGUAGE**

*Greek*—2 credits. As covered by Gleason and Atherton's *Beginner's Greek Book*; Xenophon's *Anabasis*, four books; Homer's *Iliad*, three books, with composition and the use of Hadley and Allen's or Goodwin's *Greek Grammar*.

*Latin*—2, 3 or 4 credits. As covered by Collar's *First Latin Book* and *Viri Romae*, together with Allen and Greenough's *Grammar* and texts; sight reading; *Caesar*, four books, or an equivalent; Cicero, four orations; Virgil, six books; sight reading from Nepos, Cicero and Gellius; Daniell's or Bennett's *Prose Composition*.

*German*—2 credits. First year: *Bacon, German Grammar*; *Storm, Immensee*; *von Hillern, Hoher als die Kirche*; other readings. Second year: German Composition; Meyer-Forster, *Karl Heinrich*; Heine, Poems and *Die Harzreise*; Lessing, *Minna von Barnhelm*; Schiller, *Wilhelm Tell*.


*The courses offered should include the texts outlined, or an equivalent. Two years of one language must be presented, but one or more years of a second language will be accepted as elective.*
SCIENCE

**Physical Geography**—1 credit or $\frac{1}{2}$ credit. A year or half year of work which should include the principles of the subject, as treated in the best recent textbooks, field and laboratory study, and the interpretation and steady use of topographic and weather maps and charts. This subject may be combined in half-credits with physiology, which may in its turn be offered as full credit if it is so desired.

**Botany**—1 credit or $\frac{1}{2}$ credit. The course should cover a study of the life histories of types from the main groups of plants, and a series of simple physiological experiments. At least two-thirds of the course should consist of laboratory work. Botany as a half-credit may be combined with a half-credit in zoology for a full credit, or year's work, in biology.

**Chemistry**—1 credit. A year's course of descriptive chemistry, consisting of both class-room and laboratory work, which should include the more common metals and non-metals and their compounds. A careful record of laboratory experiments should be kept.

**Physics**—1 credit. Along with the use of one of the standard textbooks the year's course should include continuous and systematic laboratory practice, which should be recorded in a notebook.

**ELECTIVES**

The electives offered for admission should be chosen from the above subjects or any other subjects ordinarily taught in high schools and accepted by reputable colleges and universities.

**ADMISSION TO ADVANCED STANDING**

Students coming from other institutions of recognized standing are admitted to classes above Freshman upon the presentation of properly authenticated certificates of work done, and when so admitted will be credited in the records of this University with so much of such work as corresponds approximately with the courses required for the desired degree here. Certificates of record should be accompanied by statements of honorable dismissal or leave of absence, and a copy of the register or catalogue showing the content of the credits certified.

**ADMISSION FROM ARIZONA NORMAL SCHOOLS**

Graduates of the 2-year and 5-year courses in the Tempe and Flagstaff Normal Schools are given a total credit of 32 units in the University, which shall include the cancelling of the requirements in Philosophy, but shall not cancel the requirements in English 1, 2, nor
any entrance requirement, the equivalent of which shall not have been fulfilled.

ADMISSION UPON CERTIFICATE

Since the statutes of Arizona provide the course of study in the high schools of the State "shall be such as, when completed, shall prepare its students for admission into the State University," the University admits without examination graduates of approved high schools of Arizona. Diplomas or corresponding credentials from high schools and preparatory schools in other states, accredited by the state universities of such states, will excuse from examinations in subjects covered by such credentials.

COURSE OF STUDY AND DEGREES

All facilities and privileges of the University are open to qualified persons of both sexes.

The courses offered in the University provide both a liberal training along literary and scientific lines and technical training along engineering, mechanical and agricultural lines. Great latitude of election is given in the literary and scientific courses, but the courses in engineering are more rigid in their requirements. Full details of the various courses follow. The aim in all is to combine the practical with the theoretical instruction. The needs of a young and growing commonwealth are kept in mind, and a steady attempt is made to develop the adaptability and resourcefulness so necessary to meet changing conditions.

The University offers four-year courses of study leading to the degrees of Bachelor of Arts and Bachelor of Science, and to other specialized degrees as shown hereafter. In each course the work is partly required and partly elective, as described by schedules later. Each student doing full work is required to take not less than fifteen hours of class work a week, and will not be permitted to take more than eighteen hours, except on petition granted by the Committee on Registration. In laboratory work a period of from two to three hours is considered the equivalent of one recitation or lecture hour.

Persons of mature age and with sufficient preparation, who are not candidates for degrees, may be admitted to regular classes as special students, provided, however, that in all such cases they show to the satisfaction of the instructors in charge that they can take the course with profit to themselves and without detriment to the regular class. It is expected that those who desire thus to specialize in mineralogy, assaying, geology or surveying, will have had at least a high school
education, or its equivalent, particularly in English, algebra, geometry, physics and chemistry.

The faculty reserves the right to cancel classes in any course of instruction when a suitable number of students fail to register for the course.

Students who complete satisfactorily the required work, and the specified amount of elective work, as shown in the accompanying schedules, will be given the degree of Bachelor of Arts or Bachelor of Science. The special character of any course of study is indicated by adding to the degree the name of the department, as Bachelor of Science in Mining Engineering.

Military science and tactics and physical training are required during the freshman and sophomore years for all male students, and physical training for female students.

Credit toward degrees is given by means of a unit system which assigns to each course of instruction offered a certain number of units or credits. A unit ordinarily represents one class-room hour a week, or its equivalent of two or three laboratory hours, for one semester. One hundred and thirty-one units, including three units in military science and tactics and physical culture, are required for the degree of Bachelor of Arts or Bachelor of Science. The requirements for degrees in the specialized courses are given below.

Any candidate for a degree may present as part fulfilment of requirements for graduation an acceptable thesis embodying the result of a special study of some subject within the range of the course pursued. The subject and the credit value of the thesis are to be submitted for the approval of the faculty at the opening of the senior year, and the completed thesis must be presented not later than three weeks before Commencement Day.

GROUPS OF SUBJECTS


GROUP A: Latin, Greek, French, German, Spanish.

GROUP B: Economics, History, Law, Sociology.

GROUP C: Agriculture, Astronomy, Botany, Chemistry, Geology, Mineralogy, Physics, Zoology.

GROUP D: Civil Engineering, Electrical Engineering, Mechanic Arts, Mechanical Engineering, Mining Engineering and Metallurgy.
REQUIREMENTS FOR DEGREES

The units necessary for the different degrees are set forth in the following statement:

BACHELOR OF ARTS: English, 24; Philosophy, 6; Military Science and Physical Training, 3; Group A, 32; Group B, 15; Group C, 16; free elective, 37,—a total of 133 units.

BACHELOR OF SCIENCE: English, 10; Mathematics, 12; French or German, 16; Military Science and Physical Training, 3; Group B, 8; Groups C and D, 40; free elective, 44,—a total of 133 units.

COURSE I

Leading to the Degree of Bachelor of Science in Agriculture

FIRST SEMESTER

<table>
<thead>
<tr>
<th>REQUIRED</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>English 1</td>
<td>3</td>
</tr>
<tr>
<td>Mech. Arts 1 (Mech. Drawing)</td>
<td>2</td>
</tr>
<tr>
<td>Mathematics 1 (Alg. &amp; Trig.)</td>
<td>6</td>
</tr>
<tr>
<td>Agr. 3 (Stock Judging)</td>
<td>3</td>
</tr>
<tr>
<td>Agr. 1 (Plant Culture)</td>
<td>3</td>
</tr>
<tr>
<td>Military Science</td>
<td>1/2</td>
</tr>
<tr>
<td>Physical Training</td>
<td>1/2</td>
</tr>
<tr>
<td><strong>SECOND SEMESTER</strong></td>
<td><strong>UNITS</strong></td>
</tr>
<tr>
<td>English 2</td>
<td>3</td>
</tr>
<tr>
<td>Mech. Arts 8 (Carpentry)</td>
<td>2</td>
</tr>
<tr>
<td>Botany (Taxonomy)</td>
<td>4</td>
</tr>
<tr>
<td>Agr. 4 (Dairying)</td>
<td>3</td>
</tr>
<tr>
<td>Agr. 2 (Farm Crops)</td>
<td>3</td>
</tr>
<tr>
<td>Military Science</td>
<td>1/2</td>
</tr>
<tr>
<td>Physical Training</td>
<td>1/2</td>
</tr>
<tr>
<td><strong>FIRST YEAR</strong></td>
<td><strong>17%</strong></td>
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</table>

SECOND YEAR

<table>
<thead>
<tr>
<th>REQUIRED</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 1</td>
<td>4</td>
</tr>
<tr>
<td>Chemistry III</td>
<td>4</td>
</tr>
<tr>
<td>Mech. Arts 9 (Forge and Metals)</td>
<td>2</td>
</tr>
<tr>
<td>Military Science</td>
<td>1/2</td>
</tr>
<tr>
<td>Physical Training</td>
<td>1/2</td>
</tr>
<tr>
<td><strong>SECOND SEMESTER</strong></td>
<td><strong>UNITS</strong></td>
</tr>
<tr>
<td>Physics 2</td>
<td>4</td>
</tr>
<tr>
<td>Chemistry III</td>
<td>4</td>
</tr>
<tr>
<td>Mech. Eng. 14 (Small Power Plants and Machinery)</td>
<td>2</td>
</tr>
<tr>
<td>Military Science</td>
<td>1/2</td>
</tr>
<tr>
<td>Physical Training</td>
<td>1/2</td>
</tr>
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<td><strong>SECOND YEAR</strong></td>
<td><strong>15%</strong></td>
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Options

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<tr>
<th>Agronomy</th>
<th>Botany 1</th>
<th>4</th>
<th>Botany 3</th>
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</thead>
<tbody>
<tr>
<td>Agr. 7 (Dry Farming)</td>
<td>3</td>
<td>Agr. 6 (Plant Breeding)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Horticulture</td>
<td>Botany 1</td>
<td>4</td>
<td>Botany 3</td>
<td>4</td>
</tr>
<tr>
<td>Agr. 5 (Market Gardening)</td>
<td>3</td>
<td>Agr. 6 (Plant Breeding)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Animal Husbandry</td>
<td>Zoology 1</td>
<td>4</td>
<td>Zoology 2</td>
<td>4</td>
</tr>
<tr>
<td>Agr. 11 (Hist. of Breeds)</td>
<td>3</td>
<td>Agr. 12 (Poultry)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>THIRD YEAR</strong></td>
<td><strong>17%</strong></td>
<td><strong>17%</strong></td>
<td></td>
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</tbody>
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THIRD YEAR

<table>
<thead>
<tr>
<th>REQUIRED</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agr. 9 (Soil Physics)</td>
<td>4</td>
</tr>
<tr>
<td>Civ. Eng. 19 (Surveying)</td>
<td>3</td>
</tr>
<tr>
<td>Agr. 15 (Vet. Physiology)</td>
<td>3</td>
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</table>
THIRD YEAR

Options

<table>
<thead>
<tr>
<th>FIRST SEMESTER</th>
<th>UNITS</th>
<th>SECOND SEMESTER</th>
<th>UNITS</th>
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</thead>
<tbody>
<tr>
<td>Agronomy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemistry 1</td>
<td>4</td>
<td>Chemistry 2</td>
<td>4</td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td>Horticulture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agr. 13 (Pomology)</td>
<td>3</td>
<td>Agr. 14 (Citrus Fruits)</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td>Animal Husbandry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agr. 17 (Animal Breeding)</td>
<td>3</td>
<td>Agr. 18 (Feeds &amp; Feeding)</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
<td>Elective</td>
<td>3</td>
</tr>
</tbody>
</table>

17

FOURTH YEAR

Required

| Economics 1 | 3 |
| Economics 2 | 3 |
| Agr. 24 (Farm Management) | 3 |

Options

<table>
<thead>
<tr>
<th>Agronomy</th>
<th></th>
<th>Agronomy</th>
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</thead>
<tbody>
<tr>
<td>Chem. 3. (Quant. Anal.)</td>
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<td>Chem. 4. (Volumetric Anal.)</td>
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</tr>
<tr>
<td>Agr. 23 (Agron. Literature)</td>
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<td>Elective</td>
<td>6</td>
</tr>
<tr>
<td>Horticulture</td>
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<td>Horticulture</td>
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<tr>
<td>Bot. 11. (Plant Pathology)</td>
<td>3</td>
<td>Botany 12. (Plant Path.)</td>
<td>3</td>
</tr>
<tr>
<td>Agr. 19. (Small Fruits)</td>
<td>3</td>
<td>Agr. 20. (Hort. Literature)</td>
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</tr>
<tr>
<td>Elective</td>
<td>6</td>
<td>Elective</td>
<td>3</td>
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<tr>
<td>Animal Husbandry</td>
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<tr>
<td>Elective</td>
<td>9</td>
<td>Elective</td>
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</tbody>
</table>

15 or 16

Total 132 or 134 units.

COURSE II

The Short Course in Agriculture

FIRST YEAR

<table>
<thead>
<tr>
<th>FIRST SEMESTER</th>
<th>UNITS</th>
<th>SECOND SEMESTER</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agr. 3 (Live Stock Judging)</td>
<td>3</td>
<td>Agr. 4 (Dairying)</td>
<td>3</td>
</tr>
<tr>
<td>Agr. 1 (Plant Culture)</td>
<td>3</td>
<td>Agr. 2 (Farm Crops)</td>
<td>3</td>
</tr>
<tr>
<td>Agr. 11 (History of Breeds)</td>
<td>3</td>
<td>Agr. 12 (Poultry)</td>
<td>3</td>
</tr>
<tr>
<td>Mech. Arts 1 (Mechanical Drawing)</td>
<td>2</td>
<td>Mech. Arts 8 (Carpentry)</td>
<td>2</td>
</tr>
<tr>
<td>Mathematics or English</td>
<td>5</td>
<td>Mathematics or English</td>
<td>5</td>
</tr>
<tr>
<td>Military Science</td>
<td>½</td>
<td>Military Science</td>
<td>½</td>
</tr>
<tr>
<td>Physical Training</td>
<td>¼</td>
<td>Physical Training</td>
<td>¼</td>
</tr>
</tbody>
</table>
SECOND YEAR

<table>
<thead>
<tr>
<th>FIRST SEMESTER</th>
<th>UNITS</th>
<th>SECOND SEMESTER</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mech. Arts 9 (Forge and Metals)</td>
<td>2</td>
<td>Mech. Eng. 14 (Small Power Plants and Machinery)</td>
<td>2</td>
</tr>
<tr>
<td>Civ. Eng. 19 (Surveying)</td>
<td>3</td>
<td>Civ. Eng. 20 (Irrigation)</td>
<td>3</td>
</tr>
<tr>
<td>Botany 1</td>
<td>4</td>
<td>Botany 3</td>
<td>4</td>
</tr>
<tr>
<td>Agr. 5 (Market Gardening)</td>
<td>3</td>
<td>Agr. 14 (Citrus Fruits)</td>
<td>4</td>
</tr>
<tr>
<td>Agr. 9 (Soil Physics)</td>
<td>4</td>
<td>Agr. 18 (Feeds and Feeding)</td>
<td>3</td>
</tr>
<tr>
<td>Military Science</td>
<td>½</td>
<td>Military Science</td>
<td>½</td>
</tr>
<tr>
<td>Physical Training</td>
<td>¼</td>
<td>Physical Training</td>
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</tbody>
</table>

COURSE III

Leading to the Degree of Bachelor of Science in Civil Engineering

FIRST YEAR

<table>
<thead>
<tr>
<th>FIRST SEMESTER</th>
<th>UNITS</th>
<th>SECOND SEMESTER</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>English 1</td>
<td>3</td>
<td>English 2</td>
<td>3</td>
</tr>
<tr>
<td>Math. 1 (Alg. and Trig.)</td>
<td>6</td>
<td>Math. 2 (Analytic Geometry)</td>
<td>6</td>
</tr>
<tr>
<td>*Chemistry 1</td>
<td>4</td>
<td>*Chemistry 2</td>
<td>4</td>
</tr>
<tr>
<td>Mech. Arts 3 (Wood Shop)</td>
<td>2</td>
<td>Mech. Arts 4 (Forge Shop)</td>
<td>2</td>
</tr>
<tr>
<td>Military Science</td>
<td>½</td>
<td>Military Science</td>
<td>½</td>
</tr>
<tr>
<td>Physical Training</td>
<td>¾</td>
<td>Physical Training</td>
<td>¾</td>
</tr>
</tbody>
</table>

18% 18%

SECOND YEAR

| Math. 3 (Differential Calculus) | 4 | Math. 4 (Integral Calculus) | 4 |
| Physics 1 | 4 | Physics 2 | 4 |
| Civ. Eng. 1 (Surveying) | 4 | Civ. Eng. 2 (Surveying) | 4 |
| Elective | 3 | Elective | 3 |
| Military Science | ½ | Military Science | ½ |
| Physical Training | ¾ | Physical Training | ¾ |

17% 17%

THIRD YEAR

| Math. 5 (Analytical Mechanics) | 5 | Math. 6 (Anal. Mechanics) | 4 |
| Astronomy 3 | 3 | Physics 4 (Electrical and Optical Measurements) | 3 |
| †Elective | 3 | Civ. Eng. 14a (Mechanics of Materials) | 3 |
| Civ. Eng. 11 (Hydraulics) | 4 | Civ. Eng. 14b (Materials Laboratory) | 1 |
| Civ. Eng. 9 (R. R. Surveying) | 2 | Civ. Eng. 18 (R. R. Surveying) | 2 |
| †Elective | 4 |

17

*Students who have not had preparatory or high school chemistry must take, in place of Chemistry 1, 2, Chemistry III, for which college credit will be given. In this case Mineralogy 7 can not be taken in the third year unless Chemistry 1, 2, is elected in the second year.
†In the third year 7 units of electives will be required, 1915-16 and thereafter. For students entering the University prior to 1913-14 the number of electives required in the third year is 5 units.
FOURTH YEAR

FIRST SEMESTER | UNITS | SECOND SEMESTER | UNITS
---|---|---|---
Mech. Eng. 3 (Heat Engines) | 3 | Mech. Eng. 4 (Pumping Machinery) | 3
Civ. Eng. 7 (Steel Mill Buildings) | 4 | Civ. Eng. 6 (Masonry and Concrete) | 4
Civ. Eng. 13 (Irrigation) | 4 | Civ. Eng. 8 (Steel Bridges) | 4
Civ. Eng. 15 (Contracts, Specifications) | 2 | Civ. Eng. 18 (Sewerage) | 3
Civ. Eng. 17 (Water Supplies) | 2 | Elective | 2
Bacteriology | 1 | | 
| Total, 134 units. | 16 | 16 |

YEAR

SECOND SEMESTER

FIRST SEMESTER | UNITS | SECOND SEMESTER | UNITS
---|---|---|---
Civ. Eng. 6 (Masonry and Concrete) | 4 | Civ. Eng. 8 (Steel Bridges) | 4
Civ. Eng. 18 (Sewerage) | 3 |
Elective | 2 | | 
| Total, 134 units. | 16 | 16 |

COURSE IV

Leading to the Degree of Bachelor of Science in Electrical Engineering

FIRST YEAR

FIRST SEMESTER | UNITS | SECOND SEMESTER | UNITS
---|---|---|---
English 1 | 3 | English 2 | 3
Math. 1 (Alg. & Trig.) | 6 | Math. 2 (Anal. Geom.) | 6
Chemistry 1 (or III) | 4 | Chemistry 2 (or III) | 4
Mech. Arts 3 (Wood Shop) | 2 | Mech. Arts 4 (Forge) | 2
Military Science | $\frac{1}{2}$ | Military Science | $\frac{1}{2}$
Physical Training | $\frac{1}{2}$ | Physical Training | $\frac{1}{2}$
| Total, 18 units. | 18% | 18% |

SECOND YEAR

FIRST SEMESTER | UNITS | SECOND SEMESTER | UNITS
---|---|---|---
Math. 3 (Diff. Calculus) | 4 | Math. 4 (Int. Calculus) | 4
Physics 1 | 4 | Physics 2 | 4
Civ. Eng. 1 (Surveying) | 4 | Mech. Eng. 2 (Mach. Design) | 2
Met. 1 (Iron and Steel) | 1 | Elective | 2
Military Science | $\frac{1}{2}$ | Military Science | $\frac{1}{2}$
Physical Training | $\frac{1}{2}$ | Physical Training | $\frac{1}{2}$
| Total, 17 units. | 17% | 17% |

THIRD YEAR

FIRST SEMESTER | UNITS | SECOND SEMESTER | UNITS
---|---|---|---
Math. 5 (Analytical Mech.) | 5 | Math. 6 (Analytical Mech.) | 4
Mech. Eng. 3 (Heat Engines) | 3 | Elec. Eng. 2 (Dynamo Elec. Mach.) | 4
Elec. Eng. 1 (Elem. Elec. Eng.) | 3 | Elect. Eng. 10 (Seminar) | 1
Civ. Eng. 11 (Hydraulics) | 4 | Elec. Eng. 11 | 2
Elective | 2 | Elective | 2
| Total, 17 units. | 17 | 17 |
FOURTH YEAR

**FIRST SEMESTER**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>Mech. Eng. 7 (Mech. Lab.)</td>
<td>2</td>
</tr>
<tr>
<td>Elec. Eng. 3 (Elect. Mach.)</td>
<td>2</td>
</tr>
<tr>
<td>Elec. Eng. 5 (Elect. Lab.)</td>
<td>2</td>
</tr>
<tr>
<td>Elec. Eng. 7 (Elect. Design)</td>
<td>3</td>
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<tr>
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**SECOND SEMESTER**

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Mech. Eng. 8 (Mech. Lab.)</td>
<td>2</td>
</tr>
<tr>
<td>Elec. Eng. 4 (Elec. Traction)</td>
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</tr>
<tr>
<td>Elec. Eng. 6 (Elec. Lab.)</td>
<td>2</td>
</tr>
<tr>
<td>Elec. Eng. 8 (Elec. Sta. Design)</td>
<td>3</td>
</tr>
<tr>
<td>Mech. Eng. 12 (Power Plants)</td>
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</tr>
<tr>
<td>Elective</td>
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Total, 134-139 Units.

COURSE V

Leading to the Degree of Bachelor of Science in Mechanical Engineering

**FIRST YEAR**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>English 1</td>
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<tr>
<td>Math. 1 (Alg. &amp; Trig.)</td>
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</tr>
<tr>
<td>Chemistry 1 (or III)</td>
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</tr>
<tr>
<td>Mech. Arts 1 (Drawing)</td>
<td>3</td>
</tr>
<tr>
<td>Mech. Arts 3 (Wood Shop)</td>
<td>2</td>
</tr>
<tr>
<td>Military Science</td>
<td>1/2</td>
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<tr>
<td>Physical Training</td>
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Total, 18% of 18%

**SECOND YEAR**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math. 3 (Diff. Calculus)</td>
<td>4</td>
</tr>
<tr>
<td>Physics 1</td>
<td>4</td>
</tr>
<tr>
<td>Mech. Arts 5 (Mach. Shop)</td>
<td>3</td>
</tr>
<tr>
<td>Mech. Eng. 1 (Mechanisms)</td>
<td>2</td>
</tr>
<tr>
<td>Civ. Eng. 1 (Surveying)</td>
<td>4</td>
</tr>
<tr>
<td>Met. 1 (Iron and Steel)</td>
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<tr>
<td>Military Science</td>
<td>1/2</td>
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<tr>
<td>Physical Training</td>
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Total, 18% of 18%

**THIRD YEAR**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Math. 5 (Analytical Mech.)</td>
<td>5</td>
</tr>
<tr>
<td>Mech. Eng. 3 (Heat Engines)</td>
<td>3</td>
</tr>
<tr>
<td>Mech. Eng. 5 (Mach. Design)</td>
<td>2</td>
</tr>
<tr>
<td>Civ. Eng. 11 (Hydraulics)</td>
<td>4</td>
</tr>
<tr>
<td>Elective</td>
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<tr>
<td>Elective</td>
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<tr>
<td>Seminar</td>
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Total, 16

**FOURTH YEAR**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>Mech. Eng. 7 (Mech. Lab.)</td>
<td>3</td>
</tr>
<tr>
<td>Mech. Eng. (Design)</td>
<td>2</td>
</tr>
<tr>
<td>Civ. Eng. 7 (Steel Mill Bldg.)</td>
<td>4</td>
</tr>
<tr>
<td>Elective</td>
<td>7</td>
</tr>
<tr>
<td>Elective</td>
<td>5</td>
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</table>

Total, 134-139 Units.
## COURSE VI
Leading to the Degree of Bachelor of Science in Mining Engineering and Metallurgy

### FIRST YEAR

<table>
<thead>
<tr>
<th>FIRST SEMESTER</th>
<th>UNITS</th>
<th>SECOND SEMESTER</th>
<th>UNITS</th>
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<tbody>
<tr>
<td>English 1</td>
<td>3</td>
<td>English 2</td>
<td>3</td>
</tr>
<tr>
<td>Chemistry 1</td>
<td>4</td>
<td>Chemistry 2</td>
<td>4</td>
</tr>
<tr>
<td>Math. 1</td>
<td>6</td>
<td>Math. 2 (Anal. Geom.)</td>
<td>6</td>
</tr>
<tr>
<td>Mech. Arts 3</td>
<td>2</td>
<td>Mech. Arts 4 (Forge Shop)</td>
<td>2</td>
</tr>
<tr>
<td>Mil. &amp; Phys. Training</td>
<td>3%</td>
<td>Mil. &amp; Phys. Training</td>
<td>3%</td>
</tr>
<tr>
<td></td>
<td>18%</td>
<td></td>
<td>18%</td>
</tr>
</tbody>
</table>

### SECOND YEAR

|                |       | Chemistry 4         | 2     |
| Math. 2 (Diff. Calc.) | 4 | Math. 4 (Int. Calc.) | 4     |
| C. E. 1 (Surveying) | 4 | C. E. 2 (Surveying) | 4     |
| Physics 1        | 4     | Physics 2          | 4     |
| Mineral. 1 (Blow Pipe) | 2 | Mineral. 3         | 2     |
| Mil. & Phys. Training | 3% | Metallurgy 2 (Assaying) | 2 |
| Mil. & Phys. Training | 3% |                  | 3%   |
|                | 18%   |                 | 18%   |

Summer Work, Min. Eng. 7, six weeks’ practical work and report. 2 units

### THIRD YEAR

|                |       | Chemistry 6         | 2     |
| S. E. 11 (Hydraulics) | 4 | C. E. 14 (Mat. Const.) | 4     |
| Geology 1 (Gen. Geol.) | 3 | Geology 2 (Gen. Geol.) | 3     |
| Met. (7-5b) (Ore Dressing) | 4 | Mineral 4         | 3     |
| Min. Eng. (Elements) | 2     |                  | 2     |
|                | 18    |                 | 18    |

Summer Course Geology 5-6 (Field Geology) 6 units.

### FOURTH YEAR

|                |       | E. E. 9 (Elec. Machinery) | 3     |
| Min. Eng. 1 (General Mining) | 2 | Min. Eng. 2        | 2     |
| Min. Eng. 3 (Laboratory) | 1     | Min. Eng. 4        | 1     |
| Min. Eng. 5 or Econ. 21 | 3     | Min. Eng. 6        | 3     |
| Geology 3 (Economic) | 3     | Geology 4 (Ore Deposits) | 3     |
| Met. 3-5a (Gold, Silver) | 4 | Met. 4 (Gen. Met.)   | 4     |
| Mineral. 5        | 2     | Mineral. 6         | 2     |
|                | 18    |                 | 18    |
COURSE VII

The Two Year Course in Commerce

Unless otherwise indicated each subject is pursued through the year.

<table>
<thead>
<tr>
<th>FIRST YEAR</th>
<th>UNITS</th>
<th>SECOND YEAR</th>
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<tbody>
<tr>
<td>English 1, 2</td>
<td>3</td>
<td>Spanish</td>
<td>4</td>
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<tr>
<td>Elementary Accounting</td>
<td>2</td>
<td>Commercial Law</td>
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<tr>
<td>Economics 1, 2</td>
<td>3</td>
<td>Economics 5, 5a</td>
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<tr>
<td>Economics 3, 4</td>
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<td>Economics 19, 20</td>
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<tr>
<td>History 1, 2</td>
<td>3</td>
<td>Business Practice</td>
<td>3</td>
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COURSE VIII

The Four Year Course in Commerce

Each subject is pursued through the year.

<table>
<thead>
<tr>
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<th>SECOND YEAR</th>
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<tbody>
<tr>
<td>English 1, 2</td>
<td>3</td>
<td>Foreign Language</td>
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<td>Economics 3, 4</td>
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<td>History 1, 2 (or Accounting)</td>
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<td>Economics 5, 5a</td>
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<td>Science or Mathematics</td>
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<table>
<thead>
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<th>FOURTH YEAR</th>
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<tr>
<td>Law or Economics 7, 8</td>
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<td>Economics 9, 10</td>
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<tr>
<td>History</td>
<td>3</td>
<td>English</td>
<td>2</td>
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<tr>
<td>Economics 19, 20</td>
<td>3</td>
<td>Econ. 15 or 16 (1st semester)</td>
<td>3</td>
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<tr>
<td>Economics 18</td>
<td>3</td>
<td>Econ. 12a (2nd semester)</td>
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<tr>
<td>Elective, first semester</td>
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<td>Suggested Optional Electives:</td>
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<tr>
<td>Elective and Econ. 12, second semester</td>
<td>8</td>
<td>Law</td>
<td>2</td>
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<tr>
<td></td>
<td></td>
<td>Psychology and Ethics</td>
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<td></td>
<td>Electives</td>
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</table>

ADVANCED DEGREES

Advanced degrees will be given only for work done in residence, to candidates who have received the Bachelor's degree from this institution or one of similar standing. Thirty units of such work, together with a thesis, will be required for the degrees of Master of Arts and Master of Science. The courses in each case will be laid out by those in charge of the departments in which the work for the degree is to be taken, and must be approved by a committee composed of all the heads of departments.

Students who expect to make mining engineering their profession are advised to take a fifth year, or a five-year course, since the four-year course gives insufficient time for a student to master all the subjects that are essential for the practice of mining engineering.
The requirements for the degree of Engineer of Mines are as follows:

Candidates must have completed the course leading to the degree of Bachelor of Science in Mining Engineering and Metallurgy, as given by the University of Arizona, or the equivalent of this course in some school of recognized standing.

The fifth year's course will consist of not less than 30 units of resident work, which will include (1) all of the following courses, the equivalent of which has not been taken by the candidate: Geology 1, 2, 3, 4, 5, 6, 7; Mineralogy 1, 2, 3, 4; Mining Engineering 1, 2, 3, 4, 5, 6, 7, 8; Metallurgy 1, 2, 3, 4, 5, 7. (2) At least 8 units of graduate work in Mineralogy, Geology, Mining Engineering or Metallurgy. (3) The remainder of the 30 units may be chosen from any of the engineering departments, but should not be of lower grade than Junior work. Six months of work underground and in smelters, with a satisfactory detailed report on the same, will be required.

COURSES OF INSTRUCTION

For the hours of classes the student is referred to the horarium issued at the first of the college year.

AGRICULTURE

PROFESSOR CLOTHIER, ASSISTANT PROFESSOR FOWLER, AND MR. JONES

1. Principles of Plant Culture.  PROFESSOR CLOTHIER

Fundamental laws governing the successful culture of plants, such as purity and vitality of seeds; relation of root development to moisture and plant food; function of stem, leaf, bud, and flower, and conditions governing their normal development; relation of the plant to light, heat, and cold, and other conditions of environment; plant propagation, plant manipulation. Lectures and laboratory work. Required of all students in the long course in agriculture, open to students in the short course, and elective to preparatory students.

3 hrs., first semester.  3 units.

2. Farm Crops.  PROFESSOR CLOTHIER

A brief study of cereals and various other farm crops of the United States, and a more detailed study of those that may be grown successfully in Arizona. Origin, history, description, methods of culture, and market demands. Required of all students in the long course in
agriculture, open to short course students, and elective to preparatory students.
4 hrs., second semester. 4 units.

3. Live Stock Judging.  ASSISTANT PROFESSOR FOWLER
The judging of different classes of horses, cattle, sheep and swine. In the first part of the work the score card is used; in the latter part practice in comparative judging is given. Animals from the college herd are used, supplemented by live stock belonging to neighboring ranchmen and farmers. Required of all students in the long course in agriculture, open to short course students, and elective to preparatory students. Text: Craig's Judging of Live Stock.
3 hrs., first semester. 3 units.

4. Elements of Dairying. ASSISTANT PROFESSOR FOWLER
Secretion and composition of milk and causes of variation in composition; the Babcock test of milk; various methods of cream raising, including a study of the construction and operation of centrifugal separators; methods of making and marketing butter; proper handling of milk on the farm. The laboratory work includes testing milk and other dairy products, operating different makes of cream separators, and making butter. Required of all students in the long course in agriculture, open to students in the short course, and elective to preparatory students.
3 hrs., second semester. 3 units.

5. Home and Market Gardening. PROFESSOR CLOTHIER
Practical and theoretical training in the general principles underlying successful intensive farming, and detailed study of the various crops grown in the home and market garden, with special reference to Arizona conditions. Lectures, laboratory and practice on the farm. Required of students in horticulture. Open to students in the short course.
3 hrs., first semester. 3 units.

6. Plant Breeding. MR. JONES
The general principles of plant breeding; a detailed study of the methods pursued and results obtained by leading plant breeders in the various experiment stations and in private work. Required of all students in agronomy and horticulture.
3 hrs., second semester. 3 units.

7. Dry Farming. PROFESSOR CLOTHIER
Rainfall and other climatic conditions in the various dry-farming regions of the world. General dry farming methods; crops adapted to
dry farming; dry farming methods and possibilities in Arizona. Students will be required to review bulletins dealing with experimental work. Lectures and library work. Required of students in agronomy. Open to students who have taken Agriculture 2.
3 hrs., first semester. 3 units.

9. Soil Physics. **Professor Clothier**

Origin, composition and classification of soils; soil temperature and conditions influencing it; soil texture and soil structure as related to tillage, moisture and plant food; various culture methods based on physical properties of soils; irrigation and drainage; mechanical analysis. Required of all students in the long course in agriculture. Open to short course students.
3 lectures and one 3 hour laboratory period, first semester. 4 units.

10. Soil Fertility. **Professor Clothier**

Amount and availability of the various elements of plant food in soils; relation of humus to soil fertility; commercial fertilizers and their application; control of alkali; making and using farm manures; crop rotations; the Rothamstead experiments; theory of toxic substances in soils. Required of all students in the long course in agriculture. Lectures and laboratory work.
3 lectures and one 3 hour laboratory period, second semester. 4 units.

11. History of Breeds. **Assistant Professor Fowler**

Characteristics of each breed of horses, cattle, sheep, swine and goats are considered at length, and each breed is discussed with reference to its origin, history and development, introduction to America, and adaptability to Arizona conditions. Required of students in animal husbandry, open to short course students, and elective to preparatory students. Text-book: Plumb's *Breeds of Farm Animals*.
3 hrs., second semester. 3 units.

12. Poultry Husbandry. **Assistant Professor Fowler**

General care and management of poultry, production of poultry for the market, diseases and pests, breed characteristics. Recitations, lectures and laboratory work, including visits to specialized poultry ranches. Required of students in animal husbandry, open to short course students, and elective to preparatory students.
3 hrs., first semester. 3 units.

13. Pomology. **Professor Clothier**

Orchard management, and detailed study of deciduous fruits, including planting, cultivation, pruning, spraying, and description and history of varieties. Attention will be given to fruit judging. Lec-
tures and laboratory work. Open to students in agronomy in the junior year. Required of students in horticulture.
4 hrs., first semester. 4 units.

PROFESSOR CLOTHIER  
Culture of citrus fruits with special reference to the citrus districts in the United States. Citrus nursery management; citrus orchard management; citrus insects and diseases; packing and marketing; judging. Open to students in agronomy in the junior year. Required of students in horticulture. Lectures and laboratory work.
4 hrs., first semester. 4 units.

15. Veterinary Physiology.  
ASSISTANT PROFESSOR FOWLER  
Special physiology of farm animals. Lectures and recitations supplemented by practical experiments in the laboratory. Text: Smith's Veterinary Physiology. Required of all students in the long course in agriculture.
3 hrs., first semester. 3 units.

ASSISTANT PROFESSOR FOWLER
(a) General and specific causes of diseases and methods of prevention; errors in feeding and in care of animals; sanitation of stables, feeding pens and pastures; preventive inoculation; tuberculin test and veterinary regulations. (b) Diagnosis and treatment of common ailments of farm animals. (c) Simple surgical operations; control of hemorrhage, dressing of wounds, care of the teeth, care of the feet, castration, spaying and caponizing; correction of malpositions and removal of placenta in obstetrical cases, etc. Text-books: Reynolds' Veterinary Studies, Mayo's Care of Animals. Prerequisites: Zoology 1, Veterinary Physiology, and the student must be registered in Chemistry I or Chemistry III, and in Zoology 2. Lectures, recitations, and clinics. Required of all students in the long course in agriculture.
3 hrs., second semester. 3 units.

17. Animal Breeding.  
ASSISTANT PROFESSOR FOWLER  
Principles of breeding, including selection, heredity, atavism, reversion, variation, correlation, with a presentation of methods of breeding, such as line breeding, in-breeding, in-and-in breeding, cross breeding, etc. Open to students above the sophomore year in college. Required of students in animal husbandry. Text: Davenport's Principles of Breeding.
4 hrs., first semester. 4 units.

18. Feeds and Feeding.  
ASSISTANT PROFESSOR FOWLER  
Principles of animal nutrition; composition and digestibility of various feeds; construction and use of silos; balanced rations; economical
feeding of animals for various purposes. Prerequisites: Chemistry III and Veterinary Physiology. Required of students in animal husbandry. Elective to students in agronomy and horticulture.

4 hrs., second semester. 4 units.

Professor Clothier

Small fruits such as the strawberry, the grape and the various bush fruits. Required of students in horticulture. Elective to students in agronomy and animal husbandry.

3 hrs., first semester. 3 units.

20. Horticultural Literature.  
Professor Clothier

Readings are assigned in bulletins and standard works upon horticulture; daily and weekly reports give the student a comprehensive view of the general field of horticulture and lay the foundation for research work. Required of students in horticulture.

3 hrs., second semester. 3 units.

21. Advanced Live Stock Judging. Assistant Professor Fowler

Show yard judging; relation of pure bred live stock to market classes; method of comparative judging. Trips are made to large herds, and students are required to spend several days at the State Fair at Phoenix, judging live stock. Prerequisites: Live Stock Judging 3, and History of Breeds 16. Required of students in animal husbandry. Elective to students in agronomy and horticulture.

3 hrs., first semester. 3 units.

22. Animal Husbandry Literature. Assistant Professor Fowler

A study of books and magazines and a review and compilation of bulletins devoted to animal husbandry. The student will be required to use the herd books of the different breeders' associations in studying the pedigrees of the best individuals in the more popular breeds of horses, cattle, sheep and swine. Required of students in animal husbandry.

3 hrs., second semester. 3 units.

23. Agronomy Literature.  
Professor Clothier

Daily and weekly reports upon assigned readings in bulletins and standard works. Designed to round out the student's knowledge of the general field of agronomy, and to prepare the way for research in the subject. Required of students in agronomy. Elective to students in horticulture and animal husbandry.

24. Farm Management.  
Professor Clothier

The purchase, organization, equipment and management of farms with reference to financial returns. Farm accounts, market demands, marketing associations, the farm lay-out, farm buildings, leveling for
irrigation, location and management of ditches, are among the subjects to be discussed. Required of students in the long course in agriculture.

2 lectures and one 3-hour laboratory period, second semester. 3 units.

SHORT COURSE IN AGRICULTURE

This course is offered to meet the demands of prospective homeseekers in Arizona; to give the student unable to afford the time or the means to pursue a full college course a brief introduction to the basis of successful farming, and to give him a measure of that general culture incidental to University life, which makes for good citizenship. It equips young men to take advantage of opportunities and to fill expert positions, which, for young men of such training, are now open in Arizona and will become more frequent as the great reclamation projects being carried on are completed. Vast areas of desert land in Arizona may be reclaimed by pumping, the development of which has scarcely been touched; but to make the most of such opportunities one will need more mechanical skill and more knowledge of the physical properties of soil than the average farmer possesses. The University from time to time has calls for farm managers at good salaries, and such calls will increase in number. Courses in Irrigation Engineering, Farm Management, Soil Physics, Vegetable Gardening, Orchard Management, and Farm Dairying, are especially designed to equip young men to take advantage of these opportunities and positions.

Students will be admitted to the short course who have a general knowledge of the common school branches and sufficient maturity in years to understand the value of their time and opportunity. They will be accorded the same privileges, and required to observe the same regulations, as other students registered in the University and resident upon the campus.

The University is amply equipped with library, laboratory, and green-house facilities, while the development of a farm of 80 acres will give an abundance of practice in the application of knowledge gained in the class room, library, laboratory and green-houses.

ART

ASSISTANT PROFESSOR NEWSOM

History of Painting.

A general survey of the history of painting, as follows: Early Christian and Byzantine, Italian, Spanish, Dutch and Flemish, French, German, English, American. Examination and comparison of the methods of each school and period; a critical study of the great masters, their environment, their works and their influence. Character-
istic details of style are studied from photographs and plates. Lectures by the instructor; investigation and reports on assigned topics by students. Not open to freshmen.

3 hrs., each semester. 3 units, each semester.

ASTRONOMY

PROFESSOR DOUGLASS

1, 2. Descriptive Astronomy. PROFESSOR DOUGLASS
   The sun, moon, planets, and other celestial objects, with constant views of their telescopic appearance, and discussion of the latest theories of the evolution of the universe and the condition of the planets. Non-mathematical; open to all students.
   2 hrs., or an equivalent, first and second semesters. 2 units, each semester.

3. Engineering Astronomy. PROFESSOR DOUGLASS
   Latitude, longitude, and time observations, and their reductions, with practice work; astronomical measurements; adjustment and handling of instruments. Course 3 is required of juniors in civil engineering.
   3 hrs., or an equivalent, first semester. Two day hours and one evening hour. 3 units.

BACTERIOLOGY

PROFESSOR MESERVE

Elements of Bacteriology.
   A limited number of lectures in the second semester, with about twice as many two-hour laboratory periods. Special reference to the significance of bacteria in agriculture, civil engineering, and home.

BIBLIOGRAPHY

MISS LUTRELL

1. Use of Books and Elementary Bibliography. Classification; card catalogues; the more common reference books; bibliographies, indexes, dictionaries, cyclopedias. Open to freshmen and sophomores. Lectures, exercises, preparation of bibliographies.
   2 hours, first semester. 2 units.

2. The Library and the School. Library administration, small school libraries, selection and ordering of books, sales catalogues, and practice work.
   2 hours, second semester. 2 units.

Library routine. Primarily for students intending to teach. Lectures and practice work.
   2 hours, second semester. 2 units.
The courses which follow are intended to articulate with the work done in biology in the average western high school.

1. Elementary Botany.  
   **MR. BROWN**  
   A general view of the four great groups of plants; the morphology of types and their genetic relations. Open to college students and required of students in horticulture and agronomy. Text: Bergen and Caldwell, *Practical Botany*.  
   2 lectures and 4 hours of laboratory work, first semester. 4 units.

2. Plant Histology.  
   **MR. BROWN**  
   Microscopy, botanical microtechnique, use of the camera lucida, and the photographic camera. The greater part of the laboratory work is given to the use of chemical reagents and stains in the preparation of microscopic slides. This course is offered for students who are preparing to teach botany or to take advanced work in this subject. Text: Chamberlain’s *Methods in Plant Histology*. Prerequisite Botany 1.  
   2 lectures and 6 hours of laboratory work, second semester. 4 units.

3. Plant Physiology.  
   **MR. BROWN**  
   Life processes of plants. Investigations of the properties of protoplasm; relations of plants to mechanical forces; influence of chemicals upon plants; relations of plants to water, gravitation, light, respiration, growth and movement. The course will appeal to students of plant physiology, because of our interesting flora and climatic conditions. Required of students in horticulture and agronomy. Text: MacDougal’s *Textbook of Plant Physiology*. Prerequisite, Botany 1.  
   2 lectures and 6 hours of laboratory work, second semester. 4 units.

4. Taxonomy.  
   **PROFESSOR THORNBER**  
   Identification of plants. Intended for those who expect to continue the study of botany, as well as for those who desire to know the common plants about them, both native, and cultivated species. Particular attention to economic plants. Excursions to adjacent mountains, mesas and river valleys. Texts: Coulter and Nelson, *A New Manual of Rocky Mountain Botany*; Gray’s *Field, Forest and Garden Botany*; also numerous other reference works. Open to college students, and required of all agricultural students.  
   2 lectures and 6 hours of laboratory work, second semester. 4 units.

5. Taxonomy.  
   **PROFESSOR THORNBER**  
   Continuation of course 4. Systematic study of our flora; notation of plant types and co-types; herbarium building; the art of keying
plant groups. Original literature is used. Different systems of classification are studied. Open to students who desire to continue the study of taxonomy.

6. General Morphology of Algae and Fungi. MR. BROWN
Open to students who have completed courses 1 and 2. The instructor must be consulted before registration. Prerequisites, Botany 1 and 2. Hours to be determined. 4 units.

7. General Morphology of Bryophytes and Pteridophytes. 4 units.

8. General Morphology of Spermatophytes. 4 units.

9. History of Botany. MR. BROWN
A lecture course dealing with (a) early descriptive botanists; (b) the period of artificial systems; (c) the beginning and development of modern botany; (d) botany and botanists of today. This course requires library work. Prerequisites, Botany 1, 2, 3 and 4.
First semester. 4 units.

10. Grazing Range Studies. PROFESSOR THORNBER
An economic study of the native grasses, saltbushes, cacti and other forage plants, particularly as concerns their grazing value. Different types of ranges with the relation of rainfall to plant growth; the open range as contrasted with the advantages of fenced ranges. Poison plants and range weeds with means of eradication. Range restoration. Recommended for students in animal husbandry and general agriculture. Prerequisite, Botany 4.
2 lectures and 6 hours of laboratory work, first semester. 4 units.

11. Plant Pathology. PROFESSOR THORNBER
The principal groups of parasitic fungi and the plant diseases caused by them, together with methods of control. External factors causing pathological conditions in plants. The commoner plant diseases throughout the country. Prerequisites, Botany 1 and 3.
1 lecture and 5 hours laboratory work, first semester, 3 units.

Continuation of course 11. Second semester. 3 units.

13. Geographical Botany. MR. BROWN
Plant distribution over the earth’s surface, with reasons for such distribution. General aspect of the vegetation characteristic of the hygrophytic forest, the tropophytic forest, the sclerophyll forest, the savannah, the steppe, the desert, the tundra. A considerable amount of reading in addition to classroom and field work is required. The lectures are frequently illustrated. Prerequisite, Botany 4. No laboratory work.
4 hours, first semester. 4 units.
14. Landscape Gardening. **Professor Thornber**

Native and introduced flowers, vines, shrubs, and trees adapted for growing under southwestern conditions; lawn making, the rose garden, and hardy bulbous species. Different types of landscape gardening, aesthetic arrangement of trees and shrubs in country and urban homes to secure the best results in planting.

3 lectures and 2 laboratory hours, first semester. 4 units.

**CHEMISTRY**

**Professor Guild, Assistant Professor Brinton and Mr. Kleeberger**

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

III. Elementary General Chemistry.

A beginning course intended for preparatory students and college students who enter without a year of high school chemistry. Textbook: Stoddard, *Introduction to General Chemistry*.

4 hrs., or an equivalent, both semesters. When taken by college student (year), 8 units.

1, 2. General Chemistry and Qualitative Analysis. **Professor Guild, Assistant Professor Brinton**

Lectures and recitations illustrating the chemical properties of the elements and their compounds. Textbooks: Mellor, *Modern Inorganic Chemistry*; Tower, *Qualitative Chemical Analysis*, and various reference books. Open to all students who have taken courses amounting to one year each in preparatory chemistry and physics.

2 hrs. and two 3-hr. laboratory periods, both semesters. 4 units, each semester.

3. Quantitative Analysis. **Assistant Professor Brinton**

Laboratory practice, with lectures and recitations; the work is chiefly in gravimetric methods of analysis. For students in agriculture, special problems in agricultural chemistry, such as analysis of water, soils, and fertilizer are considered. Open to all students who have taken Chemistry 2.

4 hrs., or an equivalent, first semester. 4 units.

4. Volumetric Analysis. **Assistant Professor Brinton**

A continuation of the work in Chemistry 3, special attention being given to the methods of wet assaying employed in the West.
4 hrs., or an equivalent, second semester. 2 units if discontinued March 15th; otherwise, 4 units.

5, 6. Special Quantitative Analysis. **Assistant Professor Brinton**
   Analysis of water, gases, oils, minerals, iron and steel. Open to students who have taken Chemistry 4.
   2 or 4 hrs., or an equivalent, both semesters. 2 or 4 units, each semester.

*7, 8. Organic Chemistry. **Professor Guild**
   Lectures on the carbon compounds; laboratory work in organic analysis and the preparation of organic compounds; vapor density and molecular weight determination. Open to students who have taken Chemistry 3, 4.
   4 hrs., or an equivalent, both semesters. 4 units, each semester.

9. Synthetic Chemistry. **Professor Guild**
   Preparation of pure chemical compounds from the crude mineral products. Open to students who have taken Chemistry 4.
   2 hrs., or an equivalent, first semester. 2 units.

10. Physical Chemistry. **Professor Guild**
   Lectures and laboratory work. Historical introduction leading up to a discussion of modern chemical theories. Open to students who have taken Chemistry 3.
   2 hrs., or an equivalent, second semester. 2 units.

*11, 12. Chemistry of the Rare Elements. **Professor Guild**
   Analysis and synthesis of uranium, molybdenum, tungsten, vanadium and cerium compounds. Open to students who have taken Chemistry 6, 9.
   4 hrs., or an equivalent, both semesters. 4 units, each semester.

13. Special Chapters of Inorganic Chemistry. **Assistant Professor Brinton**
   Lectures and laboratory practice on selected topics from the field of recent work in inorganic chemistry. Open to students who have taken Chemistry 3. Chemistry 9 is advised as preparation for this course.
   2 hrs., or an equivalent, second semester. 2 units.

**Civil Engineering**

**Professor Waterbury and Assistant Professor Kelton**

The courses in this department have been arranged with special reference to the engineering development of the Southwest. Stress is laid on surveying, railroad and structural work, and irrigation engineering. The student receives a thorough and practical knowledge of
the essential principles of his profession, and of the technical practice of the times, so far as this is possible, without sacrificing in other directions.

Some of the courses in civil engineering are offered on a consultation basis. For such courses the class does not meet in a body and periods will not be scheduled. Each student arranges with the instructor for the required consultation periods. In general, two or three consultation periods a week, in each subject, are required of each student. For courses requiring laboratory or drafting work the student must spend as much time in the laboratory or drafting room as may be required to complete the assigned work.

1. Elementary Surveying.  
   **Assistant Professor Kelton**

   Use and care of surveying instruments, United States system of land surveys, city surveys, computations. Lectures, recitations, drawing, and fieldwork. Textbooks: Tracy’s *Plane Surveying*, and Pence and Ketchum’s *Surveying Manual*. Open to students who have taken trigonometry, and who have taken or are taking Mechanic Arts 1.

   3 hrs. and Sat. A. M., first semester. 4 units.

2. Topographic and Mine Surveying.  
   **Assistant Professor Kelton**

   A continuation of Civil Engineering 1. The work of the second semester includes topographic surveying, hydrographic surveying, patent surveys, and underground surveying. Open to students who have taken Civil Engineering 1.

   3 hrs. and Sat. A. M., second semester. 4 units.

   **Professor Waterbury**

   Precise triangulation work, including measurement of base lines, measurement of angles, adjustment and computation of triangulation systems, and adjustment of precise level circuits. Open to students who have taken Civil Engineering 1, 2, and Astronomy 3 or 4. This course may be taken as a consultation course.

   1 hr., first or second semester. 1 unit.

6. Concrete and Masonry Construction.  
   **Professor Waterbury**


   2 hrs., and two 3-hr. drafting periods, second semester. 4 units.
7. Steel Mill Buildings. **Professor Waterbury**

Graphical and analytical computation of stresses in roof and bridge trusses; details of structural steel designing; complete design with drawings, estimate of weights, and estimate of cost for a steel mill building. Textbook: Ketchum, *Steel Mill Buildings*. Open to students who have taken Civil Engineering 14. This course may be given as a consultation subject.

2 hrs., and two 3-hr. drafting periods, first semester. 4 units.

8. Bridge Design. **Professor Waterbury**

Computation of stresses due to moving loads upon various points of bridge structures; a detailed study of bridge designs and bridge erections; complete investigation with drawings, estimate of weights, and estimate of cost of a steel bridge. Textbook: Ketchum, *Design of Highway Bridges*. Open to students who have taken Civil Engineering 7. This course may be given as a consultation subject.

2 hrs., and two 3-hr. drafting periods, second semester. 4 units.

9, 10. Railroad Engineering. **Assistant Professor Kelton**

Preliminary and location surveys; simple and easement curves, turnouts and switches; principles of economic location as based upon cost of construction, operating expenses, alignment, and grades; maintenance of way. The fieldwork consists of the surveys for a railroad of sufficient length to secure familiarity with the methods of actual practice. Each student makes a complete set of notes, maps, profiles, calculations and estimates of cost. Textbook: Allen, *Railroad Curves and Earthworks*. Open to students who have taken Civil Engineering 1, 2.

1 hr., and one 4-hr. field or drafting period, both semesters. 2 units, each semester.

11. Hydraulics. **Professor Waterbury**

Velocity and discharge from orifices, weirs, tubes, and pipes; flow in sewers, ditches, canals and rivers; measurement of water power; water wheels of various types. Textbook: Merriman, *Hydraulics*. Open to students who have taken Civil Engineering 1, 2 and Mathematics 4.

4 hrs., first semester. 4 units.

13. Irrigation Engineering. **Assistant Professor Kelton**

Engineering principles relating to the construction and maintenance of canals and reservoirs and the various means of diverting, measuring, and pumping water for use in irrigation. Textbook: Wilson, *Irrigation Engineering*. Open to students who have taken Civil Engineering 1, 2, 11, 14.

3 hrs., and one 3-hr. laboratory and drafting period. This course may be given as a consultation subject. First semester, 4 units.
Professor Waterbury
Analysis and computation of stresses in prisms, beams, columns, and shafts. Textbook: Merriman, *Mechanics of Materials*. Open to students who have taken or are taking Mathematics 5, 6.
3 hrs., second semester. 3 units.

Assistant Professor Kelton
Laboratory work in the testing of materials used in engineering construction, including cement, concrete, wood, iron, and steel. Open to students who are taking or have taken Civil Engineering 14a.
One 3-hr. laboratory, second semester. 1 unit. 2 units additional may be elected, hours to be arranged.

15. Contracts and Specifications.  
Professor Waterbury
Essentials of a contract; items included in various kinds of engineering contracts and specifications; preparation of a complete set of specifications and a contract. Textbook: Johnson, *Engineering Contracts and Specifications*. Open to all college students. This course may be given as a consultation subject.
2 hrs., first semester. 2 units.

Professor Waterbury
Assigned work on an investigation, design, or original research. No student is permitted to register in this subject unless his previous work has been of high grade. Open to senior students in civil engineering.
First or second semester. 2 units.

17. Public Water Supplies.  
Professor Waterbury
Methods of investigation of available supplies of use, including a study of results of chemical analysis of water, and the bacterial examination of water; methods of purification of water; and a study of the design of water systems. Textbooks: Turneaure and Russell, *Public Water Supplies*. Open to students who have taken or who are taking Civil Engineering 11. This course may be given as a consultation subject.
2 hrs., first semester. 2 units.

18. Sewerage.  
Professor Waterbury
Methods of sewerage purification; sewerage disposal plants; and design of sewer systems. Textbook: Folwell, *Sewerage*. Open to students who have taken or are taking Civil Engineering 11. This course may be given as a consultation subject.
3 hrs., first or second semester. 3 units.

*Omitted 1912-1913.
19. Agricultural Surveying. **Assistant Professor Kelton**

An elementary course in surveying for students in agriculture. The construction and use of surveying instruments; surveying operations having particular application in agricultural and irrigation work. Textbook: Pence and Ketchum, *Surveying Manual*. Open to students who have had high school or preparatory algebra.

2 hrs. and one 3-hr. field period, first semester. 3 units.

20. Principles of Irrigation. **Assistant Professor Kelton**

Methods of irrigation, measuring water for use in irrigation, present condition of irrigation development in the United States, irrigation legislation, and methods of establishing water rights. Open to students who have had Civil Engineering 19.

2 hrs. and one 3-hr. laboratory period, second semester. 3 units.

22. Highway Engineering. **Professor Waterbury**

Highway location and construction; construction of city pavements; bituminous materials for dust prevention and road preservation. Pre-requisite, Civil Engineering 1. 2 hrs., second semester. 2 units.

**Economics**

**Professor Chandler and Mr. Hubbard**

1. Principles of Economics. **Professor Chandler**

The main principles underlying the science. Special emphasis upon practical illustrations drawn from business activities of today. Open to all college students.

3 hrs., first semester. 3 units.

2. American Business. **Professor Chandler**

Rise of the factory system in the United States, and origin and development of the leading American industries. History of the tariff from 1789 to 1911 and its relation to the development of agriculture, manufacture and commerce. Special topics: trusts in their relation to high protection; bearing of the tariff upon increased cost of living; conservation of natural resources in relation to the tariff; high protection and decline in American shipping; needed tariff reform; reciprocity; the tariff commission. Open to all college students who have had Economics 1.

3 hrs., second semester. 3 units.

3. Industrial Organization. **Professor Chandler**

The scientific basis of large scale industry by analyzing the principles of competition, combination, monopoly and the savings of integration. Various business units from the point of view of their comparative efficiency for different kinds of business; methods of business
consolidation; pools; trusts; holding companies; mergers; agreements; community of interest. Scientific management and elements of cost.

2 or 4 hours, first semester. 2 or 4 units.

4. Transportation and Commerce. PROFESSOR CHANDLER

1. Rise of the American railway system; its past and present relation to the development of agriculture, manufacturing, and other industries.

2. The present American railway system; its business organization, methods of combination, and financial operations.

3.Relation of the railroad to the government and the public; rights of the shipper and the investor in railway securities; Interstate Commerce Commission and Federal control of commerce; proposed reforms in State and Federal regulation; government ownership in Europe and Australia, and its practical value if applied to American conditions. Open to students who have had Economics 1. Students taking this subject for credit in the general Commerce Course are required to do sufficient work in the Materials of Commerce for two extra units of credit.

2 hrs., second semester. 2 units.

4a. Business Economics for Engineers.

PROFESSOR CHANDLER AND MR. HUBBARD

Especially for engineering students and others who have only a limited time to study economics. Special problems of capital, labor and organization of importance to the engineer who may enter the business side of mining, transportation, manufacturing and other industrial work. This course is not open to students who have had courses 3, 4 or 5.

2 hrs., either semester. 2 units.

5. Corporation Organization and Finance. PROFESSOR CHANDLER

1. Organization and management; how and where to organize; powers and privileges of corporations in the different states; minority rights.

2. Business development and promotion of various properties and enterprises, with special reference to the promotion and development of mining companies.

2 or 3 hrs., first semester. 2 or 3 units.

5a. Financial Institutions and Investments. PROFESSOR CHANDLER

A study of the investment market, including:

1. Financial agents and institutions; stock brokers; stock exchanges; stock market; money market; function of Wall Street.

2. Investments of securities; methods and laws of investment and
speculation; relative merits of railway stocks, bonds, municipal bonds, industrial, irrigation and mining securities.
2 or 3 hrs., second semester. 2 or 3 units.

7. Introduction to the Study of Society. **Professor Chandler**
   2 or 3 hrs., first semester. 2 or 3 units.

8. Elements of American Politics. **Professor Chandler**
   2 or 3 hrs., second semester. 2 or 3 units.

9. Labor Problems. **Professor Chandler**
   1. Origin of the labor problem and history and growth of labor organizations.
   2. Economic and social condition of the working classes in the United States and Europe today, including study of child and woman labor; immigration and its relation to wages and the standard of living of American workmen; sweating system; poverty and unemployment.
   3. Organized labor vs. organized capital; strikes and lockouts; closed vs. the open shop; secondary boycott; collective bargaining; employers’ organizations.
   4. Political and legal aspects; use and abuse of the injunction; police power of the state; recent court decisions; the laborer in politics.
   2 or 3 hrs., first semester. 2 or 3 units.

10. Economic Reform Movements. **Professor Chandler**
    This course logically follows Economics 9. The labor question with emphasis upon the constructive side. The chief proposals for the solution in America, Europe and Australia; profit sharing; co-operation; industrial education; compulsory arbitration; labor legislation in the United States.
    2 or 3 hrs., second semester. 2 or 3 units.

12. Discussion of Public Questions. **Professor Chandler**
    Students receive training in the handling of public questions, political, economic and social, by means of discussions and debates. Open to all college students.
    1 hr., first semester. 2 units.

12a. Seminar in Arizona Problems. **Professor Chandler**
    Open only to advanced students.
    1 3 hr. credit, each semester.

13. Elementary Accounting. **Mr. Hubbard**
    An introductory study of simple accounts; the general principles of accounting, meaning of the balance sheet and other reports furnished by firms and corporations, and accounting problems incident to efficient business management. Concrete examples, with special atten-
tion given to farm, engineering, and cost accounting. Open to all college students.
2 hrs., both semesters. 2 units, each semester.

15. Advanced Accounting.  
Mr. Hubbard
2 hrs., first semester. 2 units.

Professor Chandler
The city in its economic, political, and social aspects.
2 or 3 hrs., first semester. 2 or 3 units.

18. Agricultural Economics.  
Mr. Hubbard
Business aspects of rural life; capital and labor as applied to farming, irrigation, forestry and mineral lands; agricultural banking and credit; buying of supplies and marketing of products; the public domain, state and national.
Students of agriculture, who have not taken the work in course 13, covering agricultural accounting, will be given in this course a simplified system of farm accounts.
3 hrs., first or second semester. 3 units.

19. Money and Banking.  
Mr. Hubbard
Functions of money and its relation to credit institutions; monetary system of the United States; theory and history of banking; function of the savings bank, the trust company, the clearing house; history of American finance; financial crises in their relation to our present currency and banking systems; examination of the principal banking systems of the world for the purpose of finding ideas which would render the American system more nearly conformable to our growing financial and commercial needs. Open only to juniors and seniors who have had at least one year of economics.
2 or 3 hrs., first semester. 2 or 3 units.

20. Business Economics. Professor Chandler and Mr. Hubbard
Insurance, real estate and taxation.
2 or 3 hrs., second semester. 2 or 3 units.

21, 22. Principles and Economics of Mining. Professor Chandler
Especially for students of Mining Engineering, and given jointly with the department of Mining Engineering. Same as Mining 5, 6. Not open to students who have had Economics 5 and 5a or Economics 4a.
3 hrs. throughout the year. 6 units.

BUSINESS COURSES IN THE UNIVERSITY

The University now offers two distinct courses in Business, Economics, Commerce and Finance: a two year course in practical busi-
ness economics leading to a certificate; and a four year course leading to the degree of B. S. in Commerce.

The Two Year Course in Business is offered especially for those high school graduates who wish to prepare for business life and who cannot afford to take a four year course in commerce. Emphasis is placed upon the more practical phases of business training.

Any subject in the two year course will be accepted for full credit in the four year course.

One of the valuable features of this course consists of talks given by business men to the students. For the coming year arrangements have been made for several of these talks by men who have had experience in business administration, organization, real estate, fire insurance, life insurance, salesmanship, banking, and trust business.

The Four Year Course in Business Economics, leading to the degree of B. S. in Commerce, is offered to meet the growing demands of the business world for men who are not only liberally educated, but who are also equipped with technical knowledge of finance, business organization and administration. In addition to all that is given in the Two Year Course, the student is required to elect science or mathematics, and more foreign languages. This course allows the student considerable freedom in the choice of electives. Entrance requirements are the same as for the A. B. degree.

**ELECTRICAL ENGINEERING**

**PROFESSOR HENLEY, MR. SNOW AND MR. BRAEUTIGAM**

The object of the course in electrical engineering is to furnish thorough instruction and practical training in applied electricity and allied subjects, and in those fundamental principles of science a knowledge of which is necessary as a basis for successful specialization. The laboratory work supplements the lecture and recitation work, training the student to see the close relation between theory and actual operation, and encouraging individual judgment rather than mere development of skill.

Work in electrical engineering proper is not undertaken until the Junior year, but a course in electricity and magnetism may be elected in the Sophomore year. Besides the electrical work courses are given in other engineering subjects, and electives give opportunity for work along non-engineering lines.

1. Elements of Electrical Engineering. **MR. SNOW**

The principles of the development of electrical engineering; a brief history of the development of the electrical industry, with modern applications of electricity to transmission of power, electric lighting, the
telephone, street cars, etc.; the theory of the generation and transmis-
sion of both direct and alternating currents,—advantages and disad-
vantages in the use of each.

First semester, junior year. 3 units.

2. Dynamo-Electric Machinery. MR. Snow
In part a continuation of E. E. 1. The study of electric illumina-
tion, comparing the various light sources, their relative values under
different conditions, cost and efficiency of operation. One 3-hour
period in the laboratory, making different connections on motors and
generators, running machines and making simple tests of them.

Second semester, junior year. 4 units.

3. Electrical Machinery. MR. Snow
The fundamental laws of electromagnetic and electrostatic circuits.
Algebraic and geometric treatment of electrical problems, in such a
manner than an analysis of the structural and performance character-
istics of electrical machinery may be easily followed.
2 hrs., first semester, senior year. 2 units.

4. Electric Traction. MR. Snow
Practical application of E. E. 3 to generators, motors, and trans-
formers. Electric railways: the railways, generators, rotary-conver-
ters, the different types of motors as applied to the work; a comparison
of the direct and alternating current systems in electric railroad work.
2 hrs., second semester, senior year. 2 units.

5, 6. Electrical Engineering Laboratory. MR. Snow
Operation and characteristics of commercial machines, making com-
plete tests of generators, motors both direct and alternating current,
transformers, synchronous converter, etc. The student becomes fa-
miliar with actual operation of the machines, common causes of trouble
and their remedy.
Two 3-hr. periods, each semester, senior year. 2 units.

7. Design of Electrical Machinery and Apparatus.
MR. Snow and MR. Braeutigam
Paralleling E. E. 3. Effect of design on the characteristics, cost of
operation and performance of electrical machinery and apparatus.
Practical calculations for designing lifting magnets, finding and plot-
ting the characteristics and predetermination of the operation of gene-
rators, motors, transformers and transmission lines.
Two 3-hr. periods and one lecture, first semester, senior year. 3 units.

8. Electric Power Station Design.
MR. Snow and MR. Braeutigam
Selection and arrangement of electric power station equipment;
wiring diagrams and switch-board connections. Transmission line design, calculations of cost of operation, estimated cost of power delivered, and power rates.

Two 3-hr. periods and one lecture, second semester, senior year. 3 units.

9. Electrical Engineering Practice.  Mr. Braeutigam
A general course in electrical engineering: electric lighting, transmission and distribution, construction and operation of alternating and direct current generators and motors. Intended for all engineering students.

2 hrs. and one 3-hr. period, first or second semester. 3 units.

10. Seminar. Professor Henley, Mr. Snow or Mr. Braeutigam
Discussion of various subjects which arise in connection with work, and review of current engineering literature.

1 hr., second semester. 1 unit.

11. Elements of Design.
A drafting room course for junior electrical students.

2 3-hr. periods, second semester. 2 units.

**ENGLISH**

Professor Bates, Professor Perry, Miss Lutrell

The purpose of the literary courses outlined below is to give a general knowledge of English literature from its beginnings to the present time, chief stress being laid upon the study of representative authors, but with broader literary movements constantly in mind. The courses in composition aim to develop accurate thought and clear, vigorous expression; opportunity for work in advanced composition is afforded in connection with the courses in literature.

1. Composition.  Professor Perry
Exposition; lectures and the study of Perry's *Exposition*; daily and weekly themes. Prescribed for all freshmen.

3 hrs., first semester. 3 units.

2. Composition.  Professor Perry
Argumentation; study of Perry's *Argumentation*, class debates, impromptu speeches, and several written arguments. Prescribed for all freshmen.

3, 4. History of English Literature.  Professor Bates
An outline of English Literature from its beginning down to the present time. Moody and Lovett's *History of English Literature* used as a textbook. Assigned readings from numerous authors. This course is preliminary to all other courses in English literature.

2 hrs., both semesters. 2 units, each semester.
5, 6. Elizabethan Drama.  
PROFESSOR BATES
Development of the Elizabethan drama from the Miracle Plays, Moralities and Interludes; the Senecan influence, the work of Lyly, Greene, Peele, Kyd, and Marlowe; a close detailed study of the leading plays of Shakespeare, followed by a cursory treatment of the post-Shakespearian drama. Lectures and discussions. A play is usually put on at Commencement by the members of this class.
3 hrs., both semesters. 3 units, each semester.

PROFESSOR BATES
The historical development of the romantic spirit and its manifestation in the poetry of Wordsworth, Coleridge, Scott, Byron, Shelley, and Keats, the essays of Lamb, Hazlitt, De Quincey, and Emerson, the fiction of Scott, Hawthorne, Poe, Charlotte Bronte and Emily Bronte.

PROFESSOR BATES
The change of spirit in the Victorian era; the work of the typical Victorians: Tennyson, Macaulay, Dickens, Thackeray, and Eliot; the various forms of revolt in Arnold, Browning, Rossetti, Swinburne, Morris, Carlyle, Ruskin, Meredith, Hardy, and Stevenson.
5 hrs., second semester. 5 units.

9, 10. Principles of Literary Criticism.  
PROFESSOR BATES
A historical study of the chief theories of literary criticism to aid the student in forming satisfactory principles of judgment for himself. In the first semester the following authors are studied: Plato, Aristotle, Sidney, Dryden, Addison, Pope, Johnson, and Burke. The second semester is devoted to writers of the nineteenth century, especially Wordsworth, Coleridge, Shelley, Hazlitt, Poe, Arnold, Pater, and various contemporary critics. Primarily for seniors.
2 hrs., both semesters. 2 units, each semester.

11, 12. Methods of Teaching English.  
PROFESSOR PERRY
Intended for students preparing to teach English in secondary schools. Methods of teaching grammar, rhetoric, composition, literature; discussion of the college entrance requirements in English; blocking out of courses, and planning and presenting of single lessons.
3 hrs., both semesters. 3 units, each semester.

PROFESSOR PERRY
An advanced course with emphasis placed on the writing of short stories. Consideration of the problems of the short story writer; the discovery, through analysis of specimen stories, of helpful principles and devices, and experimentation in their application in short story
writing. Frequent short themes and monthly long ones will be required. Open to college students who have successfully completed English 1 and 2.

3 hrs., first semester. 4 units.

14. Public Speaking. Professor Perry

A practical course intended to correct faults in delivery, establish sound standards of oratory, and train students in easy, effective oral expression. Constant class-room practice in informal debates and in other forms of public speaking. Open to students who have finished the required English courses.

3 hrs., second semester. 3 units.

15, 16. Contemporary Literature. Professor Bates

Such a study of British and American literature in the last quarter-century as will enable the student to form a clear estimate of present-day tendencies: the decadent and symbolic schools of British poetry, the Irish movement, contemporary American poetry, the romantic and realistic schools of fiction, and the revival of the drama, with especial reference to the influence of Ibsen. Readings assigned in the poetry of Francis Thompson, Dowson, Symons, Henley, Yeats, and Hovey; in the prose of Kipling, Bennett, Wells, Grierson, and Herrick; in the dramas of Ibsen, Pinero, Jones, Shaw, Wilde, Phillips, and Synge. Lectures, discussions and quizzes.

2 hrs., both semantics. 2 units, each semester.

17, 18. Chaucer. Miss Lutrell

A large part of the Canterbury Tales is read, the Prologue of the Legende of Gode Wommen, and some of the minor poems. The course is purely literary and a knowledge of Anglo-Saxon is not required.

3 hrs., both semantics. 3 units, each semester.

19. Advanced Course in Methods of Teaching English. Professor Perry

The course is offered on request for the benefit of seniors who as juniors took English 11 and 12. The work will be a review and continuation of the work of that course.

Second semester. 2 units.

FRENCH

Professor Turrell, Mr. Otis

1, 2. Elementary French. Professor Turrell

First semester: Fraser and Squair, French Grammar, (Part I), Aldrich and Foster, French Reader. Second semester: Reading of Daudet, La Belle Nivernaise, Labiche and Martin, La Poudre aux
Yeux, Halévy, L’Abbé Constantin. Composition and dictation, with drill on the irregular verbs.
5 hrs., both semesters. 4 units, each semester.

3, 4. Advanced French. PROFESSOR TURRELL
First semester: Fraser and Squair, France Grammar, (Part II), Merimeé, Colomba or Carmen, Lamartine, Graziella, Sand, La Mare au Diable or La Petite Fadette. Second semester: Selected reading: including Canfield, French Lyrics, Victor Hugo, Les Misérables (abridged).
5 hrs., both semesters. 4 units, each semester.

5. French Literature to the Nineteenth Century. PROFESSOR TURRELL
3 hrs., first semester. 3 units.

6. French Literature in the Nineteenth Century. PROFESSOR TURRELL
3 hrs., second semester. 3 units.

2 hrs., both semesters. 2 units, each semester.
Courses 5, 6, 7, 8 may be taken together or separately, but must be preceded by courses 1, 2, 3, 4.

GEOLGY
MR. WILLIS
The earlier courses in geology introduce the student to general and applied geology, but with special reference to development of the observational faculties, and to training in inductive and deductive reasoning so that he may discover for himself the causes for the phenomena observed. The more advanced courses are technical and cover the essentials of geology for a mining engineer. The courses in geological mapping give opportunity for field work, and include reconnaissance and detailed field mapping and underground geological map-
ping. Special field work may be undertaken by advanced students under the direction of the department.

1. General Geology.

Geological processes, their causes and effects. The atmosphere, surface and underground water, the ocean and ice and snow as geological agents; earth movements, mountain and continent building, volcanism; origin and alterations of rocks. Historical geology, reviewing the physical history of the earth and correlated life progress. Summary of the general principles of ore deposits.

Reading and interpreting topographical and geological maps, the fundamentals of geological mapping, structural problems, and stereographic and graphic methods for the solution of problems in faulting. Classification and laboratory study of rocks. Short field trips are taken in the second semester.

3 hrs., both semesters. 3 units, each semester.


Statistics, production, utilization, value, occurrence, genesis and methods of investigation of iron and manganese and the non-metallic products, viz.: coal, gas, bitumen, etc.; building stones, clays, cement materials, sands, etc.; borax, phosphates, fluorspar, gypsum, graphite, mica, asbestos, mineral paints, etc.; salines, mineral waters, artesian flows, and investigation of underground water flow, etc.; precious stones.

3 hrs., first semester. 3 units.


Detailed study of ore deposits. Prerequisite, Geology 1, 2.

3 hrs., second semester. 3 units.

5. Field Geology. (Summer Work.)

This course is designed to give the student practice in the various processes involved in geological mapping. The work covers, the preparation of a complete topographical map, including triangulation and contouring, the working out and mapping of the areal geology and the study of the economic features of the territory studied.

Two reports are required, one areal and one underground and each must include reconnaissance maps and notes as well as detailed geology. The reports are due November 1st. Open to students who have taken Geology 1 and 2.

Six weeks during the summer between the Junior and Senior years. 6 units. Required in Course VI.

7. Type Fossils.

Identification of type fossils, especially the Paleozoic.

2 hrs., first semester. 2 units.
9, 10. Advanced Ore Deposits.
   The literature of special ore deposits or special problems in ore
   deposition, with microscopic work.

11, 12. Advanced Field Work.
   Detailed study and mapping of a selected area, or of a selected ore
   deposit.

GERMAN

MR. OTIS

1. 2. Elementary German.
   First semester: Paul V. Bacon, German Grammar.  Second semester:
   Reading of Storm, Immensee, Gerstacker, Germelshausen.  Conver-
   sation based on Paul V. Bacon, Im Vaterland.  Grammar com-
   pleted.

   5 hrs., both semesters.  4 units, each semester.

3, 4. Advanced German.
   First semester: Pope, German Composition, with review of Syntax.
   Reading of Meyer-Foerster, Karl Heinrich, Heine, poems and Die
   Harzreise.  Second semester: Composition continued.  Lessing,
   Minna von Barnhelm, Schiller, Wilhelm Tell, etc.

   5 hrs., both semesters.  4 units, each semester.

5, 6. Lessing, Schiller, and Goethe.
   First semester: Reading and interpretation of Lessing, Emilia
   Galotti, Nathan der Weise, Schiller, Maria Stuart, Wallenstein.
   Accompanied by a brief outline of German literature to the nine-
   teenth century.  Second semester: Goethe, Hermann und Dorothea,
   Egmont, Die Italienische Reise, Faust, Part I.

   3 hrs., both semesters.  3 units, each semester.

7, 8. German Literature in the Nineteenth Century.
   First semester: The Romanticists and their successors.  Class read-
   ing of Kleist, Der Prinz von Homburg, Grillparzer, Der Traum ein
   Leben, Die Ahnfrau, etc.  Second semester: the rise of Naturalism
   and Symbolism.  Wildenbruch, Harold, Fulda, Der Talisman, Suder-
   mann, Johannes, Hauptmann, Die versunkene Glocke.  Lectures and
   library readings.

   2 hrs., both semesters.  2 units, each semester.

Note.—Courses 5, 6, 7, 8 may be taken together or separately, but
must be preceded by Courses 1, 2, 3, 4.
GREEK

ASSISTANT PROFESSOR NEWSOM

1, 2. Beginner's Course.
   4 hrs., both semesters. 4 units, each semester.

3, 4. Homer and Plato.
   Homer, *Iliad* (first four books); Plato, *Apology* and *Crito*; and selections from Lysias.
   4 hrs., both semesters. 4 units, each semester.

HISTORY

PRESIDENT WILDE, PROFESSOR CHANDLER, MR. HUBBARD

*1, 2. Expansion of the American People. PROFESSOR CHANDLER*

   Political, social and economic development and expansion of the American people from the settlement on the Atlantic seaboard down to the recent political activities in the far West. The transplanting of European peoples and institutions, and the adaptation of them to American conditions; the industrial evolution in the United States; the early western movement; the public domain; the development of American democracy; the great social and economic changes accompanying and following the civil war; the settlement of the far West. During the second semester considerable time will be given to the history of the Southwest and to the study of its peculiar problems. Open to all college students.
   3 hrs., both semesters. 6 units.

3, 4. Mediaeval History. PRESIDENT WILDE

   European history from the fall of the Roman empire to the close of the Protestant Reformation. The rise of institutions; the political, social, and economic life of the time; influence of the church; development of the modern state. The course gives a foundation for more intensive studies in history and provides a historical basis for the study of economics or other sciences.
   3 hrs., both semesters. Hours to be announced. 6 units.

5, 6. Nineteenth Century Europe. HR. HUBBARD

   The liberal and reform movements of Europe since the Congress of Vienna; the evolution of constitutional government; various movements toward national unity; the rise of modern Italy; the Franco-Prussian war; the rise of modern Germany; English reform bills of 1832, 1867, and other political developments.
   3 hrs., each semester. 6 units.

*Offered in 1911-12 and alternate years.
7, 8. Constitutional History of the United States.  

Professor Chandler  

The formation of the Union and of the political and constitutional history of the United States, based on letters and speeches of American statesmen, public documents and special histories.  
3 hrs., both semesters. 6 units.

9, 10. Ancient History.  

President Wilde  

A study of the history and institutions of ancient Greece in the first semester. The same general view of the history and institutions of ancient Rome in the second semester. Not offered in 1913-14.  
2 hrs., each semester. 2 units.


Mr. Hubbard  

The English people from the earliest times to the end of the Tudor period. The influence of Church and Continental relations; the causes and events relative to the development of English social and political institutions. The student is expected to have a clear idea of the Constitution as developed to the close of the period.  
3 hrs., first semester. 3 units.


Mr. Hubbard  

Beginning with the close of the Tudor period, a study of the events and legislation causing and directing the growth of English political parties. The prerogatives of the crown, the development of the cabinet system, elections, methods of legislation, and the reform bills of the nineteenth century.  
3 hrs., second semester. 3 units.

13, 14. Modern Europe.  

Mr. Hubbard  

European history from the close of the Reformation to the end of the Napoleonic period. During the first semester much time is given to the consideration of European civilization of the seventeenth and eighteenth centuries; the second semester is devoted to an intensive study of the French Revolution and the Napoleonic period.  
3 hrs., each semester. 6 units.

Latin  

Assistant Professor Newsom  

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

1, 2. Livy and Cicero.
Livy, Selections; Cicero, de Senectute, de Amicitia; selections from Cicero's Letters. Exercise in prose composition.
4 hrs., both semesters. 4 units, each semester.

3, 4. Tacitus and Horace.
Tacitus, Germania and Agricola, Selections from Histories; Horace, Odes.
3 hrs., both semesters. 3 units, each semester.

LAW

MR. GALBRAITH

The University offers but one course in law,—an introductory study, with special emphasis on commercial law. The lectures are given in the evening for the convenience of residents of Tucson who may desire to attend. The course requires a substantial amount of reading in the library.
3 hrs., both semesters. 3 units, each semester.

MATHEMATICS

PROFESSOR GRIMES, ASSISTANT PROFESSOR MECRAFT

1a. College Algebra. PROFESSORS GRIMES AND MECRAFT
Prescribed for all B. S. Courses.
3 hrs., first semester. 3 units.

1b. Trigonometry. ASSISTANT PROFESSOR MECRAFT
Fundamental formulas of the plane trigonometry with applications to surveying. Prescribed for all B. S. courses.
3 hrs., first semester. 3 units.

Students having had trigonometry may obtain college credit for the subject by passing a satisfactory examination, provided the same work has not been used for entrance.

2. Analytical Geometry. PROFESSORS GRIMES AND MECRAFT
The fundamental methods of plane and solid analytical geometry. Prescribed for all B. S. courses except Agriculture.
5 hrs. and a 2-hr. laboratory period, second semester. 6 units.

2a. Advanced Algebra. ASSISTANT PROFESSOR MECRAFT
Continuation of Mathematics 1a.
2 hrs., second semester. 2 units.

2b. Spherical Trigonometry. ASSISTANT PROFESSOR MECRAFT
Fundamental formulas and principles of the spherical trigonometry, with applications to astronomy. Prerequisite—Mathematics 1b.
2 hrs., second semester. 2 units.
3. Differential Calculus. **Professor Grimes**
   Fundamental principles and formulae of the differential calculus, with their application. Prescribed for sophomores in engineering courses.
   4 hrs., first semester. 4 units.

4. Integral Calculus. **Professor Grimes**
   The fundamental principles and formulae of the integral calculus with their applications; including the use of tables of integrals. Prerequisite—Math. 3.
   4 hrs., second semester. 4 units.

4a. Advanced Calculus. **Professor Grimes**
   A supplementary course to Mathematics 3 and 4, giving special attention to special methods and applications to geometry, physics, mechanics, and other allied subjects.
   2 hrs., second semester. 2 units.

5, 6. Analytical Mechanics. **Professor Grimes**
   The mathematical treatment of the fundamental principles of dynamics, statics, etc. Prerequisites—Mathematics 3, 4. Prescribed for all engineering courses.
   4 hrs. and a 2-hr. laboratory period for the first semester. 5 units.
   4 hrs., second semester. 4 units.

5a. Differential Equations. **Professor Grimes**
   A course in elementary differential equations, with applications to physics, astronomy, mechanics, and engineering.
   2 hrs., first semester. 2 units.

7. Higher Plane Curves. **Assistant Professor Medcraf**
   A study of algebraic and transcendental curves, from the analytical and graphical standpoints.
   First semester. 2 units.

8. Computation. **Professor Grimes**
   In this course will be given opportunity for the student to become familiar with many of the empirical and theoretical formulae of engineering, mathematics and physics.
   Second semester. 2 units.

**Mechanic Arts**

**Professor Henley, Mr. Snow**

The courses in Mechanic Arts comprise the elements of shop work and drawing. The work consists of lectures, recitations and drawing, tool and machine work. Special regard is had to the needs of students in engineering, to familiarize them with ordinary methods in shop
work valuable to every engineer, rather than to develop the skill of the mechanic.

1. Mechanical Drawing. MR. BRAEUTIGAM
   Elements of mechanical drawing, including lettering, tracing, and blue printing. The subject is treated in a purely mechanical way. The student learns to make and read ordinary working drawings, and acquires some knowledge of ordinary drafting room practice.
   2, 3 or 4-hr. laboratory periods. One section each semester. 2, 3 or 4 units.

2. Descriptive Geometry. MR. BRAEUTIGAM
   Elements of descriptive geometry, including problems in warped surfaces and intersection of solids.
   1 lecture and 2 3-hr. laboratory periods. One section each semester. 3 units.

3. Wood Shop. PROFESSOR HENLEY
   Bench and machine work; elements of pattern and foundry work.
   2 3-hr. periods, with occasional lectures. One section each semester. 2 units.

4. Forge Shop. PROFESSOR HENLEY
   Forge work in iron and steel; tempering, case-hardening and annealing; characteristics of iron and steel which affect their working in the shop.
   2 3-hr. periods, with occasional lectures. One section each semester. 2 units.

5, 6. Machine Shop. PROFESSOR HENLEY
   Elements of machine shop practice, and erection and care of machinery. Work on the drill press, shaper, lathe, and planer, as well as at the bench, and on the erecting floor. Only the ordinary classes of work are taken up, the object being to make it as much as possible, a general engineering course. Open to students who have had courses 1, 3, 4 or an equivalent.

   Wood work, including framing, joining, care of tools, etc.
   2 3-hr. periods, second semester. 2 units.

   Forge work in iron and steel, pipe work, drill press, and care of small machinery.
   2 3-hr. periods, first semester. 2 units.
11. Lettering.
Types of letters used for drawings and notes in various branches of work.
1 or 2 3-hr. periods, either semester. 1 or 2 units.

MECHANICAL ENGINEERING
Professor Henley and Mr. Snow

The work in Mechanical Engineering deals primarily with the design, construction, and operation of machinery. The course includes a study of mathematics and of such sciences as are of value to all engineers, together with a certain amount of work in the other engineering departments. An effort is made to harmonize the work as much as possible with actual practical conditions.

1, 2. Mechanisms and Elements of Machine Design.

Mr. Braeutigam

Theory and design of linkages, gears, cams, screws, and other machine elements.
2 3-hr. periods, both semesters. 2 units, each semester.

3. Heat Engines.  
Professor Henley and Mr. Snow
Principles of thermodynamics as applied to steam and internal combustion engines. Testing and operation, steam and gas engines, boilers, etc.
2 hrs. and 1 3-hr. laboratory period, first semester. 3 units.

4. Pumping Machinery.  
Professor Henley
Various types of pumps and compressors, and their efficiencies under different conditions.
2 hrs. and 1 3-hr. laboratory period, second semester. 3 units.

Professor Henley, Mr. Braeutigam
Design, largely empirical, of various tools or machine parts.
2 3-hr. drafting periods, both semesters. 2 units, each semester.

7, 8. Mechanical Laboratory.  
Professor Henley
Testing of different types of engines, boilers, pumps, injectors and other machinery. Inspection of power plants and machinery installations.
2 3-hr. laboratory periods and 1 3-hr. computation period, both semesters. 3 units, each semester.

9, 10. Engine Design.  
Professor Henley
Design of the main features of a steam or gas engine, pump or compressor, with the completion of as much of the working details as time permits.
2 3-hr. drafting periods, both semesters. 2 units, each semester.
12. Power Plants. **Professor Henley**

The economic design and operation of power and pumping plants. Problems involving the selection of machinery to perform a given duty with a probable minimum expense.
2 hrs., second semester. 2 units.

14. Small Power Plants and Pumping Machinery. **Professor Henley and Mr. Snow**

An abridged course in small machinery installations, problems encountered in ordinary small pumping plants. This course is intended for students in agriculture, and is made as non-technical as possible.
2 hrs. and 1 3-hr. elective laboratory period, second semester. 2 or 3 units.

16. Seminar. **Professor Henley, Mr. Snow, Mr. Braeutigam**

Discussion of various subjects that arise in connection with the work of the department and the review of current engineering literature.
1 hr., second semester. 1 unit.

**Metallurgy**

**Professor Goodrich**

1. Introduction to Metallurgy.
Physical properties of metals, alloys, thermal treatment of metals, thermal measurements, fuel, refractory materials, metallurgical processes, furnaces, thermo-chemistry, metallurgy of iron and steel.
Lectures, 1 hr., first semester. 1 unit.

2. Fire Assaying.
Fire assay for gold, silver and lead. Bullion assays. Prerequisite, Chemistry 3, 4.
Three 3-hr. laboratory periods, second semester. (March, April, May.) 2 units.

Stamp milling, chlorination, tube-milling, and filtering, cyaniding, pan-amalgamation; Patio, and Tina processes; hyposulphite leaching practice, etc. Lectures. Prerequisite, Metallurgy 1, 2, 7.
3 hrs., first semester. 3 units.

4. Metallurgy of Lead and Copper.
Sampling, receiving, purchasing, roasting; blast furnace methods, reverberatory furnace methods; pyritic smelting, converting, desilveration of base bullion, electrolytic refining, hydro-metallurgy of copper, etc. Lectures. Prerequisites, Metallurgy 1, 2, 7.
4 hrs., second semester. 4 units.
5a. Metallurgical Laboratory.
Amalgamation, cyaniding, chlorination, hyposulphite lixiviation, etc., tests, together with mill work. This course runs parallel with Metallurgy 3. Lectures.
1 3-hr. laboratory period, first semester. 1 unit.

5b. Metallurgical Laboratory.
Sampling, concentration, mill work. This course runs parallel with Metallurgy 7. Lectures.
1 3-hr. laboratory period, first semester. 1 unit.

Original problems in the treatment of ores, experiments to determine the best method of treatment. The equipment now is as complete as in some of the best commercial ore testing plants, and new machinery is constantly being added.
2 3-hr. laboratory periods, second semester. Time to be arranged. 2 units.

7. Ore Dressing.
Breaking, crushing, separating, concentrating, sampling; mill processes and management. Lectures and recitations. Prerequisite, Metallurgy 2.
3 hrs., first semester. 3 units.

8. Metallurgy of Rare Metals.
Metallurgy of zinc, cadmium, nickel, mercury, bismuth, tin, antimony, cobalt, platinum, tungsten, molybdenum. Lectures. Prerequisites, Metallurgy 1, 2 and 3.
2 hrs., second semester. 2 units.

On the completion of the various subjects, trips will be taken to suitable plants, in order to study practically the metallurgical operations. The student thus is enabled to reap the advantage of our location—central in a great metallurgical field.

10. Concentrator and Smelter Design.
A practical metallurgical problem, such as may confront the student on entering practical work. The student may design the plant to suit the ore tested in Met. 6 Course.
3 hrs., or an equivalent, second semester. 3 units.

MINERALOGY

PROFESSOR GUILD

The main object of the courses in mineralogy is to familiarize the student with facts and methods that enable him to determine the char-
acter of an ore or mineral by observation of its physical properties and by the performance of a few simple tests with the blow-pipe, since in the field and mine recourse can not usually be had to a well equipped chemical laboratory.

1. Determinative Mineralogy and Blow-Pipe Analysis.
   Laboratory work with occasional recitations. Textbook: Brush and Penfield, *Determinative Mineralogy and Blow-Pipe Analysis*. Prerequisite, Chemistry 2.
   Two 3-hr. laboratory periods, first semester. 2 units.

3. Elementary Crystallography.
   Two lectures or recitations per week. Prerequisite, Physics 2. 2 units.

4. Descriptive Mineralogy.
   Lectures and recitations on the mode of occurrence, uses and classification of minerals. Study of a large number of hand specimens of minerals. Textbook: Dana, *A Text-book of Mineralogy*. Prerequisites, Geology 1, Mineralogy 1 and 3.
   3 lectures, second semester. 3 units.

5. Optical Mineralogy.
   With microscopic study of the rock-forming minerals. Prerequisites: Geology 2, and Mineralogy 4.
   2 hrs., or an equivalent, first semester. 2 units.

6. Petrography.
   Preparation of thin sections of rocks for microscopic study, and study of a type selection of rocks. Prerequisite: Mineralogy 5.
   2 hrs., or an equivalent, second semester. 2 units.

7. Crystallography.
   Measurement, projection and drawing of crystals. Prerequisite: Mineralogy 3.
   Either semester. 2 or 4 units.

MINING ENGINEERING

PROFESSOR GOODRICH AND MR. WILLIS

In this course attention is largely directed to the operations and economics of mining. The laboratory and drafting work is so arranged that the student will have plans and designs which will be of value in the practice of the profession.

Note.—All students in Mining Engineering are required to give a minimum of one hour a week for each unit taken in the Mining Engineering courses, in the preparation of a card catalogue and summary of current technical literature on mining. These cards will be examined each week by the department.
1, 2. Mining Machinery. Mr. Willis
Machinery in its application to mining, taking up in detail: churn and diamond drills, hand and machine tools for excavation, air compression, rock drills, electric drills, tunneling machines, explosives and blasting, hydraulicking machinery, coal mining machinery, methods of haulage including aerial tramways, hoisting machinery, drainage and pumping machinery, ventilation and illumination. Surface plants are studied, including shops, ore bins, head frames, rock houses, breakers, etc.

2 hrs., each semester. 2 units, each semester.

3, 4. Mining Laboratory. Mr. Willis
Parallel to Mining 1, 2; the operation of mining machinery, methods of use, repairs; design and construction of ore bins, head frames, dumping devices, timbering methods, surface plants, etc.
1 3-hr. laboratory period, each semester. 1 unit, each semester.

5, 6, or Economics 21, 22. Principles and Economics of Mining. Mr. Willis and Professor Chandler
A detailed study of the business of mining. Mine examinations, sampling, reports, valuation of mines, considerations preceding the opening of mines, organization, incorporation, financing, mine promotion, stockholders rights, mining investments, frauds, mine administration, leasing, ore contracts, costs of operations, cost accounting with reference to mines especially, analysis of costs, administrative reports, statistics, royalties, influence of transportation facilities, development of mines, factors governing methods, underground methods, safety costs, mechanical equipment, efficiency, power conditions, surface handling, ore sorting, freight contracts, smelter contracts, labor problems, systems of handling, labor unions, mine accidents, laws regulating, social condition of workmen, mining law of United States and Arizona.
3 hrs.; each semester. 3 units, each semester.

7. Practical Mining.
Before entering upon the work of the senior year, all students who are candidates for the degree of B. S., in Mining Engineering and Metallurgy, must have spent at least six weeks in practical underground mining or in practical metallurgical work. The fulfillment of this requirement must be evidenced by the certificate of the superintendent or foreman, and by notes and sketches of the processes observed, and a report of such work must be made before November 1st of the same year. Two units credit are given upon the report with original notes and sketches attached.
8. Elements of Mining.  
Mr. Willis

This course is to introduce the student to the science of mining and gives a brief but concise summary of all methods of mining. It includes placer mining, open cut mining, quarrying, coal mining and underground mining. The history and importance of the industry and the principal ore mines are studied simultaneously.

2 hrs., second semester. 2 units.


In connection with the courses in Mining Engineering and Metallurgy, trips are made to mining districts in Arizona and Sonora, usually one or two weeks in March or April. These trips are required of all candidates for the degree of B. S. in Mining Engineering and Metallurgy.

The purpose of these trips is to afford the student an opportunity for close study and inspection of mining and metallurgical plants, and of rock formations and of minerals of commercial value. The students are accompanied by members of the faculty, and effort is made to make the trips of the greatest practical value. The trips are carefully scheduled; notes, with sketches, measurements and photographs are taken, and elaborated into comprehensive reports by each student after the return.

PHILOSOPHY AND EDUCATION

ASSISTANT PROFESSOR STANLEY

1, 2. History of Philosophy.  
Assistant Professor Stanley

Basal concepts and fundamental problems of philosophical thought as developed historically. Lectures, recitations and assigned readings. Textbooks: Schwegler's History of Philosophy; Calkins, The Persistent Problems of Philosophy. Open to Juniors and Seniors.

3 hrs., both semesters. 3 units, each semester.

3. Psychology.  
Assistant Professor Stanley

A special consideration of the subject as applied to teaching. Lectures, recitations and collateral reading. To be taken in the Sophomore year. Text: Angell's Psychology. Not to be given in 1913-14.

4. Pedagogy.  
Assistant Professor Stanley

Educational evolution, both as a culture fact in the history of civilization and as a foundation for professional work; lectures, giving a brief but comprehensive outline of school systems, a special study of leading educators such as Comenius, Pestalozzi, Froebel, Mann, and others. Arrangements have been made with the Tucson city schools
to provide practice work for this class. Open to students who have taken Philosophy 1.
2 hrs., both semesters. 2 units, each semester.

6. Introduction to Ethics. ASSISTANT PROFESSOR STANLEY
Theoretical and practical ethics; view of the historical development of the science; origin and development of the moral consciousness; application of the principles of ethics to the problems of life. Lectures, discussions and assigned readings. Open to Juniors and Seniors.
3 hrs., second semester. 3 units.

PHYSICAL TRAINING
GYMNASIUM—MR. KLEEGERBER, MR. GALBraith, MISS CHAPIN
Such exercises are given the student as will best create and maintain a vigorous physical health, and will at once benefit, interest, and stimulate him. Physical training is prescribed for all freshmen and sophomores from October 1st to May 15th. With the approval of the Director of Athletics, students may substitute some form of regular athletic work for the course in the gymnasium for specified periods.

A. Physical Examination for Men. MR. KLEEGERBER
About thirty measurements of the body; tests of strength; examination of the heart, lungs, and other vital organs; with inspection for marks of vaccination and physical inequalities. Prescribed for all freshmen and sophomores at the beginning of the year or on entrance into these classes. A second examination is optional with the instructor, but the University may order at any time complete special examination without expense to the student.

1, 2. Gymnastics and Hygiene for Men. MR. KLEEGERBER, MR. GALBraith
Setting-up exercises, calisthenic drills, indoor games, and simple apparatus work. Lectures on the physiology of exercise, personal hygiene and corrective exercises. Required of all freshmen unless excused on recommendation of a physician.
2 half-hour periods, both semesters. 1-2 unit.

3, 4. Advanced Gymnastics. MR. KLEEGERBER, MR. GALBraith
A continuation of the work of the first year; the use of apparatus, parallel bars, horizontal bars, horses, rings, out-door runs, etc. When possible the class will be divided into graded sections for special work on the apparatus. Required of all sophomores.
2 half-hour periods, both semesters. 1-2 unit.

5, 6, 7, 8. Gymnastics for Women. MISS CHAPIN
The work is prescribed for young women as for men, and resembles that for men in its general scope and aim. It is, however, modi-
fied to suit the needs of the young women, emphasis being laid upon poise, carriage, grace, and development. Music is used for class drills, marching and dancing. A gymnasium suit is necessary, consisting of a loose blouse waist, divided skirt, and the regular gymnasium shoes. The waist has a sailor collar trimmed with white braid. Four yards of double width, 54-inch dark blue serge is required. Ready-made suits may be purchased for about $4 at the gymnasium. Required of freshmen and sophomores.

3 half-hour periods, each semester. 2 units.

ATHLETICS—MR. QUIGLEY, DIRECTOR

The climate of Tucson permits athletics out of doors throughout the academic year. Students who prefer to substitute out-door work for class-work in the gymnasium have this privilege under the supervision of the Director of Athletics. The main out-door sports are football, baseball, tennis, and track work. Every student is encouraged to undertake some form of athletics, and exercise, as in the gymnasium, is graduated to the physical needs and the endurance of the student.

Team work is provided to add interest to the sport. There is an unusually large percentage of students engaged in athletics. Remoteness from other colleges prevents excessive interest in intercollegiate contests and gives occasion for inter-class games. These have had a most satisfactory development.

Credit for athletic work is given on the same terms as for work in the gymnasium, and there is the same requirement of regular attendance and faithful work.

MILITARY DRILL—PROFESSOR POWELL AND MR. GROSSETTA

Military drill is required of all students not specially excused, three times a week, to the end of the Sophomore year in college. Each student provides himself with the required uniform, khaki for the warm weather, cadet grey for the cooler weather.

The drill is under the direction of an officer detailed from the United States Army. It gives the young man valuable physical exercise, a healthy means of competition with his fellows, and a more intelligent military service to his country should this ever be required.

PHYSICS

PROFESSOR DOUGLASS

The object of this course is to acquaint the student with the fundamental physical principles which underlie the higher courses of chemistry, mechanics and engineering. Note books are required in all courses.
1, 2. General Physics.  
**Professor Douglass**  
Lectures, recitations and laboratory work. First semester: Mechanics and heat. Second semester: Electricity, wave motion, sound and light. The laboratory experiments give prominence to general electrical measurements, but include the study of wave motions and their application to the other subjects. Prerequisites: A course in elementary physics and Mathematics 1.

2 hrs., and two 2-hr. periods in the laboratory, both semesters. 4 units, each semester.

3. Thermodynamics and Heat.  
**Professor Douglass**  
The foundation principles underlying mechanical engineering, latent and specific heats, conductivity, expansion, mechanical equivalent, high temperatures, cycles, entropy, properties of steam, etc. Prescribed for third year in mechanical engineering course.

1 hr. and two 3-hr. periods, first semester. 3 units.

4. Electrical and Optical Measurements.  
**Professor Douglass**  
Electrical machines and instruments used in mechanical engineering, and optical instruments handled in mining and civil engineering courses. Prescribed for the third year in mechanical and civil engineering courses.

1 hr. and two 3-hr. periods, second semester. 4 units.

**Spanish**

1, 2. Elementary Spanish. Sections A and B.


5 hrs., both semesters. 4 units, each semester.

3, 4. Advanced Spanish.


5 hrs., both semesters. 4 units, each semester.

5. Spanish Literature to the Nineteenth Century.  
**Professor Turrell**  
Lectures in Spanish on the early literature of Spain, the “Siglo de Oro,” etc., with library readings. Class study of Cervantes, *Don*
Quijote (Selections); Lope de Vega, La Estrella de Sevilla; Calderón, La Vida es Sueño, etc.
3 hrs., first semester. 3 units.


**Professor Turrell**

3 hrs., second semester. 3 units.

7, 8. History of Mexican Literature.

**Professor Turrell**

Reading of works by the best authors, as included in the *Biblioteca de Autores Mexicanos*, etc.
2 hrs., both semesters. 2 units, each semester.

9, 10. Advanced Spanish Composition and Commercial Spanish.

**Professor Turrell**

A practical course in writing and speaking Spanish. Harrison, *Spanish Correspondence*; Remy, *Spanish Composition*, etc., will be used. Original essays, letters and reports in Spanish. (May be taken with courses 5, 6, but must be preceded by courses 1, 2, 3, 4.)
2 hrs., both semesters. 2 units, each semester.

**Zoology**

**Mr. Brown**

1. Invertebrate Zoology.

2 hrs. of lectures and 6 hrs. of laboratory work, first semester.
4 units.

2. Vertebrate Zoology.

A continuation of course 1.
4 units.

3. Histology of the Animal Tissues.

The theory and use of the microscope, the camera lucida, the photomicrographic camera, the use of chemicals in the preparation of microscope slides. The course is primarily a laboratory course.
4 units.

4. Physiology.

A thorough review of high school physiology. Laboratory work is emphasized. A first semester course, open to college students.
4 units.
5. Physiology.
A continuation of course 4. Physiology of secretion, digestion and nutrition takes up the entire semester. Open to college students. Prerequisite, Physiology 4.
4 units.
AGRICULTURAL EXPERIMENT STATION STAFF

Arthur H. Wilde, Ph. D., President of the University.
Robert H. Forbes, M. S., Director.
John James Thornber, A. M., Botanist.
Albert E. Vinson, Ph. D., Biochemist.
Clifford N. Catlin, A. M., Assistant Chemist.
Frederick W. Wilson, B. S., Animal Husbandman.
G. E. P. Smith, C. E., Irrigation Engineer.
Arthur L. Enger, B. S., Assistant Engineer.
Robert W. Clothier, M. S., Agriculturist.
Alexander M. McOmie, B. S., Assistant Agriculturist.
George F. Freeman, B. S., Plant Breeder.
Donald F. Jones, B. S., Assistant Plant Breeder.
Austin W. Morrill, Ph. D., Entomologist.
Carlos C. Cable, Secretary.
Helen M. A. Miller, Librarian.

ORGANIZATION AND WORK

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

The organization of the station includes the departments of administration, agriculture, horticulture, animal husbandry, botany, entomology, plant breeding, chemistry, and irrigation investigations, the whole or a major portion of the time of one or more members of the station staff being devoted to each department of the station work. Provision is made for Farmers' Institutes, by means of which the results of experiments and investigations in agriculture are carried to the farmers throughout the state.

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

The Director's office and the departments of botany, plant breeding, chemistry, and irrigation investigations are maintained at Tucson in the University buildings. From this base of operations the three
great agricultural districts of the State—Salt River Valley, the lower Colorado, and the upper Gila—are accessible with equal convenience for field work and observations.

For the same reason—fitness of location for the work undertaken—the Experiment Station Farm has been maintained and strengthened at Phoenix. Salt River Valley is intermediate in elevation, in situation, and in mean yearly temperature, between the other two important farming districts of southern Arizona, and for this reason the agricultural and horticultural results obtained there are capable of general application in the southern part of the state.

The date palm orchard, conducted in cooperation with the United States Department of Agriculture, is situated in the alkaline district south of Tempe, where a successful demonstration of this palm as a commercial fruit producer will be of the greatest value, creating use for great areas of alkaline land in the arid Southwest.

The demonstration farm near Yuma, in the fertile Colorado valley bottom, has likewise afforded a succession of object lessons to the public of that locality, as well as much needed information concerning crops, agricultural methods and markets for that rich region.

Experiments in dry-farming have been undertaken on tracts in the Sulphur Spring Valley, in the neighborhood of Snowflake in Navajo County, and near Prescott, in localities typical of large areas.

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

The results of the Experiment Station work are made public at frequent intervals in the bulletins and reports of the Station. These publications are made in two series: First, the longer and more technical bulletins, stating in considerable detail the investigations as they mature; and, secondly, the Timely Hints for Farmers, which are brief writings issued at the time when they will be most useful, written in plain language, and presented in popular form.

Along its several general lines of effort the Station during the fourteen years ending with 1912 has issued 129 publications, exclusive of annual reports which contain much technical information of similar character. These publications may be classified as follows:

Soils, waters, alkali, and farm management, 26; climate, 3; crops, 50; weeds, insect pests and plant diseases, 16; irrigation, 13; animal industry and the range, 21.
Since for years past the mailing list has enabled us to reach from forty to fifty percent of the farming population of Arizona, it is not surprising that the effects of Station work are now generally in evidence, more particularly in our irrigated southern valleys.

Continuing with former appropriations the First State Legislature set aside $18,000 for the use of the Experiment Station for the fiscal year ending June, 1913. This appropriation provides for printing, for Farmers’ Institutes, for dry farming experiments, and for the maintenance of the date orchards at Tempe and Yuma. The El Paso & Southwestern Railroad has also contributed $5,000 for hydrographic and dry farming investigations in Sulphur Spring Valley. Supplementing the Federal funds, therefore, provision is made for the symmetrical development of this work in the State, both experimentally and educationally; and, prospectively, “the farmer’s college” bids fair to increase in usefulness to the growing agricultural interests of Arizona.

BUREAU OF MINES AND ASSAYING

A separate department of the School of Mines under the name of “The Bureau of Mines and Assaying” has been established to receive and work ores, and to make assays and analyses of ores, minerals, mineral waters and petroleum.

Assays of ores and minerals are made for prospectors and miners of Arizona and for others at fixed rates established by law, and tabulated below. To meet the requirements of this work a special laboratory has been erected and maintained. Qualitative determinations of the nature of samples are made free.

Extreme accuracy and excellence of work are considered of more importance than pecuniary profits. All assays are made in duplicate and if not accordant are repeated. The work of the Bureau is under the personal direction of the professor of metallurgy.

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

RATES FOR ASSAYING AND CHEMICAL DETERMINATIONS
COMMON ASSAYS AND CHEMICAL DETERMINATIONS

In accordance with the Act of the Legislature of Arizona, approved March, 1897, and amended in March, 1899.

One element only:
Gold, or silver, or copper, or lead, or iron, or insoluble......$ 1.00
Zinc, or calcium, or magnesium, or sulphur, or manganese...... 1.50
Silicon or chlorine

**Combinations:**
- Gold and silver
- Copper and iron, or lead and iron
- Insoluble, copper, and lead
- Insoluble, copper, and iron
- Insoluble, lead, and iron
- Insoluble, zinc, and iron
- Insoluble, lead, copper, and iron
- Gold, silver, copper, and lead
- Gold, silver, copper, iron, and insoluble

**SPECIAL CHEMICAL DETERMINATIONS**

One element only:
- Aluminum, or tungsten, or barium, or chromium
- Cadmium, or tin, or arsenic, or bismuth, or antimony, or titanium, or sodium, or potassium, or uranium, or phosphorus
- Nickel, or cobalt, or molybdenum, or vanadium

**CHEMICAL ANALYSIS**

- Coal and coke analysis, giving moisture, volatile combustible matter, fixed carbon and ash
- The same, including determination of sulphur and phosphorus
- Silicate analysis
- Cement analysis (chemical)
- Cement analysis (mechanical)
- Cement tests for strength and soundness by the Department of Civil Engineering
- Boiler water analysis

**RATES FOR TESTING ORES**

Stamp mill amalgamation, including sampling, assays, retortings, etc.:
- For lots of one ton or thereabouts
- The same, with concentration of pulp on Wilfley table
- For lots of two tons, without concentration
- For lots of two tons, with concentration

Smaller amalgamation tests, including all sampling charges, and concentration after amalgamation:
- For small samples, up to five pounds
- For small samples, five to twenty-five pounds
- For small samples, twenty to one hundred pounds

In these smaller tests, the sample is ground to pass a suitable mesh, and is agitated with mercury. The mercury is panned out, retorted,
the values determined in bullion. The values in the concentrates and tailings are also determined. The number of tests necessary to determine the adaptability of any ore to treatment in cyaniding varies so greatly that no general rates can be offered.

See Metallurgy for more complete description of equipment.

CONSIGNMENTS AND REMITTANCES

Samples, ores, and other consignments should be shipped to the University of Arizona, Tucson, Arizona. Small quantities may best be sent by parcel post; larger quantities by express or by freight. The Wells Fargo Express Company makes daily deliveries at the University.

All assays, chemical determinations and chemical analyses, except gratuitous qualitative tests mentioned elsewhere, must be paid for in advance. Remittances should be made by postoffice money order, Wells Fargo money order, bank draft, or check on a Tucson bank, payable to University of Arizona, business communications relating to matters discussed in this circular being addressed to the Business Manager of the University.

EXTENSION LECTURES

In the current year the University has begun a system of extension lectures under an appropriation made by the legislature of 1912. The University responds to requests for lectures in various fields of its work, giving these lectures without cost to the community for service or transportation. Whenever possible, the community provides the entertainment for the speaker.
THE SUB-COLLEGIATE DEPARTMENT
Faculty, 1912-1913

ARTHUR HERBERT WILDE, Ph. D., President.
IDA C. REID, Ph. M., Principal; Mathematics and History.
WILLIAM W. HENLEY, A. B., Shop Work and Drawing.
ANDREW ELICOTT DOUGLASS, D. Sc., Physics.
ROBERT W. CLOTHIER, M. S., Agriculture.
CAPT. HIRAM M. POWELL, Military Science and Tactics.
CHARLES A. TURRELL, A. M., Spanish and French.
WILLIAM G. MEDCRAFT, A. M. Mathematics.
PAUL M. P. BRINTON, M. S., Chemistry.
LEVONA PAYNE NEWSOM, Ph. D., Latin and Greek.
WILLIAM J. GALBRAITH, A. B., Physical Training.
WILLIAM L. FOWLER, B. S., Animal Husbandry.
ELSA CHAPIN, A. B., English.
ARTHUR H. OTIS, A. B., German.
LOYD C. ELLIOT, Physics.

By vote of the Regents of the University the first year of the Sub-Collegiate Department was discontinued after June, 1912, and the second year will be discontinued after June, 1913.

GENERAL INFORMATION

This department aims to give only such subjects as will supplement defective training for college entrance requirements; at the same time it offers an opportunity to the students from the small high schools, having only two or three years of work, to complete their academic training.

Admission to the sub-collegiate courses presupposes the completion of two years of high school work. Students who do not bring certificates showing the completion of this work must take examinations to test their ability to pursue profitably the work desired. Final decision in the matter rests with the committee on registration. A certificate is granted to all students who have completed satisfactorily the work required for entrance to the Liberal Arts courses of the University. Students who have completed the entrance requirements of a university course are admitted to that course without examination.

LIVING ACCOMMODATIONS AND EXPENSES

A portion of South Hall is set apart for the use of male preparatory students; young women are accommodated in West Cottage. Details of furnishings and living expenses are set forth in a paragraph earlier in this Register. These expenses are substantially the
same for both college and sub-collegiate students, save that laboratory fees and book bills are higher for the former. The expenses necessarily incurred during the academic year are about $300, but of this amount nearly one-third falls due in the first month, or in the six weeks before November 1st, in the form of charges which are made but once during the year. The following are the estimated ordinary expenses for the first month:

- Incidental fee: $10.00
- Dormitory fee, first payment: 3.00
- Mattress, blankets, pillows, etc., (unless brought from home): 15.00
- Board by the month: 20.00
- Books: 6.00
- Shop and Drawing fee: 1.50
- Military uniform: 14.50

Total: $70.00

Students who have completed the entrance requirements of a University course are admitted to that course without examination. The entrance requirements to the various University courses are repeated below for the convenience of the sub-collegiate student.

Admission requirements for the Bachelor of Arts or Bachelor of Science course:

- English: 3 units*
- American History and Civics: 1 unit
- Language other than English: 2 units
- Physics, Chemistry or Biology: 1 unit
- Mathematics (1½ algebra, 1 plane geometry): 2½ units
- Electives: 5½ units

Total, 15 units

Admission requirements for the four-year course in Agriculture are the same as those for the general B. S. degree, excepting that language, other than English, is elective. Admission to the short course in Agriculture is possible without previous high school work.

Admission requirements for the engineering courses are as follows:

- English: 3 units
- Language other than English: 2 units
- Mathematics: 3 units
- Physics or Chemistry: 1 unit
- Electives: 6 units

Total, 15 units

For Civil, Electrical, and Mechanical Engineering, Physics is required.

For Mining Engineering both Physics and Chemistry are required, leaving only five electives.

*A unit represents a subject pursued for one year with five or four recitation periods a week.
The following distribution of work is required, unless, in the opinion of the registration officer, there is good reason for departing from it:

**FIRST YEAR**—Discontinued.

**SECOND YEAR**—In 1913-14 all the work of the second year will be discontinued except English and Advanced Algebra.

**THIRD YEAR**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>5</td>
</tr>
<tr>
<td>Plane Geometry</td>
<td>5</td>
</tr>
<tr>
<td>Chemistry</td>
<td>5</td>
</tr>
<tr>
<td><em>Languages, other than English</em></td>
<td>5 each</td>
</tr>
<tr>
<td><em>Plane Geometry</em></td>
<td>5</td>
</tr>
<tr>
<td><em>Electives</em></td>
<td>5</td>
</tr>
</tbody>
</table>

**FOURTH YEAR**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>American History and Civics</td>
<td>5</td>
</tr>
<tr>
<td>Solid Geometry, 2nd Sem</td>
<td>5</td>
</tr>
<tr>
<td>Physics</td>
<td>5</td>
</tr>
<tr>
<td>Languages, each</td>
<td>5</td>
</tr>
<tr>
<td>Mechanic Arts</td>
<td>5</td>
</tr>
</tbody>
</table>

**OUTLINE OF STUDIES**

**ENGLISH**

The courses in English are planned to give the student knowledge of the fundamental requirements of grammar and rhetoric, to make him acquainted with good literature, and to establish good habits in written and oral expression and in reading. The time is therefore divided between the study of composition and literature.

**Course I.** Required of all students who do not bring certificates showing the completion of at least two years of High School English.

**Composition and Grammar.** Scott and Buck; *A Brief English Grammar*. Thorough drill in grammar and correct usage. Principles of composition, with constant practice in the writing of themes.


**Course II. Composition and Rhetoric.** Principles of rhetoric applied to structure of expository themes and informal argument; topical outlines; analysis of essays studied in class.


*Since one language must be continued through two years to meet entrance requirements, the election of the first foreign language should not be delayed beyond the beginning of the third year.
Twelfth Night, Macbeth, Spenser one book of Faerie Queene, Chaucer Prologue.

MATHEMATICS

ALGEBRA. Second year, one semester; involution, evolution, theory of exponents, radicals, quadratic equations and proportion. This course is required for entrance to the engineering courses in college.

PLANE GEOMETRY. Emphasis is laid on thorough work in original exercises. SOLID GEOMETRY. Second semester, with original exercises.

MECHANIC ARTS

This work consists of both drawing and shop work, between which subjects the student's time is about equally divided. The course covers one year and furnishes a thorough elementary knowledge of manual training as taught in the secondary schools of the country.

DRAWING. Freehand sketching in perspective and orthographic projection. Reinhart's lettering, freehand working drawings. Mechanical drawing and geometrical problems.

SHOP WORK. "Sloyd," care and use of woodworking tools. Forging, joinery, wood turning.

SCIENCE

The courses in science initiate the student into the processes and methods used in laboratory work; teach close observation, careful manipulation and logical deduction, together with the fundamental facts of the various branches of science.

AGRICULTURE

The following courses in Agriculture may be elected by preparatory students: Agr. 1 (Plant Culture), Agr. 2 (Farm Crops), Agr. 3 (Live Stock Judging), Agr. 4 (Elements of Dairying), Agr. 11 (History of Breeds), Agr. 12 (Poultry).

Any two of the above half-year courses will count one credit in the preparatory course. For description of the courses, see index under Agriculture.

BIOLOGY

The course extends through the year, botany being offered the first semester, zoology the second. The plant is studied as a living individual in all its relations; plant societies and plant groups. Text, Coulter, Plant Studies. Types of invertebrates and vertebrates are studied in regard to anatomy, physiology, habits, etc. Text, Kellogg, The Animals and Man.

CHEMISTRY

A year's work with the text and in the laboratory, in such proportions as the instructor decides upon. Each student must keep a note-
book in which he describes the process and results of his laboratory work.

**PHYSICS**

The course shows that physics is not something abstract or mysterious, but is the simple explanation of everyday occurrences not usually understood and often unnoticed. It consists of three recitation periods and four laboratory periods per week, pursued along the lines laid down for the senior year in secondary schools. Each student keeps a notebook in which a minimum number of experiments are written up.

**HISTORY**

The work in history leads the pupil to see the development of the American people along political, social, and economic lines, and to arouse in him a love for the subject and a habit of broad and discriminating reading.

The text in history will be James and Sanford, *American History*, or Channing, *Students' History of the United States*. In civics the historical development of the subject is made prominent, while practical problems, such as taxation and municipal government, are made the subjects of special investigation and study. Hart, *Actual Government*, or Foreman’s *Advanced Civics*, is the textbook.

**LATIN, GREEK, FRENCH, SPANISH, AND GERMAN**

One of these languages must be pursued for at least two years. For an outline of the courses in Latin, Greek, French, Spanish and German, see under requirements for admission.

**HONORS, PRIZES AND SCHOLARSHIPS, 1911-12, 1912-13**

**HONORS**

The University gives formal recognition to the highest attainment in scholarship. Those students who carry one-half of full work (30 units) with a grade of A and the other half with not less than a grade B are entitled to Senior, Junior, and Sophomore Scholarships in those respective years, and to Honorable Mention in the Freshman year and in the Senior year of the Preparatory Department. These Scholarships carry no financial remuneration, but are recognized as the highest undergraduate distinction attainable.

In the year 1911-12 Honors were awarded as follows:

Senior Honors, CATHERINE W. GOODRICH, HARRY W. LUSK, GEORGE NISHIHARA.

Junior Honors, HOWARD W. ESTILL.
Sophomore Honors, MAUD MACPHERSON.
Honorable Mention in the Freshman Class, ROBERT A. B. GOODMAN,
Percy F. Minister.
Honorable Mention in the Preparatory Graduating Class, CHARLES
W. ISBELL, MARCUS T. KENDALL.

PRIZES

THE MILITARY PRIZES

For their interest in the military department of the University
Captain Hiram M. Powell, Commandant of Cadets, and Mr. Merrill
P. Freeman of Tucson, sometime regent of the University, have an-
ually presented prizes to the best drilled students,—a sword, the
gift of Captain Powell, as first prize, and a medal, the gift of Mr.
Freeman, as second prize. In the year 1911-12 these prizes were
awarded as follows:

The Powell Sword, CLIFTON H. Rolfe.
The Freeman Medal, Leo F. Cloud.

THE DRACHMAN PRIZES

Mr. Harry A. Drachman, of Tucson, offers to the students of the
University two annual cash prizes of $25 and $15 respectively, the
contest open to all students of the University.

During the academic year 1910-1911, the prizes were offered for
the two best debates. Since that time they have been offered for the
two best theses written upon subjects of historical or practical impor-
tance in Arizona. Theses are not limited in length and will be judged
for originality of investigation and logical development of subject mat-
ter. The literature dealing with political, social, historic, and eco-
nomic problems of the Southwest, collected by the Department of
Economics, is available for all students competing for these prizes.
In the year 1911-12 the prizes were awarded as follows:

First Prize, ARTHUR L. LOVEJOY.
Second Prize, LAURA MAY SWAN.

THE TROUTMAN MEDALS

Dr. George D. Troutman, of Tucson, to stimulate interest among
the students in the chemistry of pure foods, offers two medals, of gold
and silver, as prizes for superior work in chemistry. In the year
1911-12 these medals were awarded as follows:

The Gold Medal, FRANK L. CULIN, JR.
The Silver Medal, JAMES D. SULLIVAN.

THE STEINFELD PRIZES

As an expression of interest in University athletics and to stimulate
wholesome competition in the student body, Albert Steinfeld & Com-
pany, of Tucson, donated to the University for the year 1911-12, athletic prizes that were awarded as follows:

- The Loving Cup, Louis C. Brichta.
- The Boxing Prize, Louis C. Brichta.
- The Gymnastics Prize, Louis C. Brichta.
- The Wrestling Prize, Herbert R. Aylworth.
- The Track Prize, Louis Lefko.
- The Tennis Prize, Leo F. Cloud.

**SCHOLARSHIPS**

During the academic year 1912-13 the County Scholarships have been awarded as follows:

- Pima County, Fred W. Rogers of Tucson.
- Maricopa County, John W. Getsinger of Phoenix.
- Yuma County, Ruby Livingston of Yuma.
- Cochise County, Margaret Poiser of Douglas.
- Gila County, Turner C. Smith of Globe.
- Graham County, Alma Sessions of Thatcher.
- Yavapai County, Ralph Bell of Prescott.
- Greenlee County, Allen C. Jones of Clifton.

The Tucson Women's Club Scholarship has been held during the year 1912-13 by

Maud MacPherson of Nogales.

The Bennett Scholarship was awarded to

Alice Patton Lawson of Pearce.
MILITARY ORGANIZATION—1913-14
CAPTAIN HIRAM M. POWELL, U. S. A., Commandant of Cadets

STAFF
Assistant Commander..........................Major W. A. Grossetta
Act. Adjutant..................................L. R. Jackson

COMPANY A
Captain..............W. M. Brewer
1st Lieut...........F. C. Mack
2nd Lieut.........Richard Lindsley
1st Sergt...........J. W. Getsinger
Sergt..............N. C. Hayhurst
Sergt..............M. Kendall

COMPANY B
Captain..............A. J. Halbert
1st Lieut...........L. R. Jackson
2nd Lieut.........C. R. Jones
1st Sergt...........C. E. Pickett
Sergt..............L. F. Cloud

BAND
Band Master.........................Prof. F. C. Kelton
Drum Major........F. J. Hobson, Jr.  Band Sergt........Chas. Balderas
ALUMNI REGISTER

The Alumni Association of the University of Arizona, organized on the second day of June, 1897, represents the body of graduates of the University; its object, as expressed in its constitution, is "To promote the interests of the University, to secure unity among its graduates and to foster an attachment to our Alma Mater."

1895
Charles Oma Rouse, B. S. Died 1906.
Mercedes Anna Shibell, B. S., (Mrs. A. J. Gould), Toronto, Canada.
Mary Flint Walker, B. S., (Mrs. Pearl Adams), Benson.

1897
Edward Marshall Boggs, C. E., (nunc pro tunc), Chief Engineer Oakland Electric Railways, Oakland, California.
Clara Cramond Fish, B. S., (Mrs. F. C. Roberts), Tucson.
George Ojeda Hilzinger, B. S., Attorney, Tucson.
Mark Walker, B. S., Metallurgist, 211 W. First St., Los Angeles.

1898
Hattie Ferrin, B. S., (Mrs. Charles Solomon), Safford.
Granville Malcolm Gillett, B. S. Died 1912.
Minnie Watts, B. S., (Mrs. W. B. Smith), Altaville, California.
John Desha Young, B. S. Died 1899.

1899
Robert L. Morton, B. S., Assayer, Yuma.

1900
Ida Clarissa Flood, B. S., (Mrs. G. Dodge), Teacher, Tucson.
Samuel Pressly McCrea, B. S., A. B., Principal of High School, Redwood City, California.
Charles Pierce Richmond, B. S., Mining Engineer, Phoenix.
Florence Russell Welles, B. S., (Mrs. Wm. Angus), Los Angeles, California.

1901
Rudolph Castaneda, B. S., Engineer, Nacoza, Sonora, Mexico.
Clara Ferrin, B. S., (Mrs. D. Bloom), Tucson.
George Millard Parker, B. S., Denver, Colorado.
David Hull Holmes, B. S., (nunc pro tunc), Architect, San Diego, California.

1902
Moses Blumenkranz, B. S., Mining Engineer, El Paso, Texas.
Ruth Brown, Ph. B., (Mrs. Wilkins Manning). Died 1910.
Felix Grundy Haynes, B. S., Ethanaca, California.
Rose Belle Parrott, Ph. B., Teacher, Roseburg, Oregon.
Phillip Matthem Reilly, B. S.
Bertram L. Smith, B. S., Engineer, Phoenix.
Bessie Smith, Ph. B., (Mrs. Earle Davis), Douglas.
Walter James Wakefield, B. S. (Mining), Manager Tucson Warehouse and Transfer Co., Tucson.

1903

Advanced Degrees:
LL. D., Hon. William Herring. Died 1912.
M. A., Benjamin Franklin Stacey, (B. A., B. D., Lombard), Teacher, Pasadena, California.

Richard Lamar Drane, B. S., Assistant Engineer Randolph Lines, Tucson.
George Mark Evans, (LL. B., Michigan), Ph. B., Teacher, Los Angeles, California.
Leslie Alexander Gillett, B. S. (Mining), U. S. Mine Inspector, Santa Fé, New Mexico.
Georgia Ann Holmesley, Ph. B., Teacher, Clifton.
Edward Horton Jones, B. S., Assayer, Denver, Colorado.
John Willard Prout, Jr., B. S., General Manager Santa Cruz M.
Thomas Edward Steele, B. S., Assayer, Sasco.

1904

William Burnham Alexander, B. S., Civil Engineer.
Elbert John Hollingshead (Kimble), B. S., Clerk, Seattle, Washing-nton.
Estella Markham (Prout) Kirkpatrick, Ph. B., Light.
Frank Caleb Kelton, B. S., Assistant Professor of Civil Engineering, University of Arizona, Tucson.
John Willard Prout, Jr., B. S. (Mining), see 1903.

1905

Ora Elinor Norway, Ph. B. Died 1908.

1906

Advanced Degree:
M. S., William B. Begg, (A. B., Toronto), Philippine Islands.

Chester Bennett Clegg, B. S. (Civil Engineering), Phoenix.
John Wesley Gebb, B. S., Engineer, 1401 Santee St., Los Angeles.
Roy Bartley Kilgore, B. S. (Mining), Seattle, Washington.
Roy Gibbons Mead, B. S. (Mining), 2261 Shattuck Ave., Berkeley, Cal.
Roy Webb Moore, B. S. (Mining), Mining Engineer, Tucson.
Carobel Murphey, (A. B., Cox College), Ph. B., Teacher, Whittier, Cal.
Ida Christina Reid, Ph. B., Instructor, University of Arizona, Tucson.
Minnie Louise Wooddell, Ph. B., Teacher, Tucson.

1907

Advanced Degree:

Harriet Estella Brown, Ph. B., Teacher, Tucson.
Wedia Ina Purcell, Ph. B., (Mrs. Ivy Marshall), San Francisco, California.
Hugh Maupin Wolflin, B. S., Student, Columbia University.

1908


Carroll Pitkin Bradstreet, B. S., Pachuca, Mexico.
Benjamin Scott Dinsmore, B. S., Miami, Arizona.
William Arthur Tarr, B. S. (Mech. Eng.), Oklahoma, (Agricultural); B. S. (Mining), Instructor in Economic Geology, etc., University of Missouri, Columbia, Mo.
Hugh Maupin Wolflin, B. S. (Mining). See 1907.
Leigh Ernest Worthing, B. S., Bay City, Michigan.

1909

Burrell R. Hatcher, B. S. (Mining), Mining Engineer, Tucson.
Ethel A. Hooper, Ph. B. Died 1912.
Grace Ysabel LaBaree, Ph. B. Died 1910.
Anita Calneh Post, Ph. B., Teacher, Yuma.
John Mosheim Ruthrauff, B. S. (Metallurgy), City Engineer, Tucson.
Arthur Perry Thompson, B. S. (Mining), Amalgamated Copper Co., Butte, Mont.
Mabel Wilkerson, Ph. B., Recorder's Office, Tucson.
1910

Ernest Orrin Blades, B. S. (Mining), Mill Foreman, Rawhide, Nevada.
Lawrence Arthur Callaway, B. S. (Mining), Lexington, Ky.
Miles Miller Carpenter, B. S., Tucson.
Fletcher Morrill Doan, B. S. (Mining), Llanos de Oro, Sonora.
Ida Whittington Douglass, Ph. B., Tucson.
Warren Arthur Grossetta, B. S. (Mechanical Engineering), Tucson.
Joseph Clyde Hoyt, B. S. (Mining), Assistant Mining Engineer, Jerome.
Leslie Creighton Millar, B. S., Minneapolis, Minnesota.
R. Izer Turner, Ph. B., 543 W. Chestnut St., Anaheim, California.

1911

Phebe May Bogan, A. B., Tucson.
Miles Miller Carpenter, E. M., Tucson.
Ralph Waldo Harrison, B. S., Ashland, Wis.
Miner Louis Hartman, B. S., Harvard University.
Katherine Florence Kitt, A. B., Tucson.
Duane Rebstock, B. S., Phoenix.
Frank Winfred Rose, B. S. (Mining), Clifton.
Ivy Mae (Purcell) Madegan, A. B., Tucson.
Janet Volume (Sine) Lusk, A. B., Tucson.
Leon Henri Strong, A. B., Tucson.

Advanced Degrees:
Clarence DeWitt Thorpe, M. A., Instructor Normal School, Flagstaff.
William Jennings Bryan, Jr., B. A., Student of Law, Tucson.
Catherine R. H. Woolston Goodrich, B. A., Graduate Student at the University, Tucson.
Ella Marie Purcell, B. A., Teaching, Tucson.
John Charles Geringer, B. S., Chicago, Ill.
Otto George Geringer, B. S., Chicago, Ill.
George Howard Pratt, B. S., Assayer, 128 N. Main St., Los Angeles, Cal.
Maynard Matthew McDole, B. S. (Civil Eng.), Tucson.
James Lee Bone, B. S. (Mining), Miami.
James Joseph Flannagan, B. S. (Mining), Douglas.
Harry Wilton Lusk, B. S. (Mining), Douglas.
George S. Nishihara, B. S. (Mining), Assistant in Geology, University of Minnesota, Minneapolis.
Frank Gibbs, Certificate in Short Course in Agriculture, Stilwell, Okla.

THE STATE SCHOOL FOR THE DEAF

Pursuant to an act of the legislature of the State in 1912, a School for the Deaf and Dumb was established in September, 1912, in affiliation with and under the direction of the University. The school has its own building adjacent to the University campus.

For the year 1912-13 the School is under the principalship of Mr. Henry C. White, A. B., with Miss Harriet T. White as teaching matron. Eighteen students have been in attendance, exhausting the accommodations of the house. The work of the School has been as carefully graded as possible in this first year of its work. Additional instructors and equipment will be needed for the future and doubtless will be provided by increased appropriations by the State.

Application for admission to the School for the Deaf must be made to the Superintendent of Public Instruction at the Capitol in Phoenix, and on approval will be referred to the President of the University and to the Principal of the School, who will notify the applicant of the acceptance of the application. The requirements set by the State for admission to the School may be learned on inquiry of the Principal, who will forward the blank to be filled and returned to the Superintendent of Public Instruction. All communications should be addressed, Principal of the School for the Deaf, Tucson, Arizona.
### REGENT OF STUDENTS

#### GRADUATE STUDENTS

<table>
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<tbody>
<tr>
<td>Chapin, Elsa.</td>
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<tr>
<td>Goodrich, Catherine W.</td>
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<tr>
<td>Kelton, Frank C.</td>
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<tr>
<td>Miller, James A.</td>
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<td>Milton, Maxwell C.</td>
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<td>Nicholson, Helen S.</td>
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<td>Palmer, Pearl.</td>
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<tr>
<td>Rider, Jane Hebst.</td>
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<td>Spoehr, Florence M.</td>
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#### SENIORS

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<tbody>
<tr>
<td>Barnes, Ernest Lee.</td>
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<tr>
<td>Barrett, Jas. Taylor.</td>
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<td>Brewer, William Francis.</td>
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<td>Brown, Marguerite B.</td>
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<td>Cochran, Horace Merle.</td>
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<td>Coles, Henry Oliver.</td>
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<td>Elliott, Loyd Creighton.</td>
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<td>Estill, Howard Wilmot.</td>
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<td>Foster, Henry Alden.</td>
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<td>Kelly, Helena M.</td>
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<td>LaTourrette, Lyman D.</td>
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<td>Lindley, James Gary.</td>
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<td>Lovejoy, Arthur L.</td>
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<td>Munds, Wm. Harold.</td>
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<td>Priddy, Irene.</td>
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<td>Schoonmaker, Hazel T.</td>
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<td>Swan, Laura May.</td>
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<td>Wesenberg, George W.</td>
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<td>Wilky, Guy L.</td>
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<td>Young, Ralph C.</td>
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#### JUNIORS

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<tr>
<td>Armstrong, William J.</td>
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<td>Burns, Joseph F.</td>
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<td>Hatcher, William E.</td>
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<td>Luis, Franklin Alfred.</td>
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<td>MacPherson, Maud.</td>
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<td>Merritt, Richard.</td>
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<td>Micotti, Alfred D.</td>
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<td>Rogers, Fred W.</td>
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<td>Wetencamp, Paul F.</td>
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<td>Wooddell, Grace Helen.</td>
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#### SOPHOMORES

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<tr>
<td>Backstein, Rytha.</td>
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<td>Balderas, Charles B.</td>
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<td>Barkley, Bessie J.</td>
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<td>Bell, Florence.</td>
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<td>Benedict, Arthur A.</td>
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<td>Bernhard, Durward I.</td>
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<td>Brewer, Walter M.</td>
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<td>Curry, Esther May.</td>
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<td>Duffy, Catherine Gertrude.</td>
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<td>Ehleb, Frank A.</td>
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<td>Goyette, Charles Edgar.</td>
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<td>Halbert, Andrew Jackson.</td>
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<td>Hayhurst, Normal C.</td>
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<td>Jackson, Lawrence R.</td>
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<td>Jones, Alice.</td>
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<td>King, William C.</td>
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<td>Lawson, Alice.</td>
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<td>Lynch, Eugene R.</td>
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<td>McIntosh, Jay A.</td>
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<td>Minister, Percy F.</td>
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<td>Moore, Mabel M.</td>
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<td>Murphey, Walter E.</td>
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<td>Oxley, Edward B.</td>
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<td>Palmer, Elizabeth.</td>
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<td>Perkins, Arthur B.</td>
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<td>Pickett, Chas. E.</td>
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<td>Pistor, Carl Wm.</td>
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<td>Record, Helen Elizabeth.</td>
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<td>Rigg, Ralph Lee.</td>
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<td>Rockfellow, Julia.</td>
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<td>Savage, Harold Curtis.</td>
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<td>Scheerer, Cedric E.</td>
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<td>Schooling, George P.</td>
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<td>Sullivan, James D.</td>
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<td>Underhill, Lawrence.</td>
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FRESHMEN

Arozena, Joe De.  
Beach, Charles P.  
Beaton, Robert.  
Bell, Ralph L.  
Benzie, Inez Marion.  
Boido, Rosalind M.  
Bourn, Belton O.  
Brinton, Mary R.  
Bristow, W. Peyton.  
Campbell, William R.  
Carter, Charles L.  
Carter, John A.  
Carter, Mabel R.  
Caruthers, Sam.  
Catron, Frank J.  
Cavanough, Helen C.  
Clancy, Katherine.  
Clark, Carl Wood.  
Clawson, George Albert.  
Cloud, Leo F.  
Cole, David, Jr.  
Condon, Albert.  
Corbin, Mary.  
Cornick, Frederic Joseph.  
Dill, Prentice W.  
Fickett, Webster L.  
Gammage, Grady.  
Getsinger, Joseph Wilson.  
Gibbs, Gladys Virginia.  
Goolsby, Arthur J.  
Harpham, Harry Wm.  
Haynes, John Crepin.  
Hedgepeth, John Allen.  
Hobson, Francis Joseph.  
Hobson, Harry Townsend.  
Hodgson, Gladys May.  
Hoy, Catherine.  
Jones, Allen Chester.  
Jones, Arthur Bernard.  
Jones, Collins R.  

Jones, James Preston.  
Kendall, Marcus Todhunter.  
King, Harold F.  
Kriegbaum, Lawrence Lee.  
Lindsley, Richard G.  
Livingston, Ruby Flora.  
Logan, Edna Belle.  
Mack, Francis C.  
Miles, Zack Robert.  
Minor, Bert.  
Murphey, Charles.  
O’Neill, Maurice Owen.  
Parmley, Loren Francis.  
Patterson, Earl M.  
Pickrell, William Watson.  
Piper, Marvin M.  
Pistor, Anna F.  
Poiser, Marguerite A.  
Pusch, Maybelle.  
Randall, Wainwright.  
Reynolds, Ralph Lyman.  
Robbins, Wm. M.  
Rogers, Edgar Albion.  
Rohrer, Gazelle Anna.  
Rolph, Inez Katherine.  
Scheerer, Geo. Wm.  
Scott, James S.  
Sessions, Alma P.  
Shattuck, Henry.  
Smith, Harry Tracy.  
Smith, Turner Church.  
Steinegger, William.  
Udall, Levi Stuart.  
Vail, Harriet Elizabeth.  
Vaughan, Wallace W.  
Voller, John W.  
Warner, Albert.  
Wells, Lucile Raymond.  
Whisler, Lois G.  
Wooddell, Allen.  

—80
UNCLASSIFIED STUDENTS

Brainard, Bessie E.
Brichta, Louis C.
Brown, Erma C.
Butler, Joel I.
Butler, Mrs. J. I.
Christensen, Elmer W.
Coopman, Margaret Mabel.
Curtis, Jennie.
Fleischman, Mrs. H. C.
Freeman, Estella F.
Geho, Millie A.
Goldsmith, Mrs. A. J.
Guild, Marilla M.

Henley, Mrs. W. W.
Lefko, Louis.
McOwan, Elva F.
Maxwell, Franklin R.
Miller, Helen M.
Rebel, Paul W.
Robles, Carmen Marie.
Ross, Henry Davis, Jr.
Sauer, Charles W.
Schutte, Carl W.
Smith, Roy R.
Snow, Marguerite.
Upham, Gaius John.

SUB-COLLEGIATE DEPARTMENT

FOURTH YEAR

Adams, Calvert.
Campbell, Hugh.
Cavanaugh, James A.
Davey, Keith.
Davison, Arthur Logan.
Glenn, John Brooks.
Glennon, Joseph H.
Grimes, Walter.
Lummis, Turbese D.

Nix, Margaret P.
Powers, Helen.
Rebel, Andrew.
Renaud, Ernest James.
Stewart, Jeb.
Terrell, Alfred Yorke.
Troutman, Roy.
Wheeler, Buckley Adams.
White, Arthur L.

THIRD YEAR

Amundson, Wilfreed.
Beavers, Bessie.
Blake, Mabel.
Fairchild, Sherman.
Forbes, Helen.
Hosmer, Mercedes.
Hughes, Helen.
Jenney, William Le Baron.
Jennings, Curtis Arthur.

Jordan, Chester A.
Keys, Clara Camille.
McClure, Frank G.
McIntosh, Sidney C.
Mayhew, Henry.
Olney, Dan Clinton.
Schiller, Robert.
Wait, Eugene Jacobs.

SECOND YEAR

Blake, John Walter Philip.
Branaman, William Stephen.
Brandt, Thomas H.
Glenn, Mary Owen.
Green, David Thomas.
Griggs, Cecil.

Martin, Ina.
Renaud, Charles.
Richardson, Katherine.
Robbins, Faye Evangeline.
Roberts, Helen Hunt.
Stowell, Marjorie.
Taylor, Belle.  Williams, Hazel.
Towner, Jesse.  Williams, Leo Roy.
Whiteside, Tom Staley.  Wood, Herbert.  —18

UNCLASSIFIED

Botiller, Celeste Dora.  Hogan, Katherine.
Chafin, Desdamona.  Langhorne, Julia F.
Dowdle, Andrew Clarence.  Mills, James Stewart.
Farr, Lulu.  Murdock, Henry.
Grajeda, Bernabe.  Roberts, Carl Weston.
Greenburg, William.  Rosenstern, Blanche Adela.
Hardisty, Bennie Thomas.  Woo, Margaret.
Hindman, Harold W.  Zachry, Frank M.  —18

AGRICULTURE—SHORT COURSE

Farr, Wilfred.  Sykes, Eugene.  —3
Rothlisburger, J. M.

SUMMARY OF REGISTRATION

College Students
Graduate students ............................................. 9
Seniors .................................................. 20
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— 180

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