University of Arizona Record

Annual Catalogue

1918-1919

e filled out by the Superintendent or Principal of the School and mailed by him direct to

UNIVERSITY OF ARIZONA

TUCSON, ARIZONA

This certifies that M.....

ided.....High School

.....weeks and graduated..... 19.....

length of the course from which he graduated is.....years of

.....weeks each. The number of credits required for graduation

..... Each credit represents a subject carried successfully for

.....weeks with.....recitations, or equivalent exercises of.....

ites each per week. Below is given a detailed statement of the record of

student. Credits marked with a star were accepted from.....

.....

Address of the Student:

.....

.....
(Street and Number)

Signature.....

Official Position.....

Address.....

Date of this Certificate.....

(OVER)

DETAILED STATEMENT OF WORK

SUBJECTS	No. of Credits	No. of Weeks	Times a Week	Length of Recitation Period	Grade
English, 1st yr.					
English, 2nd yr.					
English, 3rd yr.					
English, 4th yr.					
Algebra					
Plane Geometry					
Solid Geometry					
Trigonometry					
Latin					
German					
French					
Spanish					
Greek					
History					
Civics					
Physics					
Chemistry					
Botany					
Zoology					
Geology					
Physical Geography					
Physiology					
Agriculture					
Industrial Training					
Commercial Subjects					
Domestic Science					
Music					
Drawing					
Other Subjects					

UNIVERSITY OF ARIZONA

Twenty-Eighth Annual Catalogue 1918-1919

ANNOUNCEMENTS FOR
1919-1920

THE UNIVERSITY OF ARIZONA RECORD
Volume XII, Number 2 April, 1919
TUCSON, ARIZONA

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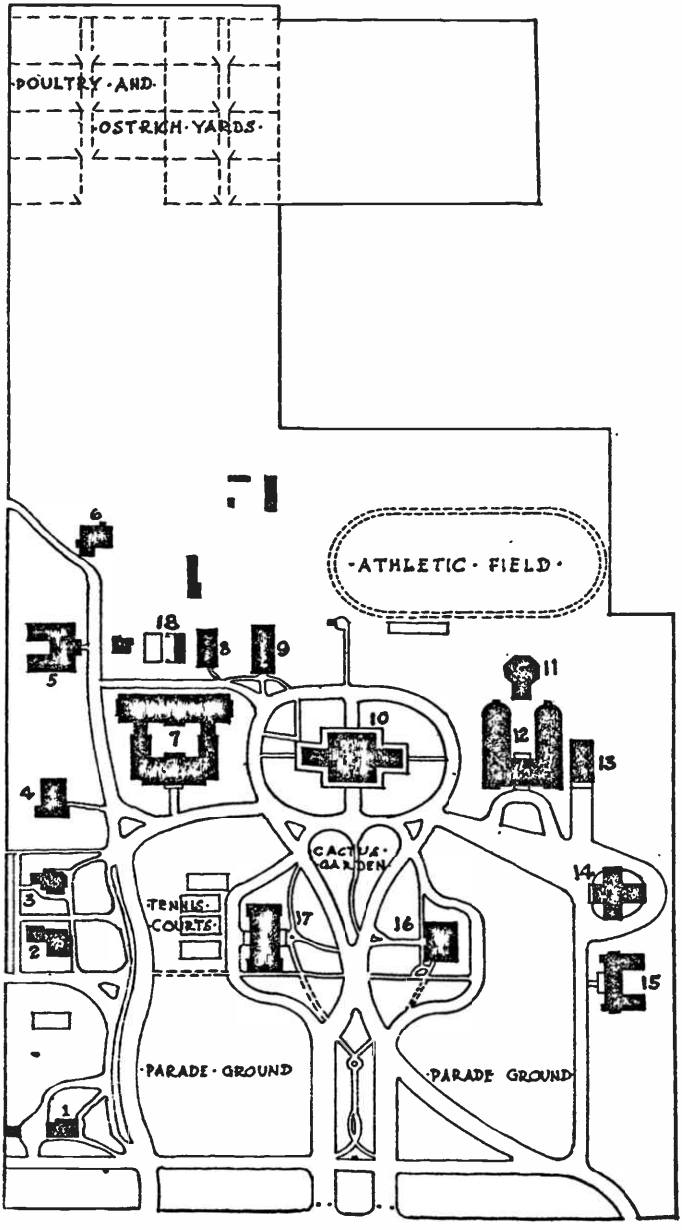
POULTRY AND
OSTRICH YARDS
ATHLETIC FIELD
CACTUS GARDEN
TENNIS COURTS
PARADE GROUND
PARADE GROUND
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18

LEGEND FOR CAMPUS MAP

1. President's House
2. West Cottage (Women's Dormitory).
3. East Cottage " "
4. Pima Hall " "
5. Mechanic Arts.
6. Stamp Mill.
7. Mines and Engineering.
8. Power House.
9. Dining Hall.
10. University Hall.
11. Auditorium.
12. Agriculture Hall.
13. Herring Hall.
14. South Hall (Men's Dormitory).
15. Arizona Hall " "
16. Library.
17. Science Hall.
18. Reservoir (Swimming Pool).

1919

JANUARY

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1920

JANUARY

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MARCH

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APRIL

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JULY

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AUGUST

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SEPTEMBER

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OCTOBER

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NOVEMBER

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DECEMBER

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19	20	21	22	23	24	25
26	27	28	29	30	31	

UNIVERSITY CALENDAR

1919-1920

FIRST SEMESTER

September 19, 20, Friday and Saturday	Matriculation and registration of new students Entrance examinations
September 22, Monday	Registration of old students
September 23, Tuesday	Class work begins
September 27, Saturday	"A" Day
October 4, Saturday	Condition examinations
November 27, Thursday	Holiday
December 23, Tuesday evening, to January 4, Sunday evening	Christmas recess
January 10, Saturday	Condition examinations
January 12, Monday	First day of registration for second semester
January 19-24, Monday to Saturday	Farmers' and Housekeepers' Week
January 24, Saturday	Semester examinations begin

SECOND SEMESTER

February 3, Tuesday	Last day of registration
February 4, Wednesday	Class work begins
April 17, 19, 20, 21	Encampment
April 19 to 24, Monday to Saturday	University Week
May 15, Saturday	Condition examinations
May 29, Saturday	Semester examinations begin Junior Day
May 30, Sunday	Baccalaureate Sunday
May 31, Monday	Senior Day
June 1, Tuesday	Alumni Day
June 2, Wednesday	Commencement
June 5, Saturday	Semester examinations end

ORGANIZATION OF THE UNIVERSITY

The University comprises the following colleges and departments:

College of Letters, Arts and Sciences
- School of Home Economics
- School of Law

College of Agriculture
- Agricultural Experiment Station, including
  - Range Study Tracts, Tucson
  - Date-Palm Orchard, Tempe
  - Demonstration Farm and Date-Palm Orchard, Yuma
  - Prescott Dry-Farm, Prescott
  - Sulphur Spring Valley Dry-Farm, Cochise
  - University Farm, Tucson
  - Experimental and Demonstration Farm, Mesa
- Agricultural Extension Service

College of Mines and Engineering
- Arizona Bureau of Mines

State Museum

Steward Observatory

United States Mines Experiment Station

University Extension Department, including
- General Extension Service
- Correspondence Courses

State Pure Food Laboratory

State School for the Deaf.

OFFICERS OF THE UNIVERSITY

BOARD OF REGENTS

EX-OFFICIO

HIS EXCELLENCY, THOMAS E. CAMPBELL....*Governor of Arizona*
HON. CHARLES O. CASE.....*State Superintendent of Public Instruction*

APPOINTED	TERM EXPIRES
WILLIAM SCARLETT, A.B., B.D., Phoenix	January, 1921
JOHN H. CAMPBELL, LL.M., Tucson	January, 1921
TIMOTHY A. RIORDAN, Flagstaff	January, 1923
JAMES G. COMPTON, Tucson Secretary	January, 1923
WILLIAM JENNINGS BRYAN, JR. A.B., Tucson Treasurer	January, 1925
EDMUND W. WELLS, Prescott	January, 1925
LOUIS D. RICKETTS, Ph.D., Warren	January, 1927
EPES RANDOLPH, Tucson President of the Board and Chancellor	January, 1927

COUNCIL OF ADMINISTRATION

RUFUS BERNHARD VON KLEINSMID, A.M., Sc.D.	President
BYRON CUMMINGS, A.M.	Dean, College of Letters, Arts and Sciences; Director State Museum
GURDON MONTAGUE BUTLER, E.M.	Dean, College of Mines and Engineering; Director, Arizona Bureau of Mines
DANIEL WEBSTER WORKING, B.Sc., A.M.	Dean, College of Agriculture; Director Agricultural Experiment Station
ANDREW ELLICOTT DOUGLASS, A.B., Sc.D.	Director, Steward Observatory
EMIL R. RIESEN, A.M.	Registrar
ANNA A. FISHER, A.M.	Dean of Women

OFFICERS OF INSTRUCTION AND INVESTIGATION

The names of officers are arranged alphabetically without regard to seniority of appointment or present rank.

ADAMSON, CHARLES R., B.S.
County Agricultural Agent, Cochise County

ALLEN, MILTON A., A.R.S.M., B.Sc. (London) Euclid and Second
Mining Engineer, Arizona Bureau of Mines

BALLANTYNE, ALANDO B., B.S.
County Agricultural Agent, Graham-Greenlee Counties

BISHOP, ANNA Campus
Instructor in Home Economics

BOND, CHARLES OMER, B.S.A. (resigned) 1418 East Fourth St.
Assistant, Department of Plant Breeding, Agricultural Experiment Station

BONIFACE, JOHN J., Major Cavalry, U. S. A. Campus
Professor of Military Science and Tactics

BRINTON, PAUL HENRY MALLETT-PREVOST (on leave)
Professor of Analytical Chemistry

BROWN, ELMER JAY, Ph.D. 748 East Fourth St.
Professor of Social Science

BROWN, JAMES GREENLEAF, M.S. Collegiate Apartments
Assistant Professor of Biology

*BRYAN, EDITH, B.S. Collegiate Apartments
Instructor in Home Economics

BRYAN, WALKER EDWARD, M.S. Collegiate Apartments
Assistant Professor of Plant Breeding; Assistant Plant Breeder, Agricultural Experiment Station

BUTLER, GURDON MONTAGUE, E.M. 827 East Fourth St.
Dean, College of Mines and Engineering; Director, State Bureau of Mines; Professor of Mineralogy and Petrology

CATLIN, CLIFFORD NORMAN, A.M.
Research Specialist in Agricultural Chemistry, Agricultural Experiment Station

CHAPMAN, THOMAS G., S.B. 725 East Fourth St.
Professor of Metallurgy and Ore Dressing

CLOKE, PAUL, E.E., M.S. 845 East Fourth St.
Professor of Electrical Engineering

CODE, WILLIAM E., B.S. 437½ East Third St.
Assistant Irrigation Engineer, Agricultural Experiment Station

COOK, WILLIAM M., A.B. 938 North Euclid Ave.
State Leader County Agricultural Agents

COON, BEULAH, B.S. Collegiate Apartments
Instructor in Teacher-Training Home Economics

CRANDALL, LUZERNE WESTCOTT, A.B. Campus
Instructor in English Composition and Rhetoric

CRIDER, FRANKLIN JACOB, M.S. 1390 East Fifth St.
Professor of Horticulture; Horticulturist, Agricultural Experiment Station

CUMMINGS, BYRON, A.M. Campus
Dean, College of Letters, Arts and Sciences; Director, State Museum; Professor of Archaeology and Classic Languages

CUNNINGHAM, WALTER S., B.S. 626 East Fourth St.
Associate Professor of Dairy Husbandry; Dairy Husbandman, Agricultural Experiment Station

DARROW, LEMUEL DEWITT, B.S., LL.B., A.M. 606 N. Park Ave.
Associate Professor of Mechanic Arts

DAVIS, ROBERT MCNAIR, A.B., J.D. 802 East Fifth St.
Professor of Law

DAVIS, RUTH W. 1189 Speedway
Director of Physical Education for Women

DERR, HOMER, M.S. 1306 E. Van Buren St., Phoenix
Supervisor of Agricultural Education

DINSMORE, AMY L., B.S.
Home Demonstration Agent, Maricopa County

DOUGLASS, ANDREW ELLICOTT, Sc.D. 1189 Speedway
Director, Steward Observatory; Professor of Physics and Astronomy

DOUGLASS, IDA WHITTINGTON, Ph.B., A.M. 1189 Speedway
Instructor in Music and Romance Languages

EDGERLY, GEORGE WILLIAM, Major Inf., U. S. A.
814 E. Speedway
Assistant Professor of Military Science and Tactics

EHLE, MARK, E.M. 738 North Sixth Ave.
Professor of Mining Engineering

ENGER, ARTHUR LUDWIG, B.S., C.E. (on leave)
Assistant Irrigation Engineer, Agricultural Experiment Station

ESTILL, HOWARD WILMOT, M.S. East Speedway
Instructor in Chemistry

FANSETT, GEORGE R., Ph.B. 924 North Fifth Ave.
Mining Engineer, Arizona Bureau of Mines

FEGTLY, SAMUEL MARKS, Ph. B., LL.B. 621 North Tyndall Ave.
Professor of Law

FILLERUP, CHARLES R.
County Agricultural Agent, Navajo-Apache Counties

FISHER, ANNA A., A.M. Campus
Dean of Women, Professor of History of Art

FORBES, ROBERT HUMPHREY, M.S., Ph.D. (on leave)
Dean Emeritus of College of Agriculture

FOSTER, FLORENCE R., A.M. 111 Olive Road
Instructor in Education, Summer Session

FOSTER, HERBERT HAMILTON, Ph.D. 111 Olive Road
Professor of Education

FRAZIER, ALLEGRA, A.B. 626 North Park Ave.
Assistant Professor of English Composition and Rhetoric

FREEMAN, GEORGE FOUCHE, Sc.D. (resigned)
Professor of Plant Breeding; Plant Breeder, Agricultural Experiment Station

GEORGE, D. C.
Consulting Plant Pathologist, Agricultural Experiment Station

GILCHRIST, D. A., B.S.
Rodent Control Specialist, in cooperation Bureau Biological Survey, U. S. D. A.

GORDON, WALTER E., M.A.
Professor of Industrial Education in Trades and Industries

GUILD, FRANK NELSON, Ph.D. 107 Olive Road
Professor of Chemistry and Optical Mineralogy

HARRIS, NORTON L.
Poultry Extension Specialist, in cooperation with Bureau of Animal Industry, U. S. D. A.

HAWKINS, RALPH S., B.S.A. 1115 East Seventh St.
Assistant Professor of Agronomy; Assistant Agronomist, Agricultural Experiment Station

HEARD, HERMAN CLAUDE, B.S. Phoenix
County Agricultural Agent, Maricopa County

HUBBARD, HOWARD ARCHIBALD, A.M. University Apartments
Associate Professor of History and Social Science

HUNT, AGNES A. 736 East Second St.
Assistant State Leader Boys' and Girls' Clubs

JENKINS, OLAF P., B.S. 905 North Euclid Ave.
Geologist, Arizona Bureau of Mines

KELTON, FRANK CALEB, M.S. 412 East Fourth St.
Associate Professor of Civil Engineering

KENNEY, FRANCIS ROYAL, B.S.A.
Associate Professor of Poultry Husbandry; Poultry Husbandman, Agricultural Experiment Station

KIMSEY, M. E., B.S.
Cereal and Forage Insect Control Specialist, in cooperation with Bureau of Entomology, U. S. D. A.

KINNISON, ALLEN F., B.S.A. 1420 East Fourth St.
Assistant Professor of Horticulture; Assistant Horticulturist, Agricultural Experiment Station

KLEINSMID, RUFUS BERNHARD VON, A.M., Sc.D. Campus
President; Professor of Philosophy and Psychology

LAMOREAUX, NORA
Home Demonstration Agent, Apache County

LAYTHE, LEO L., B.S. 845 North Fourth Ave.
County Agricultural Agent, Pinal County

LEONARD, HEMAN BURR, Ph.D. Campus
Professor of Mathematics

LOCKWOOD, FRANCIS CUMMINS, Ph.D. University Apartments
Director, General Extension

LOCKWOOD, MARY PRITNER, B.S. University Apartments
State Leader, Home Demonstration Agents

LONGSTRETH, J. W.
County Agricultural Agent, Yuma County

LUTRELL, ESTELLE, A.B. 637 North Park Ave.
Librarian; Assisting in English Literature

MCKALE, JAMES FRED, A.B. 926 North Euclid Ave.
Director of Athletics

MEDCRAFT, WILLIAM GEORGE, A.M. 730 East Third St.
Associate Professor of Mathematics

MILLER, J. O., A.B.
Farm Labor Specialist in cooperation with Office Farm Management

MORRILL, AUSTIN WINFIELD, Ph.D. Phoenix
Consulting Entomologist, Agricultural Experiment Station

NICHOLS, DELORE, B.S.
County Agricultural Agent, Coconino County

NICHOLSON, HELEN, A.M. 1016 University Ave.
Instructor in Romance Languages

OTIS, ARTHUR HAMILTON, A.B. 636 North Park Ave.
Associate Professor of Romance Languages

OXLEY, EDWARD B., B.S.
County Club Leader, Maricopa County

PARKE, LELAND S., B.S.A. 926 North Euclid Ave.
State Leader Boys' and Girls' Clubs

PATTISON, SIDNEY F., A.M. East Estill Cottage
Professor of English Literature

PERRY, FRANCES MELVILLE, A.M. 1207 Speedway
Professor of English Composition and Rhetoric

POST, ANITA CALNEH, Ph.B., A.M. 631 East Second St.
Instructor in Romance Languages

RAK, MARY KIDDER
Special Lecturer, Social Science

REDINGTON, PAUL G., B.S.
District Forester, in cooperation with Bureau of Forestry, U. S. D. A.

REID, IDA CHRISTINA, Ph.M. 614 East Second St.
Assistant Professor of History

RIESEN, EMIL R., A.M. 407 East Fourth St.
Registrar; High School Visitor; Associate Professor of Philosophy and Psychology

SANDIGE, J. R., B.S.
County Agricultural Agent, Gila County

SANDIGE, FLORENCE DUNBAR, B.S.
Home Demonstration Agent, Gila County

SARLE, CLIFTON J., Ph.D. 920 North Euclid Ave.
Professor of Geology

SCHNEIDER, W. E., B.S.A.
Swine Specialist, in cooperation Bureau of Animal Industry, U. S. Department of Agriculture

SKIDMORE, MARK, A.M. 908 East Fourth St.
Assistant Professor of Romance Languages

SMITH, GEORGE EDSON PHILIP, B.S., C.E. 1195 Speedway
Irrigation Engineer, Agricultural Experiment Station

SPORLEDER, LOUISE
Home Demonstration Agent, Cochise County

TATARIAN, BEDROS, B.S. 528½ North Tyndall Ave.
Acting Professor of Chemistry

TAYLOR, ESTES PARK, B.S. 731 North First Ave.
Director, Agricultural Extension Service; Assistant Dean College of Agriculture

THOMAS, DEROSSETTE, B.S. 732 North Euclid Ave.
Professor in Charge of School of Home Economics

THOMPSON, GEORGE E., B.S.A. 1030 North First Ave.
Professor of Agronomy, College of Agriculture; Agronomist, Agricultural Experiment Station

THORNBER, JOHN JAMES, B.S., A.M. 109 Olive Road
Professor of Botany; Botanist, Agricultural Experiment Station

TUFTS, GRACE I.
Demonstration Agent, Yuma-Yavapai Counties

TURRELL, CHARLES ALFRED, B.S., A.M., *Lic. en Letras*
835 North Tyndall Ave.
Professor of Romance Languages

VAN BENSCHOTEN, ANNA LAVINIA, Ph.D.
Professor of Mathematics

VINSON, ALBERT EARL, Ph.D. 629 East First St.
Professor of Agricultural Chemistry; Chemist, Agricultural Experiment Station

VORHIES, CHARLES TAYLOR, Ph.D. 1445 East Fourth St.
Professor of Entomology; Entomologist, Agricultural Experiment Station

WHEATLEY, WILLIAM D. 1042 North Euclid Ave.
Director of Musical Organizations

WIECHARDT, AUGUST JULIUS, M.E., M.M.E. 370 Highland Ave.
Professor of Mechanical Engineering

WILLIAMS, JESSAMINE CHAPMAN, B.S. Campus
Professor of Home Economics

WILLIAMS, RICHARD HERMON, Ph.D. Campus
Professor of Animal Husbandry; Animal Husbandman, Agricultural Experiment Station

WILLS, FLOSSIE D., B.S.
Home Demonstration Agent, Graham-Greenlee Counties

WILSON, ELDRED DEWEY, B.S. 711 East Sixth St.
Assistant Geologist, Arizona Bureau of Mines

WORKING, DANIEL WEBSTER., B.Sc., A.M.
Dean, College of Agriculture; Director, Agricultural Experiment Station

ZIMMERMAN, HAZEL 809 East Third St.
Home Demonstration Agent, Southeastern Counties

FELLOW ASSISTANTS

CALBERT LEE VANCE	*Assistant, Arizona Bureau of Mines*
ELSIE ELLIOTT (resigned)	*Assistant in Romance Languages*
SAMUEL RIDGELY CRUSE	*Assistant in Mechanics Art*

STUDENT ASSISTANTS

CLARENCE L. OREM	*Assistant in Chemistry*
DOROTHY ANDREWS	*Assistant in Chemistry*
HAZEL MCCOY	*Assistant in Museum*
JESSE A. WOOLF	*Assistant in Metallurgy*
	Assistant in Mineralogy
DOROTHY BISHOP	*Assistant in Botany*
BLANCHE SMITH	*Assistant in Agricultural Chemistry*

EXECUTIVE OFFICERS

RUFUS BERNHARD VON KLEINSMID, A.M., Sc.D. — *President*

BYRON CUMMINGS, A.M.
Dean, College of Letters, Arts, and Sciences; Director, State Museum

GURDON MONTAGUE BUTLER, E.M.
Dean, College of Mines and Engineering; Director, Arizona Bureau of Mines

DANIEL WEBSTER WORKING, B.Sc., A.M.
Dean, College of Agriculture; Director Agricultural Experiment Station

ANDREW ELLICOTT DOUGLASS, A.B., Sc.D.
Director, Steward Observatory; Secretary Academic Senate

ESTES PARK TAYLOR, B.S.A.
Director Agricultural Extension Service; Assistant Dean, College of Agriculture

EMIL R. RIESEN, A.M. — *Registrar; High School Visitor*

ANNA A. FISHER, A.M. — *Dean of Women*

THOMAS R. BLAIR — *Cashier*

ESTELLE LUTRELL, A.B. — *Librarian*

FRANCIS M. WALKER — *Bookkeeper*

ADA ENGLISH — *Secretary to the President*

HESTER L. HUNTER — *University Editor*

MAUDE A. CLINGAN — *Secretary, Arizona Bureau of Mines*

LILLIAN E. HUTCHINSON
Secretary to the Director, Agricultural Extension Service

ETHEL STOKES
Secretary to the Dean, College of Agriculture

RUIE ADKINSON — *Clerk, Registrar's Office*

THURSTON M. PERKINS — *Assistant to the President*

WILLIAM J. BRAY — *Superintendent of Buildings*

FRANCES R. BURT — *Campus Nurse*

ALICE GUEST — *Stewardess, University Dining Hall*

ALBERT E. REAU — *Campus Engineer*

LIBRARY OFFICERS

ESTELLE LUTRELL, A.B. — *Librarian*

ABBIE GAMMONS, B.S. — *First Assistant Librarian*

MIRIAM E. CLAY, B.S. — *Second Assistant Librarian*

MABEL AENELLA GUILD — *Cataloguer*

COMMITTEES OF THE FACULTY

1918-1919

ADMINISTRATION:
Council of Administration.

ALUMNI OCCUPATION AND RELATIONSHIP:
Professors Riesen, Foster, Kelton, Reid, Miss Post, and the instructor in whose department a major is completed.

ASSEMBLY:
Dean Cummings, Professors Thornber, Davis.

ATHLETICS:
Director McKale, Professors Leonard, Chapman, Kelton, Davis, Professor of Military Science.

CLASSROOMS AND OFFICES:
Professors J. G. Brown, Kelton.

CORRESPONDENCE WORK:
Professors Leonard, Foster, Sarle, Vorhies, Taylor.

CURRICULUM:
Professors Fegtly, Butler, Cummings, Thornber, Turrell.

DINING HALL:
Professor Jessamine Williams, Assistant to the President, President Student Body, President Women's Guild.

DOUGLAS ENDOWMENT FUND:
Director Douglass, Professors Guild, Wiechardt.

EXTENSION WORK:
Professors E. J. Brown, Taylor, Jessamine Williams, University Editor.

GRADUATE STUDY:
Dean Butler, Professors Guild, Vinson, and the heads of the departments in which work is being completed.

LIBRARY:
Professors Lutrell, Perry, Cunningham, Smith, Hubbard, Pattison, Ehle.

PROGRAM:
Professors Pattison, Medcraft, Darrow.

PUBLICATION AND PUBLICITY:
University Editor, Professors Perry, Bryan, Medcraft, Vorhies.

REGISTRATION:
Professors Riesen, Fegtly, Leonard, Otis, Vinson, Tatarian.

RHODES SCHOLARSHIP:
President von KleinSmid, Director Douglass, Professor Thompson.

SELF-GOVERNMENT:
Professors E. J. Brown, Fisher, Perry, Davis, Reid, Miss Post, Miss Davis, Professor of Military Science.

SOCIAL LIFE AND STUDENT ENTERPRISES:
Professors Fisher, Cummings, Lutrell, Reid, Miss Davis.

SPECIAL UNIVERSITY OCCASIONS:
Professors Otis, Catlin, Thomas, Kelton, Miss Bishop.

STUDENT LOAN FUND:
President von KleinSmid, Professors Smith, Cloke.

STUDENT SCHOLARSHIP:
Professors Turrell, J. G. Brown, Williams, Hubbard, Riesen.

STUDENT RESIDENCES:
Dean Fisher, Professor Crider, Miss Davis, Professor of Military Science.

SUMMER SESSION:
Deans Cummings, Butler, Douglass, Working, Dr. Vinson.

VOCATIONAL EDUCATION:
Professors Foster, Butler, Riesen, Thomas, Vinson, Jessamine Williams.

GENERAL INFORMATION

PURPOSE AND GOVERNMENT

GENERAL STATEMENT

The University of Arizona is an integral part of the system of public education established by and for the State. Its purpose, in the language of the organic law, is "to provide the inhabitants of this State with the means of acquiring a thorough knowledge of the various branches of literature, science and the arts," and, in so far as possible, a technical education adapted to the development of the peculiar resources of Arizona. In furtherance of this purpose the College of Letters, Arts and Sciences, the College of Mines and Engineering, the Arizona Bureau of Mines, the Steward Observatory, the College of Agriculture, the Agricultural Experiment Station, and the State Museum have been organized. In creating the University the Legislative Assembly wisely unified under the one management these various schools and institutions of higher learning and investigation.

The general organization of the University 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 1901.

THE BOARD OF REGENTS

The government of the institution is vested in the Board of Regents of the University of Arizona, a corporation consisting of the Governor and the Superintendent of Public Instruction of the State, ex-officio, and eight members appointed by the Governor. Appointment is made subject to the advice and consent of the Senate. The term of office is eight years, beginning on the date of confirmation by the senate, and continuing until the appointment of a successor. In case of vacancy the Governor fills the office by appointment. The Board elects a presiding officer who is Chancellor of the University and, ex-officio, President of the Board. It also selects its own Secretary, Treasurer and Librarian.

The Board of Regents has power to control and manage the University and its properties, to enact laws governing the University,

to appoint and employ a President of the University and the requisite number of professors and tutors, and to determine salaries. While the immediate government of the various departments is placed in the faculties, the Board of Regents has power to regulate instruction and under advice of the faculty to prescribe books and authorities used therein. It has the power to confer degrees and grant diplomas as is usual in such institutions. The regular meetings of the Board are held on or near the tenth of each month.

THE UNIVERSITY COUNCIL

The University Council of Administration is composed of the President, the Deans of the several colleges of which the University is composed, the Directors of separated departments, the Registrar, and the Dean of Women. This body is to exercise such powers as the Board of Regents may confer upon it.

THE ACADEMIC SENATE

The Academic Senate is composed of the Faculties of the University and must conduct the general administration of the University, regulate the general and special courses of instruction, receive and determine all appeals from acts by the Faculty of any college, and exercise such other powers as the Board of Regents shall confer upon it. The proceedings of the Senate must be conducted according to the rules of order adopted by it, and every person engaged in instruction in the University may participate in its discussion. The right of voting, however, is confined to the President, Professors, Associate Professors and Assistant Professors.

THE FACULTIES OF THE SEVERAL COLLEGES

The immediate government of the several colleges is entrusted to their respective Faculties, each of which must have its own organization, and regulate its own immediate affairs, subject to the approval of the Academic Senate, and may recommend courses of study and text-books to be used.

MAINTENANCE AND ENDOWMENT

The University is maintained by funds appropriated by the United States and by the State of Arizona.

Federal Support—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 facilities for such instruction." This Morrill Fund is duplicated by the Nelson Fund, created by the Act of March 4, 1907. The University receives from the same source, for the support of the Agricultural Experiment Station, $15,000 yearly, from the Hatch Act of 1887, and $15,000 additional from the Adams Act of 1906. Approximately, $17,433 for 1919-20, and $18,863 for 1920-21, will be the Federal appropriations for the Agricultural Extension service. Fifty-seven sections of 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.

State Appropriations—The appropriations of the Legislature for the biennium 1919-1921 are, for maintenance, $436,165; general improvements, repairs, and equipment, $83,900; general building, $24,400; for the erection and furnishing of a dormitory, $145,000; for printing and binding of reports and other printed matter, $18,000; for extension work, $51,320; for experiment and instruction farms in the State and experiment work at the University, $155,350; for Bureau of Mines work, $62,000; campus extension, $25,000.

Gifts and Endowments—By the munificence of Doctor James Douglas, of New York, the University received in June, 1908, the sum of $10,000, the income from which is to be annually applied 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. The fund thus created has been named the Douglas Endowment Fund.

In 1916 the late Mrs. Lavinia Steward gave to the University the sum of $60,000 for the purpose of providing a building for and the equipment of an Astronomical Observatory. This gift will add immeasurably to the facilities of the institution in the field of Astronomy, a field which offers remarkable opportunities for study and research in this locality. Contracts for the instrument and accessories were let early in 1917, but completion has been delayed by the war. The building will, in all likelihood, be ready for use during the coming year.

The University also receives annually a small amount from miscellaneous sources such as matriculation, tuition, and dormitory fees.

HISTORY

The Act of Legislative Assembly authorizing the formation of the University of Arizona was passed in 1885. By 1890 three of the departments for which it provided, the College of Agriculture, the College of Mines and Engineering, and the Agricultural Experiment Station, were organized, and in 1891 the University was opened to students, with a faculty of eight professors and instructors. Only thirty-one students, all told, matriculated in that year, and only nine of these were of college rank. All the departments at that time were housed in University Hall. The need for expansion was felt at once and by 1894 three brick houses had been built upon the campus on the north side, and an annex constructed to University Hall to accommodate enlarging work in the School of Mines. The Library was housed in the same building in charge of the English Department. In 1900 a brick building containing the shops for Mechanic Arts and special assaying rooms was added. A handsome Library and Museum building was erected in 1904 in the particular architectural style which has since been followed on the campus. At about the same period, Herring Hall was built for a gymnasium.

In 1906 Mechanical and Civil Engineering courses were developed, and a year later a full course in Agriculture, together with a shorter two-year course. By 1910 the Engineering courses were well filled out, offering degrees in Electrical Engineering and Metallurgy as well as in courses already mentioned. All these departments are accommodated in the new Mines and Engineering building. Science Hall was built in 1909 and since then has held the Departments of Physics, Chemistry and Biology.

Twenty-four years after the opening of the institution the Preparatory Department had been dropped, and the increase in all departments caused a division of the organization into the College of Letters, Arts, and Sciences, the College of Mines and Engineering, and the College of Agriculture, with a dean over each. There had been an instructor in Law for some four years, but at this time a full course for the degree of Bachelor of Law was offered. A Home Economics department also was developed to give degrees either in textiles or cookery. A department of Archaeology was added whose head was Director of the State Museum, and the collection of material for the Museum increased rapidly.

This expansion was made possible and convenient by the addition of the splendid Agriculture Building in 1915. For the coming year a similar structure will accommodate the entire College of Mines and

Engineering, including also the United States Mines Experiment Station. This year a part of the building of the Steward Astronomical Observatory will be erected on the highest part of the campus. Development in other lines has taken place, including the School for the Deaf in 1912. The State Bureau of Mines was authorized in 1915. The General Extension Service and the Agricultural Extension Service carry the benefits of the University to people of the State, aided by correspondence courses and the State Pure Food Laboratory, also many demonstration and experiment farms connected with the College of Agriculture.

The membership of the University proper has shown a steady, normal growth gratifying in a pioneer State in which the industrial basis that makes the privilege of higher education a matter of course, is still in process of establishment. To secure this growth and develop a university worthy to rank among older state universities and competent to offer the youth of the Commonwealth just educational advantages, Arizona has been obliged rapidly to expand and enrich the various departments of instruction in the University, and to that end has provided a faculty and equipment of high order for a College of Letters, Arts, and Sciences, a College of Mines and Engineering, and a College of Agriculture.

LOCATION AND CLIMATE

GENERAL STATEMENT

The University of Arizona is situated at Tucson, a city of twenty-five thousand inhabitants, on the main lines of the Southern Pacific Railway and the El Paso & Southwestern System, 312 miles west of El Paso, Texas, and 500 miles east of Los Angeles, California. The city lies in a broad valley at an altitude of 2400 feet and is surrounded by mountains.

Advantages of Location for Students of Engineering—Because of its situation in the neighborhood of great mines, the University offers exceptional advantages to the students of mining engineering, affording them the opportunity of seeing the actual operation of mines and the development of great enterprises, while carrying on the theoretical and experimental work of the mining course. As Tucson is a railroad center of some importance and the engineering headquarters for several lines of the Southern Pacific System, the students of civil engineering are also provided with a field for observation and vacation employment.

Advantages of Location for Students of Agriculture—The situation of the University is favorable for students 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.

Advantages of Location for Students of Astronomy—In natural advantages the University, with all Southern Arizona, is even more highly favored by a climate which is perhaps the best in the United States for astronomical observations. The fine weather day after day, the quietness of the air at night, and the freedom of the winters from snow, all contribute to a consecutiveness of observation day by day such as is found practically nowhere else, and to a perfection of the atmospheric conditions that renders the most exacting work possible.

Climatic Advantages—The situation of the University is fortunate also because of the advantages it offers from the point of view of general wellbeing. Its dry, mild, and equable climate has made Tucson a winter resort unsurpassed for healthfulness. 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 for the year averages less than twelve inches, half of which comes in the months of July, August, and September. These advantages insure to students a comfortable education and a wide range of out-door recreation throughout the college year.

GROUNDS

The University Campus, comprising sixty-five acres, is situated upon high ground about a mile from the business center of Tucson, with which it is connected by an electric car line. On every side it commands a view of mountain scenery of remarkable extent and grandeur. The Campus is laid out in drives, lawns, and gardens, with a large number of palm, olive, ash, umbrella, pepper, bagota, and cottonwood trees.

The University has its own water supply system for fire protection, irrigation, laboratory, and domestic purposes. The water is drawn from deep wells, and is of exceptional purity, chemically and bacteriologically. A well with a capacity of 1500 gallons a minute

furnishes a supply ample for the needs of the institution for many years to come. The Campus has a complete sewer system connecting with the city mains. The buildings are lighted by electricity.

BUILDINGS

University Hall, the oldest of the University buildings, contains recitation rooms, laboratories and apparatus rooms of various departments, and an assembly room.

The Library, a structure of red brick and Bedford sandstone, contains the library reading room, the stack rooms, work rooms for the library, and departmental conference rooms.

Science Hall, architecturally harmonious with the Library, which it faces, is of three stories, the first devoted to physics, the second to chemistry and mineralogy, and the third to chemistry, biology and civil engineering. A superstructure on the roof is temporarily used as an astronomical observatory.

Agriculture Hall, a commodious building of brick and reinforced concrete, provides temporary administration offices and permanent quarters for the University Museum, the College of Agriculture, and the Department of Home Economics.

The Mines and Engineering Building, a large, new building of brick, reinforced concrete, and terra cotta, provides class rooms, drafting rooms, laboratories, and offices for the College of Mines and Engineering, the United States Bureau of Mines and Experiment Station, and the Arizona Bureau of Mines.

Mechanic Arts Building, a new brick and wood structure, provides exceptionally commodious quarters for the shops, as well as an office, finishing room, locker and wash room, and stock room.

Mill Building, a plain wooden structure which formerly housed all the ore dressing machinery since removed to the new Mines and Engineering Building, is still utilized for some leaching experiments, and other large scale metallurgical operations.

Music Hall provides music rooms and recitation rooms for the Departments of Music and Art.

Herring Hall, the gymnasium, 40 x 80 feet in size, is the gift of the late 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 Auditorium, having a seating capacity of five hundred, accommodates University meetings and student assemblies. Its stage,

when opened on the patio between the wings of Agriculture Hall, completes an open air theater seating about twelve hundred.

The President's House is situated at the west end of the north drive.

Pima Hall and West Cottage provide dormitory accommodations for about forty women. Each hall has its parlor, living rooms, and sleeping-porches.

Arizona Hall and South Hall provide dormitory accommodations for about one hundred men. Both halls are admirably suited to their purpose and in addition to the customary equipment, provide spacious sleeping-porches.

The Dining Hall provides boarding accommodations for all persons living on the Campus.

The central heating, lighting and power plant is equipped with necessary boilers, engines, generators, etc., for the complete heating and electrical service for the Campus.

GENERAL EQUIPMENT

LIBRARY

Accessions—The Library contains over 30,000 bound volumes exclusive of public documents, and several thousand unbound bulletins and reports. The present appropriations provide for an annual increase of 1500 volumes. About one-fourth of these accessions come from binding periodicals and serials, of which 200 are received by subscription and some 300 more by gift and exchange. The back files of these periodicals show 58 complete sets and 42 long runs nearly complete. Important additions to these sets are made yearly. In addition to the accessions acquired by purchase, the Library receives as a depository the documents and publications of the United States Government and the publications of the Carnegie Institution.

Classification and Catalogues—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 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 not in their stock. There is also a card catalogue of the publications of the U. S. Department of Agriculture, and a card index of the publications of the State Experiment Station.

The Law Library—The Law Library was opened in 1915 as a part of the General Library. It now embraces the National Reporter

system, the American Digest system, as well as the Cyclopedia of Law and Procedure, Corpus Juris, some of the leading text-books and Lawyer's Reports Annotated (old and new series), all of which sets are continued as issued.

The Reading Rooms—The Library affords accommodation for 100 readers. In one section of the old reading room additional stacks have been installed, while the remaining space has been converted into a faculty study, and periodical room.

In the general reading room are about 600 reference books—encyclopedias, dictionaries, periodical guides, the books reserved by instructors for collateral reading, and the card catalogues. Some 130 magazines are also accessible, together with the current numbers of many of the local papers, and the college exchanges.

Withdrawal of Books—Books may be drawn by all officers and students of the University. When not reserved for classes books may be borrowed for home use for two weeks, and may be renewed for two weeks more if not otherwise needed for University work. Books reserved for classes may be borrowed from the Library only at the hour for closing the reading room. They must be returned within the first hour of the next opening of the Library. Books from the stacks which are not returned on time are subject to a fine of five cents a day. Books from the reserve shelves are subject to a fine of ten cents for the first hour and five cents for each additional hour if kept overtime. Books recalled for University work must be returned at once upon receipt of the notice. If not returned within two days after notice is mailed a fine of ten cents a day is charged.

Hours—In term-time the Library is open week days from 8 A. M. to 5:30 P. M., and from 7 to 9:30 P. M. The reading room is open Sundays from 2 to 4:30 P. M. During the summer vacation a shorter schedule is observed. Readers not connected with the University are free to use the Library at these hours.

Correspondence and Loans—Reference work for teachers and students throughout the State is gladly undertaken by correspondence. Loans of books will also be made to teachers and others engaged in systematic study in so far as the grant is not precluded by their need for resident use.

Courses in Bibliography—The Librarian offers a general course in the use of books, elementary bibliography, and library administration, open to all students. In connection with this course the University Library issued in 1916 an *Annotated Shakespeare Book List for Secondary Schools,* and a list of *Library Books for High Schools (Annotated) General Reference. English Section. History Section.*

THE AGRICULTURAL EXPERIMENT STATION LIBRARY

This Library is on the second floor of Agriculture Hall. It comprises about 5000 volumes. It contains the publications of the U. S. Department of Agriculture, complete sets of U. S. State Experiment Stations' bulletins and reports, together with the card catalogues indexing these sets. It also receives currently many reports from foreign Agricultural Bureaus, annual volumes of American Herd Books, and some thirty agricultural journals.

THE ARIZONA BUREAU OF MINES LIBRARY

A small working library is being established gradually in connection with the State Bureau of Mines. In addition to the standard mining handbooks, much local material is being collected, and about twenty-five journals are received, chiefly in exchange for the bulletins of the Bureau. This material is all catalogued and is accessible to the specialist upon application.

MUSEUM

At the opening of the school year in September, 1915, the collections of the State Museum were placed in Agriculture Hall. This is practically a fireproof structure, and insures the protection and safe-guarding of the property of the Museum until such time as the institution secures a museum building.

During the year 1917-18 no field work was undertaken because of war conditions. All the able bodied students who had planned to help us went into the service of the U. S. Government. In April, 1918, R. F. Gilder, of Omaha, Arthur H. Vaughn, student assistant in the Museum, and the Director made a few small exploring excavations on the bench, back of St. Mary's hospital at Tucson. They uncovered several pieces of good pottery, a quantity of charred corn and a human skeleton lying 5½ feet beneath the surface under the floor of a room in an ancient pueblo. The best preserved of the pottery are a large olla holding five gallons, a bowl, and a vase. The bowl had been placed in the mouth of the olla as a cover and both are the smooth, undecorated red ware so common to the prehistoric pueblos of the Gila Valley and its tributaries. The vase is rather small, in shape like an acorn, and decorated in a cream-white design on a red background. The cranium of the skeleton was saved and is of quite a marked dolichocephalic type. All of these articles have been placed in the State Museum at the University.

In August, 1918, the Director and Mr. Clarence G. White, of Tucson, made a trip from Monticello, Utah, into the Beef Basin country in the western part of San Juan County, Utah, to examine

the ruins there and secure some sections of timbers found in the prehistoric dwellings, and of trees that had grown within the fallen walls of the rooms. Three cross-sections of cedars and one of pine were obtained which give great promise of material service in helping determine the relative age of these ancient pueblos. Mr. White generously bore the entire expense of this trip.

The Arizona Archaelogical and Historical Society purchased from Elizabeth C. Stanley an interesting collection of ethnological material illustrating religious ceremonies among the Hopis and the Chippewas, and also showing the industries of these tribes and the Utes. Several gifts from private parties have come to the Museum during the year, among them 80 stone implements from mounds near Florence, Arizona, by Mr. N. D. Mills, five stone implements from Seneca River, New York, and a fibre robe from Nicaragua from Mr. A. J. Dinkel, of Tucson, and a loan collection of Alaskan baskets and Indian bead work by Miss Gardia E. Burt, of Don Luis, Arizona.

Two large rooms on the third floor have been set aside for the use of collections in Archaeology, Ethnology, and Natural History. Room 302 contains the valuable Herbert Brown collection of Arizona birds, a collection of 75 specimens of reptiles, and a few fossil remains of prehistoric animals. The bird collection comprises some 1600 specimens of bird skins, 1000 bird eggs, and 100 bird nests. The number and great variety of Arizona birds in the Herbert Brown collection of bird skins make the Natural History Museum exceedingly valuable. The addition of 175 mounted specimens of types of these birds has added greatly to the interest and attractiveness of the display of the bird life of the State. This collection, secured and prepared by Mrs. J. W. Wheeler, formed the attractive display formerly in the Wheeler Villa near Tucson.

The Museum is open each afternoon from 2 to 6 o'clock and the public is invited to examine its collections.

STEWARD OBSERVATORY

The gift of the Steward Observatory was made in September, 1916. Early in 1917 the form of instrument and other equipment was decided on and contracts let, but war conditions compelled the manufacturers to defer work upon it. The work of constructing both instrument and buildings has now been resumed, and their completion is expected early in the coming year. In December, 1917, the Observatory was organized by the Board of Regents so that scientific work could be undertaken in its name and in February, 1918, a Director was appointed to have charge of its organization

and construction. The 8-inch and 4-inch telescopes and Callendar pyrheliometer and other equipment heretofore in use at the University will be transferred to the Steward Observatory as soon as the buildings are ready to receive them. Research upon the planet Mars and certain studies of relation between climate and solar activity will be the first work undertaken by the new Observatory.

EQUIPMENT OF THE COLLEGE OF AGRICULTURE

AGRICULTURAL CHEMISTRY

The student laboratory for soil chemistry and soil physics is located on the second floor of Agriculture Hall. Equipment for the study of the physical and chemical properties, and for the mechanical analysis of soils is provided. A store room well stocked with apparatus is connected with the laboratory.

The chemical laboratories of the Agricultural Experiment Station, located on the first floor of Agriculture Hall, embrace a commodious suite of eight rooms especially designed to meet the needs of the Department. The two main laboratories, one for routine Station work, and one for research, are connected by the balance room and a constant temperature dark-room. These laboratories are well equipped for general agricultural analytical work, being provided with polariscope, oxygen bomb calorimeter, electrolytic table, and other special apparatus. The nitrogen room is well isolated from the laboratories by an intervening office and is fireproof. A large work room for the preparation of samples is provided with electric power, suitable tables, mills, and a Buchner press. This room and the two large laboratories communicate directly with the store room, which, conveniently, has been made the center of the suite. Office room is also provided for the chemist and assistants.

The Experiment Station laboratories are open to graduate students and to undergraduates who are prepared to take up the investigation of special problems under the direction of the chemist.

AGRONOMY

The Department of Agronomy is located on the third floor of Agriculture Hall. The laboratories are equipped with running water, waste facilities, gas, and light. In addition to these facilities there is an abundance of class demonstrative material, germinating ovens, seed testers, microscopes, and lenses. A very complete library on agronomic subjects is at the disposal of the students. Numerous

periodicals are also in the files of the Department for student use. The Department is fully equipped with necessary apparatus to conduct work in soil bacteriology.

In addition to the class room and laboratory facilities the Department has under its supervision two dry-farms, one at Cochise and one at Prescott, and two irrigated farms, one near Tucson, and one in the Salt River Valley near Mesa. These farms offer opportunities for students to study actual farming operations under various conditions, give means for carrying on demonstrations, and furnish abundant class and laboratory material for grain judging and study of varieties.

The farm at Tucson is particularly useful for class instruction in that it is situated near the University, with which it is connected by automobile service for the convenience of instructors and students. The tract is irrigated from a well fitted with a 15 H. P. distillate engine and a No. 5 Krogh centrifugal pump. The distributing system consists of a 12-inch cement tile. The operation of this plant affords opportunity for the student to get first-hand information in the installation and operation of modern pumping machinery. The other farms are not so readily accessible, but are visited on special occasions and offer excellent opportunities for students given employment thereon to gain practical experience during their summer vacations.

ANIMAL HUSBANDRY

The equipment of this Department consists of livestock, buildings, laboratories, and an excellent herd-book library. At the University Farm registered cattle, sheep, and hogs are maintained and used by the classes in stock judging and management. In addition there are some excellent stock farms and cattle ranches within easy access of Tucson. The class in advanced stock judging, in charge of instructors, attends the annual State Fair at Phoenix. Additional facilities for instruction consist of charts, lantern slides, various instruments for measuring and studying stock, specimens of feeding stuffs, wool, and other animal products. Special instruments, medical appliances, charts, models, and preparations are available for instruction in veterinary anatomy and physiology, and in the diseases of livestock.

DAIRY HUSBANDRY

The Department of Dairy Husbandry occupies a portion of the first floor of Agriculture Hall. The laboratory is large, well lighted, and well equipped. Many makes of cream separators are kept here for use of students. Babcock testers, ice-cream freezers, hand and

power churns, pasteurizers, cheese outfit, and a variety of testing apparatus are included in the equipment of the laboratory. Ample opportunity is given for milk testing, for the making of butter, cheese, ice-cream, and for a study of the principles and practice of handling milk and cream to insure the most wholesome products.

The dairy herd consists of some of the most desirable types of registered Holstein-Friesian and Jersey cattle. These cows are used by classes in stock-judging, and study of breeds. In addition to the University dairy, a number of commercial dairies in the neighborhood of Tucson are used to illustrate the principles of profitable dairying.

POULTRY HUSBANDRY

The poultry equipment occupies about three acres of land on the University Campus. There are a number of houses of various types; several hundred fowls of the breeds and varieties best suited to Arizona, and a flock of turkeys; an incubator cellar with a number of different makes of incubators, a large brooder house, with various types of brooders, poultry laboratory with exhibit of various disease specimens, cramming machine and fattening batteries, trap-nests, and other essential appliances. Lantern slides, charts, and photographs are used to illustrate breeds of fowl, houses, farms, equipment, etc.

HORTICULTURE

The Department of Horticulture is located on the second floor of Agriculture Hall, and occupies five rooms, including office, lecture room, student laboratory, research laboratory, and storage apartment. The laboratories are equipped with fruit packing and grading tables, pruning tools, grafting and budding material, spraying apparatus, seed testers, microscopes, and other necessary facilities for instruction in horticulture.

The orchard on the University Farm, composed of representative varieties of the leading species of cultivated fruits, furnishes field practice in pruning, spraying, cultivation, fertilizing, and other phases of fruit culture and orchard management. A garden of one acre on the Campus, with an additional area on the University Farm devoted to vegetables, serves to give practical instruction in home and in commercial vegetable growing.

The greenhouse at the rear of Agriculture Hall, and the large glass range, consisting of a palm house and two service wings, soon to be erected on the Campus, will be available for practical work in plant propagation, vegetable forcing, and floriculture. Study in

landscape gardening is facilitated by the splendid collection of ornamental trees, shrubbery, and flowers on the University Campus.

The ranch orchards, truck farms, and market gardens in the vicinity of the University, and the parks within the City of Tucson, furnish additional opportunities for study in these respective subjects of horticulture.

For students who are specializing in horticulture, trips are arranged to study practical horticultural work at the different substations and in those sections of the State in which certain special cultures are highly developed: (a) thirty acres of the Salt River Valley Farm at Mesa devoted to horticultural demonstration and experimentation; (b) the date orchards at Tempe and Yuma where several hundred varieties of dates are being grown and successfully marketed on a commercial scale; (c) the large citrus industries of the Salt River Valley and the Yuma Mesa; (d) the extensive olive orchards in Salt River Valley, and those being developed particularly in the vicinity of Casa Grande.

PLANT BREEDING

The Department of Plant Breeding occupies a well equipped class room in Agriculture Hall. In class work, much use is made of material drawn from the operations of the Department of Plant Breeding in the Experiment Station. Here, work in the practical breeding of corn, wheat, dates, beans, and other crops, furnishes ample material for laboratory and field practice in the study of variation, hybridization methods, selection, and fixation of types. Greenhouse space is available for the forcing of plants to be hand-pollinated in winter, and during the warmer season a garden covered with screen wire furnishes a place protected from insects where cultures requiring close fertilization, or cross-fertilization by hand, may be carried on in the open without the inconvenience of special plant cages or the bagging of the individual flower clusters.

EQUIPMENT OF THE COLLEGE OF LETTERS, ARTS, AND SCIENCES

ART

For use in the courses in the history of painting, a good collection of standard reference books is available in the University Library, together with appropriate maps; a large number of foreign photographs, Seeman colored reproductions, and Elson prints. Recently a representative collection of plaster casts has been acquired, to be used in teaching the influence of sculpture on painting.

ASTRONOMY

A gift of $60,000 has been made to the University by the late Mrs. Lavinia Steward for the purpose of erecting an astronomical observatory. This sum will provide a special observatory building and a 36-inch reflecting telescope of the most modern type, together with a photographic equipment, astronomical clocks, a chronograph and other accessories.

An 8-inch Clark lens and mounting, both of the finest quality, loaned to the University by the Observatory of Harvard University, Cambridge, Massachusetts, stand on a cement pier in the temporary observatory at the top of Science Hall. This lens is most efficient in fundamental research work. The equipment also includes a 4¼-inch Brashear telescope, belonging to the University, siderial and mean time clocks, and pier for latitude and longitude observations.

In order to obtain continuous records of the sun's heat falling upon this region, the Department has a Callendar Sunshine Receiver connected to a Leeds and Northrup Recording Galvanometer. This mechanism has been running since October 9, 1913. For correcting its results a Smithsonian Silver Disk Pyrheliometer has been purchased.

BIOLOGY

The biological laboratories occupy a convenient and well lighted suite of eight rooms, and have equipment suited to modern instruction and research in the biological sciences, to the region, and to the courses offered.

The herbarium consists of 72,000 mounted specimens, of which 30,000 sheets are in the Arizona Botanical Survey Collection. There are 10,000 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 utlimately in the publication of a Flora of Arizona. The unique flora and fauna of the mountains, foothills, mesas, and river valley collecting grounds, in close proximity to the Institution, offer attractive opportunities for instruction and research, particularly along taxonomic and ecological lines.

There are articulate and inarticulate skeletons, plaster and papier maché models of the more important structures of the human anatomy, and duplicate material for study and dissection. The Department has twenty-six compound microscopes of Spencer, Bausch and Lomb, and Leitz types, a Bausch and Lomb binocular monobjective, a Leitz binocular microscope, a Leitz rotary mictrotome, photographic ap-

paratus, stereopticon, electric thermostats, centrifuge, spirometer, caloriscope, electric apparatus including inductorium and rheocord for animal physiology, and also apparatus for plant physiology.

The Desert Botanical Laboratory of the Carnegie Institution located at Tucson is an inspiration for research work in the Department and supplements the facilities of the University for botanical investigation, particularly as concerns field plant physiology and plant geography.

CHEMISTRY

The Department of Chemistry occupies fifteen rooms in Science Hall. The Laboratory for general chemistry accommodates one hundred and twenty students, in three sections, and is well equipped with all the usual facilities for this kind of work. A special laboratory is devoted to the study of qualitative analysis.

The laboratory for quantitative analysis is equipped for the teaching of gravimetric, volumetric, and gasometric analysis. Ample hood space, well supplied with electrically heated hot plates, enables the students in metallurgical analysis to do a large volume of work, thus preparing them for the actual working conditions of the mine and smelter laboratories. A system of down-draft forced ventilation on every desk maintains a good atmosphere in the laboratory. Each desk is also fitted with suction for rapid filtration. Electricity at 110 and 220 volts is supplied for the heating of constant temperature drying ovens, muffle and tube combustion furnaces. A standarized gas meter, calorimeter, flash, and fire-point apparatus, and viscosimeter are among the special pieces of apparatus for the analysis of gases, fuel and lubricating oils. The balance room contains eighteen analytic balances of the latest models, so arranged as to insure a maximum of stability and accuracy. This room also contains such reference works loaned from the general library as are useful in connection with the laboratory work.

A lecture and demonstration room fitted with a projection lantern, charts, and special apparatus used in the illustration of the principles of theoretical and practical chemistry, accommodates about one hundred students.

The laboratory of physical chemistry is equipped with the following apparatus: Wanner's optical pyrometer, le Chateliers pyrometer, boiling point and freezing point apparatus, Pulfrich refractometer, Abbé refractometer, large wave length spectroscope made by Adam Hilger, thermostats, polariscope, and apparatus for conductivity work and the determination of electromotive force. A recent addition is

a large Freas electrically controlled water thermostat, in which a temperature constant to two thousandths of a degree can be maintained for weeks at a time.

One small laboratory is equipped for electro analysis, another for general electric furnace work, and a third for organic synthetic chemistry. The equipment for electric furnace work consists of both arc and resistance furnaces, transformers and motor-generators, vacuum pump for use with vacuum furnaces, and complete outfit for the thermal analysis of metals and alloys. This room is also furnished with gas muffle and crucible furnaces which find use in connection with the work in inorganic preparations.

Two offices and two private laboratories complete the equipment of the Department.

The laboratories and equipment offer good facilities for original research in inorganic, organic, analytical, physical, and mineralogical chemistry, and the Department encourages such work for those having the necessary preparation.

HOME ECONOMICS

The south wing of the third floor in Agriculture Hall has been planned for the Department of Home Economics. The three large laboratories, one for cooking and dietetics, the other two for dressmaking and millinery, are well lighted and adequately equipped. Each sewing laboratory has a large locker and supply room. The pantry of the cookery laboratory is well furnished and convenient. A model kitchen, butler's pantry, and dining room are provided. Practice in all household processes, including the cooking and serving of meals, the cleaning and decorating of rooms, and the care of the sick and convalescent, is given in the Practice House, a five-room cottage. The work is carried out under the supervision of an instructor.

MILITARY SCIENCE AND TACTICS

An armory is fitted with the necessary gun racks and accessories. The equipment includes 200 U. S. magazine rifles, model 1917, with complete accoutrements, 12 sabers with belts, musical instruments for the band, signal flags, target material, one B-H relief map, one sand table, one sand table combination set, one fire distribution set, one target designation set, one musketry target, one 12-inch war game map, etc.

PHYSICAL TRAINING

Gymnasium—Herring Hall, the Gymnasium, is well supplied with standard apparatus such as stall-bars and benches; boom, vault-

ing saddle; balance beams, chestweights, dumbbells, 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, basketballs and goals, five large mats, and set of anthropometric apparatus. In the basement are located one hundred and forty-four lockers, and five shower baths supplied with hot water from a heater with a large reservoir.

Outdoor Equipment—The outdoor equipment consists of two baseball fields, a quarter mile track with 120-yard straightaway, five tennis courts, a football field, hockey field, and basketball court for girls. The new athletic field contains six acres adjoining the gymnasium. A concrete open air swimming pool, 100 feet long and 40 feet wide, and from three to seven feet deep, is in daily use throughout the year.

A physical examination is given each woman student at the beginning of the school year,and a prescription of exercise and other hygienic measures given according to individual needs. Those who have any weaknesses, or bodily defects which can be corrected are given special exercises or training. Each student is observed during the year, and any signs of illness, overwork or condition injurious to health, looked after.

PHYSICS

The Department of Physics has facilities for the demonstration of all important phenomena. A lecture room seating forty persons is fitted with lights, water, gas, heliostat, alternating and direct current 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, repair and store room, photographic dark and enlarging room, and constant-temperature room are provided. A pendulum seismograph is to be installed in the magnetic laboratory and a special space has been provided for a 55-foot Faucault pendulum and the study of falling bodies.

An 8-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 200 feet. The Department possesses also a Knott wireless outfit of ¼-kilowatt power, capable of sending messages about 25 miles; a very sensitive audion receiver with a pair of mica diaphragm telephones; three motor generator sets, the largest having an output of 7 kilowatts; a Leeds and Northrup potentiometer and accessories; a Carey Foster low resistance bridge; a Leeds and Northrup recording galvanometer and bridge with various resistance thermometer bulbs; and a very complete apparatus for showing electro magnetic phenomena, rotary fields, and stationary electric waves, polarization, etc. There is also special apparatus for measuring radiation and for the harmonic analysis of curves.

EQUIPMENT OF THE COLLEGE OF MINES AND ENGINEERING

CIVIL ENGINEERING

The quarters of the Department of Civil Engineering are in the new Mines and Engineering Building and include an instrument room, offices, recitation rooms, a material testing laboratory, and drafting rooms. Two spacious and well lighted rooms provide excellent facilities for drafting, one for lower classmen and the other for advanced students. Individual lockers are available in which the student may keep private instruments and equipment.

The surveying instruments include eight transits, six 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 3-gang abrasion cylinder, a tensile testing machine, briquette molds, cube molds, molds for concrete beams, molds for specimens for testing shearing strength of concrete, Vicat needle machines, specific gravity flasks, sieves, drying oven, moist chamber, immersion tanks for cement and concrete specimens, and other auxiliary equipment.

For the laboratory work in hydraulics space and special equipment have been provided in the mechanical engineering laboratory, located in the new Mines and Engineering Building. Tanks, concrete reservoirs and pits, weirs, and other equipment are available for indoor laboratory work in this subject, in addition to which much excellent work can be carried on out-of-doors. The swimming pool is utilized for rating current meters, and irrigation ditches are used for various experiments relating to the flow of water in open channels.

ELECTRICAL ENGINEERING

The laboratory is well equipped for carrying on all tests on direct and alternating currents, circuits, and machines. A standard Northrup millvolter enables instruments to be quickly and accurately calibrated, thus insuring high accuracy in the work done. Power comes in from the campus power house at 220 volts, 60 cycle, 3 phase and may be transformed for various uses by three 2 kw. transformers. These being wound for a variety of standard voltages, all standard polyphase transformer connections may be made and studied. Direct current power is obtained from a local set in the laboratory, a 20 kv.a. 3 phase 220-volt synchronous motor driving a 23-horsepower Crocker-Wheeler compound wound direct current generator. Power is delivered from the AC-DC switchboard to various outlets in the laboratory. The remainder of the equipment consists of a 5 kw. Packard variable voltage auto transformer; a Thordarson 110-23000 volt transformer for high voltage testing and experimenting; a Tesla coil for high frequency work; a constant current transformer; a 1000 ampere welding transformer; variable inductance coils, condensers, and resistances; a Crane lecture room oscillograph; a General Electric standard oscillograph; standard test tables; three current transformers; integrating wattmeters; a recording ammeter; standard resistances and a standard coil; a Leeds & Northrup potentiometer; a galvanometer; a large assortment of ammeters, voltmeters, and wattmeters for all classes of work; one 7 kw. 3-phase, interpole, compound wound Westinghouse rotary converter, used also as DC generator or motor and AC generator or motor; a 5 kw. Fort Wayne 2-phase, 3-phase rotary converter used in similar manner to above machine; a 5 kw. General Electric 3-phase rotary converter used similarly to two previous machines; a 5-horsepower Fort Wayne direct current compound motor; a 5-horsepower General Electric direct current compound motor; two 2.5-horsepower Westinghouse shunt motors; a 3.5-horsepower Westinghouse compound motor; a 5.5-horsepower Westinghouse compound motor; a 7.5 kw. Westinghouse compound generator; a 110 volt 3-horsepower series motor; a 3-horsepower Edison bipolar generator; a 3-horsepower Mather generator; a 1½ kw. Fairbanks-Morse compound generator; several fractional horsepower direct current machines; a series parallel Westinghouse controller with resistance grids for series motors; a 72 ampere-hour Edison storage battery; a 15-horsepower General Electric 3-phase 220 volt squirrel cage induction motor; a 15-horsepower Wagner 3-phase 220 volt variable speed induction motor; a 5-horsepower Westinghouse induction motor, 3-phase, 220 volt, with leads

brought out for study of winding connections; a 5-horsepower Westinghouse induction motor, type C; a 5-horsepower Westinghouse, type A, single phase induction motor; a 3-horsepower Century single phase induction motor, repulsion motor start.

GEOLOGY AND MINERALOGY AND PETROLOGY

These departments share quarters on the second floor of the new Mines and Engineering Building, and occupy a suite of rooms which includes a large museum, lecture room, mineralogical laboratory into which open two glass-partitioned oral-quiz rooms, a geological drafting room, photo-metallographic room, work room, stock and apparatus room, and an office. In the basement, close to the elevator, is a large store room.

The present equipment includes a set of index fossils, and a working collection of fossils; a large number of specimens illustrating phenomenal geology; all necessary minerals, apparatus, and reagents for teaching blowpipe analysis; a type collection of minerals aggregating about 1000 specimens, classified according to Dana; supplementary collections illustrating the physical properties of minerals; a type collection of rocks numbering several hundred pieces, and including the new Ward-Clark Collection of American Rocks; a working collection of minerals comprising about 20,000 specimens; an already large, and rapidly growing working collection of rocks; 300 pasteboard, and numerous glass and wooden models of crystals; a working collection consisting of nearly 1000 natural crystals; a large number of geologic, topographic, and geographic maps and charts, including the Shaler-Davis physiographic models and photographs; models and apparatus for demonstrating the work of various geologic agents; a stereopticon and a large number of carefully selected slides; a Natchet polarizing microscope, and a Leitz metallographic outfit for the study of polished ore surfaces; and a complete outfit for work in field geology, including a transit, plane tables, telescopic and other alidades, barometers, pedometers, pocket transits, pocket levels, and a telometer.

Field Work—The Departments of Geology, Mining, and Metallurgy enjoy opportunities to carry on extensive field work during the academic year. It is planned to make the overland trip to the Grand Canyon by way of the Petrified Forests, Painted Desert and Northern Arizona volcanic field, a biennial feature of great value to students of geology. In addition, frequent trips of one or two days' duration are made in the vicinity of Tucson. Briefly, the region consists of deformed Paleozoic, Mesozoic, and Cenozoic sedimentary rocks, in some places resting upon pre-Cambrian meta-sedimentaries, in others

directly upon a base of schists and composite gneisses of pre-Beltian age; and of various Mesozoic and Tertiary intrusives and extrusives. The mountains which are separated by wide, partly waste-filled valleys which increase in size toward the southwest consist, in part, of maturely eroded fault-blocks, and, in part, of less completely dissected chains which are a composite folding and faulting. Thus, many varied features of geology and physiography are presented, as well as several types of ore deposits, such as contact metamorphic deposits in the Twin Buttes and Silverbell districts, veins and replacements in connection with intrusive granitic rocks in the Santa Rita and Patagonia Mountains, and veins intersecting late Tertiary extrusives in the Mammoth district and the Tucson Mountains. In the immediate vicinity of Tucson there are several large producers, and a great number of smaller mines which afford opportunities to study a large variety of mine development and mining methods as well as geological features. There are also several concentrating mills and a copper smelter in the vicinity.

MECHANIC ARTS

The new Mechanic Arts Building, a brick and wood structure completed in the spring of 1918, provides commodious and convenient quarters for the various shop courses, as well as an office, exhibition room, locker and lavatory room, finishing room, etc.

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

The forge room is equipped with down-draught forges, a hardening and tempering furnace, a power hammer, a power drill press, and the usual assortment of small tools and appliances.

For the study of drawing and machine design the Department is provided with a large assortment of models and drawings, and the trade literature of a large number of concerns in the machinery field.

The machine shop is equipped with a 24-inch Lodge and Shipley engine lathe with taper attachment, two 14-inch Lodge and Shipley lathes, a 14-inch Pratt and Whitney lathe with taper attachment, a 12-inch Seneca Falls lathe with taper attachment and provided with drawn-in chuck and English and metric change gears, a 10-inch Reed speed lathe, a 16-inch Cincinnati shaper, a 24-inch by 6-foot Woodward and Powel planer, a Brown and Sharp No. 2 Universal milling machine, Brown and Sharp No. 1 Universal grinder, a Prentice 24-

inch drill press, a 13-inch Slater sensitive drill, a power hack-saw, a drill grinder, an emery stand, a grinding attachment for lathes, a 1½-ton portable hoist, a 1-ton triplex hoist, and a ½ ton screw hoist, and an arbor press.

Each shop is provided with its own tool room for small tools, gauges, and measuring implements.

MECHANICAL ENGINEERING

Quarters for the Department of Mechanical Engineering are provided in the new Mines and Engineering Building. Large, well lighted rooms for mechanical drawing and machine design are located on the third floor, together with a lecture room, model room, blueprint room, store room, and instructor's office. Provision is made for adequate locker facilities, drawing tables and cabinets, catalogue files, projection lantern, etc. The Department office is on the second floor.

The work in experimental engineering will be carried on in the new mechanical laboratory in the rear of the building. Ample provision is made for the testing of a great range of mechanical apparatus and for research work in that field. The laboratory is supplemented by the University power house and its equipment, as described elsewhere.

The mechanical laboratory equipment includes a 75-horsepower internally fired boiler with accessories; a small vertical boiler, a 35-horsepower Atlas center crank engine; a Chuse high speed center crank engine directly connected to a Fort Wayne 50 kv.a. alternator; a 30-horsepower Fort Scott engine; a Worthington duplex direct acting steam pump; a Fairbanks-Morse gasoline engine; an automobile motor; a small Pelton wheel; a turbo blower; a single stage and double stage centrifugal pump, as well as small pumps, motors, injectors, etc. The Department is also well provided with such apparatus as gauges, steam indicators, weighing scales and calibrating instruments. Apparatus is also at hand for testing fuels, flue gases, lubricants, etc. The new power and heating plant has been so arranged as to offer facilities for advanced work in power plant testing and for investigations in steam and hot water heating. The power plant equipment includes two Stirling water tube boilers with superheaters, two Chuse new type Uniflow engines directly connected to General Electric alternators; a Cochran open feedwater heater and C. H. Wheeler condenser. The boilers are oil fired.

METALLURGY

The new quarters of the Department in the Mines and Engineering Building include a laboratory for fire assaying with separate parting and weighing rooms, a metallurgical laboratory for small scale work, and a metallurgical laboratory for large scale work.

The laboratory for fire-assaying is equipped with furnaces using gas, gasoline, and oil for fuel so that a student may have an opportunity to use all three types. The laboratory is designed to accommodate twenty-five students at one time.

The metallurgical laboratory for small scale work is designed mainly for practice and experimental work in ore dressing and hydrometallurgy. The Department has already on hand the following equipment for this room: Janney, Callow, and K. & K. flotation machines, Callow miniature plant consisting of a jig, classifier, Wilfley table and feeder, percolators, and two 150-pound cyanide plants.

The laboratory for large scale work in milling and hydro-metallurgy contains a crushing and sampling room with a partition between it and the main laboratory. The equipment already on hand for the crushing room includes breakers of the Blake, Dodge and Gyratory types, a small pebble mill, a Chipmunk sample crusher, and a Braun pulverizer. The main laboratory is equipped for larger scale work than is possible in the small laboratory. During the past year a twenty-ton Simplex flotation plant and a Huff electrostatic machine have been installed in the metallurgical laboratories by the manufacturers of these machines.

MINING ENGINEERING

The Department of Mining Engineering occupies quarters in the new Mines and Engineering Building and is amply provided with office, class room, drawing room, and laboratory facilities. A large reflectroscope of latest design has recently been added to aid in class room instruction.

The laboratory equipment includes a large assortment of hand and machine tools with all needful accessory apparatus; a WG 3 8x8 Sullivan belt-driven compressor, with 30x6 pressure tank; a FF12 Sullivan 2½ Lite Weight drill with tripod; a DC19 jack hammer drill, Sullivan type; a Waugh drifting drill; a Chicago stoper; a 40G Cleveland stoper; a No. 1 Model V Murphy block-hole drill; a 2½-inch Pacific rock drill, with clamp and column; a 3-inch Leyner Model 5 slugger, with tripod; a 4E Temple-Ingersoll electric air drill, with clamp and column; a 2½-inch Wood drill, with clamp and

column; a McKiernan-Terry jack hammer drill; a model 55 Denver clipper drill, and five Sullivan class D.P. rotators.

For testing purposes the Department provides a Paynter rock drill testing machine complete with all accessories. The large two-stage Ingersoll-Rand compressor, belonging to the Department of Mechanical Engineering, is available for investigations concerned with the generation and transmission of compressed air.

The sharpening department is equipped with a Buffalo forge and a No. 3 Leyner oil forge, anvils, and complete assortment of tools.

Drilling operations are carried on out of doors in a specially designed pit heavily bulk-headed with concrete.

Pumping and drainage are illustrated by a 6x24 Fernier sand pump; a Cameron model pump; a 4-inch type EE American centrifugal pump; a 5½x2⅛x3 Blake pump; a 1-inch Class O Buffalo centrifugal pump; a model Connellsville cycloidal pump; a 3x2x3 Dow steam pump; an Edison 8-foot trench pump; a type N Kingsford centrifugal pump; a 2-inch Krogh vertical centrifugal pump; and a 5¼x3½x5 Worthington steam pump. The above apparatus is arranged for operation in conjunction with the new hydraulic testing laboratory.

Ventilation is studied with the aid of one double inlet Sirocco fan; a model Connellsville involute blower; a 3½-inch Acme blower, and a 12-inch Typhoon blower.

The timber framing department is supplied with tools and presses, and an assortment of models illustrating the use of timber underground, as well as the construction of head frames, ore bins, etc., above ground.

OPTICAL MINERALOGY AND PETROGRAPHY

The laboratory contains seven petrographic microscopes including both American and foreign makes, a 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 sections corresponding, one hundred and twenty oriented sections of minerals, and apparatus for photomicrography and projection. For the study of crystal measurement, there are several two-circle contact goniometers and one two-circle reflecting Goldschmidt goniometer, apparatus for projection and drawing of crystals, and a model machine for cutting crystal models from plaster of Paris.

STUDENT RESPONSIBILITIES AND ACCOMMODATIONS

Student Body Organization—The students are organized under the title, The Student Body Organization, for the purpose of carrying on all student enterprises with the co-operation and under the supervision of a faculty committee. The organization has a carefully drawn constitution, a President, Vice-President, Secretary and Treasurer. Much of the business of the organization is carried on in a House of Representatives which meets twice a month and to which two faculty members belong. The funds of the organization are kept in the hands of the Financial Secretary of the University.

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

Dormitories—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, and in Arizona Hall, accommodating forty students; Pima Hall and West Cottage provide accommodations for forty-two students; to accommodate the increase of women students, a third hall, East Cottage, has been opened. The new Woman's Dormitory furnishing accommodation for one hundred young women will be ready for occupancy in September, 1919. Each of these halls is under the supervision of the Dean of Women; the two cottages have Head Residents, who preside over the hall. All dormitories are lighted by electricity. All students sleep on open porches, screened and properly sheltered. Rooms contain a rug, tables, chairs, chiffoniers, and are supplied with bed linen. Students supply their own blankets, towels, brooms, laundry bags, and such articles as they may desire for ornamenting their rooms. They care for their own rooms under the direction of the head of their dormitory.

Women students should come to the University supplied with a thick, warm bathrobe to wear to and from the swimming pool and on the sleeping porches. It is also suggested that they provide themselves with an all-over sleeping suit of cotton flannel for wear during the winter, that they may be thoroughly comfortable on the sleeping porches. For hygienic reasons all beds are single ones, so that more special provision for warmth must be made than is necessary when

double beds are used. Approved clothing for gymnastic and athletic wear may be purchased after arrival.

Residence Off the Campus—The residence of students off the Campus, so far as these students are not living in their own homes, is subject to the approval of the University authorities.

The Dining Hall—The Dining Hall of the University is under the management of a trained dietitian who is responsible to the President and the Board of Regents. It is the aim of the University to serve substantial, wholesome, appetizing meals at cost. Students and members of the faculty who reside outside the dormitories may board at the Dining Hall with permission of the President. All young women of the halls are expected to take their meals at the Dining Hall. Board is payable in advance on the first of each month.

EXPENSES AND FEES

Tuition—The University of Arizona requires no general tuition fee of students who are legal residents of the State of Arizona, and there is no charge for instruction except for some courses in the Department of Music. Students who are non-residents of the State pay a tuition of $30 annually. A non-resident is (1) a minor whose parents or guardians are not residents of Arizona; (2) a student of legal majority who comes to Arizona without the intention of making this State his home. Students from Spanish-American countries and Belgium are by courtesy exempt from tuition.

Incidental Fee—An incidental fee of $10 is payable annually by all students on the day of registration, $5 of which is credited by the University to the Student Activity Fund. *On the incidental fee there is no rebate if for any reason a student is compelled to leave the University,* the amounts collected having already been either expended in cost of registration or distributed to the individual student enterprises. But students entering at the opening of the second semester are required to pay only $5 of this incidental fee.

Board—Board on the Campus is charged for at the rate of $22.50 per month. The University charges for board only a sufficient amount to cover its cost, and reserves the right to increase the rate sufficient to meet increases in the price of foodstuffs.

Rooms—Rooms in the dormitories of the institution are double rooms, costing each student $18 each semester, payable in advance at the time of registration. *No portion of this amount is rebated, except in case of withdrawal from the institution.*

Cadet Uniforms—Freshmen, Sophomores, and others who are required to take Military Drill, are required to provide themselves with uniforms, and to this end must deposit on the day of registration the sum of $25 to cover the cost of same.

Encampment Expense—The cadets will also pay the cost of their transportation to the annual encampment amounting to about $5. Students who are members of the cadet companies and do not live on the Campus are charged $4 for their board during the period of encampment.

Laboratory Fees—In certain laboratory courses deposits are required as security for the payment of the cost of breakage and material supplied. A statement of the amount of such deposits may be found in connection with the announcement of courses. Any balances remaining in these funds are returned to the students upon the completion of such courses.

Trips for Engineering Students—Trips to nearby mines, mills, smelters, and power plants are made during the year by the students in mining, metallurgy, geology, mechanical and electrical engineering, and the students shall pay a minor share of the transportation expenses and all personal expense. The expenses will be made in all cases as low as possible.

Checks and postoffice or express money orders should be made payable to the University of Arizona.

ASSISTANCE TO STUDENTS

Self-Support—Various positions about the grounds, buildings, and laboratories of the University, paying from $4 to $30 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 people, able to do this outside work and at the same time maintain a good record as students.

The Students' Loan Fund—The Students' Loan Fund 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.

SCHOLARSHIPS

County Scholarship—By Act of the Legislature, a scholarship in the University is granted to each county of the State, to be assigned to that student who passes the best examination set by the University. The examination is under the supervision of the County School Superintendent and is held in the month of May. The papers are read at the University; 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, Geometry, or a second science). The examination is restricted to five subjects.

The scholarship amounts to $500 a year and is payable by the State direct to the University, to be applied on the student's bill for board, room, incidental, and other fees.

The scholarship is good for one year at the University and is to be held during the student's Freshman year. When a county offers no candidate for the Freshman class, a candidate for admission to a higher class in the institution may apply for the qualifying examination and if successful, secure the scholarship.

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.

The Collegiate Club Scholarship—The Collegiate Club of Tucson has for several years given a scholarship stipend of $50 to aid in the education of some young woman recommended by a committee of faculty members of the Collegiate Club. In the year 1917-18 the Club added a second scholarship of $150, as a war measure, to assist in the education of some young man registered in the College of Mines and Engineering, and during the present year two scholarships of $100 each were awarded by the Collegiate Club to women students in the University.

The University Club of Tucson Scholarship—The University Club of Tucson contributed during the present year one scholarship of $150. During the coming year this Club has voted two scholarships of $150 each to be given to worthy young men.

The University of Arizona Alumni Association Scholarship—The University of Arizona Alumni Association has established a scholar-

ship of $150 annually, to be awarded by a committee of the alumni in consultation with the President of the University.

The Arizona Federation of Clubs Scholarship—The State Federation of Clubs not infrequently makes a University student the beneficiary of one of its scholarships.

The Tucson Woman's Club Scholarship—The Tucson Woman's Club has established a scholarship of $150 annually, to assist in the education of some worthy student.

BUREAU OF MINES FELLOWSHIPS

The University of Arizona, through the Arizona Bureau of Mines, offers two fellowships to men holding Bachelors' degrees who have specialized in metallurgy or chemistry as undergraduates. Each fellowship yields $750 per year of twelve months, and the fellows are expected to put half their time during the academic year and all of their time during the summer vacations upon research work for the United States Bureau of Mines Experiment Station located on the Campus of the University. Time not utilized in this way must be spent in study in candidacy for an advanced degree. The University offers unusual advantages to those wishing to do advanced work in mining, metallurgy, and geology.

Applications for these fellowships should include an abstract of the applicant's undergraduate work signed by the proper college authority, letters of recommendation from instructors or others capable of judging of the candidate's character and ability to engage in research.

BUREAU OF RECOMMENDATIONS

The University of Arizona maintains a Bureau of Recommendations for the purpose of helping deserving students and graduates who have received their training at the University of Arizona, to secure desirable positions, and of leading employers to find well prepared and efficient workers. No registration fee is charged, and the bureau, without expense to the candidate, forwards to those interested in his application confidential information which it has collected concerning him. All students desiring to register with the bureau will consult the Chairman.

ADMISSION

GENERAL REQUIREMENTS APPLYING TO ALL NEW STUDENTS

Age—All applicants for admission to the University must be at least sixteen years of age.

Character—All new students are required to furnish satisfactory evidence of good character, and certificate of graduation or of honorable dismissal from the school last attended.

Health—All students at the time of registration shall submit a statement, signed by a reputable physician, certifying to good health or to such disability as will not in any way affect the student's University work or his membership in the University.

REQUIREMENTS FOR ADMISSION TO FRESHMAN RANK

All applicants for admission to Freshman rank in the University are expected to have completed the equivalent of a four-year high school course including the work indicated by the fifteen credits specified below:

English 3	Physics, Chemistry or Biology 1
Algebra.....1½	Latin, Greek, French, German, or Spanish.....2
Plane Geometry.....1	Electives 5½
History and Civics.....1	

A credit is understood to stand for one study pursued satisfactorily five times a week for one year.

All departments of the University require fifteen credits for admission.

All departments excepting the College of Agriculture require the distribution of credits called for above. This college differs from the other departments in its requirements in one point only. For admission to the four-year course in agriculture, a student may substitute two elective units for the two years of a foreign language.

SCOPE OF ADMISSION REQUIREMENTS

ENGLISH

English—3 credits. (a) English Composition. The candidate should have the ability to express himself in writing clearly and consecutively. No candidate will be accepted whose work is notably de-

fective in point of neatness, spelling, punctuation, idiom, or division into paragraphs. (b) English Classics. The classics to be studied in preparation for college English are divided into two classes, those intended for thorough study and those intended for general reading. Preparation in the former class should cover subject matter, form, and structure, and the leading facts in those periods of English literary history to which the prescribed books belong. In the latter class, the student should secure general knowledge of the subject matter, and of the lives of the authors. In exceptional cases an equivalent amount of reading and study in other than prescribed works will be accepted as a substitute.

For thorough study for 1920 Shakespeare's *Macbeth* or *Hamlet;* Milton's *Comus, L'Allegro,* and *Il Penseroso,* or selection from Book IV of Palgrave's *Golden Treasury;* 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-V of College Entrance Requirements in English for 1920-1922.

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 Hawkes, Luby and Touton, *Complete School Algebra,* or Slaught and Lennes.

Plane Geometry—1 credit for a year of work. The requirement is based upon the work outlined in text-books such as Wentworth and Smith's *Geometry,* with special reference to original exercises and notebook work.

Solid Geometry—½ credit for a half year of work. Original exercises and notebook work are required.

HISTORY

To meet the requirements in history the student should have acquired a knowledge of events as presented in any of the standard text-books. There is required further an interpretation and analysis of these events, which include an understanding of the causes and results of any movement, and an appreciation of the various influences acting in the development of an institution.

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.

LANGUAGES

*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; 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. Two years of high school work to cover the following texts or their equivalent: P. V. Bacon's *German Grammar,* Storm's *Immensee,* von Hillern's *Hoeher als die Kirche,* Meyer-Foerster's *Karl Heinrich,* Schiller's *Wilhelm Tell.*

*French—2 credits. Two years of high school work, covering the following texts, or an equivalent: Frazer and Squair, *French Grammar,* (Part I), with additional drill on the irregular verbs; Aldrich and Foster, *French Reader;* Allen and Schoell *French Life;* Halévy *L'Abbé Constantin.*

*Spanish—2 credits. Two years of high school work, covering the following texts, or an equivalent: Hänssler and Parmenter, *Beginner's Spanish;* Ingraham-Edgren, *Spanish Grammar;* Turrell, *Spanish Reader;* Alarcón, *El Capitán Veneno.*

SCIENCE

Physical Geography—1 credit or ½ credit. A year or half-year of work should include the principles of the subject, as treated in the best recent text-books, field, and laboratory study, and the interpretation and steady use of topographic and weather map and charts. The subject may be combined in half-credits with physiology, which may in its turn be offered as a full credit if so desired.

Botany—1 credit or ½ 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.

*The courses offered should include the texts named, 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.

Chemistry—1 credit. A year's course of descriptive chemistry, consisting of both class-room and laboratory work, 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 text-books the year's course should include continuous and systematic laboratory practice, recorded in a notebook.

ELECTIVES

The electives offered for admission should be chosen from the subjects named above or any other subjects ordinarily taught in high schools and accepted by colleges and universities of standing, with the following restrictions:

Credit to the extent of one unit each may be allowed in music, freehand drawing, mechanical drawing, shop work, home economics, stenography, typewriting, and bookkeeping, or two units may be allowed for stenography including typewriting. Credits in other subjects may be presented for the consideration of the Registration Committee.

METHODS AND CONDITIONS OF ADMISSION TO FRESHMAN RANK

Admission on Certificate—The University admits without examination graduates of approved high schools of Arizona, presenting certificates showing them to have completed satisfactorily the courses prescribed for admission on page 53 in this catalogue.

This Transcript of High School Credits should in all cases be sent by the high school officer to the Registrar of the University before the student applies for admission.

The following is a list of accredited high schools in the State of Arizona whose graduates are entitled to entrance into the University of Arizona without examination:

Bisbee
Benson
Clarkdale
Clifton
Douglas
Glendale
Globe
Jerome
Mesa
Morenci
Flagstaff Normal School
Florence
Kingman
Miami
Safford
Tempe Normal School
Nogales
Phoenix

Prescott	Williams
Tempe	Willcox
Tucson	Yuma
Winslow	Gila Academy

The following schools are accredited for such a part of the four-year course as the students may present:

Casa Grande	Gilbert
Duncan	St. John's Academy
Metcalf	Tombstone
Chandler	Snowflake Academy
Holbrook	

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.

Admission by Examination—Students lacking satisfactory credentials will be examined on the work required for admission, on the first two days set aside for registration. Application for such examinations should be made at least two weeks before the date for the entrance examinations.

Time of Removal of Entrance Deficiencies—All entrance deficiencies must be removed not later than the beginning of the Junior year. Such deficiencies as are not met by that time will be satisfied where possible by cancellation of such college units as may be necessary to satisfy the entrance requirements.

Manner of Removal of Entrance Deficiencies—An entrance deficiency may be removed by examination, or if the deficiency is in other than required work, by transfer of college credit to entrance credit on the basis of six units of college work, three hours a week for a year, to one entrance credit, five hours a week for a year.

ADMISSION TO ADVANCED STANDING

From Other Colleges—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. No degree will be granted to any student for less than 20 units of resident work, distributed through not less than two semesters. 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.

Entrance Requirements of Students Admitted to Advanced Standing from Institutions of Equivalent Rank—Students who have had one or more years of work at an institution of equivalent rank to the University of Arizona and who have satisfied the entrance requirements of that institution will be given full entrance standing.

Admission from Arizona Normal Schools—Graduates of the six-year course in the Tempe and Flagstaff Normal Schools are given a maximum credit of 55 units in the University, which shall not cancel requirements in English Composition 1, 2.

ADMISSION OF SPECIAL STUDENTS

Students over twenty-one years of age, who have not met the entrance requirements, may be admitted to the University as special students, and may elect, with the consent of the instructor in charge, such courses as they are prepared to carry with profit. A special student, twenty-five years of age, may, by permission of the faculty, become a candidate for a degree, subject to the fulfillment of such requirements regarding entrance work as may be determined by the faculty.

Soldiers, honorably discharged from the U. S. army, may enter under the above conditions without meeting the age requirement.

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.

ADMISSION OF UNCLASSIFIED STUDENTS

Students over twenty-one years of age, who have met the entrance requirements, but who do not wish to become candidates for a degree, are, upon presentation of a satisfactory written statement of reasons for taking special work, admitted to the University as unclassified students. Students who are not yet twenty-one years of age, who have met the entrance requirements, are admitted as unclassified students only when the request to pursue a special course is accompanied by the written approval of parent or guardian.

REGISTRATION

Qualifications—All facilities and privileges of the University are open to properly qualified persons of both sexes. The qualifications in age, character, health, and scholarship required for registration are stated on page 53.

Time and Place—All students are required 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.

Penalty for Late Registration—For late registration a fee of $1 will be charged for the first day, and twenty-five cents for each day thereafter, until a maximum of $2 is reached.

Presentation of Credentials—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, and a copy of the school catalogue or course of study in order to facilitate registration.

Fees—An incidental fee of $10 is payable annually by all students on the day of registration. For other fees and deposits payable at the opening of the year see page 47.

Certificates of Registration—Each student must obtain from the Registrar's office a Certificate of Registration indicating that fees have been paid and that the student is entitled to enroll in class work.

Study Cards—Students in the Freshman and Sophomore years select, with the advice of the Dean of the College in which they register, the courses for the ensuing semester and inscribe them on a study card. The study card, bearing the signature of the Dean, must be filed with the Registrar not later than three days after the date of registration.

For students in the Junior and Senior years, the method of procedure is the same, except that the study card is filled out with the advice of the head of the Department in which the student's major subject is chosen, signed by him, and countersigned by the Dean.

Required Subjects—All men in the Freshman and Sophomore years are required to register for military instruction.

Physical training is required for women throughout the Freshman and Sophomore years.

Each student must register for the required subjects of his course as far as possible in the year for which they are prescribed. Arrangements for making up entrance deficiencies should be sought at each registration. English Composition 1 and 2 is required of Freshmen. For the specific requirements of the several courses leading to degrees, see outlined courses of study, pages 86 to 179.

Elective Subjects—Entering students may not elect work in excess of the number of units recommended in the course for which they register. Petitions to elect work in excess of number of units recommended in the course for which a student registers, will be considered only when presented by students whose capacity for work has been demonstrated to the satisfaction of the faculty.

Change of Registration—Registration may be changed within ten days of entrance into the University by obtaining the proper card from the Registrar, and securing thereon the signatures of both instructors concerned, and that of the Dean. In the case of Juniors and Seniors it must also bear the approval of the head of the Department in which the student's major is taken.

Registration may not be changed after the expiration of the ten days' limit, except after investigation and approval by the Registration Committee.

GENERAL REGULATIONS AFFECTING REGISTERED STUDENTS

Attendance—A student having registered for a course, is required to attend all resulting appointments regularly. Any student who is absent three times from one class is automatically suspended from that class, and when his absences from all classes reach twelve, he is suspended from all University work. Absences from a class during neglected suspension from that class, count towards this total.

Excuses for absence during a stated length of time may be secured beforehand by presenting a petition to the Dean of the College in which the student is registered, or to the President. The petition having been approved by the Dean or the President, is filed with the Registrar.

Reinstatment—Students automatically dropped from classes or University under the ruling stated above may apply for reinstatement by filing with the Registrar a petition for such reinstatement, together with the approval of the Dean or the President and the instructors concerned. Such petition shall state in writing the circumstances of the absence.

Absence Before and After Holidays—Students absent without excuse on the day before or after holidays will not be permitted to take the regular examination at the end of the semester, but must take special examinations later; and in laboratory courses such students will be recorded as incomplete at the close of the semester.

Withdrawal from Courses—To withdraw from a course during a semester a Freshman or Sophomore must secure the approval of his instructor and the Dean of his College, and deposit with the Registrar the official withdrawal card properly signed by the instructor and the Dean concerned. A Junior or Senior must further secure the approval and signature of the head of the Department in which his major is taken. For such a withdrawal, made at least six weeks before the close of the semester, the grade W shall be entered on the records.

Dismissal from Courses—After conference with the President and the Dean of the College in which the student is registered, an instructor may, at any time, dismiss a student from a course. Written notice of such action, signed by the Dean and the instructor interested, should be sent immediately to the Registrar. Such a dismissal is considered a failure and is indicated on the records by the grade X.

Grades—The grades awarded in courses of study are given on the basis of relative position in a series. These grades are: 1, 2, 3, 4, and 5. Grades 1-4 indicate different ranks of passing work; grade 5 indicates failure. As a standard of grade distribution to be approximated as closely as possible a normal probability curve has been adopted. D and I are used to indicate deferred grading; D, a failure that may be removed by extra-class requirement or examination only at the time set for condition examination; I, incomplete, because of illness or other accepted reasons, a deficiency that may be made up at the convenience of the instructor. W is used to indicate approved withdrawal; 5, a failure, can be removed only by repeating the course.

Eighty per cent of the work done for a degree must be above the grade of 4.

Only one attempt to remove a D condition by examination or extra-class work is permitted. Such a condition must be removed before the repetition of the course in which it has been obtained, and if not so made up, automatically becomes 5, necessitating the repetition of the course.

Continuance in College—All students shall be required to carry with a grading above D, at least 50 percent of the work for which they are registered. Students who are unable to do so shall be barred from class privileges for one semester. Such students may be granted a card of honorable dismissal, in which a statement regarding deficiency in work shall be expressly included. Students coming from other institutions of similar standing with dismissals of this kind will be required to give continued evidence of ability to carry successfully the work in the courses which they elect.

Eligibility to Student Activities—A student must be carrying at least ten units of work to be eligible for any regular student activity. Any student failing (that is, receiving D, I, or 5) in 25 per cent or more of the hours for which he is registered in a given semester, shall be debarred from holding any office in the Student Body Organization, or in any student organization of the University, and from representing the University or any organization of the University in any contest or public performance, until such time as these deficiencies shall be removed and assurance given by the instructors concerned that at least 75 per cent of such student's work is of passing grade. The Committee on Student Scholarship, with the approval of the President, shall have authority to debar any student from holding such offices or so representing the University whenever instructors shall report delinquencies in 25 per cent of such student's registration; notice of

such action will be sent to the student and to the faculty members of the House of Representatives.

Classification—A student to have Sophomore standing must have obtained 20 units of college credit, and must have fulfilled the entrance requirements.

A student to have Junior standing must have obtained 55 units of college credit, and must have fulfilled entrance requirements.

A student to have Senior standing must have obtained 90 units if a B.S., A.B., or B.S.A. candidate, and 100 units if a candidate for an engineering degree.

Classification is based upon the number of units credited at the beginning of the school year.

Petitions—Students or classes desiring to make requests of the faculty should file their petitions 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.

DEGREES

THE BACHELOR'S DEGREE

General Statement—The University offers four-year courses of literary and scientific study leading to the degrees of Bachelor of Arts and Bachelor of Science, and four-year courses of more technical study leading to the degrees of Bachelor of Laws and Bachelor of Science in some specified field; Agriculture, Commerce, Chemistry, Civil, Electrical, or Mechanical Engineering, or Mining Engineering and Metallurgy. Great latitude of election is given in literary and scientific courses, but the technical courses are more rigid in their requirements. No degree is granted to any student for less than 20 units of resident work, distributed through at least two semesters.

The Unit System—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 usually represents one hour of class-room work a week for a semester, and assumes three hours of application; it may stand for one hour of class-room work and two hours of preparation, or for three hours of laboratory work, or for such distribution as the particular course may demand.

Number of Units Required for Degrees—The number of units required for graduation varies with the course chosen:

In the courses leading to the degrees, Bachelor of Arts, Bachelor of Science, Bachelor of Laws, Bachelor of Science in Agriculture, and Bachelor of Science in Commerce, 124 units, including four units in Military Tactics for men, and four units in Physical Training for women, are required.

In courses leading to the degrees, Bachelor of Science in Chemistry, Bachelor of Science in Civil Engineering, Bachelor of Science in Electrical Engineering, Bachelor of Science in Mechanical Engineering, Bachelor of Science in Mining Engineering and Metallurgy, the requirement for graduation is 144 units, including four units in Military Tactics for men, and four units in Physical Training for women.

Thesis—Any candidate for a Bachelor's degree may present as part fulfillment 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 not to exceed four units, are to be approved by the head of

the Department in which the thesis is taken, and the Registration Committee. The completed thesis must be presented not later than three weeks before the Commencement Day.

Not more than 30 units of work in subjects from Group VII and Law shall be counted for credit for the A.B. or B.S. degrees, and for such degrees no majors shall be allowed from the subjects of Group VII and Law.

Grouping of Subjects—For convenience in outlining courses the various subjects taught in the University are grouped as follows:

Group I. English Composition and Rhetoric, English Literature.

Group II. Latin, Greek.

Group III. Spanish, French, German.

Group IV. History and Archaeology, Social Science, Philosophy and Psychology, Education, Law, History of Art, History of Music..

Group V. Military Tactics, Physical Training.

Group VI. Astronomy, Botany, Chemistry, Geology, Mathematics, Mineralogy, Physics, Zoology, Bacteriology.

Group VII. Agriculture, Home Economics, Mechanic Arts, Military Science, Engineering, Metallurgy.

REQUIREMENTS FOR THE DEGREES OF BACHELOR OF ARTS AND BACHELOR OF SCIENCE

The candidates for the degrees of Bachelor of Arts and Bachelor of Science are allowed a large measure of freedom in choice of work, but to safeguard them from choosing too narrow and highly centralized courses, and at the same time to secure reasonable concentration, they are subject to the following restrictions:

No candidate for the degree of Bachelor of Arts or Bachelor of Science may take over 50 units in one Department.

Every candidate for the degree of Bachelor of Arts or Bachelor of Science must elect and file with the Registrar before April the first of the Sophomore year, a major subject in which he must take from 24 to 40 units. The exact number of units, including the thesis, if a thesis is offered, is to be determined by the Department. The work on the major subject must be distributed through five semesters. A student may change his major at the beginning of any semester by filing a petition with the Registrar, approved by the heads of both departments concerned, and countersigned by the Dean of the College in which the student is registered.

All candidates for the degree of Bachelor of Arts or Bachelor of Science must take the courses prescribed and distribute a number of their electives in accordance with the outlines given below:

REQUIREMENTS FOR THE DEGREE OF BACHELOR OF ARTS

*Group I (English)	16	units, as follows: English Composition and Rhetoric 1, 2. English Literature 1, 2, and six units taken from English Literature.
Group II or III (Foreign Language)	16	units, one subject
Group IV (History, Philosophy, etc.)	8	units, one subject
Group V (Mil. Drill or Phys. Tr.)	4	units, one subject
Group VI (Science)	8	units, one subject
	52	units required
	72	units elective

The elective major ranging from 24 to 40 units may lie wholly within the 72 electives or be included, in part, in the 52 required units.

With permission of the faculty two related subjects may be combined to form a major.

REQUIREMENTS FOR THE DEGREE OF BACHELOR OF SCIENCE

Group I. (English)	10	units, including English Composition 1, 2
Group III. (Modern Language)	16	units, one subject
Group IV. (History, Philosophy, etc.)	8	units, one subject
Group V. (Mil. Drill or Phys. Tr.)	4	units, one subject
Group VI. (Science)	24	units, including 8 units in Mathematics and 16 units in not more than two subjects.
	62	units required
	62	units elective

The elective major ranging from 24 to 40 units may lie wholly within the 62 electives or be included, in part, in the 62 required units.

SUGGESTED PRE-MEDICAL COURSE

Students intending to take a medical or dental course will find the following suggested courses valuable assistance. The best medical colleges require two years of general college work as a preparation for the medical course, and dental schools are now requiring one year. The pre-medical course outlines two years of such work and the pre-dental one year. By following these suggested courses, students will find themselves better able to pursue the professional course they desire.

*The groups are given on preceding page.

FIRST YEAR

FIRST SEMESTER	UNITS	SECOND SEMESTER	UNITS
English Comp. 1	3	English Comp. 2	3
*Foreign Language	4	Foreign Language	4
Chemistry 1	4	Chemistry 2	4
Botany 1	4	Zoology 1	4
Military 1	1	Military 2	1
	16		16

SECOND YEAR

English Lit.	2	English Lit.	2
Chemistry 23	4	Bacteriology	4
Physics 1	4	Physics 2	4
Psychology	3	Psychology	3
Foreign Language	4	Foreign Language	4
Military 4	1	Military 3	1
	18		18

SUGGESTED PRE-DENTAL COURSE

FIRST SEMESTER	UNITS	SECOND SEMESTER	UNITS
English Comp. 1	3	English Comp. 1	3
Mathematics 1a	3	Zoology 1	4
Botany 1	4	Chemistry 2	4
Chemistry 1	4	Physics 22	3
Physics 21	3	Military 2	1
Military 1	1		
	18		15

REQUIREMENTS FOR DEGREE IN THE SCHOOL OF LAW

ENTRANCE REQUIREMENTS

For Entrance to the University. See page 53.

FOR ENTRANCE TO THE SCHOOL OF LAW

Group I.	(English Comp. 1, 2, English Literature 1, 2)	10 units
Group II, III.	(Foreign Language, one subject)	8 units
Group IV.	(History, Philosophy, etc., except Law)	8 units
Group V.	(Military Drill or Physical Training, one subject)	4 units
	Total required academic credits	30 units

The degree of Juris Doctor (J.D.) will be conferred by the University upon those candidates for a degree in the Department of Law who have satisfactorily pursued and obtained credit in courses of study in the Department of Law totalling seventy-eight (78) semester units and who have been granted the degree of Bachelor of Arts (A.B.) or

*If Latin has not been presented for entrance, this language should be Latin.

Bachelor of Science (B.S.) by this University or by any other accredited institution.

The degree of Bachelor of Laws (LL.B.) will be conferred by the University upon those candidates for a degree in the Department of Law who have met all entrance requirements and have satisfactorily pursued and obtained credit in courses of study in the Department of Law totalling seventy-eight (78) semester units, but who have not secured the academic degree of Bachelor of Arts (A.B.) or Bachelor of Science (B.S.) in this University or in some other accredited institution.

COURSES LEADING TO THE DEGREE OF BACHELOR OF SCIENCE IN AGRICULTURE (B.S.A)

The following subjects with the units of credit assigned are required of all students who are candidates for the degree Bachelor of Science in Agriculture. The student is advised to complete the more elementary of these fundamental subjects before beginning his special work in Agriculture. Students who plan to do their major work in Agronomy or Horticulture are advised to take Botany 3 and Plant Breeding 1. Students who plan to do their major work in Animal Husbandry are advised to take Zoology 2 and Animal Husbandry 8; and students who plan to take the work in Dairying are recommended to take Bacteriology 1. It is recommended that Agronomy 3, Animal Husbandry 8, Plant Breeding 1, Agricultural Chemistry 2, and Physics 21 and 22, all required subjects, be taken during the third or fourth year.

REQUIRED GENERAL COLLEGE WORK

Botany 1, Elementary Botany	4 units
Botany 3 or Zoology 2 or Bacteriology 1	4 "
Chemistry 1, 2, General Chemistry	8 "
English Composition 1, 2	6 "
Mathematics 1b, Trigonometry	2 "
Mechanic Arts 1 or 10, Mechanical Drawing	2 "
Military Tactics 1, 2, 3, 4	4 "
Physics 21, 22, Agricultural Physics	6 "
Social Science 1, 2, Economics	6 "

REQUIRED GENERAL AGRICULTURAL WORK

Agricultural Chemistry 1, Soil Physics	4 units
Agricultural Chemistry 2, Soil Chemistry	2 "
Agricultural Chemistry 7, Food Chemistry	3 "
Agronomy 7 or 8, Farm Crops	3 "
Agronomy 3, Farm Management	3 "
Animal Husbandry 1, Livestock Judging	3 "
Animal Husbandry 8 or Plant Breeding 1	3 "
Animal Husbandry 20, Animal Nutrition	3 "
Dairy Husbandry 1	3 "
Horticulture 2, Plant Propagation	3 "

SUGGESTED COURSE FOR STUDENTS IN AGRICULTURE FOR THE FIRST AND SECOND YEARS

FIRST YEAR

FIRST SEMESTER	UNITS	SECOND SEMESTER	UNITS
English Comp. 1	3	English Comp. 2	3
Math. 1b, Trig.	2	Mech. Arts 10	2
Chem. 1 or Bot. 1	4	Chem. 2 or Bot. 3 or Zool. 2 or Bacteriol. 1	4
Agron. 7 or Dairy Husb. 1 or Hort. 2	3	Agron. 8 or Poultry Husb. 1	3
Animal Husb. 1 or Agric. Chem. 1	3 or 4	Agric. Group Elective	3 or 4
Mil. Tact. 1	1	Mil. Tact. 2	1
	16 or 17		16 or 17

SECOND YEAR

FIRST SEMESTER	UNITS	SECOND SEMESTER	UNITS
Social Science 1	3	Social Science 2	3
Bot. 1 or Chem. 1	4	Bot. 3 or Zool. 2 or Bacteriol. 1 or Chem. 2	4
Agron. 7 or Dairy Husb. 1 or Hort. 2	3	Animal Husb. 20	3
Animal Husb. 1 or Agric. Chem. 1	3 or 4	Agron. 8 or Poultry Husb. 1	3
Agric. Chem. 7	3	Agric. Group Elective	4
Mil. Tact. 3	1	Mil. Tact. 4	1
	18		18

GROUP ELECTIVES IN AGRICULTURE

Students taking the Agricultural course must also complete not less than 16 units in one of the following ten Agricultural Groups. This is in addition to any required general agricultural work that the student may have taken already in that particular department. In planning his major work the student will advise with his major professor concerning the subjects best suited to his needs and the years when these may be taken.

GROUP I. AGRICULTURAL CHEMISTRY—Agricultural Chemistry 4, 5, 6; Chemistry 3, 23, 7, 8, 19, 20.

GROUP II. AGRICULTURAL EDUCATION—Agricultural Education 1, 2; Education 1, 4, 6, 14, 20; Philosophy 9.

GROUP III. AGRONOMY—Agronomy 2, 4, 5, 6, 7 or 8, 9; Entomology 1, 2; Horticulture 1, 3; Plant Breeding 2; Botany 10.

GROUP IV. ANIMAL HUSBANDRY—Animal Husbandry 2, 3, 7, 10, 11, 12, 13, 14, 15, 16, 18, 19, 21, 22; Botany 10; Dairy Husbandry 3; Poultry Husbandry 1.

GROUP V. BIOLOGY—Bacteriology 1; Botany 2, 4, 5, 6, 7, 10, 11, 16; Entomology 1, 2; Zoology 2, 4, 9, 10.

GROUP VI. DAIRY HUSBANDRY—Animal Husbandry 3, 7, 10; Dairy Husbandry 2, 3, 4, 5; Poultry Husbandry 1.

GROUP VII. HORTICULTURE—Botany 11; Entomology 1; Horticulture 1, 3, 6, 9, 10, 11, 12, 13, 14, 15.

GROUP VIII. POULTRY HUSBANDRY—Poultry Husbandry 1, 2, 3, 4, 5, 6; Dairy Husbandry 3; Animal Husbandry 7.

GROUP IX. RURAL ECONOMICS AND ADMINISTRATION—Civil Engineering 15; Education 6 units; English Composition 3, 7, 8, 9; English Literature 1, 2, 20; Law 6 units; Social Science 4, 9, 13, 14, 18.

GROUP X. RURAL ENGINEERING—Civil Engineering 1, 2, 6, 11, 13, 14, 15, 19, 20, 21, 22; Electrical Engineering 1, 9; Mechanic Arts 8, 9, 11, 13, 14; Mechanical Engineering 1, 2, 3, 4, 12; Students taking a major in this course should take as free elective Mathematics 1a, 2, 3, 4, 5, 6.

FREE ELECTIVE WORK

In addition to the above, to complete his course in Agriculture, the student will take a total of 24 units of free elective work in any department or departments of the University. The student who is planning to become a research worker or a teacher in Agriculture is advised to take these elective units in a foreign language, either French or German.

The following is a summary of the units, together with their grouping, that are required for graduation from the regular course in Agriculture:

Required General College work	42	units
Required General Agricultural work	30	"
Agricultural Group work including major	28	"
Free electives	24	"
Total	124	

In addition to completing the above satisfactorily, candidates for the degree of Bachelor of Science in Agriculture must file with the Registrar not later than the beginning of their Senior year a certificate signed by the Dean of the Agricultural College and their major professor, stating that they have had at least three months actual experience in agricultural work and are familiar with ordinary farm practice.

TEACHER-TRAINING COURSE FOR SMITH-HUGHES TEACHERS OF VOCATIONAL AGRICULTURE

Students preparing to teach vocational agriculture in secondary schools will take the four-year course in Agriculture, with major in Group II, Agricultural Education. This group includes Psychology and all courses in Education required by the State Board for a first-class teacher's certificate. Students majoring in Agricultural Education should select their remaining group electives from elementary courses in several departments of agricultural science rather than to specialize in one subject.

TWO-YEAR SHORT COURSE IN AGRICULTURE

(Not leading to a degree)

Any student who has obtained 60 units of University credit of which four are in Military Tactics and not less than 40 in agricultural science, including Agricultural Chemistry 1, Agronomy 7 or 8, Animal Husbandry 1, Botany 1, Dairy Husbandry 1, Horticulture 2, and Poultry Husbandry 1 is eligible to a certificate for having completed the Short Course in Agriculture. Any person holding a Short Course certificate who has met the entrance requirements for the four-year course in Agriculture shall have Junior rank. Students will be admitted to the Short Course who have a general knowledge of the common school branches and sufficient maturity to understand the value of their time and opportunity.

COURSE LEADING TO THE DEGREE OF BACHELOR OF SCIENCE IN CHEMISTRY

FIRST YEAR

FIRST SEMESTER	UNITS	SECOND SEMESTER	UNITS
English Comp. 1	3	English Comp. 2	3
Math 1	5	Math. 2	4
German 1, or French 1	4	German 2, or French 2	4
Chem. 1 or 21	4	Chem. 2 or 22	4
Mech Arts 1	2	Mech. Arts 2	3
Mil. Tactics 1	1	Mil. Tactics 2	1
	19		19

SECOND YEAR

English Lit. 1	2	English Lit. 2	2
Math. 3	4	Math. 4	4
German 3, or French 3	4	German 4, or French 4	4
Physics 1	4	Physics 2	4
Chem. 23	4	Chem. 3	4
Mil. Tactics 3	1	Mil. Tactics 4	1
	19		19

THIRD YEAR

Chem. 4	2	Chem. 5	4
Chem. 7	4	Chem. 8	4
Geol. 1a	2	Geol. 2a	2
Mineral. 1	3	Chem. 19	3
Met. 2	2	Electives	4
Electives	4		
	17		17

FOURTH YEAR

Chem. 6	4	Chem. 24	2
Met. 11	2	Met. 12	2
Chem. 14	2	Chem. 15	2
Thesis	2	Chem. 20	3
Electives	7	Thesis	2
	17	Electives	6
			17

Total, 144 units

COURSE LEADING TO THE DEGREE OF BACHELOR OF SCIENCE IN CIVIL ENGINEERING

FIRST YEAR

FIRST SEMESTER	UNITS	SECOND SEMESTER	UNITS
Eng. Comp. 1	3	Eng. Comp. 2	3
Math. 1 (Alg. and Trig.)	5	Math. 2 (Anal.)	4
Mech. Arts 1 (Eng. Draw.)	2	Mech. Arts 2 (Descrip. Geom.)	3
Chem. 1 or 21	4	Chem. 2 or 22	4
Foreign Language	4	Foreign Language	4
Mil. Tactics 1	1	Mil. Tactics 2	1
	19		19

SECOND YEAR

Math. 3 (Diff. Cal.)	4	Math. 4 (Int. Cal.)	4
Physics 1 (General)	4	Physics 2 (General)	4
Eng. Lit. 1	2	Eng. Lit. 2	2
Mech. Arts 3 (Wood Shop, Foundry)	3	Mech. Arts 4 (Mach. Shop, Forge)	3
C. E. 1 (Surveying)	3	C. E. 2 (Surveying)	3
Mil. Tactics 3	1	Mil. Tactics 4	1
Elective	2	Elective	2
	19		19

THIRD YEAR

Math. 5 (Theor. Mech.)	4	Math. 6 (Theor. Mech.)	4
C. E. 11 (Hydraulics)	4	C. E. 14 R & L (Mech. of Mat.)	4
E. E. 9 (General)	3	Mech. Eng. 3 (Heat Engines)	3
Option 1:		Option 1:	
Geol. 1a (Dynam. & Struc.)	2	Geol. 2a (Historical)	2
Electives	4	Electives	4
Option 2:		Option 2:	
Astron. 3 (Eng. Ast.)	3	Physics 4 (Elec. & Opt. Meas.)	3
Electives	3	Electives	3
	17		17

FOURTH YEAR

C. E. 7 (Steel mill Bldgs.)	4	C. E. 6 (Concrete Design)	4
C. E. 9 (R. R. Eng.)	2	C. E. 8 (Bridges)	4
C. E. 13 (Irrigation)	4	C. E. 10 (R. R. Eng.)	2
C. E. 15 (Contracts)	2	C. E. 18 (Sewerage)	3
C. E. 17 (Water Supply)	3	Soc. Sc. 2	3
Soc. Sc. 1	3		
	18		16

Total, 144 units

COURSE LEADING TO THE DEGREE OF BACHELOR OF SCIENCE IN COMMERCE

FIRST YEAR

FIRST SEMESTER	UNITS	SECOND SEMESTER	UNITS
English Comp. 1	3	English Comp. 2	3
Foreign Language	4	Foreign Language	4
Hist. 1 (Amer. Hist.)	3	Hist. 2 (Amer. Hist.)	3
Soc. Sc. 1 (Intro. to Econ.)	3	Soc. Sc. 2 (Intro. to Econ.)	3
Soc. Sc. 3 (Trade Res. & Pol.)	2	Soc. Sc. 17 (Trade Res. & Pol.)	2
Mil. Tactics 1	1	Mil. Tactics 2	1
	16		16

SECOND YEAR

Foreign Language	4	Foreign Language	4
Science or Math	4	Science or Math	4
Soc. Sc. 13 (Accounting)	3	Soc. Sc. 14 (Accounting)	3
Soc. Sc. 23 (Bus. Mens Lecture Course)	1	Soc. Sc. 24 (Bus. Men's Lecture Course)	1
English Lit. 1	2	English Lit. 2	2
Mil. Tactics 3	1	Mil. Tactics 4	1
Electives:		Electives:	
Soc. Sc. 5 (Corp. Finance)	2	Soc. Sc. 4 (Transp.)	3
Free Elective	2	Soc. Sc. 6 (Investments)	2

THIRD YEAR

Soc. Sc. 46 (Comm. Law)	3	Soc. Sc. 47 (Comm. Law)	3
Soc. Sc. 40 (Amer. Govt. & Pol.)	3	Soc. Sc. 41 (State and Munic. Govt.)	3
Soc. Sc. 10 (Sociology)	3	Soc. Sc. 22 (Bus. Organization)	3
Electives:		Electives:	
Soc. Sc. 15 (Corp. Accounting)	2	Soc. Sc. 30 (Cost Accounting)	2
Soc. Sc. 20 (Insurance)	2	Soc. Sc. 21 (Insurance)	2
Psychology	3	Soc. Sc. 11 (Sociology)	3
English 7 (Public Speaking)	3	Constitutional Law	3
Free Elective	4		

FOURTH YEAR

Soc. Sc. 27 (Seminar)	1	Soc. Sc. 28 (Seminar)	1
Electives:		Electives:	
Soc. Sc. 9 (Labor Problems)	3	Soc. Sc. 32 (Adv. Accounting)	2
Soc. Sc. 44 (International Relations)	3	Soc. Sc. 18 (Agric. Econ.)	3
Soc. Sc. 16 (Public Finance)	2	Soc. Sc. 19 (Money & Banking)	3
Soc. Sc. 31 (Adv. Accounting)	2	Soc. Sc. 26 (Selling)	3
Soc. Sc. 25 (Purchasing)	3	Free Elective	6
Soc. Sc. 23 (Bus. Men's Lect. Course)	1		
Free Elective	6		

Total, 124 units

COURSE LEADING TO THE DEGREE OF BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING

FIRST YEAR

FIRST SEMESTER	UNITS	SECOND SEMESTER	UNITS
English Comp. 1	3	English Comp. 2	3
Math. 1 (Alg. and Trig.)	5	Math. 2 (Anal. Geom.)	4
Foreign Language	4	Foreign Language	4
Mech. Arts 1 (Eng. Draw.)	2	Mech. Arts 2 (Descript. Geom.)	3
Chem. 1 or 21	4	Chem. 2 or 22	4
Mil. Tactics 1	1	Mil. Tactics 2	1
	19		19

SECOND YEAR

Math. 3 (Diff. Cal.)	4	Math. 4 (Int. Cal.)	4
Physics 2 (General)	4	Physics 1 (General)	4
English Lit. 1	2	English Lit. 2	2
Mech. Arts 3 (Wood Shop, Foundry)	3	Mech. Arts 4 (Mach. Shop, Forge)	3
Mech. Eng. 1 (Mechanisms)	3	Mech. Eng. 2 (Mach. Draw.)	3
C. E. 19 (Surveying)	2	C. E. 20 (Surveying)	2
Mil. Tactics 3	1	Mil. Tactics 4	1
	19		19

THIRD YEAR

Math. 5 (Theor. Mech.)	4	Math. 6 (Theor. Mech.)	4
Mech. Arts 5 (Mach. Shop)	2	Mech. Eng. 3 (Heat Engines)	3
Mech. Eng. 5 (Mach. Design)	3	Mech. Eng. 15 (Elec. Mach. Design)	2
E. E. 9 (General)	3	E. E. 1 (Direct Current)	4
C. E. 11 (Hydraulics)	4	C. E. 14R & L (Mech. of Mat.)	4
Elective	2	Elective	1
	18		18

FOURTH YEAR

Mech. Eng. 7 (Mech. Lab.)	2	Mech. Eng. 8 (Mech. Lab.)	2
E. E. 7 (Design)	3	*E. E. 15	3
E. E. 5 (Lab.)	2	E. E. 6 (Lab.)	2
E. E. 2 (Alt. Current)	3	E. E. 3 (Illumination)	2
Seminar	1	E. E. 4 (Elec. Traction)	2
Elective	5	Mech. Eng. 12 (Power Plants)	2
		Elective	3
	16		16

Total, 144 units

*Social Science 1 and 2, E. E. 13 and 14 recommended.

COURSES FOR DEGREE OF BACHELOR OF SCIENCE IN HOME ECONOMICS

Candidates for the degree of Bachelor of Science in Home Economics elect their work in accordance with one or the other of the courses outlined:

COURSE LEADING TO THE DEGREE OF BACHELOR OF SCIENCE IN HOME ECONOMICS WITH MAJOR IN FOODS AND NUTRITION

FIRST YEAR

FIRST SEMESTER	UNITS	SECOND SEMESTER	UNITS
English Comp. 1	3	English Comp. 2	3
Chem. 1	4	Chem. 2	4
Modern Language	4	Modern Language	4
Phys. Tr.	1	Phys. Tr.	1
*Electives	3	*Electives	3
	15		15

SECOND YEAR

English Lit. 1	2	English Lit. 2	2
Modern Language	4	Modern Language	4
†Agric. Chem. 7	3	†Agric. Chem. 8	3
H. E. 1 (Foods and Cookery)	3	H. E. 2 (Foods and Cookery)	3
Phys. Tr.	1	Phys. Tr.	1
Psychology 9 (Gen. Psychology)	3	Educ. 12	3
	16		16

THIRD YEAR

Zool. 9 (Physiology)	3	Zool. 10 (Physiology)	3
H. E. 3 (Food Economics)	3	H. E. 4 (Food Economics)	3
H. E. 9 (House planning, furnishing and decorating)	3	H. E. 10 (House planning, furnishing and decorating)	3
Educ. 14	3	Physics 22	3
Bacteriology 1a	3	*Electives	4
	15		16

FOURTH YEAR

H. E. 11 (Methods of Teaching Home Economics)	3	H. E. 30 (Practice Teaching)	3
H. E. 7 (Dietetics)	3	H. E. 8 (Dietetics)	3
H. E. 31 (Household Management)	3	H. E. 32 (Household Management)	3
H. E. 27 (Home Nursing)	3	*Electives	6
*Electives	4		
	16		15

Total, 124 units

*H. E. 13 and 14 (Elementary Clothing and Hand Work), H. E. 17 (Drafting, Draping and Pattern Making), H. E. 27 (Home Nursing), Social Science 10 and 11 (Sociology and Social Reform) are recommended electives.

†Chemistry of Foods and Nutrition, Chemistry of Cleaning, Chemistry of Textiles.

COURSE LEADING TO THE DEGREE OF BACHELOR OF SCIENCE IN HOME ECONOMICS WITH MAJOR IN TEXTILES AND CLOTHING

FIRST YEAR

FIRST SEMESTER	UNITS	SECOND SEMESTER	UNITS
English Comp. 1	3	English Comp. 2	3
H. E. 13 (Elementary Clothing)	3	H. E. 14 (Elementary Clothing)	3
Modern Language	4	Modern Language	4
Chem. 1	4	Chem. 2	4
Phys. Tr.	1	Phys. Tr.	1
	15		15

SECOND YEAR

English Lit. 1	2	English Lit. 2	2
Modern Language	4	Modern Language	4
H. E. 15 (Costume Design)	2	H. E. 16 (History of Costume)	2
Bacteriology 1a	3	H. E. 18 (Dressmaking)	2
H. E. 17 (Drafting and Pattern-making)	2	Educ. 12	3
Phys. Tr.	1	Phys. Tr.	1
Psychology (Gen. Psychology)	3	†Agric. Chem. 8	3
	17		17

THIRD YEAR

H. E. 19 (Dressmaking)	2	H. E. 20 (Advanced Dressmaking)	2
H. E. 22 (Millinery)	2	H. E. 25 (Methods of Teaching Home Economics)	3
H. E. 24 (Textiles)	3	H. E. 23 (Millinery)	2
Educ. 14	3	H. E. 28 (Textiles)	3
*Electives	5	Electives	5
	15		15

FOURTH YEAR

H. E. 21 (Advanced Dressmaking)	2	Soc. Sc. 11	3
H. E. 30 (Practice Teaching)	3	H. E. 10 (House Planning and Decoration)	3
H. E. 9 (House Planning and Decoration)	3	Physcs 22 (Household Physics)	3
Soc. Sc. 10	3	H. E. 27 (Home Nursing)	2
Electives	4	Electives	4
	15		15

Total, 124 units

*H. E. 1 and 2 (Foods and Cookery), H. E. 28 (Household Management), History of Art are recommended electives.

†Chemistry of Textiles.

HOME ECONOMICS VOCATIONAL COURSE LEADING TO THE DEGREE OF BACHELOR OF SCIENCE IN HOME ECONOMICS

(Organized according to the provisions of the Smith-Hughes Act)

FIRST YEAR

FIRST SEMESTER	UNITS	SECOND SEMESTER	UNITS
English Comp. 1	3	English Comp. 2	3
Chem. 1	4	Chem. 2	4
H. E. 13 (Elementary Clothing and Handwork)	3	H. E. 14 (Elementary Clothing and Handwork)	3
Modern Language	4	Modern Language	4
Phys. Tr.	1	Phys. Tr.	1
	15		15

SECOND YEAR

H. E. 1 (Foods and Cookery)	3	H. E. 2 (Foods and Cookery)	3
H. E. 17 (Draping and Pattern-making)	2	H. E. 18 (Dressmaking)	2
†Agric. Chem. 7	3	†Agric. Chem. 8	3
English Lit. 1	2	Educ. 12	3
Phys. Tr.	1	English Lit. 2	2
Bacteriology 1a	3	Phys. Tr.	1
Electives	2	*Electives	2
	16		16

THIRD YEAR

H. E. 3 (Food Economics)	3	H. E. 4 (Food Economics)	3
H. E. 19 (Dressmaking)	2	H. E. 28 (Textiles)	3
H. E. 24 (Textiles)	3	H. E. 25 (Methods of Teaching Home Economics)	3
Zool. 9 (Physiology)	3	Zool. 10 (Physiology)	3
Educ. 14	3	Physics 22	3
*Elective	1		
	15		15

FOURTH YEAR

H. E. 7 (Dietetics)	3	H. E. (Dietetics)	3
H. E. 11 (Methods of Teaching Home Economics)	3	H. E. 30 (Practice Teaching)	3
H. E. 31 (Home Management)	3	H. E. 32 (Home Management)	3
Soc. Sc. 10	3	H. E. 27 (Home Nursing)	3
*Electives	4	*Electives	4
	16		16

Total, 124 units

*Social Science 11 (Sociology and Social Reform), H. E. 9 and 10 (House Planning), H. E. 27 (Home Nursing), H. E. 22 and 23 (Millinery), and History of Art are recommended electives.

†Chemistry of Foods and Nutrition, Chemistry of Cleaning, Chemistry of Textiles.

COURSE LEADING TO THE DEGREE OF BACHELOR OF SCIENCE IN INDUSTRIAL ARTS

FIRST YEAR

FIRST SEMESTER	UNITS	SECOND SEMESTER	UNITS
Math. 1	5	Math. 2	4
Mech. Arts 1 (Mech. Drawing)	4	Mech. Arts 2 (Descript. Geom)	3
Modern Language 1	4	Modern Language 2	4
English Comp. 1	3	English Comp. 2	3
Mech. Arts 11 (Free Hand Drawing and Lettering)	2	Mech. Arts 8 (Carpentry)	2
Mil. Tactics 1	1	Mech. Arts 12 (Technical Sketching)	2
		Mil. Tactics 2	1
	19		19

SECOND YEAR

Physics 1	4	Physics 2	4
Mech. Arts 3 (Pattern Shop and Foundry)	3	Mech. Arts 4 (Forge and Machine Shop)	3
Educ. 4	3	Educ. 1	3
Mech. Eng. 1 (Mechanisms)	3	Mech. Eng. 2 (Machine Drawing and Design)	3
English Lit. 1	2	English Lit. 2	2
Soc. Sc. 1	3	Soc. Sc. 2	3
Mil. Tactics 3	1	Mil Tactics 4	1
	19		19

THIRD YEAR

Philosophy 9	3	Mech. Arts 17 (Methods of Teaching Manual Training)	3
Educ. 6	3	Educ. 5	3
Mech. Arts 5 (Advanced Machine Shop)	4	Mech. Arts 6 (Advanced Machine Shop)	4
Elective	7	Elective	7
	17		17

FOURTH YEAR

Mech. Arts 15 (Cabinet Work)	3	Mech. Arts 16 (Cabinet Work)	3
Elec. Eng. 9 (Electrical Engineering Practice)	3	Mech. Arts 19 (Advanced Pattern Work)	1
Mech. Arts 18	1	Elective	13
Elective	10		
	17		17

Total, 144 units

The four-year degree course outlined above is designed primarily to prepare high school graduates to become technical teachers in the sense in which the term is used in the Smith-Hughes Bill. In order to attain any measure of success, it is essential that such students

should have considerable trade experience, obtained either before entering the course or during vacations while in attendance at the University. The course in Industrial Arts will also furnish adequate training for those desirous of teaching manual training in secondary schools, and there are so many electives in the course that the candidate can prepare to teach also one or more allied subjects such as drawing, mathematics, or physics.

COURSE LEADING TO DEGREE IN THE SCHOOL OF LAW

FIRST YEAR

(Required)

FIRST SEMESTER	UNITS	SECOND SEMESTER	UNITS
Law 2, Contracts	3	Law 5, Agency	3
Law 8, Criminal Law	3	Law 3, Contracts	3
Law 37, Pleading and Practice	3	Law 38, Pleading and Practice	3
Law 6, Property	2	Law 7, Property	3
Law 41, Torts	3	Law 42, Torts	3
	14		15

SECOND YEAR

(Required)

Law 22 Suretyship	3	Law 21, Sales	3
Law 10, Equity Jurisdiction	3	Law 25, Bills and Notes	3
Law 18, Evidence	3	Law 19, Evidence	3
Law 39, Property	3	Law 40, Property	3
Law 17, Quasi-Contracts	3	Law 36, Trusts	3
	15		15

THIRD YEAR

(Twenty units required)

Law 43, Constitutional Law	3	Law 44, Constitutional Law	3
Law 30, Mining Law	3	Law 29, Water Law	3
Law 26, Partnership	3	Law 24, Carriers	3
Law 46, Practice Court	2	Law 46, Practice Court	2
Law 47, Private Corporations	2	Law 48, Private Corporations	2
Law 49, Property	3		

GENERAL ELECTIVES

Law 53, Legal Bibliography and the Use of Law Books	1	Law 54, Brief-Making and Legal Argument	1

Total, 90 units

COURSE LEADING TO THE DEGREE OF BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

FIRST YEAR

FIRST SEMESTER	UNITS	SECOND SEMESTER	UNITS
English Comp. 1	3	English Comp. 2	3
Math. 1 (Alg. and Trig.)	5	Math. 2 (Anal. Geom.)	4
Foreign Language	4	Foreign Language	4
Mech. Arts 1 (Eng. Draw.)	2	Mech. Arts 2 (Descript. Geom.)	3
Chem. 1 or 21	4	Chem. 2 or 22	4
Mil. Tactics 1	1	Mil. Tactics 2	1
	19		19

SECOND YEAR

Math. 3 (Diff. Cal.)	4	Math. 4 (Integral Cal.)	4
Physics 1 (General)	4	Physics 2 (General)	4
English Lit. 1	2	English Lit. 2	2
Mech. Arts 3 (Wood Shop, Foundry)	3	Mech. Arts 4 (Mach. Shop)	3
Mech. Eng. 1 (Mechanisms)	3	Mech. Eng. 2 (Mach. Draw.)	3
C. E. 20 (Surveying)	2	C. E. 20 (Surveying)	2
Mil. Tactics 3	1	Mil. Tactics 4	1
	19		19

THIRD YEAR

Math. 5 (Theor. Mech.)	4	Math. 6 (Theor. Mech.)	4
Mech. Arts 5 (Mach. Shop)	2	Mech. Arts 6 (Mach. Shop)	2
Mech. Eng. 5 (Mach. Design)	3	Mech. Eng. 6 (Mach. Design)	3
E. E. 9 (General)	3	Mech. Eng. 3 (Heat Engines)	3
C. E. 11 (Hydraulic)	4	C. E. 14R & L (Mech. of Mat.)	4
Elective	2	Mech. Eng. 19 (Lab.)	1
		Elective	1
	18		18

FOURTH YEAR

Mech. Eng. 7 (Mech. Lab.)	3	Mech. Eng. 8 (Mech. Lab.)	3
Mech. Eng. 9 (Eng. Design)	2	Mech. Eng. 10 (Eng. Design)	2
Mech. Eng. 4 (Pumping Mach.)	3	Mech. Eng. 12 (Power Plants)	2
C. E. 7 (Steel Mill Bldgs.)	4	Mech. Eng. 11 (Adv. Heat Engines)	2
Mech. Eng. 13 (Seminar)	1	Electives	7
Elective	3		
	16		16

Total, 144 units

COURSE LEADING TO THE DEGREE OF BACHELOR OF SCIENCE IN MECHANIC ARTS

FIRST YEAR

FIRST SEMESTER	UNITS	SECOND SEMESTER	UNITS
English Comp. 1	3	English Comp. 2	3
Math. 1 (Alg. and Trig.)	5	Math. 2 (Anal. Geom.)	4
Foreign Language	4	Foreign Language	4
Mech. Arts 1 (Eng. Draw.)	4	Mech. Arts 2 (Descript. Geom.)	3
Mech. Arts 11 (Free-Hand Drawing and Lettering)	2	Mech. Arts 8 (Carpentry)	2
Mil. Tactics 1	1	Mech. Arts 12 (Tech. Sketching)	2
		Mil. Tactics 2	1
	19		19

SECOND YEAR

Physics 1 (General)	4	Physics 2 (General)	4
Mech. Arts 3 (Wood Shop, Foundry)	3	Mech. Arts 4 (Machine Shop, Forge)	3
Educ. 4 (Principles)	3	Educ. 1 (History)	3
Mech. Eng. 1 (Mechanisms)	3	Mech. Eng. 2 (Mach. Drawing)	3
English Lit. 1	2	English Lit. 2	.2
Mech. Arts 15 (Cabinet Work)	3	Mech. Arts 16 (Cabinet Work)	3
Mil. Tactics 3	1	Mil. Tactics 4	1
	19		19

THIRD YEAR

Mech. Arts 18 (Adv. Pattern Work)	1	Mech. Arts 19 (Cabinet Work)	1
Philos. 9	3	Mech. Arts 17 (Methods of Teaching Manual Training)	3
Educ. 6 (Secondary)	3	Educ. 5 (Vocational)	2
Mech. Arts 5 (Mach. Shop)	4	Mech. Arts 6 (Mach. Shop)	4
Soc. Sc. 1 (Economics)	3	Soc. Sc. 2 (Economics)	3
Electives	3	Electives	4
	17		17

FOURTH YEAR

E. E. 9 (General)	3	Mech. Arts 22 (Practice Teaching)	2
Mech. Arts 21 (Practice Teaching)	2	Thesis	3
Electives	12	Electives	12
	17		17

Total, 144 units

COURSE LEADING TO THE DEGREE OF BACHELOR OF SCIENCE IN MINING ENGINEERING AND METALLURGY

FIRST YEAR

FIRST SEMESTER	UNITS	SECOND SEMESTER	UNITS
English Comp. 1	3	English Comp. 2	3
Math. 1 (Alg. and Trig.)	5	Math. 2 (Anal.)	4
Mech. Arts 1 (Eng. Draw.)	2	Mech. Arts 2 (Descript. Geom.)	3
Chem. 1 or 21	4	Chem. 2 or 22	4
Foreign Language	4	Foreign Language	4
Mil. Tactics 1	1	Mil. Tactics 2	1
	19		19

SECOND YEAR

Chem. 23 (Qual. Anal.)	4	Chem. 3 (Quant. Anal.)	4
Math. 3 (Diff. Cal.)	4	Math. 4 (Int. Cal.)	4
C. E. 1 (Surveying)	3	C. E. 2 (Mine Surveying)	3
Physics 1 (General)	4	Physics 2 (General)	4
Min. and Pet. 1(Cryst. and Blow-Pipe Anal.)	3	Min. and Pet. 2 (Determinative Mineralogy)	3
Mil. Tactics 3	1	Mil. Tactics 4	1
	19		19

THIRD YEAR

English Lit. 1	2	English Lit. 2	2
Math. 5	4	Math. 6	4
Geol. 1	3	Geol. 2	3
Chem. 4	2	Min. and Pet. 4	2
Mech. Eng. 21	1	C. E. 14R	3
Met. 2	3	Met. 7R	2
Mining 1	2	Mining 2	1
Elective	1	Elective	1
	18		18

FOURTH YEAR

Geology Option

Geol. 3	3	Geol. 4	3
E. E. 9R	2	C. E. 12	2
Geol. 5	3	Geol. 6	3
Opt. Min. 5	2	Opt. Min. 6	2
Met. 21	2	Chem. 24	2
Mining 3	2	Mining 19	1
Geol. 8	2	Thesis	1
Elective	1	Elective	1
	17		15

Mining Option

Geol. 3	3	C. E. 12	2
Met. 11	2	Met. 12	2
Mining 3	2	Mining 19	1
E. E. 9	3	Mining 4	2
Geol. 5A	2	Mining 6	2
Met. 14	3	Mining 8	2
Elective	1	M. E. 3	3
		C. E. 11L	1
		Elective	1
	16		16

Metallurgy Option

Geol. 3	3	C. E. 12	2
E. E. 9R	2	M. E. 3	3
Met. 7L	1	Met. 12	2
Met. 11	2	Chem. 24	2
Met. 14	3	Met. 18	2
Soc. Sc. 1	3	Soc. Sc. 2	3
Mining 3	2	Elective	1
Elective	1		
	17		15

NOTE—Students who expect to follow the profession of mining engineering are advised to take a five-year course, since the four-year course allows insufficient time to master all the subjects with which a mining engineer must be familiar in order to attain eminence in his profession.

ADVANCED DEGREES

Advanced degrees will be given only for work done in residence by students who have received the Bachelor's degree from this institution, or one of similar standing.

For the degrees of Master of Arts and Master of Science, 30 units of graduate work are required, of which not less than 15 units and not more than 22 must be in a major subject.

Two or more closely allied subjects such as crystallography, mineralogy, microscopic mineralogy, petrology, and geology, may be combined to form a major if approved by the Graduate Study Committee. The major subjects shall include only courses ordinarily considered to be of Junior, Senior, or graduate grade.

Not over 10 units of work earned in other institutions may be applied toward an advanced degree given by this University. In other words, at least 20 units of graduate work must be completed by a candidate for an advanced degree while in residence in this institution.

On approval of the Graduate Study Committee and the heads of the departments concerned, the phrase "in residence" may be so interpreted as to cover work done off the Campus but under the direct supervision and guidance of a member or members of the faculty. This clause is especially intended to cover thesis work done off the Campus.

Each candidate for an advanced degree must submit his course of study for the year to the Committee on Graduate Study for approval on or before November 15. This statement must include the title and an outline of the thesis.

On the fifteenth of every month after the approval of the course of study and thesis has been secured, a brief progress report on the thesis must be submitted to the Graduate Study Committee. This report should embody a statement from the head or heads of the department or departments concerned as to whether the progress has been satisfactory or otherwise.

Work done by candidates for an advanced degree in other than the major subject or subjects may be taken in one department or more than one department. The nature of such minor courses is left to the discretion of the Graduate Study Committee.

The thesis must be in the major subject or subjects, and the number of units of credit allowed for a thesis shall not be less than four nor more than fifteen. A tentative statement of the number of units

of credit which the candidate expects to receive for the thesis must be submitted with the course of study for the year on or before November 15, but it is understood that the determination of the exact number of units of credit awarded to a thesis shall be made by the head or heads of the department or departments concerned after the thesis has been completed.

Two complete copies of the thesis must be submitted to the head of the department most concerned not later than May 15 if the student desires to be considered a candidate for an advanced degree. At the time the completed thesis is submitted a deposit of $1 must be made to cover the cost of binding one copy for the Library.

Candidates for advanced degrees must, on or before May 20, pass an oral examination in their major subject or subjects, at which examination the Graduate Study Committee shall be represented, and at which all members of this committee have the privilege of being present.

Students who have not yet secured a Bachelor's degree, but who wish to register for work to be applied toward the units required for an advanced degree, must register for such subjects on a separate card, and must secure the approval of the Graduate Study Committee for such action.

Permission to deviate from these regulations must be secured from the Graduate Study Committee in advance and in writing.

Graduate students are not required to take courses in Military Science and Tactics or Home Economics.

Special Requirements for the Degree of Engineer of Mines—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. In addition not less than 30 units of graduate work must be done and must include (1) all of the following courses or their equivalents which have not already been completed by the candidate: Geology 1, 2, 3, 4, 5, 6, 8; Mineralogy and Petrology 1, 2, 4; Optical Mineralogy 5, 6; Mining Engineering 1, 2, 3, 4, 6, 8, 19; Metallurgy 2, 7, 11, 12, 14, 18; (2) at least eight units of graduate work in the Departments of Mineralogy and Petrology, Optical Mineralogy and Petrography, Geology, Mining Engineering, or Metallurgy; (3) sufficient advanced work in other departments of the University to make up a total of 30 units; (4) at least six weeks of practical work in the field, together with a satisfactory detailed report on the same.

Graduate Assistants in the State Bureau of Mines—The University of Arizona has established in connection with the State Bureau of Mines a limited number of positions in which graduate assistants are employed. These pay $750 per year.

The graduate assistants appointed agree to hold these positions during the year, and to devote one-half of their time to work in connection with the Bureau of Mines; the remaining time is devoted to graduate study in candidacy for advanced degrees.

This work is in conjunction with the research work of the U. S. Bureau of Mines Experiment Station, and the men so appointed work in the laboratories of the United States Station as cooperators.

Applications for such positions should be made to the University of Arizona, Tucson, Arizona.

DESCRIPTION OF COURSES OF INSTRUCTION

1919-1920

The number by which a course is designated is not intended to indicate the relative advancement of the course.

The faculty reserves the right to cancel any class not elected by an adequate number of students.

A student registering for a course must meet the prerequisites, or otherwise satisfy the instructor of his ability to take that course.

For the hours of classes, the student is referred to the schedule issued at the opening of the college year.

AGRICULTURAL CHEMISTRY

PROFESSOR VINSON, ASSISTANT PROFESSOR CATLIN

1. Soil Physics.

PROFESSOR VINSON AND ASSISTANT PROFESSOR CATLIN

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; soil colloids and organic matter; various culture methods based on physical properties of soils; mechanical analysis. Required of all students in agriculture. First semester. Three lectures and one three-hour laboratory period. Four units.

2. Soil Chemistry. PROFESSOR VINSON

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; composition of irrigating waters; making and using farm manures; theory of toxic substances in soils. Required of all students in agriculture. Prerequisites, Chemistry 1, 2, and Agricultural Chemistry 1. Second semester. Two lectures. Two units.

4. Agricultural Analysis.

PROFESSOR VINSON AND ASSISTANT PROFESSOR CATLIN

The principles of volumetric and gravimetric analysis illustrated

by agricultural and food products. Prerequisite, Chemistry 2. Second semester. Three units. Laboratory fee, $8.

5. Agricultural Analysis, Advanced.
PROFESSOR VINSON AND ASSISTANT PROFESSOR CATLIN

Selected work in the chemical analysis of soils, fertilizer, insecticides, feeding stuffs, and plant and animal products; a study of the methods adopted by the Association of Official Agricultural Chemists; readings, reports and occasional lectures. Prerequisite, Quantitative Analysis. First semester. Two or three three-hour laboratory periods. Three or four units. Laboratory fee, $8 or $12.

6. Agricultural Analysis, Advanced.
PROFESSOR VINSON AND ASSISTANT PROFESSOR CATLIN

Continuation of 5. Second semester. Two or three three-hour laboratory periods. Three or four units. Fee, $8 or $12.

7. Food Chemistry PROFESSOR VINSON

The commoner mineral and organic compounds occurring in foods; their chemical and physical properties, classification, and detection. The chemistry of food materials, including fruits, vegetables, cereals, fats and oils, dairy products, meats, beverages, and condiments. Prerequisite, Chemistry 1 and 2, or 21 and 22. First semester. Two lectures, one three-hour laboratory period. Three units. Laboratory fee, $5.

8. Textile and Household Chemistry. PROFESSOR VINSON

The raw materials used in the manufacture of clothing; their origin, preparation, properties, and detection. The laundering of fabrics; the removal of stains, and bleaching; disinfectants; household chemicals and chemical processes other than foods and cooking. Prerequisite, Chemistry 1 and 2, or 21 and 22. Second semester. Two lectures, one three-hour laboratory period. Three units. Laboratory fee, $5.

Research and Thesis.

The chemical laboratory and facilities of the Agricultural Experiment Station are open both semesters and during the summer to competent persons for original research in subjects of agricultural chemical interest, under the direction of the professor in charge; credits not exceeding four units for undergraduates and fifteen units for graduate students may be obtained.

AGRICULTURAL EDUCATION

1. Principles of Secondary Agricultural Education. Origin and development of Agricultural Education in secondary schools; organization of Agricultural courses as general science and as prevocational training; school farms, and cooperative experiments; influence of the school work on the agricultural practices of the community. First semester. Three lectures. Three units.

2. Method of Agricultural Instruction in Secondary Schools. A general study of the presentation of agricultural subjects in secondary schools, such as the selection and care of livestock; common plant and animal disease; general agriculture and horticulture with special reference to irrigation and dry farming, field, orchard, and garden crops for semi-arid, subtropical conditions and alkali resistance; marketing and the business problems of the farm. Prerequisite, Education 4, and proficiency in the vocational subject matter of the course. Second semester. Three lectures. Three units.

AGRICULTURE

PROFESSOR WORKING

1. The Expansion of Agriculture.

A general survey of agriculture which is intended to deal in a summary way with its beginnings in ancient times and the steps by which it has reached its present position. The aim is to give the student a broad view of agriculture and the principal epochs in its development. Not open to Freshmen. First semester. One unit.

2. Rural Organization.

A study of the agencies through which rural communities conduct their associated activities. Early attempts to develop organizations will be reviewed and special attention given to the volunteer and governmental agencies engaged in promoting educational, economic, and social progress among country people. Farm bureau and similar organizations will be given careful consideration. Open to Juniors and Seniors. Second semester. One unit.

AGRONOMY

PROFESSOR THOMPSON AND ASSISTANT PROFESSOR HAWKINS

7. Forage Crops. PROFESSOR THOMPSON

A study of the forage crops of the United States with particular reference to their value in the Southwest. This course will include

a careful study of legumes from the standpoint of hay, pasture, and soil improvement. The innoculation of legumes will be given special attention. A brief study will be made of cover crops and crops grown for their fiber. Cotton will be given detailed study. The native pastures and ranges and their maintenance and improvement will be considered. Required of students specializing in Agronomy and Plant Breeding., Dairy Husbandry, and Animal Husbandry. Optional with others in Agriculture. Text, *"Forage Plants and Their Culture,"* by Piper. References will be assigned. First semester. Three lecture hours. Three units.

8. Cereal Crops. ASSISTANT PROFESSOR HAWKINS

A brief study of the most important cereals of the United States; a more detailed study of those that may be grown successfully in Arizona; commercial varieties, methods of culture, and market demands. Required of all students in Agronomy and optional with Horticulture 2, of all other students in Agriculture. Second semester. Three hours. Three units.

3. Farm Management. PROFESSOR THOMPSON

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. Required of all students in Agriculture. Open to Juniors and Seniors. First semester. Two lectures and one three-hour laboratory period. Three units.

2. Dry-Farming. PROFESSOR THOMPSON

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 possibilities in Arizona. Review of bulletins dealing with experimental work; lectures and library work. Prerequisites, either forage or cereal crops and soils. Second semester. Three hours. Three units.

5. Agronomy Literature. PROFESSOR THOMPSON

Lectures and regular reports and reviews of assigned readings in bulletins and standard works. This course is intended to round out the student's general knowledge of agronomy, and to prepare the way for research. Required of students specializing in Agronomy and Plant Breeding, optional with others. Prerequisites, cereal crops

and forage crops. Open to Juniors and Seniors. First semester. Three lecture hours. Three units.

6. Seeds and Seed Testing. ASSISTANT PROFESSOR HAWKINS

A course designed to familiarize the student with the seeds of economic plants and weeds. Purity tests and the germination of seeds by official methods will be considered. Required of all students in Agronomy and Plant Breeding. Optional with others in Agriculture. First semester. One hour class room work, and three hours laboratory. Two units.

9. Farm Machinery. ASSISTANT PROFESSOR HAWKINS

A course designed to give the students practical information and experience in the setting up, adjustment, operation, and repairing of the ordinary types of farm machinery. The overcoming of side draft, the calibration of drills and planters, the babbiting of boxings, and the handling of similar farm problems will be treated. First semester. Two lectures, one three-hour laboratory period. Three units.

Research and Thesis. PROFESSOR THOMPSON

The laboratory and facilities of the Agronomy Department are open throughout the year to competent persons for research and special investigation. The work will be under the direction of the head of the department. Not to exceed four units of credit may be obtained by under-graduate students. Prerequisites, cereal crops and forage crops.

4. Soil Bacteriology. PROFESSOR THOMPSON

A study of the relationship of bacteria to soil fertility. The formation of humus, bacterial activity in manures, relationship of bacteria to nitrification, denitrification and nitrogen fixation; the use of bacteria and methods employed in inoculating soils for legume growing, and the action of these organisms on the minerals in the soil. Prerequisites, Forage Crops, Botany 1, Soils and General Bacteriology. First semester. Two lectures and two three-hour laboratory periods. Four units.

ANIMAL HUSBANDRY

PROFESSOR WILLIAMS, ASSISTANT PROFESSOR ————————

The Department of Animal Husbandry has at the University Farm an assortment of livestock which is used for class work at the University. There is also a complete set of herd books and laboratory equipment.

1. Livestock Judging. PROFESSOR WILLIAMS

Judging different classes of horses, cattle, sheep, and swine. Use of the score card; practice in comparative judging. Animals from the University herd are used, supplemented by livestock belonging to neighboring ranchmen and farmers. Required of all students in agriculture. First semester. Two lectures and one three-hour demonstration. Three units.

2. Veterinary Physiology and Anatomy.
ASSISTANT PROFESSOR ————

Special physiology and anatomy of farm animals. Lectures and recitations supplemented by practical experiments in the laboratory. Offered in 1919-20, but not in 1920-21. First semester. Three hours. Three units.

3. Animal Diseases. ASSISTANT PROFESSOR ————

(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 operations. Prerequisite, Animal Husbandry 2. Second semester. Two lectures, one three-hour demonstration. Three units.

7. History of Breeds. ASSISTANT PROFESSOR ————

Characteristics of each breed of horses, cattle, sheep, swine, and goats; origin, history, and development; introduction to America; adaptability to Arizona conditions. First semester. Three hours. Three units. Offered in 1919-20, but not offered in 1920-21.

8. Animal Breeding. ASSISTANT PROFESSOR ————

Principles of breeding, including the study of variation and its causes; the influence of environment on the development of animals; heredity, atavism, reversion, and selection. Special attention is given to the methods of breeding used by the most successful stockmen in the improvement of breeds. Required, optionally with Plant Breeding 1, of all students in agriculture. Prerequisites, Botany 1 or Zoology 1, Animal Husbandry 7. Second semester. Three hours. Three units. Offered in 1919-20, but not offered in 1920-21.

10. Advanced Livestock Judging.
ASSISTANT PROFESSOR ————————

A detailed study of the various types, classes, and breeds of livestock; special practice in the judging of groups, making comparisons, and giving reasons. Trips are made to large herds, and students are required to attend the State Fair at Phoenix. Prerequisites, Animal Husbandry 1 and 7. First semester. One lecture, two three-hour demonstrations. Three units.

11. Meat Production. PROFESSOR WILLIAMS

The study of meats and meat products with special emphasis on the selection and preparation of animals for the feed yard, show ring, market, butcher, and consumer. Prerequisites, Animal Husbandry 1 and 9. First semester. Two lectures, one three-hour demonstration. Three units. Not offered in 1919-20, but offered in 1920-21.

12. Animal Husbandry Literature. PROFESSOR WILLIAMS

Survey of the literature relating to animal husbandry; selecting and compiling data; assigned readings and reports on special subjects. Open to Juniors and Seniors. First semester. Three hours. Three units. Offered in 1919-20, but not in 1920-21.

13. Seminar. PROFESSOR WILLIAMS

Study of special problems relating to the care and management of livestock. Open to advanced students in the Department. First semester. One unit.

14. Seminar. PROFESSOR WILLIAMS

For advanced students. Second semester. Two hours. Two units.

15. Market Classes and Grades of Cattle and Sheep.
ASSISTANT PROFESSOR ————————

Market classification of cattle and sheep; the judging of these animals by score-card and comparison. Prerequisite, Animal Husbandry 1. Second semester. Two lectures and one three-hour demonstration. Three units.

16. Market Classes and Grades of Hogs and Horses.
ASSISTANT PROFESSOR ————————

Classification, characteristics and special uses of the various types of hogs and horses. Prerequisites, Animal Husbandry 1 and 15.

First semester. Two lectures and one three-hour demonstration. Three units.

18. Range Cattle Production. PROFESSOR WILLIAMS

The development of the range cattle industry in the Southwest; range management of cattle; problems of production under range conditions. Prerequisite, Animal Husbandry 8 or 9. Second semester. Two lectures. Two units. Offered in 1919-20, but not in 1920-21.

19. Range Sheep Production. PROFESSOR WILLIAMS

Study of the sheep industry on Arizona ranges; care and management of breeding flocks; lamb and wool production; feeding; diseases; marketing. Prerequisite, Animal Husbandry 8 or 9. Second semester. Two lectures. Two units. Not offered in 1919-20, but in 1920-21.

20. Principles of Animal Nutrition.

A consideration of the laws of animal nutrition including digestion, absorption, and metabolism; elimination; coefficients of digestibility; the functions and values of the various nutrients, and a classification of feeds according to their composition, digestibility and food values. Prerequisites, Chemistry 1, 2. Required of all students in agriculture. Second semester. Three lectures. Three units. Offered in 1919-20, but not in 1920-21.

21. Feeding Cattle and Sheep.

Selection and use of feeds for special purposes; balanced rations; methods of feeding, and experimental work in feeding beef cattle and sheep. First semester. Two lectures and one three-hour demonstration. Three units. Offered in 1919-20, but not in 1920-21.

22. Feeding Horses and Hogs.

Selection and use of feeds for special purposes; balanced rations; methods of feeding, and experimental work in feeding horses, mules, and hogs. First semester. Two lectures and one three-hour demonstration. Three units. Not offered in 1919-20, but offered in 1920-21.

Thesis.

Students specializing in Animal Husbandry may elect a thesis during Senior year; Credits not exceeding four units for undergraduates, and fifteen units for graduate students may be obtained.

NOTE—The following sequence of courses is recommended for students majoring in Animal Husbandry:

Freshman First semester, 1. Second semester, 15.

Sophomore: First semester, 16; 2 or 7. Second semester, 3; 8 or 20.

Junior: First semester, 7 or 2; 11 or 21; 21 or 22. Second semester, 20 or 8; 18 or 19.

Senior: First semester, 10; 13; 12 or 11; 22 or 21. Second semester, 20 or 8; 14; 18 or 19.

Advanced courses: 3, 10, 11, 12, 13, 14, 18, 19, 21, 22. Thesis.

ARCHAEOLOGY

PROFESSOR CUMMINGS

1. Anthropology.

A general course in anthropology which seeks to lay the foundation for the intelligent study of history and social science.

A study of prehistoric man on the eastern hemisphere, tracing the evidence of his existence, the conditions under which he lived, and his development through the bronze age. First semester. Two hours. Two units.

2. Anthropology.

Continuation of 1. A study of prehistoric man on the American continent, tracing the evidence of his existence and the various phases of culture he developed in the different localities he occupied down to historic times, with special attention to the prehistoric inhabitants of Arizona. Second semester. Two hours. Two units.

3. American Archaeology.

A detailed study of the prehistoric inhabitants of southwestern United States and Mexico. Prerequisites, Archaeology 1, 2; History 1, 2. First semester. One lecture, one three-hour laboratory period. Two units.

4. American Archaeology.

Study of the prehistoric people of Central and South America. Second semester. One lecture, one three-hour laboratory period. Two units.

5. Greek Archaeology.

The principal monuments and ruined cities of Greece are studied as illustrating the development of the religious, social, and political customs, and the literature, art, and architecture of the ancient Greeks. Prerequisite, History 9. First semester. Two hours. Two units.

6. Roman Archaeology.

A study of the principal cities and monuments of the ancient Romans as illustrating their early development and their powerful legal and military institutions. Prerequisite, History 10. Second semester. Two hours. Two units.

ART

PROFESSOR FISHER

1. History of Art.

A general survey of the history of art throughout the ages; the origin of art; Egyptian, Chaldean, Persian, Greek, Roman, Etruscan, and Christian art; Romanesque, Gothic, Renaissance, and Modern Architecture; painting from the Renaissance at Siena and Florence to the close of the nineteenth century. Text: Reinach, *Apollo.*

2. History of Art.

Continuation of 1. Second semester. Three hours. Three units.

3. Italian Painting.

An intensive study of the early Christian and Byzantine sources, the Gothic period, the evolution of later Italian art, and the influence of Italian art on other schools of painting. It is desirable that the student be familiar with Art 1 and 2. First semester. Two hours. Two units.

4. French Art.

The work of the great painters of the Barbizon School is the basis of this course. Second semester. Two hours. Two units.

5. To those students who desire to complete as far as possible the intensive study of the schools of art, Dutch, English, and American art will be offered as the demand may arise.

ASTRONOMY

PROFESSOR DOUGLASS

1. Descriptive Astronomy.

The sun, moon, planets, and other celestial objects, with constant views of their telescopic appearance; discussion of the latest theories of the condition of the planets and the evolution of the universe. Non-mathematical; open to all students. Note books will be required. First semester. Two hours (with frequent addition of an evening hour). Two units.

2. Descriptive Astronomy.

Continuation of 1. Second semester. Two hours. Two units.

3. Engineering Astronomy.

Latitude, longitude, meridian, and time observations and their reductions, with practice work; astronomical measurements; adjustment and handling of instruments. Astronomy 3 is required of Juniors in Civil Engineering. An elementary knowledge of spherical trigonometry is required for this course. First semester. Two hours. and one evening laboratory period of three hours. Three units.

4. Engineering Astronomy.

Continuation of Astronomy 3, with more exact measurements and use of the astronomical transit. Second semester. One two-hour day period and one three-hour evening period. Two units.

BIOLOGY

Students desiring a course in general biology, or a foundation in both botany and zoology, are advised to elect both Botany 1 and Zoology 2. These are introductory courses and come successively in the same year. This is advisable for students in the Arts and Sciences, for those preparing for medicine, and for those expecting to teach.

BACTERIOLOGY

ASSISTANT PROFESSOR BROWN

1. General Bacteriology.

An elementary course covering the industrial and hygienic applications of bacteriology. Several groups of the bacteria and some of the common yeasts and moulds are studied in the laboratory in cultures and in microscopic preparations. The course is intended for general science students as well as for students of domestic science, students preparing for medicine and those specializing in biology. First semester. Two lectures and six laboratory hours. Four units. Laboratory fee, $3.

1a. General Bacteriology.

This course includes the first thirteen weeks of General Bacteriology 1. First semester. Two lectures and six laboratory hours. Three units. Laboratory fee, $2.50.

BOTANY

PROFESSOR THORNBER, ASSISTANT PROFESSOR BROWN

1. Elementary Botany. ASSISTANT PROFESSOR BROWN

A general view of the great groups of plants; the morphology of types and their genetic relations; the gross and microscopic structure

and phenomena including karyokinesis. The course is presented from a biological viewpoint. Required of all agricultural students. Text: Bergen and Caldwell, *Practical Botany*. First semester. Two lectures and six laboratory hours. Four units. Laboratory fee, $2.

2. Plant Histology. ASSISTANT PROFESSOR 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. For students who intend to teach botany or to take advanced work in this subject. Text: Chamberlain, *Methods in Plant Histology*. Prerequisite, Botany 1. Second semester. Two lectures and six hours of laboratory work. Four units. Laboratory fee, $2.

3. Plant Physiology. ASSISTANT PROFESSOR 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. Of interest to students of plant physiology, because of our unique flora and climatic conditions. Required of students in horticulture and agronomy. Text: Barnes, *Text-book of Physiology*. Prerequisite, Botany 1. Second semester. Two lectures and six hours of laboratory work. Four units. Laboratory fee, $2.

4. Taxonomy. PROFESSOR THORNBER

Identification of plants. 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, *Field, Forest and Garden Botany;* other reference works. Second semester. Two lectures and six hours of laboratory work. Four units. Laboratory fee, $2.

5. Taxonomy. PROFESSOR THORNBER

Continuation of Course 4. Systematic study of our flora; citation of plant types and co-types; herbarium building; the art of keying plant groups. Study of a group. Different systems of classification are studied. Open to students who desire to continue the study of taxonomy. First semester. One lecture and six laboratory hours. Three units. Laboratory fee, $2.

*General Morphology of Algae and Fungi.

ASSISTANT PROFESSOR BROWN

The instructor must be consulted before registration. Prerequisites, Botany 1 and 2. First semester. Two lectures and six laboratory hours. Four units. Laboratory fee, $2.

*7. General Morphology of Bryophytes and Pteridophytes.

ASSISTANT PROFESSOR BROWN

Prerequisites, Botany 1 and 2. First semester. Two lectures and six laboratory hours. Four units. Laboratory fee, $2.

*8. General Morphology of Spermatophytes.

ASSISTANT PROFESSOR BROWN

Prerequisites, Botany 1, 2 and 4. First semester. Two lectures and six laboratory hours. Four units. Laboratory fee, $2.

9. History of the Biological Sciences PROFESSOR ————

A lecture course on the history of the development of the sciences of Botany and Zoology, from their earliest beginnings to the remarkable expansion of the last few decades, and the present trend. One-half the course will deal primarily with Botany, and the other with Zoology. Library work is required. Prerequisites, Botany 1, 2 and 4; Zoology 2 and 4. First semester. Three lectures. Three 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 grazing 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. Second semester. Two lectures and three hours of laboratory work. Three units. Laboratory fee, $2.

11. Plant Pathology. ASSISTANT PROFESSOR BROWN

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. First semester. One lecture and three hours laboratory work. Two units. Laboratory fee, $2.

*Botany 6 is given in 1919-20; Botany 7 in 1920-21; Botany 8 in 1921-22.

14. Shade and Ornamental Plants. PROFESSOR THORNBER

Native and introduced trees, shrubs and vines, evergreen and deciduous, for growing under southwestern conditions; also roses, irises, bulbs, and other hardy flower groups and lawn plants. Plants for arid and alkaline situations; frost and heat resistant plants; proper methods of planting. Plants for woodlots, home grounds, and farms. First semester. Two lectures and three laboratory hours. Three units. Laboratory fee, $1.

16. Weeds. PROFESSOR THORNBER

Study and identification of the commoner weeds and weed seeds; their habits of growth and means of introduction, dispersal and eradication or control. For agricultural students and teachers of high school science. Prerequisite, Botany 4 or equivalent work. First semester. One lecture and three hours laboratory work. Two units. Laboratory fee, $2.

ZOOLOGY

ASSISTANT PROFESSOR BROWN

2. Elementary Zoology.

An introductory course in the structure, physiology, development, and behavior of animals, treated from the biological viewpoint. The student is made acquainted with living animals, and not merely with dead dissections. It is highly desirable that Botany 1 precede this course, which is prerequisite to advanced work in zoology. Required of students in animal husbandry. Second semester. Two recitations and six hours in the laboratory. Four units. Fee, $3.

4. Vertebrate Zoology.

The morphology and phylogeny of vertebrates, with such attention to natural history and local fauna as the needs of the class demand. Dissection of a selected series of chordate types. Recommended especially for pre-medical students. Second semester. Two lectures and six hours of laboratory work. Four units. Fee, $3.

9. General Physiology.

Designed for those wishing a general rather than a highly technical knowledge of the elementary facts concerning the structure and functions of the human body, and for students of domestic science. As far as possible for the general student unacquainted with technical manipulations, the work is based on laboratory experiment and observations. First semester. Two recitations and three hours labora-

tory work. Three units. No prerequisites, but general biology or a knowledge of elementary chemistry very desirable. Fee, $1.50.

10. General Physiology.

Continuation of 9. Second semester. Two recitations and three hours laboratory work. Three units. Fee, $1.50.

CHEMISTRY

PROFESSOR GUILD, PROFESSOR BRINTON, PROFESSOR TATARIAN

1. General Chemistry. PROFESSOR TATARIAN

Lectures, recitations, and laboratory work illustrating the fundamental theories of chemistry, together with a study of the chemical elements and their compounds. Text-book: Smith, *General Chemistry for Colleges.* Open to students who have credit for one year of high school chemistry. First semester. Three lectures and one three-hour laboratory period. Four units. Laboratory fee, $8.

2. General Chemistry. PROFESSOR TATARIAN

Continuation of 1. Second semester. Three lectures and one three-hour laboratory period. Four units. Laboratory fee, $8.

21. Introductory General Chemistry. PROFESSOR TATARIAN

A course intended for those who have not had high school chemistry. First semester. Two lectures and two three-hour laboratory periods. Four units. Laboratory fee, $8.

22. Introductory General Chemistry. PROFESSOR TATARIAN

Continuation of 21. Second semester. Three lectures and one three-hour laboratory period. Four units. Laboratory fee, $8.

23. Qualitative Analysis. PROFESSOR BRINTON

Text-book: Tower, *Qualitative Analysis.* Prerequisite, Chemistry 2 or 22. First semester. One lecture and three three-hour laboratory periods. Four units. Laboratory fee, $14.

3. Quantitative Analysis. PROFESSOR BRINTON

Text-book: Blasdale, *Principles of Quantitative Analysis.* Open to students who have taken Chemistry 23. Second semester. One lecture and nine hours of laboratory work in gravimetric methods of analysis. Four units. Laboratory fee, $14.

4. Volumetric Analysis. PROFESSOR BRINTON

A continuation of Chemistry 3, special attention being given to fundamental principles of volumetric analysis and thorough drill in the stoichiometric relation of standard solutions. First semester. Six hours laboratory work with occasional lectures. Two units. Laboratory fee, $8.

24. Metallurgical Analysis. PROFESSOR BRINTON

A course dealing with the gravimetric, volumetric, and electrolytic methods of analysis as commonly used in mine and smelter laboratories. The principles underlying speed of manipulation are emphasized in such a way as to teach students how to handle a large volume of work without sacrifice of the requisite degree of accuracy. Stress is laid on discrimination in the selection of methods, special emphasis being placed upon accuracy or upon rapidity, according to the end sought. Second semester. Six hours laboratory work with occasional lectures. Two units. Laboratory fee, $8.

5, 6. Advanced Quantitative Analysis. PROFESSOR BRINTON

A thorough survey of the whole field of analytical chemistry. Lectures of an extensive nature with intensive emphasis on the typical procedures selected for laboratory practice serve to ground the student in a basic understanding of the most varied branches of gravimetric, volumetric, electrolytic, and gasometric methods of analysis. Prerequisite, Chemistry 4. Both semesters. One lecture and nine hours of laboratory work. Four units each semester. Chemistry 5 is offered in the second semester, and Chemistry 6 in the first semester, but either course may be taken first. Laboratory fee, $14 each semester.

7. Organic Chemistry. PROFESSOR GUILD

First semester. Two lectures and six hours laboratory work. Prerequisite, Chemistry 2. Four units. Laboratory fee, $14.

8. Organic Chemistry. PROFESSOR GUILD

Continuation of 7. Second semester. Two lectures and six hours laboratory work. Four units. Laboratory fee, $14.

19. Advanced Inorganic Chemistry. PROFESSOR BRINTON

The preparation of pure chemical compounds from the crude materials, and the study of the properties and constants of the finished products. The lectures introduce advanced points of view, and help to classify and organize the knowledge of inorganic chemistry gained

in the preceding courses. Second semester. One lecture and six hours of laboratory work. Three units.

20. Physical Chemistry. PROFESSOR GUILD

Lectures and laboratory work. Application of physiochemical methods to the study of such problems as the determination of molecular weights, vapor densities, reaction velocity, conductivity, electromotive force, etc. Prerequisite, Chemistry 4. Second semester. One lecture and six hours of laboratory work. Three units. Laboratory fee, $8.

11. Chemistry of the Rare Elements. PROFESSOR BRINTON

A study of those rarer elements which are not considered in the general courses of inorganic chemistry. Special attention is given to the compounds of tungsten, molybdenum and vanadium, owing to their commercial importance in Arizona. Prerequisite, Chemistry 19. First semester. One lecture and six hours laboratory work. Three units. Laboratory fee, $8.

12. Chemistry of the Rare Elements. PROESSOR BRINTON

Continuation of 11. Second semester. One lecture and six hours laboratory work. Laboratory fee, $8.

13. Special Chapters of Inorganic Chemistry. 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, and who have a reading knowledge of German. Chemistry 19 is advised as preparation for this course. Second semester. Two units.

14. Industrial Inorganic Chemistry. PROFESSOR TATARIAN

Lectures, recitations, and reports on the application of inorganic chemistry to the processes of modern industry and manufacture. First semester Two hours. Two units.

15. Industrial Inorganic Chemistry. PROFESSOR TATARIAN

A continuation of Course 14, dealing with the application of organic chemistry. Second semester. Two hours. Two units.

CIVIL ENGINEERING

ASSOCIATE PROFESSOR KELTON

1. Elementary Surveying.

Use and care of surveying instruments, United States system of land surveys, city surveys, and computations. Lectures, recitations

and field work. Open to students who have taken trigonometry, and have taken or are taking Mechanic Arts 1. Required of civil and mining engineering students. First semester. Two recitations and one three-hour period of field or drafting work. Three units. Laboratory fee, $1.50.

2. Topographic and Mine Surveying.

A continuation of Civil Engineering 1. Topographic surveying and drawing, patent surveys, and underground surveying. Open to students who have taken Civil Engineering 1. Required of civil and mining engineering students. Second semester. Two recitations and one three-hour period of field or drafting work. Three units. Laboratory fee, $1.50.

3. Geodesy.

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. This course may be given as a consultation course. First or second semester. One hour. One unit.

6. Concrete and Masonry Construction.

A study of reinforced concrete construction and design, and of other forms of masonry construction, including arches, dams, retaining walls, foundations, and buildings. Prerequisite, Civil Engineering 14R. Second semester. Three recitations and one three-hour period of drafting. Four units. Laboratory fee, $.50.

7. Steel Mill Buildings.

Graphical and analytical determination of stresses in roof trusses, steel bracing, transverse bents, towers and head frames; structural steel detailing, and estimates of weights. Text-book: Ketchum, *Steel Mill Buildings*. Prerequisite, Civil Engineering 14R. First semester. Two recitations and two three-hour periods of drafting. Four units. Laboratory fee, $.50.

8. Bridge Design.

A continuation of the work of structural steel design given in Civil Engineering 7, including in particular a detailed study of steel bridge design with drawings and estimates, stresses due to moving loads, and influence diagrams. Text-book: Ketchum, *Design of High-*

way Bridges. Prerequisite, Civil Engineering 7. Second semester. Two recitations and two three-hour periods of drafting. Four units. Laboratory fee, $.50.

9. Railroad Engineering.

Preliminary location surveys; simple and easement curves, turnouts and switches; principles of economic location as based upon cost of construction, operating expenses, alignment, and grades. The field work 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. Open to students who have taken Civil Engineering 1, 2. First semester. One recitation and one four-hour field or drafting period. Two units. Laboratory fee, $1.50.

10. Railroad Engineering.

Continuation of 9. Second semester. One recitation and one four-hour field or drafting period. Two units. Laboratory fee, $1.50.

11. Hydraulics.

A study of velocity and discharge from orifices, weirs, tubes, and pipes; flow in pipes, sewers, and canals; measurement of flow in ditches and rivers; water wheels and pumps. Prerequisite, Mathematics 4. First semester. Three recitations and one three-hour laboratory period. Four units. The laboratory work (11L) may be given in the second semester in connection with course 12. Laboratory fee, $1.

12. Hydraulics.

A study of the principles of hydraulics, covering the same general field as Civil Engineering 11; required of students in mining engineering. Second semester. Two recitations. Two units.

13. Irrigation Engineering.

A study of principles and details relating to the design, construction and maintenance of irrigation works, and relating to the diversion, measurement, and pumping of water for use in irrigation. Prerequisites, Civil Engineering 1, 2, 11, 14R. First semester. Three recitations and one three-hour drafting period. Four units. Laboratory fee, $.50.

14R. Mechanics of Materials.

Analysis and computation of stresses in prisms, beams, columns, and shafts. Text-book: Merriman, *Mechanics of Materials.* Open to students who have taken or are taking Mathematics 5, 6. Second semester. Three recitations. Three units.

14L. Materials Testing.

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 14R. Second semester. One three-hour laboratory period. One unit. Two units additional may be elected, hours to be arranged. Laboratory fee, $1.50.

15. Contracts and Specifications.

Essential elements of a contract; general clauses of engineering contracts; detailed engineering specifications; standard specifications for engineering materials. Open to all students. First semester. two recitations. Two units.

16. Thesis.

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. Two units.

17. Public Water Supplies.

Methods of investigation of available supplies; methods of purification of water; and a study of the design of water systems and purification plants. Prerequisite, Civil Engineering 11. First semester. Two recitations. Two units.

18. Sewerage.

Methods of sewage purification; sewage disposal plants; and the design of sewer systems. Prerequisite, Civil Engineering 11. Second semester. Three recitations. Three units.

19. Elementary Surveying.

Chaining, compass, level, and transit work; land surveying, traversing and computations. This course is parallel to Civil Engineering 1, and is offered especially for agricultural, mechanical and electrical engineering students. Prerequisite, Mathematics 1, or its

equivalent. First semester. One lecture-recitation period and one three-hour field period. Two units. Laboratory fee, $1.50.

20. Surveying.

A continuation of Civil Engineering 19. Canal surveying, elementary topographic surveying, etc. For agricultural, mechanical and electrical engineering students. Second semester. One lecture-recitation period and one three-hour field or laboratory period. Two units. Laboratory fee, $1.50.

21. Irrigation.

Duty of water, its development, diversion, measurement, and application to land. Offered especially for agricultural students, to be taken in connection with Civil Engineering 20. Second semester. One lecture-recitation period. One unit.

22. Highway Engineering.

Highway location and construction of city pavements; bituminous materials for dust prevention and road preservation. Prerequisite, Civil Engineering 1. Second semester. Two recitations. Two units.

CLASSICAL LANGUAGES

GREEK

PROFESSOR CUMMINGS

1. Beginner's Course.

A study of Greek grammar and practice in easy prose. White's *First Greek Book*. First semester. Five hours. Four units.

2. Greek Prose.

About four books of Xenophon's *Anabasis* are read, together with selections from the New Testament. Second semester. Five hours. Four units.

3. Greek Epic Poetry.

Several books of the *Iliad* and the *Odyssey* are read and serve as a medium for a study of the Greek religion and Greek social and military customs. First semester. Five hours. Four units.

4. Greek Drama.

The *Oedipus Rex* of Sophocles and the *Birds* of Aristophanes are read, together with selections from other plays, to serve as a basis for a study of Greek tragedy and comedy and their influence upon the people. Second semester. Four hours. Four units.

LATIN

PROFESSOR CUMMINGS

1. Beginners' Course.

This course provides opportunity for college students who have been unable to secure any knowledge of Latin in their high school course to take up the study and gain a sufficient foundation in the subject to aid them in securing a more complete understanding of the grammar of English and other modern languages. The course embraces a study of Latin grammar and the mastery of a sufficient vocabulary to enable them to read with facility simple prose literature. Bennett's *First Book*. First semester. Five hours. Four units.

2. Beginners' Course.

Continuation of 1. Rolfe's *Viri Romae* and selections from *Caesar's Gallic War* provide the basis for the course. Second semester. Five hours. Four units.

3. The Oratorical Prose of Cicero.

Several of Cicero's orations are read with a careful study of the elements of Cicero's success and the social and political situation in Rome at the time. First semester. Four hours. Four units.

4. The Poetry of Virgil.

Several books of the *Aeneid* are read with selections from the Bucolics and Georgics, together with a careful study of the Roman religion and their moral standards. Second semester. Four hours. Four units.

5. Cicero's Philosophical Prose and Letters.

Cicero's *De Amicitia* and *De Senectute* and selections from his letters are taken as a basis for the study of the home life and education of the Romans. Three hours. Three units. Given in 1919-20.

6. Roman Lyric Poetry.

Selections from Horace's Odes, Epodes and Satires are read with a study of that author's favorite meters, characteristics and influences upon the empire. Three hours. Three units. Given in 1919-20.

7. Tacitus.

The Agricola and Germania are read as a basis for a study of Rome's policy of conquest and of colonial organization. First semester. Three hours. Three units. Given in 1920-21.

8. Tacitus.

Continuation of 7. Second semester. Three hours. Three units. Given in 1920-21.

9. Livy.

Books I, XXI and XXII serve as a basis for a study of Rome's struggle for commercial supremacy. First semester. Two hours. Two units. Given in 1919-20.

10. Livy.

Continuation of 9. Second semester. Two hours. Two units. Given in 1919-20.

DAIRY HUSBANDRY

ASSOCIATE PROFESSOR CUNNINGHAM

1. Elements of Dairying.

A study of profitable dairying, herd improvement, and dairy sanitation; secretion, composition, and properties of milk; methods of cream separation, including a study of the construction and operation of centrifugal separators; testing milk and other products; care of milk and cream; and butter making on the farm. First semester. Two lectures, one three-hour laboratory period. Three units.

2. Dairy Manufactures.

A study of the principles and practice of butter making, including the use and care of starters; cream ripening; manufacturing and marketing of butter; cheese making, with special reference to the soft cheeses, including Cheddar, Neufchatel, Pimiento, and Brick; ice cream making, including natural and artificial flavorings; use of fillers and stiffeners; types of freezers, and the manufacture of sherbets and ices. Prerequisite, Dairy Husbandry 1. Second semester. Two lectures, one three-hour laboratory period. Three units.

3. Dairy Management.

A study of dairy farm management; methods of feeding; developing dairy herds; dairy equipment; registration of animals; official testing. Prerequisite, Dairy Husbandry 1. Second semester. Two lectures, one three-hour demonstration. Three units.

4. Selection of Dairy Cattle.

Judging cattle of the different dairy breeds by use of the score-card and by comparison. Study of the development and the characteristics of different breeds of dairy cattle. Interpreting the value of pedigrees. Principles of breeding and selection. First semester. One lecture, one three-hour laboratory period. Two units.

5. Dairy Husbandry Literature.

Assigned readings in bulletins, periodicals and standard books, presenting a general view of the dairy industry and providing a basis for research work. Open to Juniors and Seniors. Second semester. Two units.

EDUCATION

PROFESSOR FOSTER

The work of this Department is planned to meet the needs of three types of students: (1) the prospective high school teacher, (2) the school superintendent or principal, and (3) the student desiring courses in education for general culture rather than as preparation for teaching. Special effort is made to meet the needs of experienced teachers and school administrators who wish to familiarize themselves with present-day educational theory and investigations. The courses offered in the Department of Education, including the work in school observation and practice teaching, and supplemented by the courses in the teaching of high school subjects offered by other departments of the University, fully meet the requirements for certification as laid down by the school laws of Arizona and most other states.

The requirements for the teacher's certificate in Arizona have been fixed by the State Board of Education as follows:

"Upon graduation from an accredited college or university, a candidate upon application shall receive from the State Board of Education a First Grade Teacher's Certificate, provided the applicant during his college course shall have completed at least fifteen units (semester hours) of work in Education and Psychology from the following groups:

"(a) At least 3 units, History of Education

"(b) At least 3 units, Principles of Education or Educational Psychology.

"(c) At least 3 units, Educational Administration or School Management

"(d) At least 3 additional units of Education."

The Department is so organized as to provide a regular sequence of work in the teacher's training, and students who contemplate training for teaching are urged to advise with the instructor regarding the best order for the courses in Education. Course 9 in Psychology should be taken by all prospective teachers before undertaking the course in Educational Psychology, preferably in the Sophomore year. Candidates for degrees with major in Education should include 7, 15, and 16 among the courses offered.

1. History of Education.

This course presents the study of educational principles, practices, and systems of those nations whose ideas and ideals have dominated in educational development. Emphasis will be placed on modern educational reforms and their significance for present-day education. Second semester. Three hours. Three units.

4. Principles of Education.

An introductory course, designed to give the student an intelligent interest in modern educational problems. A special study will be made of typical present-day movements toward educational reform, with special reference to the principles upon which they are based. First semester. Three hours. Three units.

5. Vocational Education.

A review of the historic types of training for vocation, together with a consideration of the problems and principles of vocational education of the present. First semester. Two hours. Two units. Offered in 1919-20, but not in 1920-21.

6. Secondary Education.

A study of the special aim, organization, and content of secondary education. The problems of the curriculum, reorganization, and socialization of secondary education will receive special attention. First semester. Three hours. Three units.

7. Philosophy of Education.

An advanced course dealing with the modern theories as to the ideals of education from the standpoint of both form and content. Various types of the more complex problems of education will be investigated, and an attempt will be made to reduce all educational theory and practice to a philosophical unity. Open to students who have had Education 4. Second semester. Two hours. Two units.

8. Comparative School Systems.

A comparative study of leading foreign school systems, especially those of France, Germany, and England. Emphasis will be laid upon the suggestions which these offer for American education, and upon the significance of educational systems and ideals in the determination of the nation's social and political ideals. Second semester. Two hours. Two units. Offered in 1920-21.

10. Social Aspects of Education.

A study of the relation of social needs, desires, and forces to the teaching, organizing, and administrative factors in education. It is recommended that students do some work in principles of sociology before taking this course. Open to students who have had Education 4. First semester. Two hours. Two units. Offered in 1920-21.

12. Educational Method.

This course will deal with the general principles of method as based on psychology, with special reference to secondary school training. Students will be given practice in the preparation of lesson plans in which the principles developed in the class-room are given practical application to the teaching of secondary subjects. Open to students who have had Education 14. Second semester. Three hours. Three units. Repeated in summer session.

14. Educational Psychology.

A course supplementary to Course 9 in Philosophy (General Psychology), introducing such additional material and indicating such pedagogical implications as to render a knowledge of psychology most serviceable in educational work.First semester. Three hours. Three units.

15. Educational Seminar.

A review of educational literature, including current educational periodicals and intensive study of special topics of professional interest. Open to advanced students in the Department. First semester. One unit.

16. Educational Seminar.

A continuation of Education 15, but may be taken independently. Second semester. One unit.

17. Elementary Education.

This course will include a study of the peculiar aims and problems of elementary education, in the light of its historical development, its present status, its needs for the future, and the function of the elementary school as a social, political, and economic institution. This course is intended for Juniors and Seniors, and especially those who are training for administrative work. First semester. Three hours. Three units. Offered in 1919-20, but not in 1920-21.

18. School Administration.

This is a course intended to train superintendents and principals of school systems in the smaller cities. A study is made of the educational systems of Arizona and much more specifically the administrative and supervisory activities of the school superintendent. First semester. Three hours. Three units. Offered in 1920-21.

19. Educational Hygiene.

This is a course presenting the hygiene of children from the standpoint of the school in its relationship to the home and community. It is a study of the theories, principles and practice of the best school systems in their attempt to meet the hygienic needs of pupils in the public schools. Second semester. Two hours. Two units. Offered in 1919-20, but not in 1920-21.

20. Rural Education.

Organization, instruction, supervision, transportation, buildings and grounds, the rural high school, the rural school as a social and civic center. First semester. Three hours. Three units.

30. Practice Teaching.

Offered during the summer session. Attention is called to the courses in the teaching of special subjects, listed under the various departments of instruction.

Summer Session in Education.

The University is now maintaining a summer session in Education at Bisbee, Arizona. At this session opportunity for practice teaching and observation is offered in the public schools of Bisbee, and a number of courses for teachers are given. Further information is to be found in the paragraphs on the Summer Session, elsewhere in this publication.

ELECTRICAL ENGINEERING

PROFESSOR CLOKE

Work in electrical engineering proper is not undertaken until the Junior year. Courses are given in other engineering subjects, and electives give opportunity for work along engineering lines.

1. Direct Currents.

The construction, theory, and principles of operation of direct current motors and generators. A thorough study of their characteristics under various conditions, and their application for different classes of work. The study of storage batteries and other direct current auxiliaries. Prerequisite, E. E. 9. Second semester, Junior year. Three one-hour lecture periods and one three-hour laboratory period. Four units. Laboratory fee, $3.

2. Alternating Currents.

The theory of alternating currents. A study of alternating current machinery including: alternators, synchronous motors, rotary converters, transformers; induction, repulsion, and series motors. This is taken up in a manner similar to direct current machinery. Prerequisite, E. E. 1. First semester, Senior year. Three hours. Three units.

15. Alternating Currents.

Continuation of 2. Second semester, Senior year. Three hours. Three units.

3. Illumination and Distribution.

Cost of producing and transmitting power for lighting purposes, different methods of distribution and their advantages under various conditions, comparing different light sources and their relative value for diverse purposes, the effect and selection of shades. Prerequisite, E. E. 9. Second semester, Senior year. Two one-hour lecture periods. Two units.

4. Electric Traction.

Traffic and schedule studies, selection of equipment, transmission of energy, location of substations and central plant, electrolysis, track lay-out and construction, signal and dispatching system, construction and equipping of rolling stock, and comparison of alternating current and direct current traction. Prerequisite, E. E. 2. Second semester, Senior year. Two one-hour lecture periods. Two units.

5. Electrical Engineering Laboratory.

Operation and characteristics of commercial machines and allied apparatus, making complete tests of generators, alternators, synchronous converters, and common causes of trouble and their remedy. Prerequisite, E. E. 2. First semester, Senior year. Two three-hour laboratory periods. Two units. Laboratory fee, $3.

6. Electrical Engineering Laboratory.

Continuation of 5. Second semester, Senior year. Two three-hour laboratory periods. Two units. Laboratory fee, $3.

7. Design of Electrical Machinery.

Practical problems in design applying the theory and empirical relations illustrated in practice and effect of design on characteristics and performance of direct current and alternating current machinery. Prerequisite, E. E. 1. First semester, Senior year. Two three-hour drafting room periods and one one-hour lecture period. Three units.

9. Electrical Engineering Practice.

A general course for all engineering students, covering the greater part of the electrical field, so as to give a broad idea of the principles and practice of electrical engineering. The laboratory work covers the actual operation and testing of generators and motors. Prerequisite, Physics 2. First semester, Junior year. Two one-hour lecture periods, and one three-hour laboratory period. Three units. Laboratory fee, $3.

10. Seminar.

A discussion of various subjects which arise in connection with class-room and laboratory work; and a review of current engineering literature. First semester, Senior year. One one-hour lecture period. One unit.

13. Central Electric Stations.

A study of the design and lay-out of stations and circuits, considering equipment of the station and transmission line and protective devices. The economic problem of size of units and lines, location of station, load, power, diversity, and maximum demand factors. The buying and selling of electric energy. Prerequisite, E. E. 1. Elective first semester, Senior year. Two one-hour lecture periods. Two units.

14. Electrical Materials Testing.

Magnetic permeability and hysteresis tests of iron and steel. Dielectric strength and dielectric hysteresis and insulation resistance of various insulating materials. Measurements of high and low resistance. Capacity and inductance measurements. Calibration of ammeters, voltmeters, watthour, and watt meters. Prerequisite, E. E. 2. Elective second semester, Senior year. One three-hour laboratory period. One unit.

ENGLISH COMPOSITION AND RHETORIC

PROFESSOR PERRY, ASSISTANT PROFESSOR FRAZIER, MR. CRANDALL

1. Exposition.

PROFESSOR PERRY AND ASSISTANT PROFESSOR FRAZIER

Lectures and the study and practice of exposition; daily and weekly themes. Prescribed for Freshmen. First semester. Three hours. Three units.

2. Argumentation.

PROFESSOR PERRY AND ASSISTANT PROFESSOR FRAZIER

The study and practice of argumentation. Class debates and written arguments, instruction in the right use of authorities, use of catalogues and indexes. Prescribed for Freshmen. Second semester. Three hours. Three units.

3. Practical Prose. PROFESSOR PERRY

A practical course in theme writing based on the study of newspapers ,magazines, informal essays, and official reports. Prerequisite, English Composition 1, 2. First semester. Three hours. Three units.

4. Narration. PROFESSOR PERRY

The writing of short-stories; consideration of the problems of the short-story writer; the discovery through the analysis of specimen stories of helpful principles and devices, and experimentation in their application in writing. Prerequisite, English Composition 1, 2. Second semester. Three hours. Three units.

6. Methods of Teaching English. PROFESSOR PERRY

For students preparing to teach English in secondary schools. Methods of teaching grammar, rhetoric, composition; blocking out courses, and planning and presenting single lessons. After 1919 stu-

dents planning to take English Composition 6 should take English Composition 3 and 7 as foundation for it. Open to Seniors. Second semester. Three hours. Three units.

7. Public Speaking. MR. CRANDALL

A fundamental course giving students a thorough understanding of the principles underlying oral expression, and training them through constant practice in expressive delivery and in swift and effective organization of ideas for oral presentation. The work includes debating, formal and informal, and independent speeches more or less formal in character. Prerequisite, English Composition 1, 2. First semester. Three hours. Three units.

8. Public Speaking.

Continuation of 7. Second semester. Three hours. Three units.

9. Advanced Public Speaking. MR. CRANDALL

A course which deals with public speaking as related to professional life. Each student is required to select a major topic and to apply the principles gained in Public Speaking 7, 8 in preparation and delivery of a series of varied speeches ranging from impromptu talks to carefully prepared and revised addresses on this topic. An effort will be made to develop in the student the power of adjustment and adaptation demanded in the business world. Prerequisite, Public Speaking 7, 8. First semester. Three hours. Three units.

ENGLISH LITERATURE

PROFESSOR PATTISON, MISS LUTRELL

1. Survey of English Literature.

A survey of English Literature from its beginning down to the present time. Assigned readings from numerous authors and from a history of English literature. This course is prerequisite to all other courses in English literature. First semester. Two hours. Two units.

2. Survey of English Literature.

Continuation of 1, which is prerequisite. Second semester. Two hours. Two units.

3. English Poetry from 1789 to 1832.

Burns, Wordsworth, Coleridge, Byron, Shelley, Keats. Copious readings. Either courses 3-4 or 5-6 are required for the degree of Bachelor of Arts. First semester. Three hours. Three units. Offered in 1919-20 and alternate years.

4. English Poetry from 1789 to 1832.

Continuation of 3. Second semester. Three hours. Three units. Offered in 1919-20 and alternate years.

5. Victorian Poetry.

Tennyson, Browning, Arnold. First semester. Three hours. Three units. Offered in 1920-21 and alternate years.

6. Victorian Prose.

Landor, Carlyle, Macaulay, Newman, Ruskin, Arnold. Second semester. Three hours. Three units. Offered in 1920-21 and alternate years.

7. American Literature.

Outlines of development. Lectures upon representative authors. Critical study and interpretation. Essays by members of the class. First semester. Three hours. Three units. Offered in 1919-20 and alternate years.

8. Modern Prose Fiction.

Studies in the structure and significance of the novel, the romance, and the short story. Illustrative readings and carefully prepared papers. Second semester. Three hours. Three units. Offered in 1919-20 and alternate years.

9. Shakespeare.

Analytic and interpretative studies of several of Shakespeare's chief plays. A careful reading of Neilson and Thorndike's *The Facts About Shakespeare* is required in connection with this course. First semester. Three hours. Three units.

10. Elizabethan Drama Other than Shakespeare.

Second semester. Three hours. Three units. Offered in 1919-20 and alternate years.

11. Modern Drama.

A study of the chief dramatic writers of the last half century. Second semester. Three hours. Three units. Offered in 1920-21 and alternate years.

13. Chaucer. MISS LUTRELL

Reading of the General Prologue, selected Canterbury Tales, and some of the minor poems. Emphasis will be placed upon Chaucer's narrative skill and upon the historical and social background of his age. First semester. Three hours. Three units.

16. Milton.

Selected poetry and prose. First semester. Three hours. Three units. Offered in 1920-21 and alternate years.

17. Modern Poetry.

A study of the chief non-dramatic poets of the present day. Second semester. Two hours. Two units. Offered in 1920-21 and alternate years.

18. The English Lyric.

The development of English lyric poetry, and a study of its technique. First semester. Two hours. Two units. Offered in 1919-20 and alternate years.

14. Eighteenth Century Prose.

Copious readings. A study of the literary, social, and political movements of the period with special reference to the essay. Second semester. Three hours. Three units. Offered in 1920-21 and alternate years.

12. The Nineteenth Century Essay.

Copious readings. Lectures, discussion, prepared papers. Second semester. Two hours. Two units. Offered in 1919-20 and alternate years.

15. Principles of Literary Criticism.

Winchester's *Principles of Literary Criticism.* An inquiry into the essentials of the literary art. A study of the chief literary forms. Illustrative reading, and carefully prepared critical papers. First semester. Two hours. Two units. Offered in 1920-21 and alternate years.

20. The Use of Books and Elementary Bibliography.

MISS LUTRELL

Classification, card catalogues; the more common reference books, bibliographies, indexes, and public documents; sales catalogues and book selection. Lectures, exercises, preparation of bibliographies. Second semester. Two hours. Two units.

ENTOMOLOGY

PROFESSOR VORHIES

1. General and Economic Entomology.

Introduction to the structure, relationships and classification of insects. Arizona insects will provide much of the material for this course, and, as far as possible, attention will be given to local pests. The work of the first semester will be general, as a preparation for the second semester, in which attention will be directed primarily to the economic side. The aim is to prepare the student to meet an insect problem in an intelligent manner. First semester. One lecture and two laboratory periods. Three units. Laboratory fee, $2.

2. General and Economic Entomology.

Continuation of 1. Second semester. Two lectures and one laboratory period. Three units. Laboratory fee, $2.

FRENCH

(See Romance Languages)

GEOLOGY

PROFESSOR SARLE

The courses in Geology, with the exception of Geology 19 and 20, are intended for students in mining and applied geology. The advanced courses are offered primarily for those students who wish to take up geology as a profession, or who are engaged in geological research. They provide opportunity for study in the unexcelled geological field of southern Arizona, which affords problems of great diversity in superficial, sedimentary, igneous, and metamorphic rocks, and in ore deposits, and where field work may be carried on at any time of the year.

1. Physical Geology.

This course and 2 cover the fundamental principles of general geology and are necessary as a preparation for the more specialized courses. Course 1 includes the geologic work of the atmosphere, of ground and surface water, and of snow and ice; the structure of the earth, earthquakes, vulcanism, continental movements, mountain and plateau formation, origin and descent of rocks, and ore deposits. Lectures and recitations, interpretation of topographic and geologic maps in the laboratory, and short field trips in the vicinity of Tucson. Text: Cleland's *Physical and Historical Geology,* Part I. Prerequisites, Chemistry 1, 2. First semester. Two one-hour lectures and one three-hour laboratory period. Three units.

2. Historical Geology.

Continuation of 1. Principles of stratigraphy, principles of organic evolution, and geologic history. Laboratory work: study of geologic atlases and index fossils. Field trips continued. Text: Pirrson & Schucheet's *Text Book of Geology,* Part II. Second semester. Two one-hour lectures and one three-hour laboratory period. Three units.

1a, 2a.

Same as 1 and 2, without laboratory work. Required of all Juniors in Civil Engineering electing the geology option. Two units each semester.

3. Economic Geology.

A study of mineral deposits on the basis of genetic classification. The first semester's work is confined to a description by classes and type examples of the occurrence, structure, and origin of the principal deposits of metallic and non-metallic minerals. Text: Emmons' *Principles of Economic Geology.* Trips will be made during the semester to various mining camps located in the mountains about Tucson. The class work comprises lectures and recitations. Required of all students taking Mining Engineering. Prerequisites, Geology 1, 2, and Mineralogy 2. First semester. Three lecture hours. Three units.

4. Economic Geology.

Continuation of 3. Several of the more important and illustrative mining districts are considered in detail; after which a study is made of the occurrence of building stones, coal, petroleum, natural gas, clays, limes and calcareous cements, salines and associated substances, gypsum, fertilizers, abrasives, and minor minerals. Text: Ries' *Economic Geology of the United States,* first twelve chapters. Trips continued. Required of all students electing the geology option. Prerequisite, Petrology 4, which may be taken in conjunction. Second semester. Three lecture hours. Three units.

5. Field Geology.

A course in the various methods of geological surveying, including detailed plane-table, pacing traverse, reconnaisance and underground methods. Geological maps are made, materials for laboratory study collected, and reports prepared. Required of all students electing the geology option. Prerequisites, Geology 1, 2, or Geology 19, 20,

which may be taken simultaneously. First semester. Three three-hour laboratory periods. Three units.

6. Field Geology.

Continuation of 5. The student works more independently, investigating some selected district. Second semester. Three three-hour laboratory periods. Three units.

7. Introductory Paleontology.

The general principles of paleontology, and the structure, relationships, and geological significance of the principal types of fossil invertebrates and plants. No attempt is made to describe or identify fossils, but instruction is given in methods of collecting fossils and preparing them for identification by a trained paleontologist. Text: Shimer's *Introduction to the Study of Fossils.* Prerequisite, Geology 1, 2, or 19, 20. Second semester. Two hours. Two units.

8. Geology of North America.

A course in the general physiography, stratigraphy, and structural and igneous geology of North America. Required of all students electing the geology option. Prerequisite, Geology 1, 2, or 19, 20. First semester. Two two-hour lecture-laboratory periods. Two units.

9. Advanced Economic Geology.

For graduate students in economic geology, especially for those who wish to work on one of the many varied problems in ore deposits afforded by the mining districts of Arizona. Each student selects his own problem, based either on the laboratory study of material on hand or preferably on material gathered by the student in the field. The work is carried on under the supervision of the instructor, with whom weekly conferences or seminars are held.

10. Advanced Economic Geology.

Continuation of 9. Second semester.

19. General Earth Science.

A lecture and laboratory course open to all students of whom Geology 1 and 2 are not required. It is intended as a cultural course for those desiring a broadened perspective of man's place in nature, and in the history of the planet on which he lives, and as an aid to any who may be called upon to teach Physical Geography or other natural sciences. Among other topics the lectures cover earth materials, agents, and structures; the origin of the earth and its early

growth; evolution of continents and ocean basins; episodes of mountain making; rythmic translations of ancient strand lines, and concomitant changes in paleogeography and climate; origin and evolution of life, and its correlation with the general succession of events recorded in geologic history; life provinces; ancient portals or waterways, and land bridges by which migration took place, etc. Attention is especially directed to the geologic history of man and his environment, and to the intermigrations of mammalian faunas which have led to their present geographical distribution. The lectures are illustrated by stereopticon, maps, charts, models, rocks, minerals, typical fossils, etc.; and the principal rock-forming and ore minerals, the common rocks,, the principal groups of invertebrate fossils, and many topographic maps illustrating relief forms are studied in the laboratory. Apparatus is also provided for exemplifying the mechanics of various geologic processes and phenomena. Field trips. First semester. Three lecture hours and one three-hour laboratory period. Four units. The lectures alone (constituting courses 19R and 20 R) may be taken for three units credit each semester.

20. General Earth Science.

Continuation of 19. Second semester. Three lecture hours and one three-hour laboratory period. Four units.

21. Geology of Arizona.

This course aims to give the student a systematic knowledge of the physiography, geologic structure, formations, index fossils, geologic history and literature of Arizona. It comprises lectures, laboratory and library work, and a ten days' to two weeks' trip to the Grand Canyon by way of the Petrified Forest, Dry Lake sinks, Painted Desert, and Northern Arizona Volcanic Field.* Second semester 1919-20, and thereafter biennially. Prerequisites, Geology 1, 2, 3, 4; the last (4) may be taken simultaneously. Three two-hour periods, or equivalent. Three units.

Thesis.

Each student electing the geology option is required to submit a thesis by the end of the Senior year setting forth in proper technical form the results of individual field investigation of some limited area, preferably in the vicinity of Tucson, which shall clearly demonstrate his ability to do practical geologic work. One unit.

*This trip is open to all students who have had the prerequisites to the course on the Geology of Arizona, but unless taken as a part of this course does not apply as credit work. In case a student takes the Grand Canyon trip and later desires to elect Course 21, he need not repeat the trip; but in that case will be allowed only two units credit, unless he does assigned equivalent work.

GERMANIC LANGUAGES

1. Elementary German.

Mosher's *Lern- und Lesebuch* used as basis for work in grammar and composition. First semester. Five hours. Four units.

2. Elementary German.

Continuation of German 1, which is prerequisite. Mosher's *Lern- und Lesebuch* completed and reviewed as basis for conversation. Grammar reviewed with Paul V. Bacon's *German Grammar.* Reading of Storm's *Immensee* and Heyse's *L'Arrabbiata...* Second semester. Five hours. Four units.

3. Advanced German.

Paul V. Bacon's *German Composition.* Reading of Meyer-Foerster's *Carl Heinrich* and Schiller's *Wilhelm Tell.* Conversation based on Manley's *Ein Sommer in Deutschland.* Prerequisite, German 2. First semester. Five hours. Four units.

4. Advanced German.

Continuation of German 3, which is prerequisite. Paul V. Bacon's *German Composition* completed. Reading of Sudermann's *Frau Sorge;* Heine's poems and *Die Harzreise;* Scheffel's *Ekkehard.* Conversation based on Manley's *Ein Sommer in Deutschland.* Second semester. Five hours. Four units.

5. Life and Works of Lessing Schiller, and Goethe.

Lessing; study of the life of Lessing, his *Emilia Galotti,* and *Nathan der Weise.* Study of the life of Schiller and his *Maria Stuart.* Prerequisite, German 4. First semester. Three hours. Three units.

6. Life and Works of Lessing, Schiller, and Goethe.

Continuation of German 5, which is prerequisite. Study of Schiller's *Die Jungfrau von Orleans.* Study of Goethe's life. Goethe's *Hermann und Dorothea, Goetz von Berlichingen,* and *Iphigenie auf Tauris.* Second semester. Three hours. Three units.
Two units.

7. German Literature in the Nineteenth Century.

The Romanticists and their successors. Reading of works of Kleist and Grillparzer. Prerequisite, German 3-4. First semester. Two hours. Two units.

8. German Literature in the Nineteenth Century.

The rise of Naturalism and Symbolism. Reading of works of Wildenbruch, Fulda, Sudermann and Hauptmann. Prerequisite German 3-4. Second semester. Two hours. Two units.

9. Methods, Theory, and Practice of Teaching German.

Observation of methods used in the teaching of German, reports and discussions on these observations. Lectures to develop ideas of teaching German, especially in secondary schools. Prerequisite, German 5-6, or may be taken with German 5-6. First semester. One hour. One unit. Not offered 1919-20, but offered 1920-21.

10. Methods, Theory, and Practice of Teaching German.

Continuation of German 9, which is prerequisite. Second semester. One hour. One unit. Not offered 1920, but offered 1921.

11. Goethe's *Faust.*

A close study of Goethe's life and of *Faust,* Part I. Text: Goethe's *Faust,* Part I, edited by Calvin Thomas. Prerequisite, German 5-6. First semester. Two hours. Two units.

12. Goethe's *Faust.*

Continuation of German 11, which is prerequisite. Study of Goethe's *Faust,* Part II. Text: Goethe's *Faust,* Part II, edited by Calvin Thomas. Second semester. Two hours. Two units.

13. History of German Literature.

Lectures and selected readings to show the development of German literature to the nineteenth century. This course is required of all students majoring in the Department of German. Prerequisite, German 5-6. First semester. Two hours. Two units. Not offered 1919-20, but offered 1920-21.

14. History of German Literature.

Continuation of German 13, which is prerequisite. This course is required of all students majoring in the Department of German. Second semester. Two hours. Two units. Not offered 1920, but offered 1921.

31. Reading and Conversation in Scientific German.

Text: Dippold's *Scientific German Reader.* Prerequisite, one year of Chemistry and one of Physics, German 3-4, or may be taken with German 3-4. First semester. Two hours. Two units.

32. Reading and Conversation in Scientific German.

Continuation of German 31, which is prerequisite. Text: Dippold's *Scientific German Reader*. Second semester. Two hours. Two units.

GREEK

(See Classical Languages)

HISTORY

ASSOCIATE PROFESSOR HUBBARD AND ASSISTANT PROFESSOR REID

1. Expansion of the American People.

ASSISTANT PROFESSOR REID

The political and social development of the American people from the settlement of the Atlantic seaboard to the present time; the analysis of the various complex forces which have resulted in the ideas and institutions of the day; the adaptation of European peoples and institutions to American conditions; the early westward movement; the development of western democracy; the social and political changes following the Civil War; the settlement of the far West. Open to all students. First semester. Three hours. Three units.

2. Expansion of the American People.

Continuation of 1. Second semester. Three hours. Three units.

3. Mediæval History. ASSISTANT PROFESSOR REID

A history of Europe from the fall of the Roman Empire in the West to the time of the Reformation; the origin and development of the various European states; the origin, growth, and significance of the religious, social, and political institutions of the period. First semester. Three hours. Three units.

4. Mediæval History.

Continuation of 3. Second semester. Three hours. Three units.

5. Nineteenth Century Europe. ASSOCIATE PROFESSOR HUBBARD

The liberal reform movements of Europe during the last century; 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. First semster. Three hours. Three units.

6. Nineteenth Century Europe.

Continuation of 5. Second semester. Three hours. Three units.

9. Greek History. ASSISTANT PROFESSOR REID

The history of Greece to the death of Alexander. A study of the development of the political, social, and economic life of the Greek people. First semester. Three hours. Three units.

10. Roman History. ASSISTANT PROFESSOR REID

The history of Rome to the fall of the Empire. A survey of the political history as a basis for the study of the organization of the Republic and the Empire; the social and economic development of the people. Emphasis will be placed upon the relation of Rome to the Mediterranean World. Second semester. Three hours. Three units.

11. Development of the English Nation.

ASSOCIATE PROFESSOR HUBBARD

The English people from the earliest times to the end of the Tudor period. The influence of Church and Continental relations; the cause 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. First semester. Three hours. Three units.

12. Development of English Party Government.

ASSOCIATE PROFESSOR 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. Second semester. Three hours. Three units.

13. Modern Europe. ASSOCIATE PROFESSOR HUBBARD

European history from the beginning of the Reformation to the Napoleonic period. European civilization of the sixteenth, seventeenth, and eighteenth centuries, including an intensive study of the French Revolution. First semester. Three hours. Three units. Not offered in 1919-20, but offered 1920-21.

14. Modern Europe.

Continuation of 13. Second semester. Three hours. Three units.

15. The Balkan States. ASSOCIATE PROFESSOR HUBBARD

A study of the origin and development of the Balkan States; the Near East problem as related to present day European politics; the causes and events of the late wars. The history during the last three

decades will be studied as much as possible from original sources. Open to students having had at least one course of college history. First semester. Two hours. Two units.

16. The Great European War. ASSOCIATE PROFESSOR HUBBARD

A study of the origin and development of the great European alliances; the political, social, and economic development of the Great Powers in the twentieth century; immediate causes, events, and international problems of the great war. Open to students having had one course of college history. Second semester. Two hours. Two units.

17. Constitutional History to the Civil War.
ASSOCIATE PROFESSOR HUBBARD

The origin and development of the constitutional idea, based on letters and speeches of American statesmen, public documents, and special histories. One purpose of the course is to direct the student to collect and organize source material. Open only to students having had History 1, 2. First semester. Two hours. Two units. Not offered in 1919-20, but offered in 1920-21.

18. Constitutional History to the Civil War.

Continuation of 17. Second semester. Two hours. Two units.

19. Later Constitutional History of the United States.
ASSISTANT PROFESSOR REID

The development of the Constitution since the Civil War, modifications of the Constitution as expressed in court decisions and in laws; the direction and significance of recent tendencies. Open only to students having had History 1, 2. First semester. Two hours.

20. Later Constitutional History of the United States.

Continuation of 19. Second semester. Two hours. Two units.

21. The Latin American Colonies. ASSISTANT PROFESSOR REID

A brief survey of Spanish institutions and culture introductory to a sketch of the course of discovery, exploration, and settlement of Latin America; a study of the form of government, social organization, economic conditions, work of the Church, intellectual status, and the struggle for independence. First semester. Two hours. Two units.

22. The Latin American Republics. ASSISTANT PROFESSOR REID

General history and present condition of the republics of Latin America; their progress toward stability, prosperity, and international recognition; relations with Europe and the United States; geography and resources; social, political, and financial situation; industrial and commercial relations. Second semester. Two hours. Two units.

23. The Teaching of History. ASSISTANT PROFESSOR REID

The course deals with the aims of teaching history; the apparatus and exercises best adapted to meet conditions; text books, casts, charts, models, pictures, etc.; lesson plans, class exercises, and collateral reading. Second semester. Two hours. Two units.

HOME ECONOMICS

PROFESSOR THOMAS, PROFESSOR WILLIAMS, MISS BISHOP, MISS COON, MISS DAVIS

1. Foods and Cookery. PROFESSOR WILLIAMS

A general survey of the principles and a development of skill in the technique of cookery, and a knowledge of household processes connected with food. Offered to all college students. No prerequisites. First semester. One lecture, two three-hour laboratory periods. Three units. Laboratory fee, $5.

2. Foods and Cookery.

Continuation of 1. Second semester. One lecture, two three-hour laboratory periods. Three units. Laboratory fee, $5.

3. Food Economics. PROFESSOR WILLIAMS

A course dealing with the quantitative aspects in the purchase and preparation of food, the cost and relative values of food, and the planning and serving of various kinds of meals. Prerequisite, Home Economics 1, 2; Chemistry 1, 2. First semester. One lecture, two three-hour laboratory periods. Three units. Laboratory fee, $5.

4. Food Economics.

Continuation of 3. Second semester. One lecture, two three-hour laboratory periods. Three units. Laboratory fee, $5.

7. Dietetics. PROFESSOR WILLIAMS

A survey of the nutritive values of foods and the food requirements of the individual throughout life. Dietaries for different ages and conditions are worked out in the laboratory. Prerequisites, Home

Economics 1, 2, 3, 4; prerequisite or parallel Bacteriology; Household Chemistry and Zoology 4 and 5 (Physiology). First semester. Two two-hour periods. Three units. Laboratory fee, $2.

8. Dietetics.

Continuation of 7. Second semester. Two two-hour periods. Three units. Laboratory fee, $2.

9. House Planning, Furnishing, and Decoration.

PROFESSOR WILLIAMS

A study of various types of modern houses, and the application of the principles of art and economy in the furnishing and decoration of them. First semester. Two two-hour periods. Three units.

10. House planning, Furnishing, and Decoration.

Continuation of 9. Second semester. Two two-hour periods. Three units.

11. Methods of Teaching Home Economics

PROFESSOR WILLIAMS

A study of the application of fundamental principles of teaching as applied to the teaching of Foods and Cookery, House Planning, Furnishing, and Decoration, Household Management, and Home Nursing including the planning of courses of study, the planning and presentation of special lessons, and the study of laboratory equipment and management. Prerequisites, Education 12-14. First semester. Three lecture periods. Three units.

13. Elementary Clothing and Hand Work. PROFESSOR THOMAS

This course gives practice in the use of sewing machines and their attachments, the making of the fundamental stitches, the drafting and use of patterns, making of simple garments, darning, patching crocheting, knitting, and simple embroidery. The course is prerequisite for all Textile and Clothing courses except Millinery. Lectures, recitations, laboratory work. First semester. Two three-hour periods. Three units. Laboratory fee, $2.

14. Elementary Clothing and Hand Work.

Continuation of 14. Second semester. Two three-hour periods. Three units. Laboratory fee, $2.

15. Costume Design. MISS BISHOP

Principles governing design in costume; study of costumes in art; sketching of gowns, hats, etc.; original designs of gowns, hats, etc.,

for various types and occasions; color theory. Students provide drawing pencils, water colors, and drawing paper. Lecture and laboratory work. First semester. Two three-hour periods. Two units.

16. History of Costume. MISS BISHOP

This course comprises a survey of ancient Egyptian, Grecian and early French costumes. Second semester. Two one-hour lecture periods. Two units.

17. Drafting, Draping, and Pattern Making. MISS BISHOP

Practice in drafting, cutting, fitting, and designing sleeves, collars, waists, skirts, and gowns. Prerequisite, Home Economics 13, 14. First semester. Two three-hour laboratory periods. Two units. Laboratory fee, $5.

18. Dressmaking. MISS BISHOP

The making of waists, dresses, and trimmings. The course includes a problem in renovation and remodeling of a woolen garment. Students are requested to bring a wool suit, dress or coat for this work. Prerequisite, Home Economics 13, 14, 17. Second semester. Two three-hour laboratory periods. Two units. Laboratory fee, $2.

19. Dressmaking.

Continuation of 18. First semester. Two units. Laboratory fee, $2.

20. Advanced Dressmaking. MISS BISHOP

A course in designing and making afternoon and evening gowns, including a study of the proportions of the human figure and application of the principles of design and color to the costume. Prerequisite, Home Economics 13, 14, 17, 18, 19. Second semester. Two three-hour laboratory periods. Two units. Laboratory fee, $2.

21. Advanced Dressmaking.

Continuation of 20. First semester. Two units. Laboratory fee, $2.

22. Millinery. PROFESSOR THOMAS

A course giving instruction in making wire frames, buckram and cape net frames, hats, renovating old materials, manufacturing artificial flowers and other trimmings. First semester. Two three-hour laboratory periods. Two units. Laboratory fee, $2.

23. Millinery.

Continuation of 22. Second semester. Two three-hour laboratory periods. Two units. Laboratory fee, $2.

24. Textiles. PROFESSOR THOMAS

This course considers: The identification of fibres and substitute materials by means of the microscope and chemical tests. It includes the history of the textile industry and a study of the process of manufacture and economic use of fabrics, shoes, hats, and dress accessories. The clothing budget will be considered. Lectures on the proper use of materials in relation to cleansing and laundering will be given. First semester. Three lecture periods. Three units.

28. Textiles.

Continuation of 24. Second semester. Three lecture periods. Three units.

25. Methods of Teaching Home Economics.

PROFESSOR THOMAS

A study of the application of fundamental principles of teaching as applied to the teaching of textiles and clothing, including the planning of courses of study, the presentation of special lessons, and the study of laboratory equipment and management. Required of Juniors in Textiles and Clothing. Prerequisites, Education 12 and 14. Second semester. Two one-hour periods. Two units.

27. Elementary Nursing and First Aid. MISS DAVIS

Instruction in caring for the sick when the services of a nurse are not needed.

The course covers such topics as: The equipment and care of the sick room, methods of sterilization and disinfection, care of the patient suffering from contagious or infectious diseases or slight indispositions, such as cold, etc., emergencies, care of children and the aged. Second semester. Two one-hour periods. Two units.

30. Practice Teaching. MISS COON

This course is planned to give practice teaching in Home Economics to students preparing to teach in vocational schools. Prerequisites, Education 12 and 14, H. E. 25 and H. E. 11. Second semester. Three units.

31. Household Management. MISS COON

A course applying scientific, economic, and sociological principles to the problems of the housewife. The management of the home is

considered: (1) from the sanitary standpoint, including the most efficient methods of heating, lighting, ventilating, cleaning, and the proper care of household furniture and equipment; (2) from the economic standpoint, including the organization of the house, standards to be attained, division of income, the household budget, the keeping of accounts, and the systematizing of household duties; (3) from the social standpoint, including the relations of the family within the home and with the community. Practice in household management will be carried out in the laboratory and the Home Economics practice house. Required of all students majoring in Foods and Cookery. First semester. Two lectures, one three-hour laboratory period or equivalent in practice house work. Three units. Laboratory fee, $5.

32. Household Management.

Continuation of 31. Second semester. Two lectures, one three-hour laboratory period. Three units. Laboratory fee, $5.

HORTICULTURE

PROFESSOR CRIDER AND ASSISTANT PROFESSOR KINNISON

2. Plant Propagation. ASSISTANT PROFESSOR KINNISON

A study of the fundamental principles and methods of plant propagation, including such subjects as seedage, separation, division, layerage, cuttage, budding, and grafting. Required of all students in Agriculture. Two lectures and one three-hour laboratory period. First semester. Three units.

9. Principles of Fruit Growing. PROFESSOR CRIDER

A course embracing problems incident to establishing an orchard. Consideration is given to such questions as orchard sites and soils, variety, selection, preparation of the land, tree planting, irrigation, cultivation, fertilizing, pruning, and spraying. Special emphasis is placed on the home orchard. Two lectures. Second semester. Two units.

10. Commercial Pomology. ASSISTANT PROFESSOR KINNISON

A course embracing the care of fruit trees, management of orchards, and the handling of fruit with special application to the growing of fruit for market. Problems of pruning, spraying, intercropping, cover crops, irrigation and frost prevention are studied; also the most approved methods of harvesting, grading, packing, stor-

ing, and marketing. All of the fruits of commercial importance belonging to the pome, stone, bush, bramble, and small fruit classes, as well as grapes and nuts, are studied. As an additional feature of the course, visits are made to commercial orchards in the vicinity of the University and in other parts of the State, thus making the student acquainted with actual orchard operations. Two lectures and one three-hour laboratory period. First semester. Three units.

6. Sub-Tropical Pomology. PROFESSOR CRIDER

This course treats in detail the problems connected with the growing and handling of such fruits as the orange, pomelo, lemon, lime, date, olive, fig, loquat, guava, avocado, and pineapple. Special attention is given the citrus, date, and olive industries; and visits are made to commercial orchards of these fruits. Two lectures and one three-hour laboratory period. Second semester. Three units.

11. Systematic Pomology. PROFESSOR CRIDER

A study of the principles underlying pomological nomenclature and variety description, classification, and adaptation. The characteristics of both the trees and fruits are studied with reference to their group relationships. Practice is given in describing and identifying varieties of fruits and nuts, placing exhibits, and judging. For this study fruits will be collected from the University orchards and other parts of the State. Two lectures and one three-hour laboratory period. First semester. Three units.

3. Home Gardening. ASSISTANT PROFESSOR KINNISON

This course teaches the value of a well-conducted home garden and serves as an introduction to vegetable growing as a business. The principles and practices of variety selection, planting, transplanting, irrigation, cultivation, fertilizing, and storing, and the handling of garden tools as well as the uses of forcing frames are considered. A special feature of the course is the assignment of individual plots to students to be planted and cared for as part of the practical work. Prerequisite to Horticulture 12. Two lectures and one three-hour laboratory period. First semester. Three units.

12. Commercial Vegetable Growing. PROFESSOR CRIDER

The purely commercial aspects of market gardening and trucking are treated in this course. Special attention is given to the trucking industry of the Southwest and the possibilities in its further development. The problems of capital, labor, methods of growing, handling, and shipping are fully treated. Two lectures and one three-hour laboratory period. Second semester. Three units.

13. Landscape Gardening. PROFESSOR CRIDER

A course which treats of the fundamental principles of landscape art with reference to the beautifying of homes and school grounds, park areas, and other public properties. A study is made of the characteristics and habits of ornamental trees, shrubs, and herbaceous perennials and their adaptation to landscape design. Practice is given in mapping, designing and laying out drives and walks, and in making lawns and planting ornamental trees and shrubbery. Tree surgery is a feature of the course. Two lectures and one three-hour laboratory period. Second semester. Three units.

14. Floriculture. ASSISTANT PROFESSOR KINNISON

A course dealing with the cultivation and handling of the more common dooryard and greenhouse flowers and foliage plants. Instruction is given in the making of soils, rooting of plants, potting preparation and planting of flower beds, execution of simple floral designs, and such practical operations as bench construction, glazing, watering, ventilation and the care of furnaces. Two lectures and one three-hour laboratory period. Second semester. Three units.

15. Advanced Horticulture. PROFESSOR CRIDER

Assigned readings and problems in horticulture furnishing a comprehensive view of the different branches of this subject. Open only to Juniors and Seniors. Three hours. Second semester. Three units.

Research and Thesis.

A Senior majoring in Horticulture is permitted to do special work under the direction of the professor in charge in a subject of special interest, serving to furnish definite knowledge in a particular field, and to give training in methods of research. Credits not exceeding four units for undergraduates and fifteen units for graduate students may be obtained.

LATIN

(See Classical Languages)

LAW

PROFESSOR FEGTLY, PROFESSOR DAVIS

The Department of Law was established by the Board of Regents of the University of Arizona in 1915 and offers a complete three years' course of study leading to the degrees of Bachelor of Laws (LL.B.) and Juris Doctor (J.D.).

The necessity of a thorough education preparatory to the study and practice of law becomes more apparent each year. Therefore, the student who expects to enter upon the practice of law should secure such thorough educational preparation before undertaking the courses of legal study. As an aid and incentive to this, the University offers a combined course of collegiate and legal studies whereby the student, while securing this desirable educational preparation, is able to shorten to six years the time required to earn both academic and legal degrees.

Students desiring admission to the Department of Law as candidates for a legal degree must have complied with the general requirements for admission to the University (see page 53) and in addition thereto, must have secured thirty (30) units of academic credit (see page 67). Admission of all other students to the Department of Law is subject to the conditions governing the admission of such students to the other departments of the University.

The courses of study offered total ninety (90) semester units. A student who is a candidate for a degree in the Department of Law may take any course offered either in the year to which he belongs or in the preceding year; provided, however, that no student may carry more than fifteen (15) hours of legal study per week without special permission of the Law Faculty. No course offered in the year succeeding the one to which a student belongs may be taken by such student without special permission of the Law Faculty.

The Case-study system, proved by years of use in the leading law schools of the United States to be the best method of legal study, is the system adopted and used by the University in the Department of Law.

A Practice Court is an organized part of the Department of Law and affords the student practical instruction in pleading and practice.

Supplementing the regular courses of study, special lectures on practice and procedure as well as on questions of substantive law will be given by prominent members of the Arizona Bar and Judiciary.

Students in other departments of the University, wishing to supplement their general education by the study of special subjects in the

Department of Law, may be admitted to classes in such subjects by special permission of the Law Faculty.

COURSES OF STUDY

2. Contracts.

Offer and acceptance; requisites of contracts under seal; express conditions precedent and subsequent. Williston's *Cases on Contracts,* Vol. 1. First semester. Three units.

3. Contracts.

Continuation of course 2. Implied conditions; illegality; impossibility of performance; discharge of contracts. Williston's *Cases on Contracts,* Vol. 2. Second semester. Three units.

5. Agency.

Relation, appointment; liabilities of principal; liabilities of agent; parties to writings; undisclosed principal; delegation and termination of agency. Wambaugh's *Cases on Agency.* Second semester. Three units.

6. Property. PROFESSOR DAVIS

Distinction between real and personal property; rights of action based on possession or on ownership; possessory interests in chattels; acquisition of ownership; fixtures; emblements. Bigelow's *Cases on Personal Property.* First semester. Two units.

7. Property. (Rights in Another's Land.)

Continuation of course 6. Easements; covenants running with the land; public rights; franchises; rents. Bigelow's *Cases on Rights in Another's Land.* Second semester. Three units.

8. Criminal Law.

Nature and sources of criminal law; the criminal act; attempts; criminal intent; circumstances affecting illegality of act; specific offenses; crimes against property; conspiracy. Beale's *Cases on Criminal Law.* First semester. Three units.

10. Equity Jurisdiction. PROFESSOR DAVIS

Nature of jurisdiction; specific performance of contracts; partial performance; consideration; marketable title; bills for an account; specific prevention; specific reparation of torts; injunctions for waste; trespass; nuisance; infringement of patents and copyrights; interference with business relations; violations of rights of privacy. Ames' *Cases on Equity Jurisdiction,* Vol. I. First semester. Three units.

17. Quasi-Contracts.

Origin and nature; benefits conferred in misreliance on right or duty; misreliance resulting from mistake of law; misreliance on invalid contract, on illegal contract, on unenforceable contract; benfits conferred through dutiful intervention in another's affairs; benefits conferred under constraint of duress, of legal proceedings, of tax or assessment; action for restitution as alternative remedy for breach of contract and for tort. Woodruff's *Cases on Quasi-Contracts.* First semester. Three units.

18. Evidence. PROFESSOR FEGTLY

Rules of Admissibility of evidence; real and circumstantial evidence; character as evidence of the *factum probandum;* testimonial capacity; methods and manner of impeachment and rehabilitation of witnesses; admissions and confessions; best evidence rule; hearsay rule. Wigmore's *Cases on Evidence.* First semester. Three units.

19. Evidence.

Continuation of course 18. Hearsay rule, continued; exceptions to hearsay rule; inapplicability of hearsay rule; discovery, testimonial and documentary; authentication of documents; privileged relations and communications; procedure of admissibility; burden of proof and presumptions; parole evidence rules; interpretation of legal acts. Wigmore's *Cases on Evidence.* Second semester. Three units.

21. Sales.

Subject matter of sales; executory and executed sales; bills of lading; seller's lien and right of stoppage *in transitu;* fraud; factor's acts; warranty and remedies for breach of warranty; Statute of Frauds. Williston's *Cases on Sales.* Second semester. Three units.

22. Suretyship.

Personal suretyship compared with real suretyship; suretyship obligations compared with insurance and indemnity obligations; guaranty and other forms of suretyship in relation to the Statute of Frauds; suretyship in transactions involving negotiable instruments; fidelity contracts and judicial bonds; surety's defenses due to original defects in his obligation or to its subsequent discharge; surety's right to subrogation, indemnity, contribution or exoneration; creditor's right to surety's securities. Ames' *Cases on Suretyship.* Second semester. Three units.

24. Carriers and Public Service Companies. PROFESSOR DAVIS

Nature, rights and duties of public employment; railroads and canals; telegraph and telephone; water companies; drainage and irrigation; inns and warehouses; common carriers of goods and passengers; liability and its limitation; bills of lading; stoppage *in transitu;* connecting carriers and actions against them; tickets and baggage; compensation and lien. Wyman's *Cases on Public Service Companies.* Second semester. Three units.

25. Bills and Notes. PROFESSOR FEGTLY

A consideration of bills of exchange, notes, and checks, including formal requisites, acceptance, endorsement transfer, extinguishment, obligation, diligence, specialty character. Smith & Moore's *Cases on Bills and Notes.* First semester. Three units.

26. Partnership.

Nature, purposes, and members; creation of partnerships; nature of partner's interest; firm name and goodwill; mutual rights and duties; actions between parties at law and in equity; powers of partners; liability for acts of partners in contract and tort; general liability; dissolution and notice; consequences of dissolution; dissolution agreements; distribution of assets; limited partnerships. Mechem's *Cases on Partnership.* First semester. Three units.

29. Water Rights and Irrigation Law.

Irrigation at common law; other systems of irrigation law; appropriations; basis of right of appropriation; patentees and appropriators; waters subject to appropriation; priorities; transfer of water rights. Bingham's *Cases on Water Rights.* Second semester. Three units.

30. Mining Law. PROFESSOR FEGTLY

A study of mining titles with reference to mining rights. Costigan's *Cases on Mining Law.* First semester. Three units.

36. Trusts.

Nature and requisites of a trust; appointment of trustee; duties of and accounting by trustee; removal or resignation of trustee; nature of *cestui que* trust's interest; transfer of trust property by trustee or *cestui que* trust; extinguishment of trust. Ames' *Cases on Trusts.* Second semester. Three units.

37. Pleading and Practice. PROFESSOR FEGTLY

Common law pleading; procedure and pleading at common law

and as modified by statute; forms of action; the declaration and necessary allegations therein; demurrers and dilatory pleas; pleas in bar; amendments, aider and repleader; parties to actions and effect of non-joinder and misjoinder. Sunderland's *Cases on Common Law Pleading.* First semester. Three units.

38. Pleading and Practice.

Continuation of course 37. Code pleading. Relation to common law pleading; parties to actions; non-joinder and misjoinder of parties; causes of action and joinder thereof; the complaint or petition and necessary allegations therein; the answer; denials, affirmative defenses and counterclaims; demurrers and the grounds thereof; the reply; waivers and motions; bills of particulars; amendment and aider; construction of pleadings. Sunderland's *Cases on Code Pleading.* Second semester. Three units.

39. Property. (Titles to Real Property.)

Continuation of courses 6 and 7. Possessory titles; prescription; accretion; mode of conveyance; execution of deeds; the property conveyed; creation of easements by implication; estates created; covenants for title; estoppel by deed; fraudulent conveyances; recording. Aigler's *Cases on Titles.* First semester. Three units.

40. Property. (Wills, Descent, Administration.)

Continuation of course 39. Testamentary capacity; wills distinguished from other dispositions; kinds of wills; the execution of wills; the revocation of wills; republication and revival; descent; the probate of wills and the administration of estates. Costigan's *Cases on Wills and Administration.* Second semester. Three units.

41. Torts. PROFESSOR FEGTLY

The damage element; corporal, sensory and mental harms and loss of liberty and life; societary harms; domestic relations; right of action for tortious death; harms to profitable relations through violence, defamation, unfair trade, infringement of trade-mark, copyright and patent; proprietary harms as shown in trespass, conversion and disseisin; mixed harms appearing in nuisance, malicious prosecution and impairment of right of personal privacy; the causation element; active and culpable causation in general. Wigmore's *Cases on Torts.* First semester. Three units.

42. Torts.

Continuation of course 41. The causation element, continued; proximateness and remoteness as matter of fact or matter of law;

negligence *per se;* acting at peril. The excuse element; defense of person and property; leave and license; contributory negligence; last clear chance; assumption of risk; paramount community interests as affected by natural calamities and the need of economic improvements; tradal rivalries and competition; strikes and boycotts; free discussion and criticism; free resort to the courts; freedom of official action; statutory rights. Wigmore's *Cases on Torts.* Second semester. Three units.

43. Constitutional Law. PROFESSOR DAVIS

Nature and sources of American constitutional law; express powers; implied powers; citizenship; privileges and immunities of citizenship; due process of law; police power. Hall's *Cases on Constitutional Law.* First semester. Three units.

44. Constitutional Law.

Continuation of course 43. Regulation of commerce; interstate commerce; money; war. Hall's *Cases on Constitutional Law.* Second semester. Three units.

45. Practice Court.

So far as it is possible to do so, the student will meet the conditions of actual practice. He will be required to choose the form of action; to prepare the pleadings; to institute the action; to raise questions of law and argue the same on motions and demurrers; to prepare the case for trial; to examine witnesses; to raise and argue questions as to the competency of witnesses and the admissibility of evidence; to plead the case before the jury; to argue questions arising upon motions subsequent to the return of the verdict; to prepare bills of exceptions; transcripts of the record and writs of error; to prepare briefs and argue the questions thereon before the court of appeal. First semester. Two units.

46. Practice Court.

Continuation of course 45. The content of course 46 will be the same as that of course 45. Second semester. Two units.

47. Private Corporations. PROFESSOR DAVIS

Nature of private corporation; its powers, authority and obligations; rights, duties and liabilities of promoters, shareholders, officers and directors; rights of creditors and others against the corporation; formation, organization and dissolution of corporations; irregular incorporation. Canfield & Wormser's *Cases on Private Corporations.* First semester. Two units.

48. Private Corporations.

Continuation of course 47. Nature of corporate stock; sale and transfer of stock; purchase by corporation of corporate stock; *ultra vires* acts and their effect; legislative control and regulation of corporations. Canfield & Wormser's *Cases on Private Corporations.* Second semester. Two units.

49. Property. (Future Interests.)

Continuation of courses 6, 7, 39, and 40. Entry for condition broken; escheat and reverter; reversions, vested remainders, and executory interests; Rule in Shelly's Case; future interests in personal property; construction of limitations; powers; rules against perpetuities; illegal conditions and restrains. Kale's *Cases on Future Interests,* shorter edition. First semester. Three units.

53. Legal Bibliography and the Use of Law Books.

PROFESSOR DAVIS

The opening lectures trace the development of the great classes of Anglo-American legal literature, viz: Statutes, Digests, Encyclopedias, Treatises, Dictionaries, and Periodicals. The work is then done in seminars by means of problems and discussions in which the various methods of getting at the contents of the books are taken up. This involves systematic practice in the mechanical use of law books of all classes. First semester. One unit.

54. Brief-Making and Legal Argument. PROFESSOR DAVIS

Continuation of course 53. Intensive study of questions of law derived from other law courses and the search for authorities to be organized into a brief on appeal, followed by oral argument of the legal questions involved. Open to Law students who have taken course 53. Second semester. One unit.

MATHEMATICS

PROFESSOR LEONARD, ASSOCIATE PROFESSOR MEDCRAFT AND ASSISTANT PROFESSOR REID

1a. Algebra. College Algebra.

Prescribed for all engineering courses. First semester. Three units.

1b. Plane Trigonometry.

Prescribed for all engineering courses. First semester. Two units.

2. Analytic Geometry.

Prescribed for all engineering courses. Prerequisite, Mathematics 1. Second semester. Four units.

3. Differential Calculus.

Fundamental principles and formulae of the differential calculus, with their applications. Prescribed for all engineering Sophomores. Prerequisite, Mathematics 2. First semester. Four units.

4. Integral Calculus.

Fundamental principles and formulae of the integral calculus, with their applications, including the use of tables of integrals. Prescribed for all engineering Sophomores. Prerequisite, Mathematics 3. Second semester. Four units.

5. Analytical Mechanics.

The mathematical treatment of the fundamental principles of dynamics, statics, etc. Some attention will be given to graphical methods. Prescribed for all engineering courses. Prerequisite, Mathematics 4 and Physics 1. First semester. Four units.

6. Analytical Mechanics.

Continuation of Mathematics 5.Prescribed for all engineering courses. Prerequisite, Mathematics 5. Second semester. Four units.

8. Computation.

Application of approved methods for calculating, including the use of the slide-rule. Prerequisite, Mathematics 1. Second semester. Two units.

9. Algebra and Trigonometry.

A briefer course than Mathematics 1a Algebra, and Mathematics 1b Trigonometry. First semester. Four units.

10. Elementary Analysis.

A briefer course than Mathematics 2, Mathematics 3, and Mathematics 4. Prerequisite, Mathematics 9. Second semester. Four units.

11. Analytic Geometry of Space.

Fundamental formulae and a brief study of surfaces, curves, and their equations. Prerequisite, Mathematics 2. First semester. Two units.

12. Higher Plane Curves.

A study of algebraic and transcendental curves, from the analytical and the graphical point of view. Prerequisite, Mathematics 2. Second semester. Two units.

13. History of Mathematics.

A brief study of the development of this branch of exact science. Prerequisite, Mathematics 4. First semester. Three units.

14. Teaching of High School Mathematics.

A study of the methods of teaching arithmetic, algebra, geometry, and trigonometry, and incidentally some of the history of mathematics will be considered. Prerequisite, Mathematics 2, Education 1, and Education 4. Second semester. Three units.

15. Differential Equations.

An elementary study of differential equations and their applications. Prerequisite, Mathematics 4. First semester. Two units.

16. Spherical Trigonometry.

Fundamental principles and formulae, with applications to surveying and astronomy. Prerequisite, Mathematics 1b Trigonometry. Second semester. Two units.

17. Advanced Algebra.

A study of selected topics. Prerequisite, Mathematics 1a Algebra. First semester. Two units.

MECHANICAL ENGINEERING

PROFESSOR WIECHARDT

1. Mechanisms.

Theory and design of linkages, gears, cams, screws, and other machine elements. A study of the relative motions of machine parts. Graphical methods are followed throughout. Required of students in Mechanical and Electrical Engineering. First semester. One one-hour recitation period, and two three-hour drafting room periods. Three units. Drawing fee, $1.

2. Machine Drawing and Empirical Design.

This course treats of the elements of machine design, taking up such subjects as shafts, bearings and lubrication, pulleys, belts, clutches, standard machine parts, fastenings, etc. Required of students in

Mechanical and Electrical Engineering. Second semester. One one-hour recitation period, and two three-hour drafting room periods. Three units.

3. Heat Engines.

An elementary course in the theory of steam and other heat engines. Problems in application of thermodynamic theories. Laboratory work in use of the indicator, and other experimental apparatus. Required of students in Mechanical, Electrical, and Civil Engineering. Second semester. Three one-hour recitation periods. Three units.

4. Pumping Machinery.

A study of pumps, compressors, vacuum pumps, blowers, exhausters, etc. Problems in performances and efficiencies and in selection of equipment for specific purposes. First semester. Three one-hour recitation periods. Three units. Laboratory, see M. E. 7.

5. Machine Design.

Design of machinery and machine parts. Consideration of conditions of construction and operation. Proportioning of parts for strength and efficiency. Required of students in Mechanical and Electrical Engineering. (Electrical Engineering students take course 15 instead of course 6 in the second semester.) First semester. One one-hour recitation period and two three-hour drafting room periods. Three units. Drawing fee, $1.

6. Machine Design.

Continuation of 5. Second semester. One one-hour recitation period and two three-hour drafting room periods. Three units. Drawing fee, $1.

7. Mechanical Laboratory.

Testing different types of engines, boilers, pumps, injectors and other apparatus. Investigation of problems arising in the design, selection, or operation of machinery. Reports of tests, inspections, etc. Required of students in Mechanical and Electrical Engineering. First semester. Two, three, or four three-hour laboratory periods. Two, three, or four units. Laboratory fee, $3 for each unit.

8. Mechanical Laboratory.

Continuation of 7. Second semester. Two, three, or four three-hour laboratory periods. Two, three, or four units. Laboratory fee, $3 for each unit.

9. Engine Design.

Design of the main features of a steam or gas engine, pump, or compressor, with the completion of as many of the working details as the time permits. Required of students in Mechanical Engineering. First semester. Two three-hour drafting room periods. Two units. Drawing fee, $1.

10. Engine Design.

Continuation of 9. Second semester. Two three-hour drafting room periods. Two units. Drawing fee, $1.

11. Advanced Heat Engines.

A continuation of course 3, taking up present day tendencies in the development of steam engines and boilers, steam turbines, internal combustion motors, etc. Required of students in Mechanical Engineering. Second semester. Two one-hour recitation periods. Two units.

12. Power Plants.

The economic design and operation of power and pumping plants. Problems involving the selection of equipment to perform a given duty with a probable minimum expense. Required of students in Mechanical and Electrical Engineering. Second semester. Two one-hour recitation periods. Two units.

13. Senior Seminar.

Required of fourth year students in Mechanical Engineering. First semester. One one-hour conference period. One unit.

15. Mechanical Design of Electrical Machinery.

A continuation of course 5, paying particular attention to the special problems involving the design of motors, generators, and other electrical machinery. Required of students in Electrical Engineering. Second semester. Two three-hour drafting room periods. Two units.

19. Elementary Experimental Engineering.

An introduction to engineering laboratory practice. Second semester. One three-hour laboratory period per week. One unit. Fee, $3.

21. Mechanisms.

A short course designed for those who have not the time needed for the full course. First semester. One one-hour recitation period. One unit.

MECHANIC ARTS

ASSOCIATE PROFESSOR DARROW

1. Engineering Drawing.

Elements of mechanical drawing, including lettering, tracing and blue printing; making and reading of working drawings; commercial drafting room practice. Required of all engineering students. First semester. Two, three, or four drafting room periods, including one recitation per week. Two, three, or four units. Drawing fee, $.50.

2. Descriptive Geometry.

Elements of descriptive geometry, including problems in warped surfaces and intersections of solids. Required of all engineering students. Prerequisite, Mechanic Arts 1 or equivalent. Second semester. One one-hour recitation period and two three-hour drafting room periods. Three units. Drawing fee, $.50.

3. Pattern Shop and Foundry.

Bench and machine work in wood; elements of pattern and foundry work. First semester. Three three-hour shop periods. Three units. Laboratory fee, $4.50.

4. Forge and Machine Shop.

Forge work in iron and steel; tempering, case hardening and annealing; characteristics of iron and steel; elementary machine shop processes. Second semester. Three three-hour shop periods. Three units. Laboratory fee, $4.50.

5. Machine Shop.

Machine shop practice; erection and care of machinery; machine tool, bench and floor work; modern industrial practice. First semester. Two, three, or four three-hour shop periods. Two, three, or four units. Fee, $1.50 per unit.

6. Machine Shop.

Continuation of 5. Second semester. Two, three, or four three-hour shop periods. Two, three, or four units. Fee, $1.50 per unit.

8. Carpentry.

Wood work including care of tools, framing, jointing, etc. Second semester. Two three-hour shop periods. Two units. Laboratory fee, $3.

9. Forge and Metals.

Forge work in iron and steel, pipe work, drill press, care of small machinery. First semester. Two three-hour shop periods. Two units. Laboratory fee, $3.

10. Mechanical Drawing.

A general elementary course for agricultural students. Second semester. Two three-hour drafting room periods. Two units. Fee, $1.

11. Free Hand Drawing and Lettering.

An elementary course including work in charcoal and in pen and ink rendering. Open to all students. First semester. Two three-hour drawing room periods. Two units.

12. Free Hand Drawing and Lettering.

Second semester. Two three-hour drawing room periods. Two units.

13. Farm Machinery.

A course designed to give the student practical information and experience in the setting up, adjustment, operation, and repairing of the ordinary types of farm machinery. The overcoming of side draft, the calibration of drills and planters, the babbiting of boxings, and the handling of similar problems will be treated. Two lectures, one three-hour laboratory period. First semester. Three units.

14. Irrigation Machinery.

An abridged course in small machinery installation and problems connected with the ordinary small pumping plant. First semester. Two one-hour recitation periods and one three-hour laboratory or field period. Three units. Fee, $3. Offered in 1920-21 and alternate years.

15. Cabinet Work.

First semester. Three three-hour shop periods. Three units. Laboratory fee, $4.50.

16. Cabinet Work.

Continuation of 15. Second semester. Three three-hour shop periods. Three units. Laboratory fee, $4.50.

17. Methods of Teaching Manual Training.

Second semester. Three lectures. Three units.

18. Advanced Pattern Work.

First semester. One three-hour shop period. One unit.

19. Advanced Pattern Work.

Continuation of 18. Second semester. One three-hour shop period. One unit.

21. Practice in Teaching Manual Training.

First semester. Two three-hour shop periods. Two units.

22. Practice in Teaching Manual Training.

Continuation of 21. Second semester. Two three-hour shop periods. Two units.

METALLURGY AND ORE DRESSING

PROFESSOR CHAPMAN

2. Fire Assaying.

This course includes the theory and practice of assaying ores and metallurgical products for gold, silver, and lead. The ores and products covered in the class-room and laboratory include: Pure and impure ores, mattes, slags, bullions, high grade silver ores, and cyanide solutions. Required of all students in Mining Engineering. First semester. One lecture and two three-hour laboratory periods. Three units. Laboratory fee, $15.

7R. Ore Dressing.

This course includes: (1) Breaking, crushing, and grinding of ores by breakers, rolls, gravity and steam stamps, ball and pebble mills, and other standard machines; (2) Preparation of crushed ore for concentration by screens and classifiers; (3) Concentration of ores by jigs, sand and slime machines; (4) Special processes of concentration including flotation, magnetic, electrostatic, and air separation; (5) Study of the milling methods of various districts of the United States. Required of all students in Mining Engineering. Second semester. Two lectures. Two units.

7L. Ore Dressing.

This course consists of laboratory practice of the principles and methods studied in course 7R. The student is given the opportunity to practice with the various crushing, grinding, and concentrating machines. Required of all students electing the metallurgy option. First semester. One three-hour laboratory period. One unit. Laboratory fee, $3.

11. General Metallurgy and Metallurgy of Copper.

The theory and practice of roasting, blast furnace, matte smelting, pyrite smelting, reverberatory matte smelting, smelting of oxidized copper ores to pig copper, smelting of native copper ores, converting of copper matte, furnace and electrolytic refining of copper, and leaching methods as applied to copper ores.The class-room work is supplemented by trips to the various smelting plants of the State. Required of all students taking Mining Engineering. First semester. Two lectures. Three to four trips to smelting plants. Two units.

12. Metallurgy of Lead, Zinc, and Iron.

This course is an extension of Metallurgy 11. It consists of a study of the various smelting and refining processes adapted to the treatment of lead, zinc, and iron ores. Required of all students taking Mining Engineering except those electing the geology option. Second semester. Two lectures. Two units.

14. Metallurgy of Gold and Silver.

The theory and practice of the various commercial methods of recovering gold and silver from ores. Most of the course deals with cyanidation of gold and silver ores, although other methods are briefly discussed. First semester. One lecture and two three-hour laboratory periods. Three units. Laboratory fee, $10.

18. Metallurgical Thesis.

A research problem involving experimental work on some ore chosen by the student or selected by the Department. The laboratory work is supplemented by conference with the student. Required of all students electing the metallurgical option. Second semester. Two three-hour laboratory periods. Two units. Laboratory fee, $5.

8. Metallurgy of the Less Common Metals.

Metallurgy of nickel, mercury, tin, antimony, platinum, tungsten, and molybdenum. Second semester. Two lectures. Two units.

10. Metallurgical Design.

A metallurgical problem such as may confront the student on entering the practical field. Second semester. One lecture and two three-hour laboratory periods. Three units.

MILITARY SCIENCE AND TACTICS

MAJOR BONIFACE

Basic Course. Required of all male students in their Freshman and Sophomore year.

1. Military Art.

(a) Practical. Instructions in physical drill, infantry drill regulations, preliminary instructions in small arms firing. Two hours.

(b) Theoretical. Theory of target practice, military organization, map reading, service of security, personal hygiene. One hour.

a and b first semester. One unit.

2. Military Art.

(a) Practical. Instructions in physical drill, infantry drill regulations, bayonet combat, intrenchments, first aid to the injured, range practice. Two hours.

(b) Theoretical. Lectures on Military Policy of the United States and Military Obligations of Citizenship, service of information, tactical exercises in combat, camp sanitation, infantry drill regulations. One hour.

a and b second semester. One unit.

3. Military Art.

(a) Practical. The same as course 1a. Two hours.

(b) Theoretical. Continuation of infantry drill regulations, small arms firing regulations, map reading, camp sanitation and camp expedients. One hour.

a and b first semester. One unit.

4. Military Art.

(a) Practical. The same as course 2a, signalling. Two hours.

(b) Theoretical. Lectures on Military History, service of information and security illustrated by tactical problems, marches, camps.

a and b second semester. One unit.

Advanced Course.

Either the practical or theoretical course required of all undergraduate students who have completed the basic course.

5. Military Art.

(a) Practical. The same as course 1a to perform duties consistent with rank as cadet officers or noncommissioned officers, military sketching. First semester. Three hours. One unit.

(b) Theoretical. Minor tactics, field orders, map maneuvers, company administration, military history. First semester. Two hours. One unit.

6. Military Art.

(a) Practical. The same as course 2a as outlined in course 5a. Second semester. Three hours. One unit.

(b) Theoretical. Minor tactics continued, map maneuvers, elements of International Law, property accountability. Second semester. Two hours. One unit.

7. Military Art.

(a) Practical. The same as course 5a. First semester. Three hours. One unit.

(b) Theoretical. Tactical problems, small forces, all arms, map maneuvers, court-martial proceedings, international relations of the United States, psychology of war and kindred subjects, general principles of strategy. First semester. Two hours. One unit.

8. Military Art.

(a) Practical. The same as course 6a. Second semester. Two hours. One unit.

(b) Theoretical. Tactical problems continued, map maneuvers, rifle in war, military history and policy. Second semester. Two hours. One unit.

THE RESERVE OFFICERS' TRAINING CORPS

An Infantry Unit of the Senior Division, Reserve Officers' Training Corps, has been established at the University by authority of the War Department, U. S. A. The primary object of the establishment of this unit is to qualify, by systematic and standard methods of training, students at civil educational institutions for reserve officers, U. S. Army.

Eligibility to membership in the Reserve Officers' Training Corps shall be limited to students who are citizens of the United States, who are not less than 14 years of age, and whose bodily condition indicates that they are physically fit to perform military duty, or will be so upon arrival at military age.

Any member who has completed two academic years of military instruction, who has been selected for further military training by the President of the University and the professor of Military Science and Tactics, and who executes the following written agreement, will

be entitled to membership in the Advanced Course, R. O. T. C., and to commutation of subsistence as fixed by the Secretary of War in accordance with law:

"....,

.....19.....

In consideration of commutation of subsistence to be furnished me in accordance with law, I hereby agree to continue in the Reserve Officers' Training Corps during the remainder of my course in the University of Arizona, to devote five hours per week during such period to the military training prescribed, and to pursue the courses of camp training during such period, prescribed by the Secretary of War.

.....(Signature)."

For those who are admitted to membership in the Advanced Course, Reserve Officers' Training Corps, the course in camp training shall consist of two four-weeks' camps, one at the end of the Junior year, and one subsequent to graduation.

The President of the United States is authorized to appoint in the Officers' Reserve Corps any graduate of the Senior Division, Reserve Officers' Training Corps, who has satisfactorily completed the prescribed course of training, and who shall have arrived at the age of 21 years.

The President of the United States is authorized to appoint and commission as temporary Second Lieutenant of the Regular Army in time of peace for purposes of instruction, for a period not exceeding six months, with the allowances now provided by law for that grade, but with pay at the rate of $100 per month, any reserve officer appointed pursuant to the preceding paragraph.

When a unit of the Reserve Officers' Training Corps has been established at an educational institution, there will be issued to such institution one complete uniform by the War Department.

MINERALOGY AND PETROLOGY

PROFESSOR BUTLER

1. Crystallography and Blow-Pipe Analysis.

Lectures, laboratory work, and recitations. This course is intended to prepare a student for work in Determinative Mineralogy and only such portions of the included subjects are emphasized as are essential for the proper understanding and determination of minerals.

Thorough drill is given in these. In the laboratory work in crystallography, a student is required to become thoroughly familiar with the crystals systems and forms through the study of crystal models. Later he determines the forms of several hundred natural crystals by the use of a pocket lens and a contact goniometer. The course in Blow-Pipe Analysis includes practice in the use of the blow-pipe and in the operations ordinarily included under the term "blow-pipe analysis," experimental work upon known substances until facility in the manipulation of the various tests is attained, and the analysis of a score or more of unknown substances. Prerequisite, Chemistry 2. First semester. Two lectures and two three-hour laboratory periods. Three units. Laboratory fee, $3. Each student must provide himself with a hand-lens.

2. Determinative Mineralogy.

Lectures, laboratory work, and recitations. About one hundred and seventy-five mineral species and scores of varieties of these are studied in this course. Emphasis is placed upon the classification of minerals by methods that involve a knowledge of the physical characteristics as revealed visually, and through the use of a pocket-knife. Chemical and blow-pipe tests are employed merely to corroborate inferences drawn from such observations. The end sought is the almost instantaneous recognition in the field of those minerals likely to be encountered in mining operations, rather than the ability to classify any mineral after a long series of tests in the laboratory. Each student is expected to determine over two thousand individual specimens during the course. Prerequisite, Mineralogy and Petrology 1. Second semester. Two lectures and two three-hour laboratory periods. Three units. Laboratory fee, $3.

4. Petrology.

A course intended to familiarize a student with the characteristics of the commoner rocks in such a way as to make reasonably accurate field identification possible. The methods employed are solely those applicable to hand specimens without the use of microscopic thin sections. Portions of the laboratory periods are used for lectures and oral quizzes. Each student is expected to classify about seven hundred and fifty individual specimens. Prerequisite, Mineralogy and Petrology 2. Second semester. Two three-hour laboratory periods. Two units.

MINING ENGINEERING

PROFESSOR BUTLER AND PROFESSOR EHLE

The courses in mining are thoroughly practical and are intended to ground the student in the fundamentals of the industry as exemplified by the best modern practice. Instruction is given by means of lectures supplemented by work in the mining laboratory and by trips to various districts of the State for systematic observation and study. The following courses are offered:

1. Development.

Boring and drilling by means of the earth-augur, drive-pipe, drop-tool, and by diamond and other forms of rotary drills; hand drilling; machine drills, their proper selection, care, and use. Explosives, their nature, proper care, and use; the principles of blasting. Mechanical excavators. Shaft sinking, tunneling, and drifting in both rock and soft ground. The principles governing the generation and use of compressed air. Required of all students taking the course in Mining Engineering and Metallurgy. First semester. Three one-hour lectures. Two units.

2. Exploitation.

A detailed study of the various methods used throughout the world for the economical development and removal of ore from the various types of deposits, both surface and underground; support of excavations by artificial means. Required of all students taking the course in Mining Engineering and Metallurgy. Second semester. Two one-hour lectures. One unit.

3. Operation.

Surface and underground transportation, including hand tramming, and pneumatic, electric, and steam haulage; gravity and engine planes; various systems of rope haulage; surface tramways and aerial rope-ways. Hoisting, including a detailed discussion of the various types of mine hoists and their adaptability to conditions of depth, output, and motive power. Head-frames, cages, cars, skips, ore bins, and standard safety devices used on hoists. Required of all students taking the course in Mining Engineering and Metallurgy. First semester. Three one-hour lectures. Two units.

4. Operation.

Continuation of Mining 3. Drainage, a discussion of the sources of mine water and the means of preventing its entry into workings;

the control of underground waters by dams and drainage levels; the use of hoisting equipment in the removal of water; the various types of pumps, and their adaptability to conditions of depth, duty, and capacity.

Ventilation of mines; air requirements of men and animals, and provisions of the law in different states; natural ventilation; the induction of air currents by artificial methods, and the means of their distribution and control; efficiency of ventilating apparatus. Required of all students electing the mining option. Second semester. Three one-hour lectures. Two units.

6. Design of Mine Plants.

Intended to give practical training in the solution of problems involving the selection, design, and construction of the ordinary structures used in mining, such as head-frames, ore bins, skips, cages, etc. To this end the student is given certain hypothetical data from which he makes the calculations and designs the equipment which best meets the conditions outlined. Required of all students electing the mining option. Second semester. Two three-hour drafting periods. Two units.

7. Practical Mining.

Before entering upon the work of the Senior year, all 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 or mill work. The fulfillment of this requirement must be evidenced by the certificate of the superintendent or foreman, by notes and sketches of the processes observed, and by a report on such work, to be made before November 1 of the same year.

8. Mining Laboratory.

Intended to familiarize the student with manipulations incident to mining operations. A detailed study of the different makes of machine drills, and their actual operation and testing; dressing, tempering, and sharpening of drill steel for hand and machine work; blasting operations; the framing and assembling of mine timbers; other mining operations. This course in connection with Mining 7 should fit a student to take a place without embarrassment among practical miners. Required of all students electing the mining option. Second semester. Two three-hour laboratory periods. Two units. Laboratory fee, $8.

19. Mine Examinations and Reports.

This course covers the sampling, the calculation of the tonnage, and the valuation of ore bodies; the sampling and valuation of placer deposits; the preparation of reports; and engineering ethics. Prerequisite, completion of the Freshman, Sophomore, and Junior work in Mining Engineering. Second semester. Two lectures. One unit. Field Excursions.

In connection with the courses in Mining Engineering and Metallurgy, trips are made to mining districts in Arizona and Sonora. These usually occupy 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, and give the student a splendid opportunity for the close study and inspection of mining and metallurgical plants, rock formations, and minerals of commercial value. The students are accompanied by instructors, and the trips are made of the greatest possible practical value. The trips are carefully scheduled. Notes with sketches, measurements, and photographs, are taken, and are elaborated into comprehensive reports by each student after his return.

Many shorter, week-end trips to nearby mines, mills, or smelters are taken by upper classmen.

Note. All students in Mining Engineering in the Senior year are required to give one hour to the seminar for the discussion of current technical literature in mining, for which work no credit is given.

MUSIC

MRS. IDA WHITTINGTON DOUGLASS

The Department of Music offers an opportunity for all University students to secure regular courses in piano, voice, stringed and wind instruments through local teachers.

The courses in the history and theory of music as enumerated below may be taken as electives to count toward a degree.

1a. Appreciation of Music.

This course is a cultural one, aiming at the teaching of intelligent listening to music. Each class meeting will consist of explanations and an abundance of music performed in illustration. Text: *Appreciation of Music,* Vols. I and II, Daniel Gregory Mason. First semester. One hour, one evening a week. One unit.

2a. Appreciation of Music.

Continuation of 1a. Second semester. One hour. One unit.

1b. History of Music.

A general survey of the development of music; primitive music, music of ancient civilization, church music, choral music, oratorio and opera; the evolution of instruments and instrumental forms; the study of great master composers and their relation to the musical movements of the time. First semester. One hour. One unit.

2b. History of Music.

Continuation of 1b. Second semester. One hour. One unit.

3. Harmony.

This course is open to those who are moderately proficient in piano or organ playing, and who can read music at sight: Notation, clefs, key signatures, intervals, consonance, and dissonance, major and minor scales. Chords and inversions, modulations, harmonizing of melodies and bases in four-part music. Text: Foot and Spalding, *Modern Harmony*. Two hours. Two units.

4. Harmony.

Continuation of 3.

MUSICAL ORGANIZATIONS

DIRECTOR WHEATLEY

GLEE CLUB

Students of the University who have some proficiency in chorus singing, or who have good voices are urged to enroll themselves in the Glee Clubs which are organized for both men and women.

THE ORCHESTRA

The University Orchestra furnishes a very delightful and useful training to those who have orchestral instruments and some knowledge of their use.

THE MILITARY BAND

The Military Band is under the control of the Military Department. It possesses a complete set of band instruments and a very good library of music. Young men who have their own band instruments are advised to bring them and become members of the band. One unit.

CLASS AND PRIVATE LESSONS IN PIANO AND VOICE

Class lessons in piano will be given in classes of three, two lessons per week. Class work will embrace hand position, finger, hand, wrist, and arm exercises at the technic table, and at the keyboard; to be followed by such studies and pieces as the pupil may be able to master. Work in theory, analysis and the like will be carried on as written work, and papers will be graded and records kept as to proficiency of students in these branches.

Vocal classes will be arranged in the same manner as the piano classes with the additional provision that classes may consist of four, if the students desire it. In vocal classes each pupil will receive personal drill in voice production and song singing, and in addition to this there will be splendid opportunity for concerted work in duets, trios and quartettes, without which no singer can be said to be well equipped, but which is so often neglected.

To those who desire it, the musical director will give private lessons in either piano or voice.

Fee, three in a class, $20; four in a class, $15 each semester.

OPTICAL MINERALOGY AND PETROGRAPHY

PROFESSOR GUILD

5. Optical Mineralogy.

The microscopic study of the rock-forming minerals. Prerequisites, Geology 2, and Mineralogy 2. First semester. Two three-hour laboratory periods. Two units. Laboratory fee, $2.50.

6. Petrography.

The preparation and study of thin sections of rock, polished sections of ore minerals, and examination of a classified selection of rocks and ores, with discussions regarding their paragenesis. Prerequisites, Mineralogy and Petrology 4, and Optical Mineralogy 5. Second semester. Two three-hour laboratory periods. Two units. Laboratory fee, $2.50.

7. Crystallography.

Measurement, projection, and drawing of crystals. Prerequisite, Mineralogy 1. Either semester. Six or twelve hours' laboratory work. Two or four units. Laboratory fee, $2.50.

PHILOSOPHY AND PSYCHOLOGY

PRESIDENT VON KLEINSMID AND ASSOCIATE PROFESSOR RIESEN

Course 9, General Psychology, is introductory to all other courses in this Department and in Education, and should be elected in the Sophomore year. It is recommended that this course be followed by 1, 2, 11 or 14.

1. Introduction to Philosophy.

A preliminary study of the field of philosophical discussion, pointing out its chief problems and proposing methods for their investigation. The aim of the course is to train in independent reflection and to make the student acquainted with philosophical method and material. Not open to Freshmen. Second semester. Two hours. Two units. Offered in 1919-20, but not offered in 1920-21.

2. Logic.

An elementary course in the theory of reasoning, including a study of the essentials of logic and training in the detection of fallacies. Not open to Freshmen. Second semester. Two hours. Two units. Not offered in 1919-20, but offered in 1920-21.

3. History of Ancient and Mediæval Philosophy.

A study of the development of speculative thought to the beginning of the modern period, together with a consideration of its relation to practical life. Open to Juniors and Seniors. First semester. Three hours. Three units.

4. History of Modern Philosophy.

A study of the problems of Philosophy from the time of the Renaissance to the present day. A continuation of course 3. Second semester. Three hours. Three units.

5. Ethics.

A study of the essential nature and the growth of morality with the application of moral theory to psychological, social, and economic problems of the present day. Open to Juniors and Seniors. First semester. Three hours. Three units. Offered in 1919-20, but not in 1920-21.

6. Present Philosophical Tendencies.

A consideration of contemporary thought, designed to give acquaintance with current philosophical problems and discussions. Open

to those who have had courses 3 and 4. Second semester. Three hours. Three units. Offered in 1919-20, but not offered in 1920-21.

8. Philoscphy of Religion.

A philosophical interpretation of the nature of religious consciousness, together with a survey of the history of religions. Open to those who have had course 1 or 3 . Second semester. Three hours. Three units. Not offered in1919-20, but offered in 1920-21.

9. General Psychology.

A study of sensation, imagination, perception, attention, higher intellectual processes, action, and the affective life. This course is prerequisite to all other courses in Psychology, and is designed as well for students of other departments. Not open to Freshmen. First semester. Three hours. Three units.

11. Child Psychology.

A study of the genesis of mental states as they appear in the evolutionary series, with special attention to the Psychology of Childhood. Open to those who have had course 9. Second semester. Three hours. Three units.

12. Psychology of Adolescence.

A consideration of the various aspects of adolescence, emphasizing those phases of greatest importance to parents and teachers. Open to those who have had course 9. First semester. Three hours. Three units.

14. Experimental Psychology.

An attempt to familiarize the student with psychological apparatus, methods of procedure, and results, providing for an intimate study of normal mental phenomena. Should be taken by all who purpose to do special work in Psychology. Open to those who have had course 9. Second semester. Three units. Not offered in 1919-20, but offered in 1920-21.

15. Abnormal Psychology.

A consideration of psychopathology as observed in various abnormalities. A study of mentally exceptional children, the criminal mind and insanity, together with a brief investigation of the occult. Open to Seniors who have had course 9. First semester. Three hours. Three units. Not offered in 1919-20, but offered in 1920-21.

16. Abnormal Psychology.

Continuation of 15. Second semester. Three hours. Three units.

17. Clinical Psychology.

A study of the methods of clinical examination, tests, scales of measurements, types, and classifications. Open only to those advanced students who have the permission of the professor in charge. First semester. Two hours. Two units. Offered in 1919-20, but not offered in 1920-21.

18. Clinical Psychology.

Continuation of 17. Second semester. Two hours. Two units.

PHYSICAL TRAINING

MISS RUTH DAVIS

Physical Training 1.

Swedish Gymnastics, Gymnastic Games, Elementary Folk and Esthetic Dancing. For those whose physical condition does not warrant their taking the regular work, and for those who need corrective exercises, a course in Remedial and Corrective exercises may be substituted. Required of Freshman girls. First semester. Three hours. One unit.

Physical Training 2.

Continuation of 1. Second semester. Three hours. One unit.

Physical Training 3.

Swedish Gymnastics, Marching Tactics, Elementary Club Swinging, Folk and Esthetic Dancing. First semester. Two hours. One unit.

Physical Training 4.

Continuation of 3. Second semester. Three hours. One unit.

Physical Training 5.

Fencing, Advanced Club Swinging, Advanced Esthetic and Interpretive Dancing. For those who expect to teach Calisthenics, Playground Drills and Games. Must be taken in connection with Physical Training 9. First semester. Four hours, no credit. Open only to Juniors and Seniors.

Physical Training 6.

Continuation of 5. Second semester. Four hours, no credit. Must be taken in connection with Physical Training 10.

Physical Training 7.

Principles of physical education: Physiology of muscular action; effect of exercise on respiratory apparatus; immediate and remote effect of exercise on the heart, etc. Classification of exercise, place of Physical Training in education, etc. First semester. Two hours. Two units. Given in 1919-20 and alternate years.

Physical Training 8.

History of physical education. Study of characteristics of leading methods, national systems. Development in American educational institutions. Second semester. Two hours. Two units. Given in 1919-20 and alternate years.

Physical Training 9.

Methods of physical education. Analysis of exercises; selection of exercises for children, according to age, sex, etc. Anthropometry, and the making of physical examinations. Methods of teaching gymnastics. Physical Training 5 must be taken in connection with this course. First semester. Two hours. Two units. Given in 1920-21 and alternate years.

Physical Training 10.

Playground administration; pageantry; planning of system of Physical Training for primary and secondary schools, etc. Physical Training 6 must be taken in connection with this course. Second semester. Two hours. Two units. Given in 1920-21 and alternate years.

Hygiene: A course in Personal Hygiene required of first-year women students. First semester. One hour per week.

Home Nursing and Elementary Course in Emergencies and First Aid. (See description of courses in Home Economics.)

Provision for sports and games is made every afternoon from 4:30 to 6.

ATHLETICS

The climate of Tucson permits out-of-door athletics throughout the academic year. The main out-of-door sports are football, baseball, tennis, and track work. Basketball is played indoors. Every student is encouraged to take some form of athletics. Tennis is played during the entire year.

The percentage of students engaged in athletics is unusually large. Team work is provided to add interest to sports. Competitive athletics are pursued with the schools, colleges, and universities of Arizona, New Mexico, Texas, and southern California.

Eight games of football are usually played. The basketball schedule contains twelve games, and baseball about the same number. A conference track meet is held every May. An interscholastic meet is held in April for all the high schools and academies of the State.

PHYSICS

PROFESSOR DOUGLASS

1. General Physics.

Lectures, recitations and laboratory work in Mechanics, Sound and Heat. The laboratory experiments in this general Physics course give a prominence to Mechanics, but include the study of wave motions and their applications to other subjects. Prerequisites, Elementary Physics and Mathematics 1. Required in all engineering courses. First semester. Two hours lecture and recitation and two three-hour laboratory periods. Four units. Laboratory fee, $1.

2. General Physics.

Continuation of 1. Electricity and Light. Second semester. Two hours lecture and recitation and two three-hour laboratory periods. Four units. Laboratory fee, $1.

3. Mechanics and Sound Measurements.

Calculation and measurement of forces. Laws of falling bodies. Mechanics of Rotation. Simple harmonic motion and wave motion. Open to Juniors. First semester. One hour lecture and recitation and two three-hour laboratory periods. Three units.

4. Electrical and Optical Measurements.

Electrical machines and instruments used in mechanical engineering, and optical instruments handled in mining and civil engineering courses. Prescribed for the third year in civil engineering. Open to Juniors. Second semester. One hour lecture and recitation and two three-hour laboratory periods. Three units.

4a. Electrical Measurements of Wireless Instruments.

Measure of inductance and capacity of wireless instruments and calculation of wave length. Offered only to students who have had

or are taking Physics 2. Not open to Freshmen. One three-hour laboratory period each semester. One unit.

5. Thermodynamics and Heat.

The foundation principles underlying mechanical engineering, latent and specific heats, conductivity, expansion, mechanical equivalent, high temperatures, cycles, entropy, properties of steam, etc. First semester. One hour lecture and recitation and two three-hour laboratory periods. Three units.

6. Optical Measurements.

Continuation of course 4, spectroscopy and polarization. Second semester. Two three-hour laboratory periods. Two units. Not offered in 1919-20.

8. Electrical Measurements.

Continuation of course 4, potentiometer, thermo-electricity and low resistance measures. Second semester. Two three-hour laboratory periods. Two units.

21. Agricultural and Household Physics.

For Agricultural students. Principles of Mechanics and Electricity involved in farm life and the use of farm appliances. Energy and power, weather and weather forecasting. Reading and recording instruments. Required of all students in the course leading to the degree of Bachelor of Science in Agriculture. Adapted to Junior year. First semester. Two recitation hours and one three-hour laboratory period. Three units.

22. Agricultural and Household Physics.

Continuation of 21. For Agricultural and Home Economic students. Physics of the household. Heat, ventilation, and illumination. The work in heat is based on thermometry, calorimetry and methods of heat transfer, including insulation and heat economy. Electric lighting is included under illumination. Sound deadening is given attention. Prescribed for all students in the course leading to the degree of Bachelor of Science in Agriculture. Required of Juniors in Home Economics courses. Second semester. Two recitation hours and one three-hour laboratory period. Three units.

PLANT BREEDING

ASSISTANT PROFESSOR BRYAN

1. Principles of Plant Breeding.

The general principles of plant breeding; detailed study of the methods pursued and results obtained by leading plant breeders in various Experiment Stations and in private work. Special emphasis will be laid on breeding problems peculiar to southwestern conditions. Required, optionally with Animal Husbandry 8, of all students in agriculture. Prerequisite, Botany 1. Second semester. Three hours. Three units.

2. Advanced Plant Breeding.

Critical examination by means of lectures and laboratory exercises of the various theories of heredity as presented by leading plant breeders and geneticists. Mendel's law in its later development and application will receive special consideration. The segregation and recombination of characters will be studied in connection with actual breeding problems. The laboratory work is designed to provide the practical application of these laws to the breeding of economic plants. Prerequisites, Plant Breeding 1 and Botany 3. Second semester. Two lectures and one laboratory period. Three units.

POULTRY HUSBANDRY

ASSOCIATE PROFESSOR KENNEY

In recognition of the importance of the poultry industry and to satisfy the demand of students who desire to give special attention to poultry raising after leaving the University, the Department of Poultry Husbandry was established. Poultry finds a place in every well-regulated plan of diversified farming, and under proper conditions may be a profitable business as a special enterprise. The poultry plant on the Campus gives an exceptional opportunity to study practical as well as theoretical poultry keeping.

2. Poultry Husbandry.

A study of the practical aspects of poultry keeping. Designed for those who are unable to take the full course in Poultry Husbandry, and as preliminary work for those who expect to specialize in poultry. The work given will include the selection of stock; construction of poultry houses and equipment; incubation and brooding; feeds and feeding methods; the preparation for market of eggs and

poultry; and marketing principles and methods. Second semester. Two lectures and one three-hour laboratory period. Three units.

3. Advanced Poultry Husbandry.

Including the study of breeds of domestic poultry and their qualities and classification; the location, planning and construction of the poultry plant and equipment. Study of feeds and feeding methods. Laboratory work will consist of drawing plans and constructing poultry houses, coops, and equipment; judging poultry; and the preparation of rations. Each student will have charge of a pen of fowls for a short period, and during that time will do all the feeding and keeping of records. First semester. Two lectures and one three-hour laboratory period. Three units.

4. Advanced Poultry Husbandry.

A continuation of course 3. Hatching by natural and artificial methods; brooding and raising young chicks; preparation and marketing poultry and eggs. In the laboratory each student will operate an incubator and brooder, and secure practice in fattening, killing, picking, and marketing broilers, capons and other poultry; and in the judging of poultry and eggs for market purposes. Prerequisite, Poultry Husbandry 3. Second semester. Two lectures and one three-hour laboratory period. Three units.

5. Poultry Breeding.

Study of the origin, history and classification of breeds and varieties of poultry; methods of breeding, with special reference to egg production; study of inheritance. Laboratory work will consist largely of judging birds for constitutional vigor and for egg-laying and market qualities as well as for the show. Prerequisites, Poultry Husbandry 3 and 4. First semester. One lecture and one three-hour laboratory period. Two units.

6. Poultry Anatomy, Diseases, and Parasites.

A study of the structure of the fowl; parasitic, infectious, and non-infectious diseases; prevention and treatment of diseases, and the care of sick birds. Laboratory work will consist of poultry surgery, including caponizing, dissection, and autopsis, diagnosis, and preparation of medicines. Prerequisites, Poultry Husbandry 3 and 4. Second semester. One lecture and one three-hour laboratory period. Two units.

ROMANCE LANGUAGES

FRENCH

PROFESSOR TURRELL, ASSOCIATE PROFESSOR OTIS, ASSISTANT PROFESSOR SKIDMORE, MISS POST, MRS. DOUGLASS, MISS NICHOLSON

1. Elementary French. ASSOCIATE PROFESSOR OTIS

Fraser and Squair, *Abridged French Grammar,* (Part I); De Monvert, *La Belle France.* Drill in phonetics and pronunciation, using Ballard and Tilly, *Phonetic French Reader.* First semester. Five hours. Four units.

2. Elementary French ASSOCIATE PROFESSOR OTIS

Continuation of 1. Grammar (Part I) completed. Composition and oral practice. Reading of Moineaux, *Les deux sourds;* Halévy, *L'Abbé Constantin.* Second semester. Five hours. Four units.

3. Advanced French. ASSISTANT PROFESSOR SKIDMORE

Fraser and Squair, *Abridged French Grammar* (Part II); Merimée, *Colomba* or *Carmen;* Lamartine, *Graziella* or *Jeanne d'Arc.* Composition and conversation, using Roberts, *Features of French Life,* (Part I). Prerequisites, French 1, 2, or two years of high school French. First semester. Five hours. Four units.

4. Advanced French. ASSISTANT PROFESSOR SKIDMORE

Continuation of 3. Victor Hugo,*Les Misérables;* Balzac, *Eugénie Grandet;* Zola, *La Débacle.* Roberts. *Features of French Life* (Part II). Second semester. Five hours. Four units.

5. French Literature to the Nineteenth Century. ASSOCIATE PROFESSOR OTIS

Outline of the history of French Literature. The classical French dramatists: Plays of Corneille, Racine and Moliere. Lectures on the eighteenth century. Voltaire, Rousseau, Diderot, etc. Beaumarchais, *Le Barbier de Seville.* Prerequisite, French 3, 4, or 3a, 4a. First semester. Three hours. Three units.

6. French Literature in the Nineteenth Century. ASSOCIATE PROFESSOR OTIS

Particular study of the drama. The Romanticists, Victor Hugo, Musset, Scribe, Augier. Recent literary movements in France. Pailleron, Dumas, Rostand, etc. Prerequisite, French 5. Second semester. Three hours. Three units.

7. Advanced Composition and Conversation

ASSISTANT PROFESSOR SKIDMORE

Koren, *French Composition,* and Kron, *French Daily Life,* will be used as a basis for conversation. Composition and essays. Prerequisite, French 3, 4, and 5, 6, or may be taken with 5. First semester. Two hours. Two units.

8. Advanced Composition and Conversation.

ASSISTANT PROFESSOR SKIDMORE

Continuation of 7. Second semester. Two hours. Two units.

9. Nineteenth Century Prose. ASSOCIATE PROFESSOR OTIS

Study of the development of the French Novel in the Nineteenth Century. Reading of works of Hugo, George Sand, Balzac, Dumas, Flaubert, Daudet, Zola. Prerequisite, French 5, 6, or may be taken with 5, 6. First semester. Two hours. Two units. Not offered in 1919-20.

10. Nineteenth Century Prose. ASSOCIATE PROFESSOR OTIS

Continuation of 9. Recent prose literature of France. Reading of works of Bazin, Loti, France, Rolland, etc. Second semester. Two hours. Two units. Not offered in 1919-20.

11. Nineteenth Century Poetry. ASSOCIATE PROFESSOR OTIS

Study of the lyric poetry of the Nineteenth Century. The Romanticists, Leconte de Lisle, Sully Prudhomme, Coppée, Richepin, Verlaine, Heredia, Rodenbach, Verhaeren, etc. Prerequisite, French 5, 6. First semester. Two hours. Two units.

12. Contemporary French Drama. ASSOCIATE PROFESSOR OTIS

Discussion of the tendencies of the French stage during the past twenty-five years. Reading of plays of Sardou, J. Lemaitre, Rostand, Brieux, Lavedan, Hervieu, Maeterlinck, Flers et Caillavet, Bernstein, Capus, etc. Prerequisite, French 5, 6. Second semester. Two hours. Two units.

13. Methods of Teaching French.

ASSISTANT PROFESSOR SKIDMORE

Study and comparison of various methods of language teaching and their application to the needs of secondary schools. Prerequisite, French 5, 6, 7, 8, or an equivalent. First semester. One hour. One unit.

14. Methods of Teaching French

ASSISTANT PROFESSOR SKIDMORE

Continuation of 13. Study of various grammars and texts, with particular reference to their use in high schools. Outlining of courses and correlation with college entrance requirements. Second semester. One hour. One unit.

101. Old French. ASSISTANT PROFESSOR SKIDMORE

A literary and historical presentation of the *Chanson de Roland,* with library references. Class reading and philological study of selected portions of the poem. Prerequisite, French 5, 6. Open only to Seniors and graduates. First semester. Two hours. Two units.

102. Old French. ASSISTANT PROFESSOR SKIDMORE

Continuation of 101. Reading of selections from French authors of the Middle Ages, accompanied by a study of historical grammar and the linguistic development of the French language. Prerequisite and requirement as for French 101. Second semester. Two hours. Two units.

SPANISH

1. Elementary Spanish. MISS POST, MISS NICHOLSON

Hannsler and Parmenter, *Beginner's Spanish;* Ingraham-Edgren, *Brief Spanish Grammar.* Conversation and composition. First semester. Five hours. Four units.

2. Elementary Spanish. MISS POST, MISS NICHOLSON

Grammar continued. Turrell, *Spanish Reader;* Carrión and Vital Azo, *Zaragüeta,* etc. Second semester. Five hours. Four units.

3. Advanced Spanish.

MISS POST, MRS. DOUGLASS, MISS NICHOLSON

Composition and conversation, using Turrell, *Spanish-American Short Stories* and other texts. Reading of Galdós, *Marianela;* Valdés, *La Alegría del Capitán Ribot.* Prerequisite, Spanish 1, 2, or two years of high school Spanish. First semester. Five hours. Four units.

4. Advanced Spanish.

MISS POST, MRS. DOUGLASS, MISS NICHOLSON

Composition and conversation continued. Reading of the Quinteros, *Doña Clarines;* Isaacs, *María;* Blasco-Ibañez, *La Barraca.*

Prerequisite, Spanish 3, or three years of high school Spanish. Second semester. Five hours. Four units.

3a. Advanced Spanish. (For students in the College of Mines and Engineering.)

MISS POST, MRS. DOUGLASS, MISS NICHOLSON

Composition, conversation, etc., as in Spanish 3, with selected readings. First semester. Three hours. Two units.

4a. Advanced Spanish.

MISS POST, MRS. DOUGLASS, MISS NICHOLSON

Continuation of 3a. Second semester. Three hours. Two units.

5. Spanish Literature to the Nineteenth Century.

PROFESSOR TURRELL

Outline of the history of Spanish literature. The "Siglo de Oro," etc., with library readings. Class study of Cervantes, *Don Quijote,* (Selections); Calderón, *La vida es Sueño,* etc. Prerequisite, Spanish 3, 4 or 3a, 4a. First semester. Three hours. Three units.

6. Spanish Literature in the Nineteenth Century.

PROFESSOR TURRELL

Particular study of the drama. Reading of Moratín, *El Sí de las Niñas;* Gutiérrez, *El Trovador;* Nuñez de Arce, *El Haz de Leña;* Tamayo y Baús, *Lo Positivo;* Echegaray, *El Gran Galeoto;* Galdós, *Electra,* etc. Prerequisite, Spanish 3, 4 or 3a, 4a. Second semester. Three hours. Three units.

7. The Literature of Mexico. PROFESSOR TURRELL

A survey of the literature of Mexico. Coester, *Literary History of Spanish America.* Reading of Fernández Lizardi, *El Periquillo Sarniento;* Portillo y Rojas, *La Parcela;* Altamirano, *La Navidad en las montañas,* etc. First semester. Two hours. Two units. Not offered in 1919-20.

8. The Literature of Mexico and South America.

PROFESSOR TURRELL

Continuation of 7. *Las Cien Mejores Poesías Mexicanas.* Selected dramas. Discussion of the literature of other Spanish American countries. Reading of various texts. Second semester. Two hours. Two units. Not offered in 1919-20.

9. Advanced Composition. MISS POST

A practical course in writing and speaking Spanish. Espinosa, *Spanish Composition* and other texts. Prerequisite, Spanish 3, 4, and

for A.B. students 5, 6, or may be taken with 5, 6. First semester. Two hours. Two units.

10. Commercial Spanish MISS POST

Continuation of 9, with particular attention to commercial vocabulary, letter-writing, etc. Second semester. Two hours. Two units.

11. Scientific Spanish. (For Technical and Engineering students.) PROFESSOR TURRELL

Willcox, *Scientific and Technical Spanish.* Study of vocabulary of electricity, steam engines, mining, bridge building, etc. Prerequisite, Spanish 1, 2, or an equivalent, and 3a, 4a, (or may be taken with 3a, 4a). Also at least one year each of Physics and Chemistry. First semester. Two hours. Two units.

12. Scientific Spanish. PROFESSOR TURRELL

Continuation of 11. *Boletín de la Unión Panamericana* and supplementary readings. Second semester. Two hours. Two units.

13. Methods of Teaching Spanish. MISS NICHOLSON

Study of the various methods of language instruction and their adaptation to the teaching of Spanish in Arizona and the Southwest. Class visitation and reports. Prerequisite, Spanish 5, 6, 9, 10, or an equivalent. First semester. One hour. One unit.

14. Methods of Teaching Spanish. MISS NICHOLSON

Continuation of 13. Outlining of courses for high schools. Comparison of grammars and other text-books. Wilkins, *Spanish in the High Schools.* Second semester. One hour. One unit.

17. Contemporary Spanish Literature. PROFESSOR TURRELL

A study of the present literary tendencies in Spain with especial reference to the national life and character. Reading and discussion of works of living dramatists, such as Galdós, Benavente, Linares Rivas, the Quinteros, etc. Designed to complete the work of Spanish 5, 6, and is required of all students majoring in Spanish. First semester. Three hours. Three units.

18. Contemporary Spanish Literature. PROFESSOR TURRELL

A study of contemporary Spanish fiction. Reading of works of Pardo-Bazán, Blasco-Ibáñez, Pio Baroja, etc. Prerequisites and requirements as for Spanish 17. Second semester. Three hours. Three units

19. Great Poets of Spanish America. PROFESSOR TURRELL

Intensive study of several of the leading poets of Spanish America, such as Heredia, Echeverría, Arboleda, Rubén Darío, Amado Nervo, etc. Prerequisite, Spanish 5, 6. First semester. Two hours. Two units. To alternate with 7; will be offered in 1919-20.

20. Great Prose Writers of Spanish America
PROFESSOR TURRELL

Study of some of the leading fiction writers and essayists of Spanish America, such as Alberto Blest Gana, Ricardo Palma, José Mármol, Federico Gamboa, Rufino Blanco Fombona, Enrique Rodó, etc. Second semester. Two hours. Two units. To alternate with 8; will be offered in 1919-20.

101. Old Spanish Readings. PROFESSOR TURRELL

Ford, *Old Spanish Readings;* selections from the *Cid,* etc. Prerequisite, Spanish 5, 6, 17, 18. Open only to Seniors and graduates. First semester. Two hours. Two units.

102. Spanish Phonology and Morphology. PROFESSOR TURRELL

Menéndez Pidal, *Manual Elemental de Gramática Histórica;* Bello-Cuervo, *Gramática Castellana,* etc. Prerequisite and requirements as for Spanish 101. Second semester. Two hours. Two units.

Note: The following arrangement of courses is suggested for students majoring in Spanish, and entering with two years of high school preparation: Freshman, 3, 4; Sophomore, 5, 6, 9, 10; Junior, 7, 8, 17, 18; Senior, 19, 20 (101, 102), 13, 14.

EVENING COURSES

1a. Elementary Spanish. MRS. DOUGLASS

Covering the work of one-half of Spanish 1. (First semester of first year,) emphasizing as far as possible conversation and oral work. May not be taken by regular students as a substitute for Spanish 1, except by special permission. Tuesday and Thursday evenings at 7:30. First semester. Two hours. Two units.

1b. Elementary Spanish. MRS. DOUGLASS

Continuation of 1a, covering the second half of Spanish 1. Not open to regular students, except by special permission. Tuesday and Thursday evenings at 7:30. Second semester. Two hours. Two units.

2a. Elementary Spanish (Continued.) MRS. DOUGLASS

Continuing the work of Spanish 1a, 1b, and covering one-half the work of Spanish 2, (second semester of first year.) Monday and Wednesday evenings at 7:30. First semester. Two hours. Two units.

2b. Elementary Spanish (Continued.) MRS. DOUGLASS

Continuation of 2a and completing the work of first year Spanish. Monday and Wednesday evenings at 7:30. Second semester. Two hours. Two units.

SOCIAL SCIENCE

PROFESSOR BROWN, ASSOCIATE PROFESSOR HUBBARD, MR. ————

1. Introduction to Economics. PROFESSOR BROWN
MR. ————

The general principles underlying the science, with emphasis upon practical application, in business, industry and the home. This includes a study of the nature of wealth, its production and consumption, and the different forms in which it is found; the localization of industry and the relation of raw material to manufacturing; forms of business organization most efficient for carrying on industry; the trust problem; influences which determine prices and the rising price level; a study of our rural credit and commercial banking systems. Open to all students. First semester. Three hours. Three units.

2. Introduction to Economics. PROFESSOR BROWN
MR. ————

A continuation of Social Science 1. A study is made of the forces which determine the present distribution of wealth, the factors determining wages, interest, rent, and profits. An examination of various practical problems dealing with labor, the railways, taxation, tariff legislation and monopolies. Various plans of social reform such as profit-sharing, single tax, cooperation and socialism are considered. Open to students who have had Social Science 1. Second semester. Three hours. Three units.

3. Trade Resources. MR. ————

The physical basis of industry and trade; resources of the world with special emphasis upon the United States; their importance, use and conservation. Open to all students. First semester. Two hours. Two units.

17. Trade Policies. MR. ————

A continuation of Social Science 3. Necessity for developing our foreign trade at the close of the war, with the opportunities and fields offered. The character of the traffic, routes, ports, papers, and contracts employed; packing and selling methods. The organization, agents and policies for promoting foreign and domestic trade, such as the tariff, trust policy, navigation laws, consular service, etc. Second semester. Two hours. Two units.

4. Transportation. PROFESSOR BROWN

This course will include a brief historical review of the development of transportation in the United States; the organization and financial arrangement of different systems; the effects of competition; freight classification; principles involved in rate making; regulation by the State and Federal Government; European practice. Open to those who have had Social Science 1 and 2. First semester. Three hours. Three units. Offered in 1920-21.

5. Corporation Organization and Finance. PROFESSOR BROWN

Organization and management; how and where to organize; powers and privileges of corporations in the different states; minority rights. Business developments and promotion of various properties and enterprises, with special reference to the promotion and development of mining companies. Open to those who have had Social Science 1 and 2. First semester. Two hours. Two units. Offered in 1919-20 and alternate years.

6. Financial Institutions and Investments. PROFESSOR BROWN

A study of the investment market, including: Financial agents and institutions; stock exchanges; stock market; investments of securities; methods and laws of investment and speculation; relative merits of railway stocks, bonds, municipal bonds; industrial irrigation, mining securities, and real estate. Prerequisite, Social Science 1 and 2. Second semester. Two hours. Two units. Offered in 1919-20 and alternate years.

9. Labor Problems. PROFESSOR BROWN

Origin of the labor problem and history and growth of labor organizations. Economic and social conditions of the working classes today, including the United States and Europe; study of child and woman labor and unemployment. Organized labor vs. organized capital; trade agreements; strikes and lockouts; conciliation and arbitration; injunction; employer's liability; workmen's insurance; profit-

sharing and cooperation. First semester. Three hours. Three units. Offered in 1919-20 and alternate years.

10. Sociology. PROFESSOR BROWN

A study of the factors which influence the development of society, such as geographic, economic and social environment and hereditary causes. A survey of social evolution, including the family, state, etc. An analysis of the agencies for controlling and directing social progress, such as law, force, religion, public opinion, education, art, and ceremony. Not open to Freshmen. First semester. Three hours. Three units.

11. Social Reform. PROFESSOR BROWN

A continuation of Social Science 10. A consideration of such practical modern problems as crime, immigation, the woman problem, divorce, population, eugenics, and the negro problem. Second semester. Three hours. Three units.

16. Municipal and Public Finance. PROFESSOR BROWN

A study will be made of municipal, state and federal expenditures and the reason for their increase. Typical budgets and reports will be analyzed and methods for securing greater efficiency in these expenditures considered. The various sources of revenue, such as the general property, income, inheritance taxes, together with customs and fees, will be taken up in detail. The Single Tax will be considered as an agency of social reform. An attempt will be made to give all students some practice in the local assessment of property. Prerequisite, Social Science 1 and 2. First semester. Two hours. Two units. Offered in 1920-21 and alternate years.

18. Agricultural Economics. ASSOCIATE PROFESSOR HUBBARD

Agricultural credit systems abroad and in the United States. Problems and organization for the efficient purchase and sale of farm supplies; the Torrens system of land registration; cooperation abroad and its possibilities here in the store, factory, dairy, and cow-testing associations. Conservation and tenure, and taxation as they affect farming. Prerequisite, Social Science 1, 2. Second semester. Three hours. Three units. Offered in 1919-20 and alternate years.

19. Money and Banking. PROFESSOR BROWN

Money—Nature and functions of money; analysis of the factors affecting prices; a brief history of paper currency and silver legislation. *Banking*—Procedure in organizing state and national banking sys-

tems as modified by the Federal Reserve Bank Act; functions of banks; preparation and analysis of bank statements; loans and granting credit; principles of foreign exchange; analysis of foreign banking systems. Prerequisite, Social Science 1 and 2. Second semester. Three hours. Three units. Offered in 1920-21 and alternate years.

20. Life Insurance. MR. ————

The nature and simple statistical basis of life insurance; the standard policies and their provisions; principles of life insurance salesmanship; occasional lectures by practical insurance men. First semester. Two hours. Two units. Offered in 1919-20 and alternate years.

21. Property Insurance. MR. ————

A continuation of Social Science 20, dealing with credit, fire, hail, title, and marine insurance, and other forms of risk bearing. Second semester. Two hours. Two units. Offered in 1919-20 and alternate years.

22. Business Organization. PROFESSOR BROWN

This is a study of the most efficient method for the organization and management of various types of business. It will consider the determination of standards, the best location of a business in relation to ownership and markets; departmental organization with means of control; systems of scientific management; qualifications of an executive; means for securing cooperation between co-workers; selection of employees, forms, tests, references, promotions, and rewards; good physical working conditions and welfare work; office organization and management routine, indexing methods, etc. Open to Juniors and Seniors. Second semester. Three hours. Three units. Offered in 1919-20.

23. Business Men's Lecture Course. PROFESSOR BROWN

A series of lectures on practical business subjects will be given during the year by prominent business men of the State. Open to all students. First semester. One hour. One unit. Not given unless twenty students elect the course.

24. Business Men's Lecture Course.

Continuation of 23. Second semester. One hour. One unit.

25. Purchasing and Selling. MR. ————

The course attempts to cover the fundamentals essential to efficient purchasing and selling. The work is divided as follows: *Purchas-*

ing—Principles of purchasing; organizations; information; forms and records; markets and agents. *Advertising*—Study of various advertising media; principles and methods underlying advertising; preparation of copy; planning advertising campaigns. *Selling*—Different systems for the distribution of goods; marketing products; training salesmen in presentation and closing sales; superintending and management of sales campaign; credit information, sources and analysis; collection policies and methods. Open to Juniors and Seniors who will register for Social Science 26. First semester. Three hours. Three units. Offered in 1919-20.

26. Purchasing and Selling. MR. ————

A continuation of the work outlined under Social Science 25. Open only to students who have had 25. Second semester. Three hours. Three units.

27. Seminar in Arizona Problems. PROFESSOR BROWN

For advanced students. First semester. One to three hours. One to three units.

28. Seminar in Arizona Problems. PROFESSOR BROWN

A continuation of Social Science 27. Second semester. One to three hours. One to three units.

13. Elementary Accounting. ASSOCIATE PROFESSOR HUBBARD

An introductory study of simple accounts; the general principles of accounting, meaning of the balance sheet, profit and loss statement, and other reports furnished by firms and corporations, and accounting problems incident to efficient business management. First semester. Three hours. Three units.

14. Elementary Accounting. ASSOCIATE PROFESSOR HUBBARD

A continuation of the work outlined under Social Science 13. Second semester. Three hours. Three units.

15. Corporation Accounting. ASSOCIATE PROFESSOR HUBBARD

The application and further study of the theories introduced in Social Science 13 and 14. A study of the voucher system and books used by corporations and larger firms. First semester. Two hours. Two units.

30. Cost Accounting. ASSOCIATE PROFESSOR HUBBARD

A study of the theory and practice of cost accounts; the apportionment of overhead expenses, and the various methods of handling direct costs. Second semester. Two hours. Two units.

31. Advanced Accounting. ASSOCIATE PROFESSOR HUBBARD

Offered in 1919-20 to those who have had Social Science 15 and 30. The course will include work in auditing. First semester. Two hours. Two units.

32. Advanced Accounting. ASSOCIATE PROFESSOR HUBBARD

A continuation of Social Science 31, and will deal with advanced accounting problems. Second semester. Two hours. Two units.

40. National Government and Politics. PROFESSOR BROWN

The Constitution: Distribution of powers of government; checks and balances; organization and powers of the executive, legislative, and judicial departments; government of territories and colonies; civil rights and their guarantee. Origin of political parties in the United States; development; party platforms. Not open to Freshmen. First semester. Three hours. Three units.

41. State and Municipal Government. PROFESSOR BROWN

A study of the organization and function of the government, with special attention to Arizona; municipal government, including county, town, and city government. Not open to Freshmen. Second semester. Three hours. Three units.

43. Comparative Governments. MR. ————

A critical study of the governments of the principal countries of the world, with emphasis upon modern movements and features of government compared with similar problems in the United States. First semester. Three hours. Three units.

44. International Relations. MR. ————

Nature and development of international law; rights and duties of states in times of peace and war; laws of war and neutrality as affected by the European War. Open to Juniors and Seniors. First semester. Three hours. Three units. Offered in 1919-20.

46. Commercial Law. MR. ————

A course specially designed for commercial students, covering contracts, negotiable instruments and agency. Bay's *"Cases on Commercial Law"* will be used, together with a text-book. First semester. Three hours. Three units.

47. Commercial Law. MR. ————

A continuation of 46, covering partnership and corporation law, and sales. Second semester. Three hours. Three units.

SPANISH

(See Romance Languages)

ZOOLOGY

(See Biology)

SUMMER SESSION IN EDUCATION

During the summer of 1918 the University initiated a summer session in Education. Because of the fine summer climate and the twelve-month school year of Bisbee, Arizona, the summer session was held in Bisbee, making use of the local schools both for places of instruction and for the practice teaching. The session was six weeks in length, opening on July 1st and closing August 10th.

The following courses of instruction were offered:

Education 12; Educational Method. This course was virtually a repetition of Education 12 as offered during the college year. Three semester units. Professor Foster.

Education 30; Practice Teaching. The students registered for this course taught one-half of each day, displacing the regular teachers in the junior high schools. Three semester units. Professor Foster, Professor Thomas, Florence R. Foster, and Ida W. Douglass.

Education 31; Educational Standards and Measurements. A discussion of the theory and practice of standardization in instruction, with special attention to the more important measurements and tests and their practical application to both elementary and secondary education. Three semester units. Professor Foster.

Home Economics 25; Methods of Teaching Textiles and Clothing. Virtually a repetition of H. E. 25 as offered during the college year. Three semester units. Professor Thomas.

For the summer session of 1919 (June 30 to August 9), a much larger variety of courses is offered, including work in Secondary Education, Elementary Education, Educational Administration, and Methods in Home Economics and Industries. Practice teaching in these several fields is offered. A special bulletin describing the organization and courses of instruction of the 1919 Summer Session in Education may be had on request.

GENERAL UNIVERSITY EXTENSION

FRANCIS CUMMINS LOCKWOOD, Ph.D *Director*

The University operates a system of extension lectures under an appropriation made by the legislature. The purpose of the University Extension Department is to carry some of the benefits and satisfaction of higher education to a large number of persons who are unable to attend regular courses at the University. This work is carried on through correspondence, by lectures and public discussions, and by the distribution of publications.

Correspondence—The University offers opportunity for home study through correspondence courses in the following subjects: agriculture, architecture, astronomy, botany, civil engineering, education, English, French, geology, German, history, mathematics, mineralogy, mining and metallurgy, philosophy, physics, and Spanish. Two types of correspondence courses are offered, formal and informal. The formal course is designed to be the equivalent of some University course, and for the satisfactory completion of such a course, University credit is given. When credit is desired, the student is required to prepare definite assignments and to pass an examination. The informal course is designed for those not desiring credit. Although such courses are carefully directed by the instructor in charge, they follow no hard and fast plan but are varied somewhat to meet the needs of the individual student.

Full information regarding correspondence work may be obtained by addressing the Correspondence Secretary, University of Arizona, Tucson.

Extension Lectures—The University responds to requests for lectures in the various fields of its work, giving these lectures without cost for service to the community. In some cases the community, however, provides transportation and entertainment of the speaker. Schools, clubs, and other organizations desiring speakers for special occasions, for single lectures on some topics, or for a series of lectures, should address correspondence to the Director of General University Extension. Ample time should be allowed for the appointment of dates and for the adjustment of all details.

The University Extension Department also offers its services to schools, clubs, or other organizations interested in debating and pub-

lic discussions. Considerable material on all current questions is available and may be secured upon request.

Wherever possible from the facilities at hand, the University will gladly send information through correspondence to any making specific inquiries concerning matters relating to personal and public welfare, hoping through its large library and its highly trained specialists to place its advantages at the service of all the people of the State.

AGRICULTURAL EXPERIMENT STATION

RUFUS BERNHARD VON KLEINSMID, A.M., Sc.D.	*President of the University*
D. W. WORKING, B.Sc., A.M.	*Director*
ROBERT H FORBES, M.S., Ph.D.	*Special Research Investigator*
JOHN J. THORNBER, B.S., A.M.	*Botanist*
ALBERT E. VINSON, Ph.D.	*Chemist*
CLIFFORD N. CATLIN, A.M.	*Research Specialist in Agricultural Chemistry*
GEORGE E. P. SMITH, B.S., C.E.	*Irrigation Engineer*
W. E. CODE, B.S.	*Assistant Irrigation Engineer*
ARTHUR L. ENGER, B.S., C.E.	*Assistant Irrigation Engineer*
WALKER E. BRYAN, M.S.	*Assistant Plant Breeder*
C. O. BOND, B.S.A.	*Assistant Plant Breeder*
F. J. CRIDER, M.S.	*Horticulturist*
A. F. KINNISON, B.S.	*Assistant Horticulturist*
CHARLES T. VORHIES, Ph.D.	*Entomologist*
RICHARD H. WILLIAMS, Ph.D.	*Animal Husbandman*
WALTER S. CUNNINGHAM, B.S.	*Dairy Husbandman*
G. E. THOMPSON, B.S.A.	*Agronomist*
R. S. HAWKINS, B.S.A.	*Assistant Agronomist*
F. R. KENNEY, B.S.	*Poultry Husbandman*
AUSTIN W. MORRILL, Ph.D.	*Consulting Entomologist*
D. C. GEORGE	*Consulting Plant Pathologist*

ORGANIZATION AND WORK

The Agricultural Experiment Station is legally a division of the College of Agriculture of the University of Arizona. The purpose of the Agricultural Experiment Station is to aid "in acquiring and diffusing useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiments respecting the principles and applications of agricultural science."

The activities of the Experiment Station include research and experimentation in Agricultural Chemistry, Agronomy, Animal Husbandry, Botany, Entomology, Horticulture, Irrigation, Plant Breeding, Plant Pathology. As needs develop and funds become available, additional lines of investigation will be undertaken. Through the Extension Service, members of the staff are able to reach audiences

of farmers in many parts of the State. Their services are made available also as consultants of County Agents and other extension workers through whom the results of experiments and investigations in agriculture are carried to farmers throughout the State.

Owing to wide variations in agricultural conditions in Arizona, it has been found of advantage to establish branches of the Experiment Station in various parts of the State to do work where conditions are most satisfactory for its accomplishment, as follows:

The administrative offices and the laboratories for research work in agronomy, animal husbandry, botany, chemistry, dairying, entomology, horticulture, irrigation, plant breeding, and poultry husbandry are maintained in the new College of Agriculture and other buildings of the University at Tucson. From this base of operations the three great agricultural districts of the State—the Salt River Valley, the Lower Colorado Valley, and the Upper Gila district—are conveniently accessible for field and observational work.

The main Experiment Station farm is established near Mesa in the Salt River Valley, which is intermediate in elevation and in mean yearly temperature with respect to the irrigated valleys of southern Arizona. Results obtained at this point are therefore capable of general application in the southern part of the State.

The Tempe date-palm orchard, managed in cooperation with the U. S. Department of Agriculture, is situated in the alkaline district at Tempe, where successful experimentation with this palm has been of great value in demonstrating a use for extensive areas of alkaline land in the Southwest.

The intensively cultivated gardens near Yuma, in the valley of the Colorado River, also afford a succession of object lessons to the local public, and have contributed information concerning crops, agricultural methods, and markets for this region.

Experiments in dry-farming are continued on a tract secured for the purpose near Cochise, in Sulphur Spring Valley, and near Prescott, in localities typical of large areas. The grazing range reserve for the study of depleted range country with a view to its improvement, which was for some years conducted in cooperation with the U. S. Department of Agriculture, continues to receive careful study. The investigators of the Carnegie Institution have joined in the work; and it is believed that important conclusions can be announced within a few years.

The University farm affords facilities for study and experimentation near Tucson. The soil of this farm is strongly alkaline and thus presents difficult problems characteristic of the more arid regions

of the Southwest. Laboratories, greenhouses, and small gardens on the University grounds serve a similar purpose.

The results of Experiment Station work are published at intervals in the bulletins and reports of the Station. The longer and more technical bulletins and annual reports give in considerable detail the results of investigations as they mature. By means of the extension press-letter still wider circulation is given to matters of agricultural interest through the newspapers of the State, which freely use the information offered.

Inasmuch as for years past the mailing list has enabled the Station to reach a large percentage of the farming population in Arizona, it is not surprising that the effects of the Station work are now generally in evidence throughout the State, more particularly in the irrigated southern valleys.

The Agricultural Experiment Station is fairly well endowed. It regularly receives the funds appropriated by Congress under the Hatch and Adams Acts. These funds are supplemented by appropriations made by the Legislature of Arizona. For the next two years the assured resources of the Station will be as follows:

	1919-20	1920-21
FEDERAL FUNDS:		
Hatch	$15,000	$15,000
Adams	15,000	15,000
STATE FUNDS:		
Citrus investigation	10,000	5,000
Dry-farming supervision	4,500	4,500
Plant introduction	4,260	4,260
Prescott Dry-Farm	6,090	5,690
Salt River Valley Farm	16,510	12,510
Sulphur Spring Valley Dry-Farm	4,490	4,540
Tempe Date Palm Orchard	3,175	2,575
Underflow water investigation	2,400	2,400
Yuma Date Palm Orchard	15,925	7,425

The Agriculture Building, which was completed September, 1915, offers ample room for research, educational work, and extension in agriculture, and will afford an attractive center for the agricultural activities of the State in time to come.

With this endowment and with an organization which brings the agricultural work of the University into close contact with the farming interests of the State, "the farmer's college" has entered upon an epoch of increasing usefulness to the growing agricultural interests of Arizona.

AGRICULTURAL EXTENSION SERVICE

RUFUS BERNHARD VON KLEINSMID, A.M., Sc.D.
President of the University

D. W. WORKING, B.Sc., A.M.
Dean College of Agriculture; Director Agricultural Experiment Station

ROBERT H. FORBES, M.S., Ph.D.
Dean Emeritus, College of Agriculture

ESTES P. TAYLOR, B.S.A.
Assistant Dean, College of Agriculture; Director Agricultural Extension Service

County Home Demonstration Work

MRS. MARY PRITNER LOCKWOOD, B.S.	*State Leader*
MISS HAZEL ZIMMERMAN	*Pima-Pinal Counties*
MRS. F. DUNBAR SANDIGE, B.S.	*Gila County*
MISS FLOSSIE D. WILLS, B.S.	*Graham-Greenlee Counties*
MISS AMY L. DINSMORE, A.B.	*Maricopa County*
MISS GRACE TUFTS	*Yuma-Yavapai Counties*
MISS LOUISE SPORLEDER	*Cochise County*
MISS NORA LAMOREAUX	*Apache County*

County Agricultural Agent Work

W. M. COOK, B.S.	*State Leader*
CHARLES R. FILLERUP	*Navajo-Apache Counties*
ALANDO B. BALLANTYNE, B.S.	*Graham-Greenlee Counties*
HERMAN C. HEARD, B.S.	*Maricopa County*
DELORE NICHOLS, B.S.	*Coconino County*
J. R. SANDIGE, B.S.	*Gila County*
LEO L. LAYTHE, B.S.	*Pima-Pinal Counties*
C. R. ADAMSON, B.S.A.	*Cochise County*
J. W. LONGSTRETH	*Yuma County*

Boys' and Girls' Club Work

LELAND S. PARKE, B.S.	*State Leader*
MISS AGNES A. HUNT	*Assistant State Leader*
EDWARD B. OXLEY, B.S.	*County Leader, Maricopa County*

Emergency Assistant County Club Leaders

GEORGE A. JUDSON
MISS PINK ELLISOR
OTTO S. SHILL
MISS C. LOUISE BOEHRINGER
MRS. ELLEN CARDON
MRS. J. T. PROFFITT
MISS NORA ALLEN
J. F. NASH
MRS. LOUELLA MARSHALL

Extension Specialists

W. E. SCHNEIDER, B.S.
Swine Extension, Boys' and Girls' Clubs, in cooperation with Bureau of Animal Industry, U. S. D. A.

N. L. HARRIS
Poultry Extension, in cooperation with Bureau of Animal Industry, U. S. D. A.

M. E. KIMSEY, B.S.
Cereal and Forage Crop Insect Control, in cooperation with Bureau of Entomology, U. S. D. A.

D. A. GILCHRIST, B.S.
Rodent Control Specialist, in Cooperation with Bureau of Biological Survey, U. S. D. A.

J. O. MILLER, A.B.
Farm Labor Specialist in cooperation with Office Farm Management, U. S. D. A.

PAUL G. REDINGTON
District Forester in cooperation with Forest Service, U. S. D. A.

E. LILLIAN HUTCHINSON
Secretary Agricultural Extension Service.

MRS. D. T. HART
Office Assistant, Boys' and Girls' Clubs.

ORGANIZATION AND WORK

The Agricultural Extension Service is organized as a division of the College of Agriculture of the University of Arizona, having the same relation to the College of Agriculture as the Agricultural Experiment Station. The purpose of the Agricultural Extension Service is to give "instruction and practical demonstrations in agriculture and home economics to persons not attending or resident in said college," including principally farmers and stockmen and their families, and new settlers throughout the State. The organization of the Agricul-

tural Extension Service was made possible by an Act of Congress approved May 8, 1914, known as the Smith-Lever Act. The work was started in Arizona on July 1, 1914. Funds for carrying on the Agricultural Extension work are provided by appropriations under the Smith-Lever Act; State appropriations supplementing Federal funds; other appropriations by the State Legislature for extension work; and appropriations made by the county boards of supervisors for the support of county extension agents; contributions from farmers' organizations, the Arizona Bankers' Association, and other sources; and also apportionments directly from the U. S. Department of Agriculture, in cooperation with which much of the Agricultural Extension work is being carried on.

The specific lines of work being conducted by the Agricultural Extension Service include the following:

COUNTY AGRICULTURAL AGENT WORK

Properly qualified men who have been technically trained in agriculture and who have had practical farming experience are located in practically all agricultural counties in the State. The county boards of supervisors contribute funds to the support of the work, the agents being employed in cooperation with the U. S. Department of Agriculture as county agricultural leaders and advisers. They devote their entire time to the county or to the combination of two counties to which they are appointed. These county agricultural agents are at the service of all farmers in the district, and conduct their work largely through definite plans known as projects. This work is carried on in cooperation with and working through a farmers' county organization, known as a County Farm Bureau, with local branches and committees. The county organizations are federated into the Arizona State Farm Bureau. In carrying on their various activities, the county agricultural agents are assisted by the extension specialists and by such other specialists of the College of Agriculture and Agricultural Experiment Station as may be sent out under the auspices of the Extension Service; or by representatives of the United States Department of Agriculture. A state leader of county agricultural agents correlates the work of the several county agricultural agents.

BOYS' AND GIRLS' CLUB WORK

Training the boys and girls of today to become the farmers and farmers' wives of tomorrow is the work of this department. Under the direction of the State Leader of Boys' and Girls' Clubs, and

under the more immediate supervision of the assistant state club leaders and the county and district club leaders, the food production and conservation work of the boys and girls of the State is carried on. This work, like most of the other lines of Agricultural Extension, is carried on in cooperation with the U. S. Department of Agriculture. Members of these clubs are regularly enrolled and are required to carry out definite lines of project work, reporting progress regularly through their leaders to the Agricultural Extension central office at the University. The members of these clubs compete with each other for local and State prizes. This work is both educational and productive in character, as it interests the boys and girls in better methods of farm and household work, adds to food produced or conserved, teaches the keeping of simple accounts, instills the idea of cooperation, and instructs in the writing of concise and complete reports of the work accomplished. The demand for Boys' and Girls' Clubs is exceeding the facilities for giving service. More than 2000 boys and girls were regular members of these clubs throughout 1918.

Corn, grain-sorghum, cotton, canning, pig, poultry, cow-testing, gardening, potato, and garment-making clubs have been included, and it is hoped to extend the clubs to other useful lines of work as fast as trained leaders are available.

COUNTY HOME DEMONSTRATION AGENTS

The county home demonstrators are leaders in women's work who correspond to the county agricultural agents, stationed in each county, or in groups of two or more counties. The work of the county home demonstration agents is directed by a State Leader of Home Demonstration Agents.

Ten counties of the State have this year had the service of county home demonstration agents.

This branch of the Extension service probably will be extended in Arizona in the future, as the Federal plan assumes that a county home demonstration agent will ultimately be employed in every county in the United States. This permanent organization of field workers, trained in home economics, is proving of inestimable value to the State and Nation in the great movement for the production and conservation of food and clothing. Since the women of the State are at this time greater food producers than ever, leadership in this direction by home demonstrators is given much thought and time.

The work of the home demonstration agents includes lectures and demonstrations, throughout both towns and country, on food production, preservation, preparation, and serving; the making and care of

clothes, efficiency in the household home nursing, household conveniences, proper nutrition and balanced meals, school lunches, sewing, millinery, dressmaking, and other phases of home economics work.

EXTENSION SPECIALISTS

The work of the county and local extension workers is supplemented and augmented by field specialists who carry out similar projects, but who may be called for farm inspection, lectures, and demonstrations into any part of the State. Although they make their headquarters, in most cases, at Tucson, these extension specialists devote their entire time to projects away from the University. These specialists are experts along their respective lines. Wherever it has been possible, without interrupting the duties of investigation and University instruction, Experiment Station specialists of the College of Agriculture have also been called into the field for special service to farmers.

Extension specialists are often employed cooperatively with various bureaus and divisions of the U. S. Department of Agriculture. Through a memorandum of understanding between the U. S. Department of Agriculture and the University of Arizona, all extension work done in Arizona is done through the Agricultural Extension Service.

Extension specialists working with our farmers during the past year have been a Livestock Specialist; Swine Extension Specialist, Farm Labor Specialist, working in cooperation with the Federal Office of Farm Management; Poultry Specialist in cooperation with the Bureau of Animal Industry; Animal Parasite Specialist, cooperating with the Bureau of Entomology; Field Entomologist, assisting in the control of cereal and forage crop insects and also cooperating with the Bureau of Entomology; a specialist in rodent control in cooperation with the Biological Survey. A special working agreement has been in effect between the Extension Service and the U. S. Forest Service.

OTHER EXTENSION ACTIVITIES

Other Extension activities are: extension schools, consisting of two and three-day courses of instruction for farmers and their families, held in different parts of the State; Farmers' and Housekeepers' Week, a week of practical instruction held at the University for people from all parts of the State; the Weekly Press Letter, issued by the Agricultural Extension Service, is sent regularly to all the newspapers and farmers' organizations in Arizona; extension circulars are

issued for distribution in the State; exhibits and judges are sent to fairs; speakers are provided for farmers' meetings; and specialists are sent to advise on farming problems.

The Agricultural Extension Service is cooperating in this work with the several county farm bureaus and with the State Farm Bureau, which is made up of more than sixty local farmers' organizations. Leading farmers and leaders in women's and children's work through the State are likewise enlisted as local demonstrators in their respective communities and act as local leaders in cooperation with and as a part of the Agricultural Extension Service plan.

UNITED STATES BUREAU OF MINES EXPERIMENT STATION

CHARLES E. VAN BARNEVELD	*Superintendent*
EDMUND S. LEAVER	*Metallurgist*
GEORGE E. POSTMA	*Junior Chemist*
WALTER WIELAND	*Laboratory Assistant*
HELEN GEYER	*Chief Clerk*

The function of the United States Bureau of Mines, as prescribed in its amended organic act, is to conduct scientific and technologic investigations in the field of mining and metallurgy, with a view to increasing safety and efficiency in the mineral industries. An act of Congress approved March 3, 1915, authorizes and directs the establishment of ten new Mining Experiment Stations under the Bureau of Mines, in addition to the then existing stations. At present there are eleven Experiment Stations, respectively situated at: Pittsburgh, Pa.; Urbana, Ill.; Columbus, Ohio; Bartlesville, Okla.; Minneapolis, Minn.; Golden, Colo.; Tucson, Ariz.; Salt Lake City, Utah; Berkeley, Cal.; Seattle, Wash., and Fairbanks, Alaska. Each station has assigned to it a specific field of work, to which, however, it is not absolutely confined. In most cases these stations are established at the state universities and are doing direct cooperative work with the state institutions in the investigation of the mining and metallurgical problems that are most important to their respective districts. The special field of the Tucson Station is the metallurgy of copper, and the staff of the Station is actively engaged in the investigation of the principal problem confronting the copper industry of the Southwest—the treatment of oxidized and partially oxidized porphyry copper ores.

Laboratories and offices have been provided for the United States Bureau of Mines in the south wing of the new Mines and Engineering Building. The laboratories consist of a general chemical research laboratory; a large metallurgical research and experimental laboratory; a flotation laboratory; an electro-metallurgical laboratory and an assay furnace room. The equipment is adapted to the investigation of concentration, flotation, roasting and leaching problems on a scale ranging from hand samples to several tons.

One of the features of the cooperation between the United States Bureau of Mines and the University of Arizona is the establishment by the University, through the Arizona State Bureau of Mines, of two graduate Fellowships in Metallurgy, which pay $750 per annum. Recipients of these Fellowships devote one-half of their time during the academic year to graduate study in candidacy for advanced degrees. The balance of their time during the academic year and their entire time during vacation periods is devoted to laboratory work under the direction of the United States Bureau of Mines. Application for Fellowships should be made to the Dean of the College of Mines and Engineering, University of Arizona, Tucson, Arizona.

ARIZONA BUREAU OF MINES

The Arizona Bureau of Mines was created by Act of the Legislature in 1915. Its objects are to make investigations and disseminate information which will lead to the development and expansion of the State's mineral industries. Among the many lines of activity in which the Bureau engages the following have proven especially important and valuable:

1. The preparation and publication of bulletins containing complete and authoritative information on a wide range of topics of interest to prospectors, miners, and others concerned with the development of Arizona's mineral resources and industries. The bulletins are distributed free of charge upon request, and about one hundred have already been issued.

2. The free classification of mineral and rock specimens. Besides naming rocks, and naming and giving the composition of minerals, the Bureau makes free qualitative tests for important elements, and answers inquiries concerning the probable market and the economic value of ore similar to samples submitted. When assays, or quantitative chemical analyses are desired these are furnished at rates established by law, a schedule of which will be submitted on request.

3. The accumulation of geologic data, and the making of topographic and geologic maps and reports. In cooperation with the

United States Geological Survey a large scale map is being drafted and will soon be available for free distribution. It is planned to prepare and issue a geological map of the entire State as soon as the necessary field work can be completed; and reports on the geology and mineral resources of counties and districts are also in preparation. It is believed that field investigations incident to these activities will yield a great deal of new and valuable information concerning promising undeveloped occurrences of petroleum and both metallic and non-metallic minerals (clay, gypsum, coal, etc.)

4. The technical education of miners and prospectors through lectures and miners' institutes held in mining camps. This work has proved very successful and it is planned to extend it materially.

5. The fostering of research on Arizona mining and metallurgical problems. Although some of this work is done by experts employed by and under the supervision of the Bureau, the greater part is accomplished through a cooperative arrangement with the United States Bureau of Mines Experiment Station on the Campus of the University. Under this agreement the Arizona Bureau of Mines provides research workers who operate under the direction of the Supervising Mining Engineer and Metallurgist of the United States Bureau of Mines Experiment Station.

6. The collection and dissemination of statistics relating to the mineral industries of the State.

7. The operation of a Clipping Bureau that collects and files all items relating to Arizona mines and minerals that appear in Arizona newspapers and in many technical periodicals.

8. The dissemination of publicity relating to Arizona's mineral industries.

9. The organization of a general information bureau that attempts to answer as completely as possible inquiries regarding mines and mining, metallurgy, geology, mineralogy, mining law, and other related subjects.

The one-word policy of the Bureau is "SERVICE," to the State and to those interested in the development of its mineral resources; and the assistance and advice of its staff are freely offered to all.

ARIZONA STATE LABORATORY

JANE H. RIDER, B.S. *Director*
CLAIR H. TOTTEN, M.D. *Chemist*

The State Laboratory, established by specific act of legislature as the State Pure Food Laboratory, is located in the south wing of the old main building of the University. It is entrusted with the enforcement of the State Pure Food Law, acting as the inspection and collection force of the State, and also performing the analytical work on which prosecutions may be based.

The routine work of the Laboratory consists of the purchase and examination of food products which may prove to be adulterated or misbranded. Should an article prove to be misbranded or adulterated within the meaning of the law, the party is afforded a hearing before the Superintendent of Public Health at Phoenix. This hearing is confined solely to questions of fact. It is held for the purpose of permitting the dealer to place the responsibility upon the party from whom he purchased the goods. In order to do this, however, he must show proper guarantees of evidence that he surrounded the transaction with the proper precautions and purchased the goods in good faith. If the hearing fails to relieve the dealer from responsibility, the Superintendent of Public Health then sends the case to the County Attorney for prosecution. In the prosecution the force of the State Laboratory appear only as witnesses, testifying as to the facts surrounding the collection of the sample, the preservation of the legal integrity of the same and the results of the analysis.

February 1, 1918, the State Laboratory had added to its other duties the work of cooperating with the Federal Food Administration, and this work consists of checking up the wheat flour substitutes in the possession of wholesale and retail dealers and bakeries, passing upon the shortening used by bakers and inspecting the finished products of the baker with reference particularly to the weight of loaves of bread and rolls.

With a view to widening its influence and serving the State as much as possible, the State Laboratory also performs any work of a strictly public health nature which the various county and municipal health officers may request of it. This includes such work as special investigations on milk and water supplies, or food products which may have come under suspicion, and work on samples from suspected cases of contagious diseases, such as typhoid, diphtheria, and tuberculosis.

STATE SCHOOL FOR THE DEAF

OFFICERS AND TEACHERS

HOWARD GRIFFIN, A.B.	*Principal*
JULIA R. BATEMAN	*Teacher*
ELEANOR C. JONES	*Teacher*
ELSIE BENSING	*Teacher*
LOUISE SADELMYER	*Teacher*
ROY HUNTER	*Instructor in Printing*
BERTHA GRIFFIN	*Matron*
IRENE WEBB	*Sewing Teacher*

The State School for the Deaf is affiliated with the University and under its direction. The school has its own buildings adjacent to the University campus, suitably equipped for the home and comfort and the academic and industrial instruction of the children in attendance.

OBJECT OF THE SCHOOL

It is the object of the school to give children that are too deaf to be educated in the public schools, a liberal education, to restore them, as nearly as possible, to a place in society beside their hearing brothers and sisters, and to equip them in such a way as to render them able to make their own way in the world.

COURSES OF STUDY

The course of study corresponds to that of the public schools of the State. Any boy or girl who shows the mental capacity will be given the necessary preparatory work to enter college. At the same time, emphasis is laid on domestic science, carpentry, and gardening. Every girl is taught plain sewing and cooking, and the boys receive instruction in carpentry and gardening.

Teaching speech and lip-reading occupy a very important place in the work of the school. Every child coming to the school will have the opportunity to be taught to speak and read the lips; finger spelling and manual signs have no place in the method of instruction.

TERMS OF ENTRANCE

The school is free to children whose parents or guardians are residents of this State. The academic year runs from September 22 to

June 1. Parents must furnish necessary clothing and transportation for their children. Application for admission is made to the Superintendent of Public Instruction, Phoenix.

Further information concerning the school will be furnished upon communicating with the Principal.

DEGREES CONFERRED JUNE, 1918

Master of Arts:

MURIEL MILLS
HELEN S. NICHOLSON
MERLE S. TEMPLETON

Master of Science in Civil Engineering:

JAMES B. WALLACE

Bachelor of Arts:

HELEN E. CAMPBELL
LUZERNE WESTCOTT CRANDALL
FLORENCE E. C. DRACHMAN
HELEN LOUISE EQUEN
GLADYS MAY HODGSON
CORAL MAURINE MUIRHEAD
GRACE PARKER
ANNE E. PAGET ROGERS
ADELAIDE LOUISE STEGER
EDITH COWAN TOMPKINS
KATHERINE ANN VINSON
HAZEL KATHRYN WHITNEY

Bachelor of Science:

HAROLD DAVID CARPENTER
EDWARD H. ESTILL
MARY H. ESTILL
RICHARD EDMUND MEYER
MARGARET B. MCROBERTS
EDWIN RUSSELL PEABODY
CHARLES LOUIS RENAUD
SANFORD SWEET
CALBERT LEE VANCE

Bachelor of Science in Agriculture:

ROBERT ROWE BENSON
CHARLES OMER BOND
WILLIAM PAUL EBERHARDT
ALBIN A. ISELIN
WILLIAM R. MCGOWEN
SANJHI RAM VARMA
LAURENCE CONNOR WHITEHEAD

Bachelor of Science in Chemistry:
RALPH F. RUSS

Bachelor of Science in Civil Engineering:
AMBROSIO G. OSMENA

Bachelor of Science in Commerce:
HAROLD MILTON HECKMAN

Bachelor of Science in Electrical Engineering:
JOHN H. GARDINER
RAYMOND HEDGES JACOBUS

Bachelor of Science in Home Economics:
RUTH REED

Bachelor of Science in Mechanical Engineering:
FIRMO BERCETCHE, JR.

Bachelor of Laws:
HARRY CLAY WESTOVER
WILLIAM HOMER WESTOVER

PHI KAPPA PHI HONOR SOCIETY

Class of 1918:
ROBERT ROWE BENSON
HAROLD CARPENTER
EDWARD ESTILL
GRACE PARKER
SANFORD SWEET
HARRY C. WESTOVER
WILLIAM H. WESTOVER
HAZEL WHITNEY

HONORS AND PRIZES

HONOR SCHOLARSHIPS

Honorary scholarships are conferred annually for the purpose of encouraging scholarship that is sound at every point. They are non-competitive, awarded to every student attaining a required proficiency. Freshmen reaching the required standard of excellence receive Honorable Mention; Sophomores, Juniors, and Seniors are recognized as Sophomore, Junior, and Senior Scholars respectively, and students carrying the work of both the Junior and Senior years at this standard, are known as the University of Arizona Scholars. In the year 1917-1918 the Honorary Scholarships were awarded as follows:

University Scholars:

ROBERT ROWE BENSON
HAROLD CARPENTER
GRACE PARKER
SANFORD SWEET
HARRY C. WESTOVER
WILLIAM H. WESTOVER

Senior Scholars:

ROBERT ROWE BENSON
GRACE PARKER
ADELAIDE STEGER
SANFORD SWEET
HARRY C. WESTOVER
WILLIAM H. WESTOVER

Junior Scholars:

ANNA KENNEDY FREEMAN
TILLIE KAUFMAN
ERMA SCHWALEN
HILDA WELLS
JESSE WOOLF

Sopohomore Scholars:

RALPH BILBY
GORDON DUNLAP
JO FISHER FREEMAN
HAZEL MCCOY
VYVYAN MOEUR
NORMA SCHEIDEMAN

Honorable Mention:

DOROTHY ANDREWS
ALICE BRERETON
ETHEL BROWN
HAROLD HOLCOMB
MILDRED KELLEY
LINDLEY ORME
GERALDINE PILCHER
FRANK WARTMAN

THE DRACHMAN PRIZE IN DEBATING

To stimulate interest in public questions, Mr. Harry A. Drachman, of Tucson, offers to the students of the University two annual cash prizes of $25 and $15 respectively. During the academic year 1917-1918 the prizes were awarded as follows:

First Prize: HESS SEAMAN
Second Prize: MARCY MALCOLM

COUNTY SCHOLARSHIPS

FRANKLIN D. WALKER, *Coconino County*
GERALD HOUCK, *Cochise County*
ROBERT A. RUPKEY, *Gila County*
WILLARD SIDEBOTHAM, *Greenlee County*
WILLIAM H. HOWE, *Maricopa County*
CLARA BOVEE, *Pima County*
GRACE C. CHATHAM, *Santa Cruz County*
MARY L. JOLLY, *Yavapai County*
CHARLES HOBART, *Yuma County*
ANNA B. PACE, *Graham County*
CHARLES D. MCCAULEY, *Navajo County*

BENNETT SCHOLARSHIP

DOROTHY BISHOP

COLLEGIATE CLUB SCHOLARSHIP

GLADYS TWEDELL
HAZEL MCCOY

UNIVERSITY OF ARIZONA ALUMNI ASSOCIATION SCHOLARSHIP

ANNA E. BLOUNT

UNIVERSITY CLUB OF TUCSON SCHOLARSHIP

ARIZONA BUREAU OF MINES SCHOLARSHIP

CALBERT LEE VANCE

TUCSON WOMAN'S CLUB SCHOLARSHIP

HAZEL HODGES

ARIZONA FEDERATION OF WOMAN'S CLUBS

FREEMAN SCHOLARSHIP MEDALS

Dr. Merrill P. Freeman offers two scholarship medals, one for men and one for women. These medals are awarded by the Committee on Administration: In the case of men, for scholarship, fondness for and success in manly outdoor sports; qualities of manhood—truth, courage, devotion to duty, sympathy, kindliness, unselfishness and fellowship; manifestations of moral force of character and of qualities of leadership. In the case of women, for scholarship, interest and service in student enterprises; qualities of womanhood—truth, courage, devotion to duty, kindness, unselfishness and fellowship; manifestations of force of character and of qualities of leadership.

In the year 1917-1918 these medals were awarded to

ROBERT ROWE BENSON
GRACE PARKER

THE L. C. HUGHES SCHOLARSHIP IN LAW

In memory of his father, ex-Governor L. C. Hughes, Mr. John T. Hughes offers a scholarship of $50 to the student who submits the best treatise on some legal topic.

In the year 1917-1918 this scholarship was awarded to

WILLIAM H. WESTOVER

THE ELLA HOWARD ESTILL MEDAL IN HISTORY OF PAINTING

Dr. Curtis Howard, of Columbus, Ohio, offers a prize of $20 to be known as the Ella Howard Estill medal to the student who makes the highest record in the history of art.

In the year 1917-1918 this medal was awarded to

CORAL MUIRHEAD

THE ARTHUR HAMILTON OTIS PRIZE IN HISTORY OF PAINTING

A prize of $10 to be known as the Arthur Hamilton Otis prize is offered to the student who makes the second highest record in the history of art.

In the year 1917-1918 this prize was awarded to

ESTHER LAWRENCE

THE CELESTE BOTILLER OTIS SHORT-STORY PRIZE

The Celeste Botiller Otis Short-Story Prize of $15 is offered each year by Mrs. Arthur Hamilton Otis to the student who does the most successful work in the course in short-story writing in the Department of English Composition.

In the year 1917-1918 this prize was awarded to

ELSIE WINDSOR

THE MILITARY PRIZES

Captain Hiram M. Powell, late Commandant of Cadets, during his lifetime presented annually a sabre to the most efficient commissioned officer. Since the death of Capt. Powell, Mrs. Powell has continued to give the sabre.

In the year 1917-1918 this sabre was presented to

EDWARD HOWARD ESTILL

Senator Andrew J. Martin offers a prize of $15 to the cadet having the best attendance record and best average score at rifle practice.

In the year 1917-1918 this prize was awarded to

ANDREW GRONDONA

MILITARY ORGANIZATION

JOHN J. BONIFACE, Major Cavalry, U. S. Army
Professor of Military Science and Tactics

GEORGE W. EDGERLY, Major Infantry, U. S. Army
Assistant Professor of Military Science and Tactics

JAMES A. BLACK, 1st Sergeant, U. S. A., Retired
Assistant Instructor of Military Science and Tactics

EDWARD CONNELLY — *Regimental Supply Sergeant*

1st Lieutenant ..... LLOYD E. ANDREWS, Adjutant
2nd Lieutenant ..... W. M. SIDEBOTHAM, Supply Officer
Sergeant Major ..... E. BELTON
Supply Sergeant ..... C. B. MCCAULEY
Color Sergeant ..... H. A. GRAY
Color Sergeant ..... E. M. PAFFORD

BAND

2nd Lieutenant ..... A. E. TRUSCOTT, Leader
Drum Major ..... T. J. WALLACE
Sergeant ..... S. E. CASTERTON
" ..... B. IVANCOVICH
" ..... O. J. LINDSEY
Corporal ..... R. BLEDSOE
" ..... R. R. CAMPBELL
" ..... H. B. MILLER
" ..... I. CROWELL
" ..... L. STALLCUP
" ..... M. HAMILTON

COMPANY "A"

Captain ..... WELLS O. ABBOTT
1st Lieutenant ..... MORRIS H. JONES
2nd Lieutenant ..... HERBERT B. ENDERTON
1st Sergeant ..... HARRY J. DOYLE
Sergeant ..... HAROLD D. BAKER
" ..... ARTHUR SEAMAN
" ..... J. M. CLARK
Corporal ..... F. WARTMAN
" ..... LINTON SIMMONS
" ..... L. H. LYONS
" ..... J. S. ABBOTT
" ..... R. G. ZEPEDA

COMPANY "B"

Captain.....LEWIS B. MAIER
1st Lieutenant.....EARL F. WOOD
2nd Lieutenant.....LOUIS B. SLONAKER
1st Sergeant.....HAROLD A. GREENWALD
Sergeant.....GEORGE D. HARDAWAY
" .....PERCY V. STAFFORD
" .....M. R. CARRILLO
" .....ROBERT WILSON
Corporal.....H. STEWART
" .....THOMAS E. DUFF
" .....P. M. HARVEY
" .....DEAN R. RYDER

REGISTER OF STUDENTS

UNIVERSITY OF ARIZONA

1918-1919

NAME	†CREDITS	DEGREE SOUGHT	RESIDENCE
*Abbott, James S.	27	B.S. in E.E.	Yuma
Abbott, Wells D.	11	B.S. in Mining	Phoenix
Abell, Norman	37	B.S. in Mining	Tombstone
*Abramson, Joshua	3	A.B.	Phoenix
*Achauer, Charles M.		R.U.	Phoenix
Ainsworth, Olive		R.U.	Tucson
*Akin, Morgan J.		R.U.	Peoria
Alexander, Bessie L.	17	A.B.	Globe
*Alexander, Raymond H.	15	P.G.	Tucson
*Allsman, Paul T.	17	B.S. in Mining	Clarkdale
Anaya, Henry Vance	14	LL.B.	Mexico City
*Andrews, Cecil J.		R.U.	Humboldt
Andrews, Dorothy G.	47	B.S. in Chem.	Youngstown, O.
Andrews, Lloyd J.	27	LL.B.	Tucson
Angus, Ethel	2	R.U.	Tucson
*Argondizza, Anthony J.		R.U.	Maspeth, L. I.
Armstrong, Arthur B.		R.U.	Phoenix
*Asher, John Edward	15	A.B.	Phoenix
Auxier, Herschel A.	19	B.S.A.	Prescott
Axe, Velma F.		A.B.	Tucson
*Baker, Harold D.	61	B.S. in C.E.	Phoenix
*Baker, James B.		R.U.	Phoenix
*Baker, Roland G.	110	B.S. in C.E.	Phoenix
*Baldwin, Edwin F.		R.U.	Bisbee
Baldwin, John Arnold		R.U.	Bisbee
Bateman, Julia R.	8	RU.	Tucson
Bandel, Emma L.		Special	Tucson
Bates, Edward A.		R.U.	Douglas
Bauer, Frank Carl		R.U.	Tempe
Baupre, Camille H.		Special	Ft. Saskatchewan, Alta.
*Beard, Raymond Ruskin	20	B.S. in Mining	El Paso, Texas
Beitz, Gertrude D.		Special	Tucson
Bellis, William C.	106	B.S.A.	Berkeley, Cal.
*Belton, Edward R.	36	A.B.	Tucson
Benard, Armando	14	B.S.A.	Hermosillo, Mex.
*Benedict, Howard L.	13	A.B.	Tombstone
*Berger, Harry H.	27	A.B.	Tucson
Berman, H. Robert	45	B.S. in Mining	N. Y. City
Bilby, Ralph W.	75	LL.B.	Tucson
Bird, Ruth S.	106	A.B.	Tucson

*Member Students' Army Training Corps.
†Units of credit computed at end of first semester.
P.G. denotes graduate student.
R.U. denotes regular unclassified student.
Special students have not met the entrance requirements.

NAME	CREDITS	DEGREE SOUGHT	RESIDENCE
Bireley, Frank W.		R.U.	Los Angeles, Cal.
Bishop, Dorothy H.	40	B.S.	Scottsdale
Blair, Jessamine M.		Special	No. Troy, Vt.
Blanchard, Lesley B.	32	B.S.	Tempe
Bledsoe, Roy F.	16	A.B.	Phoenix
Blount, Anna E.	83	A.B.	Tempe
Bodwell, Mintie E.	29	A.B.	Austin, Texas
*Bohnert, Frederick W.	5	B.S. in E.E.	Central Point, Ore.
Bond, Sara I.	39	A.B.	Tucson
Bond, Charles Omer		P.G.	Tucson
Booth, Rebecca A.		R.U.	Jacksonville, Fla.
Bouldin, David W.	11	B.S.A.	Austin, Texas
Bouldin, Helen L.	2	A.B.	Austin Texas
Boulton, Ellen H.	96	A.B.	Caldwell, Idaho
Bovee, Clara E.	14	A.B.	Tucson
*Bowen, John H.		Special	Phoenix
Bowen, Lucy M.	45	A.B.	Tucson
Bowers, Oscar A.		R.U.	Tucson
Boyer, Walton T.		R.U.	Red Rock
Boyle, Nellie		R.U.	Tucson
Brady, Doris		Special	Tucson
Brady, Josephine	15	A.B.	Tucson
Brady, Ralph H.	11	A.B.	Modesto, Cal.
Brannen, Dorothy	65	A.B.	Tucson
Brannen, Phyllis	35	A.B.	Tucson
Brazee, Norma	43	A.B.	Phoenix
Breen, Maurice	31+	B.S. in Mining	Los Angeles, Cal.
Brereton, Alice B.	62	B.S.	Bisbee
Brewster, Archie H.		B.S.A.	Glendale
Briggs, Caroline E.	124	A.B.	Tucson
Briggs, Thomas A.	2	R.U.	Tucson
Brown, Ethel M.	46	A.B.	Tucson
Brown, Katherine F.	69	A.B.	Cleburne, Texas
Brown, Maggie Barlow	44	A.B.	Cleburne, Texas
Brown, Maude T.	2	R.U.	Tucson
Brown, Thomas E.	11	B.S.	Tucson
Brown, Lizzie P.	6	R.U.	Tucson
*Bryan, James H.	17	B.S. in Mining	Douglas
*Bryce, Dewey A.		R.U.	Fort Thomas
Bull, Grace	16	A.B.	Douglas
Burrows, Joseph F.	117	B.S.A.	Detroit
Bush, Delia		R.U.	Tucson
*Butler, Dan Clifford	16	B.S. in E.E.	Big Springs, Texas
Bywater, Edward N.		P.G.	Tucson
Bywater, Elva W.		R.U.	Tucson
*Calvert, Donald Lee	74	B.S. in Mining	Grant's Pass, Ore.
Calvert, Leonard S.		Special	Seligman
Campbell, Frank W.		Special	Ash Fork
*Campbell, James		B.S.	Clifton
*Campbell, Peter R.	16	B.S. in Commerce	Williams
Campbell, Ruth	33	A.B.	Tucson
Carrillo, Alfonso R.	19	B.S. in C.E.	Tucson
*Carrillo, Miguel R.	43	B.S.	Tucson
*Carns, Arthur G.	3	B.S.A.	Tempe
Carr, Leonard	4	B.S.A.	Tempe

NAME	CREDITS	DEGREE SOUGHT	RESIDENCE
*Carpenter, James H.		R.U.	Thatcher
Carpenter, Miles M.		P.G.	Tucson
Carpenter, Warner		B.S.	Mancos, Colo.
*Carroll, Eugene J.		R.U.	Miami
Case, Harvey J.	117	B.S. in Mining	Phoenix
Case, Carrie E.		Special	Grossman, Ore.
*Casterton, Shirley E.	43	B.S. in Mining	Ajo
Cattell, Eva	4	R.U.	Tucson
Chandler, E. Bel	4	R.U.	Bedford, Ore.
Chapin, Alice E.	3	P.G.	Tucson
*Chase, Howard W.		R.U.	Venice, Cal.
Chatham, Grace C.	14	A.B.	Nogales
Cherry, Carl W.	4	R.U.	Tucson
Childs, Walter S.	11	P.G.	Atlanta, Ga.
Christine, Sister		R.U.	Tucson
Clarke, Gertrude	18	B.S. in H.E.	Tucson
Clark, Charles F.		R.U.	McGill, Nev.
*Clark, James N.	5	B.S. in E.E.	Yuma
Clawson, Leslie V.	87	A.B.	Thatcher
Clemons, Philip R.	94	A.B.	El Paso, Texas
*Clifton, John A.	48	B.S. in E.E.	Phoenix
Clingan, Maude C.	2	R.U.	Phoenix
Cloud, Marie	80	B.S. in H.E.	Tucson
Collins, Helen		R.U.	Tucson
*Collins, William A.		R.U.	Phoenix
Comstock, Allyne	2	R.U.	Tucson
Conover, Alice E.		R.U.	Globe
Conover, Guy D.		P.G.	Globe
Conrey, E. W.		B.S.A.	Cleveland O.
*Conway, Joseph W.	14	LL.B.	Hayden
Coombs, Marion G.	43	B.S. in H.E.	Tucson
Cooper, Zulla M.	45	A.B.	Tucson
*Copeland, Richard V.		R.U.	Blackwell, Texas
*Core, Clark D.	17	B.S.A.	Bisbee
*Cotten, Samuel L.	12	B.S. in Mining	Tucson
Crandall, Evelyn	2	R.U.	Tucson
Crandall, Luzerne W.	10	M.A.	Tucson
Cross, Zella		A.B.	Phoenix
*Crowell, Irving P.	13	B.S. in C.E.	Tucson
Cruce, Lorena Jane		P.G.	Ardmore, Okla.
Cruse, Sidney R.		R.U.	Memphis, Tenn.
*Cummings, Malcolm B.	79	A.B.	Tucson
Cunningham, Emilie E.	47	B.S. in H.E.	Douglas
*Cunningham, Henry		R.U.	Douglas
Current, George L.		P.G.	Tucson
Curtis, Ivy I.		R.U.	Tucson
Curtis, Nathaniel	4	R.U.	Thatcher
Daily, John W.		B.S. in Mining	Carthage, Ill.
*Dains, Wesley F.		R.U.	Camp Verde
Dale, Marion	58	A.B.	Tucson
*Dameron, Logan D., Jr.	9	A.B.	Phoenix
Darr, Helen E.		Special	Tucson
Davey, Effie	79	A.B.	El Paso, Texas
Davidson, Charles H.		R.U.	Douglas
*Davis, Berle M.	19	B.S. in E.E.	Morenci

NAME	CREDITS	DEGREE SOUGHT	RESIDENCE
Davis, Ruth W.		R.U.	Tucson
Deans, Marie C.		R.U.	Denison, Texas
*Decker, James Henry		R.U.	Douglas
DeWolfe, Frances L.	8	A.B.	Tucson
Dodge, Mabel Wilson	4+	R.U.	Tucson
Doebler, J. H.	4	R.U.	Tucson
Doebler, Rotha G.	3	R.U.	Tucson
Donnelly, Elizabeth C.	16	A.B.	Tucson
Douglas, Dorothy		R.U.	Tucson
*Doyle, James Perry	48	B.S. in Chem.	Phoenix
Doyle, Mary		Special	Vail
Drachman, Rosemary	58	A.B.	Tucson
*Dresser, Walter E.	5	A.B.	Fresno, Cal.
*Duff, Thomas G.	55	B.S. in Mining	Tucson
Duffy, Mary M.		R.U.	Tucson
Duffy, Myrtle		R.U.	Tucson
*Dunagan, William T.		R.U.	Tolar, Texas
Duncan, Martha L.		R.U.	Tucson
Dunlap, Gordon B.	81	B.S.	El Centro, Cal.
*Dunlap, Stuart B.		B.S.	El Centro, Cal.
*Dunne, Numa P.		R.U.	Oakland, Cal.
*Eakle, Earl L.	15	A.B.	Clay, W. Va.
Earl, Ernest W.	5	Special	Phoenix
Eastman, Alice W.	48	A.B.	Mammoth
Eberhardt, Elizabeth M.		Special	Tucson
Edgerly, Claudia M.		R.U.	Tucson
*Edmundson, Charles S.	8	A.B.	Bisbee
Edwards, Florence V.	15	A.B.	Nogales
*Edwards, Harold E.		R.U.	Phoenix
*Eichbaum, Joseph H.	14	A.B.	Douglas
Elder, Allan C.	10	LL.B.	Phoenix
*Elerick, Joe Francis		R.U.	Phoenix
Elliott, Elsie J.	73	A.B.	Phoenix
Elliott, Jennie Mae	15	A.B.	Tucson
Ellis, Bruce B.		P.G.	Tucson
Ellsworth, Jessie L.	60+	B.S. in H.E.	Safford
*Enderton, Herbert B.	47	B.S. in Mining	Yuma
*Ensign, Ormsby H.		R.U.	Phoenix
Epler, Nora Elizabeth	104	A.B.	El Centro, Cal.
*Erb, Merion J.	19	B.S. in E.E.	Yorktown, Texas
Estill, Mary Howard		M.S.	Tucson
*Etter, Clyde M.		R.U.	Phoenix
Evangelista Sister		R.U.	Tucson
Evans, Bessie M.	2	R.U.	Tucson
Evans, John H.		R.U.	Phoenix
*Evans, Wallace B.		R.U.	Yuma
Failor, Edith B.	47	A.B.	Tucson
Fairchild, Sherman M.	8	R.U.	Oneonta, N. Y.
Faught, John L.		R.U.	Globe
Fay, Everett Dewey		R.U.	Woodhull, Ill.
Fegtly, Mary A.	16	R.U.	Tucson
Fickett, Mary	61	B.S. in H.E.	Tucson
*Field, Leatham A.	13	B.S.	Tucson
Fields, Josephine M.	121	A.B.	Phoenix
*Fields, William C.		R.U.	Phoenix

NAME	CREDITS	DEGREE SOUGHT	RESIDENCE
Finlayson, Donald C.		R.U.	Prescott
Fogle, Paul E.	38	A.B.	Tucson
Forbes, Georgia	4	R.U.	Tucson
*Fram, Alfred J.		R.U.	Tolleson
Franklin, Dorothy M.	55	B.S.	Tucson
Franklin, Elizabeth W.	17	B.S.	Tucson
*Frauenfelder, Albert		R.U.	Somerton
Freeman, Anna Kennedy	124	A.B.	Tucson
Freeman, Jo Fisher	83	A.B.	Tucson
*Froehlke, Adolph W.	19	B.S. in Chem.	Neenah, Wis.
Gallatin, Margaret	54	B.S. in H.E.	Tucson
Gallatin, Olive	84	B.S. in H.E.	Tucson
*Gardner, Nat H.		R.U.	Willcox
Garrigus, Frank A.	35	B.S. in E.E.	Tucson
*Geare, Edwin A.		R.U.	Phoenix
George, L. N.		R.U.	Tucson
Geyer, Helen	6	A.B.	Tucson
*Goodman, John T.	38	B.S. in E.E.	Phoenix
Gould, Silas E.	19—	B.S. in C.E.	Tucson
*Grasmoen, William J.		R.U.	Phoenix
*Gray, Harold A.	36	B.S.A.	Chandler
Gray, Hollis B.	103	B.S.A.	Chandler
Gray, Marie		Special	Tucson
Grebe, Ronald	17	B.S. in Mining	Phoenix
*Greenwald, Harold	51	B.S. in M.E.	Tucson
Griffin, Howard	7	J.D.	Tucson
Griffin, Stuart W.		P.G.	Jackson, Mich.
*Griswold, Jesse F.		R.U.	Phoenix
*Grondona, Andrew A.	22	B.S.	Tucson
*Grosh, Vincent G.		R.U.	Miami
Gross, Carolyn M.		B.S.	Braddock, Pa.
*Gruewell, Daniel B.		R.U.	Phoenix
Guest, Alice		R.U.	Tucson
Guild, Marilla M.	4	P.G.	Tucson
Hackett, Charles W.		R.U.	Tucson
Hackett, Duella	80	B.S. in Chem.	Tucson
Hadsell, Idora P.	7	Special	Buckeye
Haldiman, Blanche E.		Special	Tucson
Haldiman, Joseph C.		A.B.	Tucson
*Hamilton, James M.	11	B.S. in Commerce	Douglas
*Hamilton, Robert L.	15	B.S. in M.E.	Fort Worth, Texas
*Hanley, William F.		R.U.	Douglas
Harbison, Ira F.		R.U.	Seeley, Cal.
Hardaway, George D.	49	B.S. in C.E.	Deming, N. M.
Harrar, Kathryn	17	A.B.	Christiana, Pa.
Harris, Annie S.		Special	Tucson
Harrison, Edith I.	16	A.B.	Bisbee
Harrison, Ila		A.B.	Ajo
Hart, Marguerite		A.B.	Tucson
*Harvey, Philip Maxwell	10	B.S. in Commerce	Ajo
*Hayes, Claude A.		R.U.	Jerome
Haynes, Marion M.	108	A.B.	Tucson
Heacock, William O.		R.U.	Albuquerque, N. M.
Hearne, Ruby D.	61	B.S. in H.E.	Phoenix

NAME	CREDITS	DEGREE SOUGHT	RESIDENCE
Hedges, Ralph A.		R.U.	Miami
*Heffelman, Malcolm C.		B.S.	Mayer
*Heflin, Dick S.		R.U.	Phoenix
*Hegelund, Carl A.	8	B.S. in E.E.	Phoenix
Heighton, Dorothy	86	A.B.	Tucson
Heney, Carlyle F.	54	B.S. in C.E.	Tucson
Henley, Stella N.	28	B.S.	Tucson
Henness, Kelvin	10	B.S.A.	Tempe
*Henry, Robert L.		R.U.	Globe
Herndon, James Prugh	116	A.B.	Tucson
*Herndon, Thomas Ralph	93	B.S. in M.E.	Tucson
*Heron, James R.		R.U.	Gila
Herreras, Eleazar D.	68	B.S. in C.E.	Tucson
Herriford, Neal F.		B.S.	Tucson
*Hershey, Carl G.	130	B.S. in E.E.	Phoenix
*Hetherington, Maurice	11	B.S. in Mining	Phoenix
Hickman, Marguerite B.	80	B.S.A.	Austin, Texas
Hickman, Mary E.	44	B.S.A.	Austin, Texas
Hildebrandt, Clara B.	115	B.S. in H.E.	Tucson
*Hinton, Troy B.	24	B.S.	Phoenix
Hittinger, Minnie W.		Special	Tucson
*Hobart, Charles	16	B.S.A.	Yuma
Hodges, Hazel	49	A.B.	Yuma
Hoesch, Mildred H.	124	A.B.	Warren
*Hoff, Julius W.		R.U.	Yorktown, Texas
Hoge, Hermione	61	A.B.	Chicago, Ill.
*Holcomb, Harold W.	34	B.S.	Benson
Houck, Gerald W.	19	B.S. in E.E.	Douglas
Houts, Sydney A.		R.U.	Tucson
Howe, Will H.	14	B.S. in Mining	Phoenix
Huber, Daisy	16	B.S. in H.E.	Mesa
Huddleston, Fay R.		R.U.	Tucson
Huddleston, Lucia		Special	Tucson
Huffman, Edith G.		R.U.	Tucson
Hunter, Hester L.		R.U.	Tucson
Hurst, Helen E.		R.U.	Tucson
*Huston, Mervin C.		R.U.	Liberty
Hutchinson, Lillian		R.U.	Tucson
Irvine, Isabelle A.		A.B.	Phoenix
Ivancovich, Byron	52	B.S.	Tucson
Jackson, Florence	17	A.B.	Tucson
Jacobs, Arthur	45	B.S.	Tucson
Jacobson, Winnie E.		Special	Tucson
Jacobus, L. Russell	67	B.S.	Tucson
Jacome, Josephine	126	A.B.	Tucson
Jacome, Rosa	9	A.B.	Tucson
Jantzen, J. Wendell	19	B.S. in E.E.	Phoenix
Jay, Edward, Jr.	7	A.B.	Tucson
Jaycox, Lester W.	68	LL.B.	Phoenix
*Jeffrey, Paul H.		R.U.	Chandler
John, Jennaveve	111	A.B.	Tucson
Johnson, Edith Edna		Special	Tucson
Johnson, Victor W.	14	Special	Tucson
Jolly, Mary Lewis	107	A.B.	Clarkdale

NAME	CREDITS	DEGREE SOUGHT	RESIDENCE
Jones, H. Leon	52	B.S.	Williams
Jones, Leona	101	A.B.	Tempe
*Jones, Morris H., Jr.	52	B.S.	Big Springs, Texas
*Jones, Walter B.		R.U.	Big Springs, Texas
Kaufman, Sophie	78	B.S.	Tucson
Kaufman, Tillie	125	A.B.	Tucson
Keen, Artemisa		R.U.	Tucson
*Kellond, Oswald E.		R.U.	Tucson
Kelly, Mildred B.	46	B.S. in H.E.	Clifton
Kempf, Louis R.	46	LL.B.	Benson
*Kendall, Harold A.		R.U.	Glendale
Kendall, Joseph S.		B.S. in C.E.	Los Angeles, Cal.
Kengla, H. W.	4	Special	Tucson
*Kenneaster, Joe Strauss		R.U.	Willcox
Kenyon, Zula		Special	Tucson
*Kilpatrick, Tom H.		R.U.	Tucson
*Kimbro, Robert M.		R.U.	Douglas
King, Ruth E.	126	B.S. in H. E.	Tucson
Kinnear, Helen		R.U.	San Jose, Cal.
*Knickerbocker, Andrew		R.U.	Douglas
Knight, Ida		Special	Tottenville, N. Y.
Knox, Dorothy E.	9	A.B.	Phoenix
Lair, Greathia L.	12	B.S. in Chem.	Phoenix
*Lamar, James C.		R.U.	Alhambra
*Lamm, Melber I.	19	B.S. in M.E.	Globe
*Lamport, James A.		R.U.	Seligman
Lance, Oliver		R.U.	Loma, Col.
*Langston, Edwin H.		Special	Phoenix
Langworthy, Jean		Special	Tucson
Larkin, Josephine L.	13	A.B.	Chicago, Ill.
Laskey, Jack M.		R.U.	Douglas
Lawrence, Esther B.	66	A.B.	Phoenix
Laythe, Lillian D.	15+	A.B.	Tucson
Lease, Alice C.	120	A.B.	Quincy, Ill.
Leeson, Frances L.	113	A.B.	Santa Fe, N. M.
Lefko, Sidney	13	A.B.	Crosby, Minn.
Leonard, Heman B.		P.G.	Tucson
Lewis, Gail I.	28	B.S.	Phoenix
Lindley, Ruth E.	40	A.B.	Tucson
Lindsey, Oscar J.	38	B.S.	Tucson
Lisitzky, Genevieve H.	24	A.B.	Tucson
*Lockling, Bret H.	19	B.S. in Mining	Courtland
*Lockwood, Walter L.		Special	Phoenix
Loflin, Margaret	13	A.B.	Tucson
Loflin, Ruth S.	43	A.B.	Tucson
Long, Thelma J.		Special	Tucson
Lovejoy, Winifred		R.U.	Tucson
Lovett, Archa E.	108	A.B.	Shepherd, Texas
*Lucas, Oakley W.		Special	Douglas
*Lynch, Clarence R.	45	A.B.	Clifton
Lyons, Francis H.	57	B.S. in Mining	Jerome
*McCall, Brooks B., Jr.		R.U.	Douglas
*McCartan, Robert E.		R.U.	Douglas

NAME	CREDITS	DEGREE SOUGHT	RESIDENCE
*McCauley, Charles D.	19—	B.S. in Commerce	Winslow
*McClellan, C. W.		B.S.A.	Phoenix
*McClure, William A.		R.U.	Tucson
McCluskey, Anna P.	70+	A.B.	Tucson
McCoy, Hazel	88—	A.B.	Willcox
*McCoy, Harry		R.U.	Phoenix
McCoy, Maisy	17	B.S.	Willcox
McCullough, John J.	16—	LL.B.	Bisbee
McDermott, Edith A.	78	A.B.	Tucson
*McDougall, Kenneth E.		R.U.	Douglas
McDougal, Leslie M.	14	B.S. in M.E.	Morenci
McGinnies, Nina E.	71	A.B.	Tucson
*McGinnies, William G.	17	B.S.A.	Tucson
McKale, James F.	15	P.G.	Tucson
McKean, John	10	B.S.	Warren
McKean, Kathryn	71	B.S. in H.E.	Warren
*McKinney, Hance W.		R.U.	Hurley, N. M.
*McLay, James B.		R.U.	Yuma
McLean, Ruth M.	50	A.B.	Globe
McLellan, Charles W.	13	B.S.	Phoenix
*McManus, Bernard		R.U.	Phoenix
McMullen, Lawrence		R.U.	Prescott
McWade, Agnes Mary		Special	Tucson
Macdonald, Marion	11	Special	Tucson
Macdonald, Norman L.	19	Special	Tucson
*Mack, Joseph Otto		R.U.	Brooklyn, N. Y.
MacLennan, Hector K.		R.U.	Tempe
MacNichols, Dorothy A.		R.U.	Washington, D. C.
Magenheimer, Floriene R.	108	A.B.	Tucson
Mahoney, Geneva H.		Special	Tucson
Maier, Lewis B.	59	LL.B.	Benson
Makey, Earl		Special	Tucson
Maldonado, Amelia M.	121	A.B.	Tucson
Maloney, Jessie	2	R.U.	Tucson
Manley, Albert	18	B.S. in Commerce	Phoenix
*Manning, Howell	25	B.S.	Tucson
Mathews, Bertha		R.U.	Tucson
Mathews, Zella Jay	102	A.B.	Phoenix
*Marks, Cecil J.	34	A.B.	Glendale
Marshall, Campbell	24	B.S.	Tucson
Martin, Glen Wesley		Special	Los Angeles, Cal.
Martin, Ross Arthur		R.U.	Clifton
Martinez, Bandelio R.		B.S.	Benson
Meadows, James H.		R.U.	Tucson
*Mealey, William P. Jr.	24	B.S.	Tombstone
*Medlyn, Norman R.		R.U.	Globe
Merrill, Philemon P.	40	B.S.	Pima
Messenger, Lewis E.		R.U.	Ray
Meyer, Nelle L.	2	R.U.	Tucson
Milhone, Erle		Special	Tucson
Miller, Barthol E.	10	B.S. in Mining	Tucson
*Miller, Clarence A.		R.U.	Clifton
Miller, Horace S.	7	B.S.A.	Tucson
Miller, Marguerite	14	A.B.	Tucson
Misbaugh, William	15	Special	Phoenix
Mitchell, Howard T.	9	A.B.	Marion, Ohio

NAME	CREDITS	DEGREE SOUGHT	RESIDENCE
Moeur, Jessie Belle	16	A.B.	Tempe
Moeur, John K.	57+	B.S.	Tempe
Moeur, Marguerite N.	16	A.B.	Tempe
Moeur, Vyvyan B.	106	A.B.	Tempe
*Montgomery, Jay		R.U.	Williams
*Montgomery, Levi P.		R.U.	Williams
Montgomery, Wilma E.		R.U.	Houston, Texas
Moody, Joseph R.		R.U.	Thatcher
Moore, Jesse H.		R.U.	Willcox
Moore, Leon G.	4	R.U.	Tucson
Morgan, Nan J.		Special	Tucson
Mortenson, William F.		R.U.	Thatcher
*Mulvey, Edward R.		R.U.	Tucson
*Munroe, William E.		R.U.	Clifton
Murphey, Carobel		P.G.	Tucson
*Murphey, John W.	84	B.S. in Mining	Tucson
*Murphey, William L.	13	B.S.	Tucson
*Murphy, Walter L.	13	B.S. in Commerce	Prescott
*Nelson, Aaron W.		R.U.	Thatcher
*Nelson, John R.		R.U.	Winslow
Newman, Edith		A.B.	Bisbee
*Nichols, Gayle Howard	16	A.B.	Douglas
Nichols, George R.	87	A.B.	Don Luis
Nichols, Rosa E.		A.B.	Tucson
Oatley, Frank J., Jr.		B.S.A.	Providence, R. I.
O'Keefe, Charlie C.	128	B.S. in Mining	Nogales
O'Keefe, John J.	80	B.S. in Commerce	Nogales
Oldewage, William		Special	Tucson
Oldt, Hazel	2	R.U.	Tucson
O'Malley, Helen K.	24	A.B.	Tucson
*Orem, Clarence L.	87	B.S. in Mining	Tucson
*Orme, Lindley H.	32	A.B.	Phoenix
Ormsby, Carrie E.		Special	Tucson
Otis, Celeste B.	114	A.B.	Tucson
Pace, Anna B.	19	B.S. in H.E.	Thatcher
*Pafford, Ernest M.	49	B.S. in Commerce	Tempe
*Paine, Mason L.	93	B.S. in Chem.	Prescott
Palmer, Farley	26	A.B.	Sioux Falls, S. D.
Park, Lorna J.	26	A.B.	Klondyke
*Parkyn, William S.		R.U.	Miami
Patterson, August		R.U.	Douglas
Payne, Mary Ruth	15	B.S. in H.E.	Prescott
Pearce, Maude	4	R.U.	Tucson
Pease, Oscar L.	21	J.D.	Tucson
Peery, James H.	9+	A.B.	Maryville, Tenn.
*Peterson, Arthur		R.U.	Bisbee
*Phillips, Claude L.		R.U.	Winslow
Phillips, Ralph A.	70+	LL.B.	Phoenix
*Pickrell, Kenneth P.	36	B.S.	Phoenix
Pike, Raymond	4	B.S.A.	Twin Buttes
Pilcher, Geraldine L.	46	A.B.	Tucson
*Pinkston, Dow G.		R.U.	Phoenix
Pistor, Fritz Moritz	102	B.S.	Tucson

NAME	CREDITS	DEGREE SOUGHT	RESIDENCE
*Pistor, William J.	17	B.S.A.	Tucson
Pitchlynn, Ethel N.	57	A.B.	Tucson
*Pitts, Charles A.		R.U.	Glendale
*Poch, Joseph K.		R.U.	Yorktown, Texas
*Pollard, Abbott S.		R.U.	Los Angeles, Cal.
Pope, Ethel V.	10	A.B.	Phoenix
Porter, Carter C.	82	A.B.	El Paso, Texas
*Potter, Raymond N.		R.U.	Clifton
*Powell, Charles S.	8	B.S.	Benson
*Powell, John L.	7	B.S. in M.E.	Florence
Power, Edith M.	17	A.B.	Lehi
Power, Katherine M.		R.U.	Indian Oasis
Power, Mildred E.	17	B.S. in H.E.	Mesa
*Powers, Julian W.	19	B.S. in Mining	Phoenix
Powner, Helene D.	51	A.B.	Tucson
*Preston, Alexander J.	3	B.S.	Tombstone
*Preston, Thomas F.		Special	Pima
Price, Inez	5	R.U.	Tucson
Prina, Eva K.	16	B.S. in Commerce	Tucson
Prina, Ruth	17	B.S.	Tucson
Purcell, Marie		Special	Tucson
*Pusch, Walter G.	64	B.S. in Commerce	Tucson
*Rabinowitz, Saul		R.U.	Clifton
Rae, Jessie E.	118	A.B.	Vail
*Rafferty, George E.		R.U.	Bisbee
Randolph, Thomas J.	15	B.S. in C.E.	Bisbee
*Reagan, Paul H.	82	B.S. in Mining	Big Springs, Tex.
*Reeves, Roloff W.	34	B.S.A.	Toltec
Reid, Ida C.		P.G.	Tucson
Renaud, Bertha C.	31	A.B.	Pearce
Reynolds, Frank W.		B.S.	Tucson
Richards, Arthur H., Jr.	107	B.S. in E.E.	Tucson
Richards, Dorothy	77	A.B.	Tucson
Rider, George Clinton	26	A.B.	Pekin, Ill.
*Riggs, Mart B.	17	B.S. in C.E.	Florence
*Ristow, Roderick E.		R.U.	Phoenix
*Roark, George V.	19	B.S. in Mining	Douglas
Robb, Inez	41	A.B.	Long Beach, Cal.
*Roberts, Horace D.	27	B.S.	Tucson
Robinson, Gladys		R.U.	Tucson
Robinson, Mildred		A.B.	Bisbee
*Rockfellow, Henrietta	116	A.B.	Cochise
Rockfellow, John P.		R.U.	Cochise
Rogers, Anne E.		P.G.	Tucson
*Rolf, Philip von	12	B.S. in Com.	Hollywood, Cal.
*Romero, Tomas D.	32	A.B.	Clifton
Ronstadt, Fred A.	115	B.S.A.	Tucson
Rosales, George		Special	Tucson
*Roscoe, Glenn E.	16	B.S. in E.E.	Tucson
Rosenswie, Lillian		Special	Tucson
Rowley, Edwin J.		Special	Tucson
Rupkey, Robert H.	19	B.S. in C.E.	San Carlos
*Russell, Barney Lee	16	B.S. in E.E.	Big Springs, Texas
Russell, Utilis L.		R.U.	Mesa

NAME	CREDITS	DEGREE SOUGHT	RESIDENCE
Ryder, Donaldson	103	B.S.A.	Phoenix
*Ryder, Erastus Dean, Jr.	18	B.S. in E.E.	Phoenix
Saelid, Althea G.	123	A.B.	Warren
Salmon, Mary Kathryn	13	A.B.	Bisbee
Sampson, George V.	44	B.S.	Winslow
Sarle, Catherine A.	68	A.B.	Tucson
Sasek, Marie A.	57	B.S. in H.E.	Pt. Richmond, N. Y.
Schaffer, John F.	21+	B.S. in Mining	El Paso, Texas
Schoonmaker, Helen M.	13	A.B.	Tucson
Schoonover, Nellie D.	3	A.B.	Stephen, Minn.
*Schuele, Martin A.	19	B.S. in M.E.	Chandler
Schwalen, Irma	119	A.B.	Tucson
*Schwalen, Walter H.		R.U.	Tucson
*Scott, Donald C.		R.U.	Phoenix
*Seaman, Arthur R.	50	B.S. in Mining	Douglas
Seaman, Hess	30	Special	Prescott
Sellew, Philip Kirk		R.U.	Yuma
Sendon, Andres R.	2+	B.S.	Tucson
Servin, Mariana	18	A.B.	Tucson
*Sexton, Joseph P.	3	B.S. in M.E.	Douglas
Shahan, Unita E.	40	B.S. in H.E.	Tucson
Shappell, Maple DeLos	52	B.S. in Mining	Chicago, Ill.
Sharman, Frank W.		P.G.	Tucson
Shaw, Samuel P.	9	Special	Newelliton, La.
Shelby, Florence D.	43	A.B.	Yuma
Shelton, Smith		R.U.	Belmont
Shen, Mung Chin	140	B.S. in Mining	Kinkiang, China
Shen, Ya Chin	3	B.S. in Mining	Kinkiang, China
Shepherd, Hazel	10	A.B.	Tucson
Shields, Louise F.	4	P.G.	Tucson
Shumway, Roswell D.		P.G.	Portsmouth, O.
Sidebotham, Nora M.	15	B.S. in Commerce	Clifton
*Sidebotham, Willard M.	54	B.S. in Mining	Clifton
Silverthorn, Leo H.		R.U.	Bisbee
*Simm, Harold Byron		R.U.	Prescott
Simmons, Linton	48	B.S.A.	Cochise
Sims, Artuhr George	10+	B.S. in Mining	Seattle, Wash.
*Sines, Edwin L.	42	B.S.	Prescott
Sireanni, Louis P.	2	R.U.	Clifton
Sitz, E. Arnold		P.G.	Perham, Minn.
Slagle, Katurah		B.S.	Phoenix
Slavens, Jean	46	A.B.	Tucson
Slavens, June	16	A.B.	Tucson
Slavens, Philip	19	B.S. in M.E.	Tucson
Sloane, Dorothy Hatch	31	A.B.	Tucson
*Slonaker, Alfred L.	49	B.S. in Commerce	Tucson
Smith, Blanche H.	75	B.S. in H.E.	Tucson
Smith, Ethel A.	2	R.U.	Berkeley, Cal.
Smith, Florida		R.U.	Kingsbury, Texas
Smith, G. Edward		R.U.	Tucson
Smith, Marie E.	11	A.B.	Tucson
Smith, Mary Gene	46	A.B.	Tucson
*Smith, Richmond S.	12	B.S. in M.E.	Tucson
*Smith, Thomas C.	19	B.S.	Miami
*Sneed, Edward B.		B.S. in Mining	Hereford

NAME	CREDITS	DEGREE SOUGHT	RESIDENCE
Snider, Wallace		B.S.	Oak Harbor, O.
Sohn, Ray Ruth		R.U.	Tucson
Solomon, Josephine	3	Special	Tucson
*Spafford, Perry P.	19	B.S. in E.E.	Tucson
Spain, Robena B.	108	A.B.	Glendale
Sparks, Lillian		R.U.	Wichita, Kans.
Spires, Ethel N.		P.G.	Tucson
Staben, Marie E.		Special	Tucson
Stack, Leo Thomas		R.U.	Prescott
Stafford, Percy V.	25	B.S.	Tucson
*Stallcup, Leonard B.	4	B.S.	Globe
Stanton, Lucy	51	LL.B.	Great Falls, Mont.
*Stark, Carl William		R.U.	Yorktown, Texas
Stark, Mildred	16	A.B.	Tombstone
*Stearns, John W.	13	B.S. in Mining	San Diego, Cal.
*Steed, Frank	31	B.S.	Deming, N. M.
Steed, Horace J.		R.U.	Deming, N. M.
Steed, John T.	56	B.S. in Com.	Deming, N. M.
Steinfeld, Viola	17	A.B.	Tucson
Stevens, LaVerna	48	A.B.	Denver, Colo.
Steward, Ann	9	R.U.	Detroit, Mich.
*Stewart, Harry A.	6	B.S.A.	Tempe
Still, Jack W.	38	B.S.	Tucson
Still, Nellie E.	73	A.B.	Tempe
Stillwell, Logan W.	119	B.S.	Mesa
*Stockder, Heinie M.	80	B.S. in M.E.	Tucson
Stokes, Ethel		R.U.	Tucson
*Stokoe, Kenneth		R.U.	Phoenix
*Striegel, LeRoy M.	32	B.S.	Humboldt
*Strittmatter, Cyrillus P.		R.U.	Patton, Pa.
Stuck, Carolyn	2	R.U.	Tucson
Sturgis, Frank Noble		A.B.	Winnette, Ill.
*Sutherland, Thomas R.	93	B.S.	Phoenix
Swaney, Oscar H.	111	B.S. in M.E.	Tucson
Sweeney, Christine	78	B.S. in H.E.	Redlands, Cal.
Sweeney, Edward F.		R.U.	Prescott
Sweeney, Susan T.	83	A.B.	Redlands, Cal.
Tacquard, Ruth M.	15	A.B.	Tucson
Taitt, Mildred L.	17	P.G.	Gouverneur, N. Y.
Talmage, T. De Witt	52	B.S. in Com.	Brooklyn, N. Y.
*Teague, Joseph O.		R.U.	Glendale
Tenley, Raymond E.	105	B.S.	Willcox
*Theobold, Edwin Y.	38	B.S.	Prescott
*Tisall, Carl J.	42	B.S. in Mining	Saugerties, N. Y.
*Toles, Silas E.	13	B.S. in M.E.	Tombstone
Tong, James A.	113	B.S. in Commerce	Tucson
*Trenham, Newton B.	16	B.S. in Commerce	Bisbee
*Truesdell, John		R.U.	Phoenix
*Truscott, Alfred E.	40	B.S.	Bisbee
Tucker, LaVergne		Special	Tucson
Turner, Edna	5+	R.U.	Melrose, N. M.
Twedell, Gladys	119	A.B.	Phoenix
Ulen, Marguerite	3	P.G.	Indianapolis, Ind.
Upshaw, Ernest M.	49	LL.B.	Tucson

NAME	CREDITS	DEGREE SOUGHT	RESIDENCE
Van Barneveld, Frances	28	B.S. in Chem.	Tucson
*Van Barneveld, John H.		R.U.	Tucson
Van Benschoten, Anna L.		P.G.	Tucson
Vance, Calbert L.		P.G.	Tucson
*Vaughan, James H.		R.U.	Tucson
Vedder, Winnie S.	16	B.S. in H.E.	Tucson
Verma, Kashi Ram	78	B.S.A.	Mandi State, Punjab, India
Vosskuehler, Max P.	115	B.S.	Phoenix
Wales, Marie Zoe	78	A.B.	Tucson
Walker, Gladys L.		R.U.	Tucson
Walker, Franklin D.	19	B.S. in Mining	Flagstaff
Walker, Holly		Special	Tucson
Wallace, Thomas J.	19	B.S.	Tucson
Walters, Hugh A.		R.U.	Liberty
*Ward, Carlos A.		R.U.	Florence
Ward, Thomas A.		Special	Sunnyside
*Warren, Howard S.	137	B.S. in E.E.	Yuma
*Wartman, Franklin S.	60	B.S. in Chem.	Phoenix
Watson, Olive		R.U.	Tucson
*Watt, Sheldon B.		R.U.	Duncan
Watts, Anna Lyle	11	R.U.	Camargo, Ill.
Webb, Max Roy		Special	Thatcher
*Weekes, Charles F.		R.U.	Mesa
Weiland, Walter	5	R.U.	Upland, Cal.
Weimar, Alice C.		Special	Tucson
Welker, Lawrence H.		R.U.	Upland, Cal.
Wells, Hilda	112	A.B.	Tucson
Westphaling, Mary E.	14	A.B.	Los Angeles, Cal.
*Wetzler, Edwin A.		R.U.	Phoenix
*White, Neil Emerson		R.U.	Florence
Whitehead, Helen S.	84	B.S. in H.E.	Indianapolis, Ind.
*Wiegel, Fred C.	67	B.S.	Tucson
Wilcox, A.C.		R.U.	Tucson
*Williams, Chet W.	12	B.S. in Commerce	Phoenix
*Williams, Griffith		R.U.	Bisbee
*Williams, Ralph S.	10	A.B.	Douglas
*Williams, Victor C.		B.S.	Nashville, Ark.
*Williams, Wylie F.		R.U.	Miami
Willits, Helen	61	A.B.	Phoenix
Wilson, Alfred Everett		R.U.	Tulsa, Okla.
Wilson, Clarence P.	115	B.S.	Omaha, Neb.
*Wilson, Eldred D.		P.G.	Rolla, Mo.
*Wilson, Harold G.	16	B.S. in Commerce	Tulsa, Okla.
*Wilson, Robert M.	13	B.S. in E.E.	Sour Lake, Texas
Wilson, Roy B.	19	B.S. in Mining	Globe
Windsor, Elsie	115	A.B.	House, N. M.
Wing, Florence A.		P.G.	Chicago, Ill.
Winsor, Irvine L.	5	B.S. in Mining	Boston, Mass.
*Wofford, Walter W.	14	B.S.	Yorktown, Texas
Wood, Earl F.	25	B.S. in Com.	Ocean Park, Cal.
Wood, Grace V.	45	B.S. in H.E.	Ocean Park, Cal.
Wood, Lillian P.	46	A.B.	Tucson
Wood, Mary R.	41	B.S.	Ocean Park, Cal.
*Wood, Wilson B.	76	B.S. in Commerce	Phoenix
Woods, Allie		R.U.	Tucson

NAME	CREDITS	DEGREE SOUGHT	RESIDENCE
Woody, Montford	11	B.S.A.	Buckeye
*Woodyard, Frank A.		R.U.	El Paso, Texas
*Woolf, Jesse A.	127	B.S. in Mining	Tempe
*Wootan, James E.		R.U.	Bonita
Wrenn, Frances	10	A.B.	Florence
Wright, Jean M.	11	A.B.	Tucson
Young, Yvonne	15	A.B.	Tucson
Zeigler, Edward W.	95	B.S. in Mining	Prescott
Zepeda, Rudolph	50	B.S. in Commerce	Tucson

SUMMER SESSION IN BISBEE

1918

Albright, Rena V. ..... Bisbee
Behler, Anna M. ..... Bisbee
Bird, Ruth S. ..... Tucson
Brereton, Alice B. ..... Bisbee
Chapman, Edith M. ..... Bisbee
Ewing, Myrtle A. ..... Bisbee
Fields, Josephine M. ..... Phoenix
Fiske, Alice Charlotte ..... Plymouth, N. H.
Gregg, Dorothy Irene ..... Bisbee
Hinters, Lulu K. ..... Hereford
Horton, M. Olive ..... Riverside, Cal.
Jacome, Josephine F. ..... Tucson
Jones, Leona ..... Tempe
King, Ruth E. ..... Tucson
McCoy, Hazel M. ..... Willcox
McKean, Kathryn S. ..... Lowell
McRoberts, Margaret B. ..... Miami
Moeur, Vyvyan B. ..... Tempe
Monroe, Anah B. ..... Bisbee
Muirhead, Coral ..... Bisbee
Newman, Edna B. ..... Bisbee
Paul, Julia V. ..... San Simon
Rae, Jessie E. ..... Vail
Reed, Ruth ..... Phoenix
Saelid, Althea G. ..... Warren
Schwalen, Irma M. ..... Tucson
Spain, Robena B. ..... Glendale
Steger, Adelaide L. ..... Tucson
Twedell, Gladys ..... Phoenix
Vinson, Katherine V. ..... Tucson
Wallace, Anna H. ..... Bisbee

CORRESPONDENCE STUDENTS

1918-1919

NAME	UNITS	ADDRESS
Adams, Charles H.	3	Silverbell Ariz.
Baker, Paul C.	2	Phoenix, Ariz.
Bartholomew, Erwin L.	2	Jerome, Ariz.
Broomfield, Florus A.	8	Indian Oasis, Ariz.
Campbell, Murray	4	Tucson, Ariz.
Corpe, Harvey A.	2	Nogales, Ariz.
Epler, Nora E.	4	El Centro, Cal.
Hedges, Ralph A.	3	Miami, Ariz.
Hinters, Lulu K.	8	Bisbee, Ariz.
Jones, Eleanor C.	4	Tucson, Ariz.
Kendall, Joseph H. S.	4	Los Angeles, Cal.
Lowdermilk, Gladys D.	4	Willcox, Ariz.
Nelson, Alice I.	7	Phoenix, Ariz.
Park, William L.	3	Claypool, Ariz.
Rees, Elinor	4	Dawson, N. M.
Reynolds, Anna	4	Tucson, Ariz.
Roby, Ruth	9	Phoenix, Ariz.
Tenley, Louise M.	4	Willcox, Ariz.
Tillett, Boone D.	5	Durham, N. Car.
van Barneveld, John	8	Trona, Cal.
Wood, Lillian P.	11	Tucson, Ariz.

SUMMARY OF REGISTRATION

1918-1919

CLASS	MEN	WOMEN	TOTAL	GRAND TOTAL (eliminating duplications)
Graduate Students	18	14	32	
Seniors	23	28	51	
Juniors	22	23	45	
Sophomores	48	48	96	
Freshmen	146	80	226	
Regular Unclassified	138	62	200	
Total Regular Students	395	255	650	650
Special Students	24	31	55	55
Summer Session		31	31	18
Correspondence Students	11	10	21	15
Short Course Students—Farmers	136	66	202	277
Short Course Students—Home Economics Extension		75	75	
Total	566	468	1034	
Totals elminating duplications				1015

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