1-1-1900

# 1898-1899 Course Catalog

University of Montana--Missoula. Office of the Registrar

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# University of Montana

## Annual Register.


1898-99.

UNIVERSITY HALL.

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# Fourth Annual Register

of the

# University of Montana,

## Missoula, Montana.

1898-99.

With an Outline of the Course of Study and the Departments of Instruction for

1899-1900.

Helena, Montana:
INDEPENDENT PUBLISHING CO.,
State Printers and Binders.
1899.

## COLLEGE CALENDAR FOR 1899-1900.

### 1899.

Entrance Examination begins Monday, September 11, 10:00 A. M.
First Semester begins Wednesday, September 13.
Thanksgiving Vacation begins Wednesday, November 29, 12:30 P. M.
Thanksgiving Vacation ends Monday, December 3, 10:30 A. M.
Christmas Holidays begin Friday, December 22, 12:30 P. M.

### 1900.

Christmas Holidays end Tuesday, January 2, 8:30 A. M.
First Semester ends Friday, February 2.
Second Semester begins Monday, February 5.
Annual Entertainments of the Literary Societies, February 15 and 16.
Instruction ends Friday, June 1, 5 P. M.
Annual Lecture before Literary Societies, June 1, 8:30 P. M.
Prize Contest in Declamation, Preparatory Students, June 2.
Baccalaureate Day, Sunday, June 3.
Annual Recital, School of Music, Monday, June 4.
Field Day, Tuesday, June 5.
H. N. Buckley Oratorical Contest, June 5, 8:30 P. M.
Commencement, Wednesday, June 6.

# CALENDAR FOR 1899-1900.

## 1899.

### JULY.

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ORO Y PLATA

# The Montana State Board of Education.

EX-OFFICIO.

GOVERNOR ROBERT B. SMITH, President.
C. B. NOLAN, Attorney General.
E. A. CARLETON, Supt. Pub. Instruction, Secretary.

APPOINTED.

O. P. CHISHOLM, Bozeman.....Term Expires February 1st, 1900
J. G. McKAY, Butte ..... " " " " 1900
HENRY R. MELTON, Dillon.... " " " " 1901
M. J. GARRETT, Lewistown.... " " " " 1901
J. M. HAMILTON, Missoula..... " " " " 1902
H. H. GRANT, Grantsdale..... " " " " 1902
N. W. McCONNELL, Helena.... " " " " 1903
O. F. GODDARD, Billings..... " " " " 1903
SARA B. MACLAY.....Clerk of the Board

EXECUTIVE COMMITTEE OF THE STATE UNIVERSITY.

J. H. T. RYMAN, President.....Missoula
T. C. MARSHALL, Secretary.....Missoula
HIRAM KNOWLES .....Missoula

# The Faculty.

OSCAR J. CRAIG, A. M., Ph. D., President,
Professor of History.

CYNTHIA ELIZABETH REILEY, B. S.,
Professor of Mathematics.

W. M. ABER, A. B.,
Professor of Latin and Greek.

FREDERICK C. SCHEUCH, B. M. E., A. C.,
Professor of Modern Languages.

MORTON J. ELROD, A. M.,
Professor of Biology.

FRED D. SMITH, B. S.,
Professor of Chemistry and Physics.

EUNICE JULIA HUBBELL, B. Ph.,
Professor of English Literature.

JAMES H. WELLS, M. E.,
Professor of Mechanical Engineering.

MRS. WALTER WHITAKER,
Instructor in Music.

ELOISE KNOWLES, Ph. B.,
Instructor in Drawing, and Assistant in English.

GRACE HERNDON,
Assistant in the Preparatory, and Instructor in Vocal Music.

LOUISE HATHEWAY.
Assistant in Physical Laboratory.

MARY A. CRAIG, B. S.,
Librarian.

# The University and Its Endowment.

The University of Montana was created by an Act of the Montana State Legislature, approved February 17th, 1893. The following extracts give the title of the act; and also certain sections that indicate the purpose of the University and the scope of its work.

"An Act to establish, locate, maintain, and govern the University of the State of Montana.

Section 1. "There is hereby established, in this State at the City of Missoula, an institution of learning under the name and style of the University of Montana."

Section 6. "The object of the University of Montana shall be to provide the best and most efficient manner of imparting to young men and young women, on equal terms, a liberal education and thorough knowledge of the different branches of Literature, Science, and the Arts, with their varied applications; and to this end there shall be established the following colleges or departments, to-wit:—

First—A Preparatory Department.

Second—A Department of Literature, Science and the Arts.

Third—Such professional and technical colleges as may from time to time be added to or connected therewith.

The Preparatory Department may be dispensed with at such rate and in such wise as may seem just and proper to the State Board of Education."

Section 7. "Such duties or courses of Instruction shall be pursued in the Preparatory Department as shall best prepare the students to enter any of the regular colleges or departments of the University.

"The college or department of Literature, Science, and the Arts shall embrace courses of instruction in Mathematical, Physical and Natural Sciences with their applications to the Industrial Arts; a liberal course of instruction in the Languages, Literature, History, Philosophy, and such other branches as the State Board

of Education may prescribe. And, as soon as the income of the University will allow, and in such order as the demands of the public seem to require, the said courses of instruction in the Sciences, Literature, and the Arts shall be expanded into distinct colleges or departments of the University, each with its own Faculty and appropriate title."

Section 9. "Tuition shall ever be free to all students who shall have been residents of the State for one year next preceding their admission; except in the Law and Medical Departments, and for extra studies. The State Board of Education may prescribe rates of tuition for any student in the law or medical department, or who shall not have been a resident as aforesaid, and for teaching such studies."

ENDOWMENT.

Section 11. "For the support and the endowment of the University there is annually and perpetually appropriated—

"First—The University Income Fund and all other sums of money appropriated by law to the University Income Fund .

"Second—All tuition and matriculation fees.

"Third—All such contributions as may be derived from public or private bounty.

Section 10. Any person contributing a sum not less than fifteen thousand dollars ($15,000) shall have the privilege of endowing a professorship in the University, or any department thereof, the name and object of which shall be designated by the State Board of Education."

By an Act of Congress dated February 18, 1892, 46,080 acres of land were donated to the State of Montana for University purposes. This land was granted by the Federal Government upon condition that the proceeds from the sale of such lands should become a Permanent University Fund.

The Income Fund arises from the rental of lands unsold, from licenses to cut trees and from the interest on the proceeds of the sale of lands invested in the Permanent University Fund. This fund is applied to the payment of the bonds, principal and interest, which were issued in 1897 for the construction and equipment of buildings.

The University lands have all been selected. They comprise some of the very best lands in the State and are rapidly increasing in value.

# The Equipment of the University.

## UNIVERSITY GROUNDS.

The University Grounds, comprising forty acres of excellent land, are on the south side of the Missoula river just where it leaves Hell Gate canyon to enter the beautiful Missoula valley. The outlook is to the west, the mountain slope being in the rear. In the foreground and to the right, lying on both sides of the river, is the city of Missoula, but the view extends uninterrupted for many miles down the valley. On the left is the Bitter Root valley with Mt. Lo Lo in the distance. On the right and beyond the river are Mt. Jumbo and the canyon of the Rattlesnake. This stream affords the waterworks an unlimited supply of water remarkable for its purity and clearness.

The citizens of Missoula have fenced the grounds, planted shade trees, and supplied them with water without expense to the State.

## BUILDINGS.

At the fifth session of the Montana Legislature authority was given to issue $100,000 in bonds, secured by the income from the University land, for the purpose of erecting and equipping permanent buildings for the use of the University. These bonds were sold at a premium, a Building Commission appointed, and the work of constructing the buildings vigorously pushed to completion.

An ample sewerage system was planned and completed, and an abundant water supply secured.

Two buildings have been constructed, one known as University Hall, containing the Library, Museum, Biological Lecture Room and Laboratory, President's Office, Assembly Room, and Lecture Rooms for Languages, History, Mathematics, Literature, etc.; the other known as Science Hall, contains the necessary rooms for work in Chemistry, Physics, and Mechanical Engineering. Science Hall also contains the steam plant for heating the building and furnishing power for the Mechanical Laboratory.

The interiors have been planned with especial reference to the present needs of the University as indicated by the work already in progress, as well as to anticipate future demands. The buildings were completed and formally presented to the State Board of Education February 18, 1899.

## THE LIBRARY.

This is a convenient and well lighted room, 30x50, and situated on the first floor of University Hall. It is provided with cases for books and pigeon holes and racks for periodicals and papers.

There are at present in the Library 3,359 volumes, and 2,581 pamphlets unbound, exclusive of periodicals. The Library contains that material most needed for reference in the work already in progress in the University. This list includes Dictionaries, Encyclopedias, Histories, standard works in Literature, Science, Politics, Philosophy and Economics.

The following periodicals are on file:

The Forum.
Popular Science Monthly.
Harper's Weekly.
Harper's Monthly Magazine.
North American Review.
Atlantic Monthly.
The Cosmopolitan.
The Arena.
The American Naturalist.
Science.
Journal of Geology.
The Scientific American and Supplement.
The Railway Age.
Foundry.
Entomological News.
The Analyst.
American Archaeologist.
Bulletin de la Chemique.
Journal of London Chemical Society.
American Journal of Mathematics.
Zum Fels und Meer.
Die Gartenlaube.
Mutter Erde.
Illinois Staats Zeitung.
Ueber Land und Meer.
Psyche.
Nature.
The Microscopical Journal.
The Journal of Applied Microscopy.
The American Journal of Science.

The Photographic Bulletin.
The American Architect.
The Outlook.
Current History.
The Educational Review.
School and Home Education.
Engineering News.
Engineer's Magazine.
Cassier's Magazine.
The American Machinist.
The Electrical World.
The Western Electrician.
Mining.
Political Science Quarterly.
Ladies' Home Journal.
American Journal of Psychology.
The Independent.
The Dial.
The Century Magazine.
Review of Reviews.
Scribner's Magazine.
Chautauquan.
Forest and Stream.
The Chemical Journal.
The American Chemical Society Journal.
The School Review.
Book Reviews.
The Monist.
Education.
Zeitschrift fur Anorganische Chemie.
Revue Des Deux Mondes.
Botanical Gazette.
The Classical Review.
The Journal of Association of Engineering Societies.
The Engineering and Mining Journal.
The Western Mining World.
Power.
The Electrical Review.
The Public School Journal.
Public Opinion.
Fliegende Blaetter.
Merck's Report.

The following newspapers are on file and are for the most part donated by their respective publishers:

The Chronicle, Bozeman.
The Daily Missoulian, Missoula.
The Bitter Root Times, Hamilton.
Avant Courier, Bozeman.
The Anaconda Standard, Anaconda.
The Western News, Hamilton.
The Montanian, Thompson Falls.
The Billings Times, Billings.
The Billings Gazette.
Democrat-Messenger, Missoula.
Glendive Independent, Glendive.
The Plainsman, Plains.
The Neihart Herald.
The Silver State.
The Madison County Monitor.
The Big Timber Express.
The Libby News.
The Missoulian.
Montana Fruit Grower, Missoula.
Belt Valley Times, Belt.
Helena Independent, Helena.
The Citizens Call, Philipsburg.
Western Mining World, Butte.
The Inter-Lake, Kalispell.
The Tribune, Butte.
The Recorder, Anaconda.
Weekly Tribune, Dillon.
The Northwest Tribune, Stevensville.
Rocky Mountain Husbandman, White Sulphur Springs.
Mining, Spokane.
The Mining and Railway Review, Butte.
The Dillon Examiner, Dillon.
The Townsend Messenger, Townsend.
The Plains News-Letter, Plains.
The Jefferson County Sentinel, Boulder.

The students have also free access to the Public Library of the City of Missoula.

## DEPARTMENT OF CHEMISTRY AND ASSAYING.

The department of Chemistry occupies the whole of the second floor of the Science Hall, which contains a lecture room, two

laboratories for students, a balance and reading room, the office and private laboratory of the Professor of Chemistry, and a store room. These rooms are all connected with a special system of flues to provide perfect ventilation. Gas is supplied to all of the rooms from a small gas plant which is placed in the engine room in the basement.

The lecture room will seat forty persons and is provided with the usual accommodations for taking notes from lectures. The lecture table, 4x14 feet, is provided with water, gas, and constant electric current from a storage battery placed under the table. This provides for the best possible presentation of the subjects studied by illustrated lectures.

In the rear of the room, tables provided with gas, are arranged for the work in determinative mineralogy and blowpipe analysis. The lecture room is well lighted by the large windows of western exposure.

The larger laboratory is arranged for the work in general chemistry and qualitative analysis. New and improved styles of laboratory desks are provided in which each student has a full set of apparatus under lock and key. Water is brought to each student's desk, as is also gas. The laboratory is provided with balances for coarse weighing, and with separate sets of reagents for each student. One feature of this room is the large number of hoods through which all of the ventilation of the room takes place, thus providing a strong draught of air for removal of noxious fumes and gases.

The laboratory is well lighted by windows and by gas when necessary. Distilled water is made for the use of all students in a distilling apparatus located in the attic, where steam from the heating plant is condensed in a block tin condenser. Twenty-four students can work at one time in this laboratory, while fifty can be accommodated with lockers and working desk room by dividing the class into two sections.

The smaller laboratory is arranged for work in Quantitative Analysis and in Organic Chemistry. Desk and locker room has been provided for sixteen students working all at once. Each student is provided with water, gas and suction at his desk. The hoods are arranged as in the other laboratory, under one of which is placed a steam heated closet for drying precipitates, etc. Each student is provided with the usual apparatus for gravimetric and volumetric analysis, or for the usual organic work in fractional

distillation, etc. Special sets of apparatus can be drawn from the store room for the more advanced analytical work, including electrolysis of metals by Classen's methods, complete analysis of milk and water, as well as the special analysis of milk by the Babcock method.

Special drying closets for fixed temperatures, and water and steam baths are at hand for the use of the students.

The Balance and Reading Room opens into the Quantitative Chemical Laboratory. In it are placed two Becker balances sensitive to .2 mg. for the beginners in Quantitative Analysis. In the same room is the Department Library for works on Chemistry in all of its branches, on Geology, Mineralogy, Metallurgy and Assaying, and on Physics and Physical Measurements. The principal scientific journals, dealing with the same subjects from both English and American authors, are also placed here. Students have access to these books under such regulations as are necessary to insure their safety. This room serves as a library and reading room for students having work in the department.

The room set apart for the private work of the Professor of Chemistry is to serve the double purpose of an office and private laboratory. It is 12x18 feet, and furnished with hoods, water, gas and electric currents. The room being a corner room is well lighted and altogether will furnish one of the best private chemical laboratories in the Northwest. It is expected that special investigations and analyses will be carried on here by the department, and attempts will be made to make the laboratory of as much service to the agricultural and mineral industries of the state as possible .

The store room between the private office and the laboratories is conveniently arranged. It is a room 11x18 feet, and serves the double purpose of store room for apparatus and chemicals, and for a preparation room for the solutions and compounds used in the laboratories and lectures. It is provided with hoods and laboratory desk space, with water, gas, etc., and is used solely for the purposes noted. Students have no access to this room.

## GEOLOGY AND MINERALOGY.

The provisions made for laboratory work in these subjects have been referred to under the head of Chemical Lecture Room. The lectures in Geology will be illustrated whenever possible with the lantern in the physical lecture room, and the material for work

will be found enumerated under the geological division of the museum. A set of 108 crystal models according to Professor Rose is provided for the work in Crystallography which always precedes the work in Mineralogy. Blowpipe sets are also at hand for the work in blowpipe analysis which will be a part of Determinative Mineralogy.

## ASSAYING.

The work in assaying, such as furnace work, grinding and sampling ores, etc., is done in a special laboratory on the first floor of the foundry. In this laboratory are built three furnaces for crucible work according to the Columbia School of Mines plans. They are built of fire brick for the use of coke as fuel, and are large enough to each take ten crucibles at one time. The muffle furnaces are also built of fire brick to use coke or soft coal as fuel. Two muffle furnaces are provided each with two murnes 9 inches by 6 inches by 15 inches. Each furnace is connected with a separate flue, so any one or all furnaces, whether for crucible or muffle work, can be heated as desired.

The crushing is done in a Bosworth Crusher operated by steam power, which is placed in the same room. The laboratory is provided with gas and water, and each student has a desk space reserved. Since the work is carried on as a division of Quantitative Analysis and not by special students as an elective, the work of mixing and weighing charges, and of inquarting and weighing beads is done in the Analytical Laboratory. The assay balance for this work is sensitive to one-twentieth of a mg. The electrolytic assay for copper is done as a part of the Quantitative Analysis, as are also the determinations usually called assays for lead, antimony, copper, etc., which are really Volumetric Analyses and are not properly assays.

## DEPARTMENT OF PHYSICS.

One lecture room and one laboratory are provided for this work. These rooms are on the first floor of Science Hall and occupy one-half of the floor space. The lecture room has a seating capacity of seventy-five, and is arranged for public scientic lectures as well as for the lectures in Physics. Provision is made for darkening the room thus allowing the use of the Colt's projection apparatus, which is to be permanently located in this room. The lecture table is provided with gas, water and electric current from a storage battery.

The laboratory is provided with working tables for twenty-four students working at the same time ,and lockers for forty-eight, allowing the class to work in two sections. Gas is brought to each desk by a special system of piping, and water for the laboratory to two sinks conveniently arranged.

The apparatus for students beginning the subject is the usual simpler form of material which is provided so that each student has his own set under lock.

Advanced students are provided with many pieces of apparatus for the work of physical measurements, such as thermometers, barometers, Atwood's machine for falling bodies, and many forms of galvonometers for electrical work.

DEPARTMENT LIBRARY.

In addition to treatises and special works already enumerated, the following journals are regularly received and at the disposal of the students:

1. Journal of the American Chemical Society.
2. American Chemical Journal.
3. Zeitschrift fur Anorganische Chemie.
4. The Analyst.
5. The Berichte.
6. The School of Mines Quarterly.
6. The Journal of the Society of Chemical Industry.
8. The American Journal of Science.

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DEPARTMENT OF BIOLOGY.

This Department has quarters in University Hall. Two rooms on the first floor, two rooms in the basement, besides the Museum, afford ample opportunity for good work. Each student is provided with an individual table, and supplied with all the necessary glassware and material. The tables are specially planned for the work. The tops are of oak, stained and waxed. On either side are two drawers for material and space below for microscope. The door below has a combination lock, and by an ingenious contrivance the drawers are locked by a button. One keyless lock locks the three spaces, making the material safe and secure. Each desk is fitted with gas. The beginners are in one room, containing sixteen tables. One-half of the lecture room is arranged for a laboratory, with six tables, used by the advanced students. Those still more advanced are given space in the base-

ment, where there is more room, and where special work may be done. The basement rooms are in part used as storage, in part for work. The rooms are as dry as those above, owing to the character of the soil; are light and airy, and altogether very suitable for work. In one corner of the basement is a very complete dark room, with shelves, gas, electric light, water, and a large table, together with all necessary apparatus for work.

The microscopical equipment is as follows: There are two compound microscopes by Leitz of Germany. One of these microscopes is the best made by this firm, and has the following accessories: Three eye pieces, a series of five objectives, one being a one-twelfth oil immersion. It has also a revolving stage, with sub-stage condenser after Abbe, and with the iris diaphragm. It has eye and stage micrometers, and accessory Nichols prisms for polarization, and also a camera lucida after Abbe.

The other Leitz instrument has two eye pieces and three objectives. There are sixteen microscopes by Bausch & Lomb Optical Co. Four of these have two eye pieces and two objectives, with sub-stage condenser for illumination. The other twelve have one eye piece and two objectives. There are also two dissecting microscopes by Bausch & Lomb Optical Co. and one by Leitz. In addition to the microscopes there is a battery of extra objectives, three inch, two inch, one inch, one-half inch, one-fourth inch, one-eighth inch and one-tenth oil immersion, to give greater range of work.

In addition to the microscopes the department has a good supply of working apparatus, consisting of the following material: Anthony's copying, reducing and enlarging camera, with accessories for making lantern transparencies; a Leitz vertical camera for photomicrography; a pair of balances; a Miller's paraffine bath and a Naples water bath, each with thermostat; an adjustable drawing board for camera lucida; an incubator, with thermostat, for use in bacteriology and embryology; a minot microtome; a student microtome; three Abbe camera lucidas; insect cages: turn tables; hardware; glassware; chemicals, etc., for carrying on histological and general biological work.

The department has considerable photographic material, and in conjunction with the work in Geology a beginning has been made for a collection of photographs to be used in class work. Several hundred lantern slides have been made. It is the intention in the near future to make the stereopticon a valuable adjunct in the department through the medium of photography.

For working material there is a collection of alcoholic vertebrates and invertebrates, land, fresh water and marine; made by purchase and collecting; a series of several hundred mounted slides, in part mounted in the laboratory, in part loaned by the professor, and for the remainder secured by purchase; an articulated skeleton; a collection of mounted and unmounted insects; an herbarium of some three thousand species of phanerogams; a collection of fishes.

The professor in charge has loaned for the use of the department a portion of his library, several hundred volumes and pamphlets. The University library contains already several hundred volumes relating to the work, altogether making a good nucleus of a department library. During the past year a number of valuable additions have been made to the library, and others will be added as they become necessary for carrying on the work.

## THE MUSEUM.

The intention is to make the museum a depository of the material representing the natural, mineral and scientific wealth of the state.

It is most earnestly requested that all who are interested in the University, and especially in the preservation of valuable material for scientific work, should take special pains to contribute to the material in the museum. Time and circumstances are fatal to nearly all specimens, but being properly cared for and placed in the museum of the University they will be preserved.

Correspondence is solicited concerning material which may be donated. All donations will be properly acknowledged, and the articles properly labeled and the donor's name recorded.

One room in University Hall is set apart for the museum, and the cases for it are of the most convenient and serviceable pattern, finished in the most artistic style. They are not only very serviceable, but also models of the workman's skill, and show attractively the collections of the University. The cases include a large display case for minerals and one with interchangeable drawers for storage. The insects will be stored in Comstock's insect cases, and when the insects can be arranged they will make a good display. Two cases contain the alcoholic fishes and other specimens. The herbarium is housed in a case of special design, dust proof, portable and convenient. In addition to these is the working material in the different rooms, with overflow cases in the halls and basement.

The geological division of the museum collection is divided into three sections, viz: Mineralogy and Petrography, Economic Geology, Paleontology.

The first division comprises a fair collection of minerals arranged according to their chemical composition, and of many specimens of rocks arranged according to their petrographical properties. The nucleus of the mineral collection is the Cobban collection, which has been re-labeled and placed in boxes. This collection has been supplemented from time to time by the founder, Mr. R. M. Cobban, as well as by many other friends of the University (see list below) and by collection by the department. The nucleus of the collection of rocks is a partial set contributed by the National Museum at Washington, D. C. The U. S. Geological Survey has sent a nearly complete set of educational series of rocks, each labelled, catalogued and described. Many specimens have also been added by collection. During the past year a lot of seventy minerals, mostly crystallized, were purchased, thus making the list of common minerals quite complete. The collection of minerals will further be augmented by purchase, by donations from friends, by exchange of duplicate material with other collectors and museums, and by collections made by special trips to noted mineral localities. The collection of rocks for petrography will be augmented principally by collections made by the Department.

The second division, Economic Geology, is an exposition of the ores of economic value of the United States in general, and of Montana in particular. A fine start upon this work has been made, the material being a part of the Cobban collection, material donated by mining men of the State ,and much that has been collected by the Department on special collecting trips. The plan in making this collection is to accurately represent the mining industries of this state in a manner as complete as possible. Average characteristic samples of ore are taken together with samples of the hanging and foot walls. Samples of the concentrates are also obtained, if the ore is concentrated, in order to fully represent the operation of the mine. The assay value of the ore is also taken if possible, in order to complete the description. Additions to this division will be made by collections and by donations. Collectors are requested to consult with the Professor in charge of Geology in order that exchanges of duplicate material may be made.

The third division, Paleontology, contains the collections of fossils in which the Eastern part of this state is especially rich. Persons finding or possessing fossils of any kind will derive but little profit from them unless in complete sets. Such specimens are valuable to our museum and will be gladly received and the species determined. The location of discovery should always be given. Additions to this division will be entirely by collection and exchange, and by donations.

During the past year the following additions have been made to the museum:

George H. Kennett, city, a pair of elk antlers.

Lem H. Tracy, city, two pairs of elk antlers.

By purchase, a mounted camel's skull.

A. J. Lyons, city, a small collection of Alaska flowers.

Earl Douglass, Medford, Minn., a large collection of Montana fossils, his own collecting, containing a number of type specimens. Mr. Douglas has collected in Montana for a number of years, and has secured many treasures unknown to science, of great value and importance in the scientific world. Many of his specimens have been donated, the others have been deposited, and upon them he is working. It is undoubtedly the best collection of Montana fossils in the state.

Smithsonian Institution and United States National Museum, a gift of a hundred species of shells.

George Westby, city, specimens of English coals and jet; also fossils and minerals from Augusta, Mont.

Prof. Wm. M. Aber, a sample of calamine. A loan of a very large and beautiful specimen of calamine. Two samples of magnetite ore in powder, and in briquettes, from Edison's magnetic separatory.

R. M. Cobban, city, one sample of crystallized native copper from Butte, Mont. Samples of copper ore from Copper Cliff, Mont.

Oscar Sedman, city, one sample native copper from Butte, Mont. Copper ores from Copper Cliff District.

H. Hazelton, city, fourteen specimens of polished home and foreign granites.

Frank Simons, Dawson City, Alaska, one crystal of gold from the Klondike.

Dr. W. P. Mills, city, one sample of jasper from Pullar Springs, Mont.

Geo. E. Boos, city, two samples of lead-silver ore, from Vermilion, Mont.

Oliver Pichette, Cedar Creek, gold and silver ores from Cedar Creek.

W. J. Baker, Wardner, Idaho, one sample of silver-lead ore, Wardner, Idaho.

U. S. Geological Survey, Washington, D. C., 138 type specimens of rocks (Educational Series of Rocks).

G. Stuart, Hamilton, Mont., Indian pipe, from Nez Perces reservation; lead-silver ore, Victor, Mont.

Collected by the department: Numerous specimens of garnet, calcite, tourmaline, orthoclase, characteristic sets of first and second class copper ore, from the Anaconda, Bell, Never Sweat, Diamond, Original, Alice, Blue Bird, Mountain Con, Colusa-Parrot, and Parrot mines. Full set of concentrates and seconds from the Parrot concentrator. Specimens of coal from Red Lodge, Crested Butte, Colo., and Diamondville, Wyo.

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## DEPARTMENT OF LATIN AND GREEK.

This department is supplied with a set of Kiepert's Classical Maps; with Cybulski's colored wall charts; and a carefully chosen collection of lantern slides and mounted photographs for the illustration of Greek and Roman Archaeology and Private Life.

The library is well supplied with the most important and essential works of reference for this department.

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## DEPARTMENT OF MATHEMATICS.

In addition to the forms, solids, spherical blackboard, etc., for illustrative purposes, this department is now supplied with an excellent equipment for work in surveying. This equipment includes transit, Y-level, vernier compass, leveling rods, ranging poles, chains, tapes, etc.

The library contains a number of works of reference for the department.

## SCHOOL OF MECHANICAL ENGINEERING.

### LIBRARY.

The department library contains a number of technical references for the use of the students in Engineering.

### DRAWING ROOM.

There have been provided for the use of students in Mechanical Engineering ten drawing tables. These accommodate two students each, and contain four drawers provided with lock and key. Each table holds two drawing boards 25x36 inches. There are other drawing boards 24x30 inches for smaller work. Special drawing instruments are placed at the disposal of the students.

### WOOD SHOP.

This shop contains the following tools and machines:

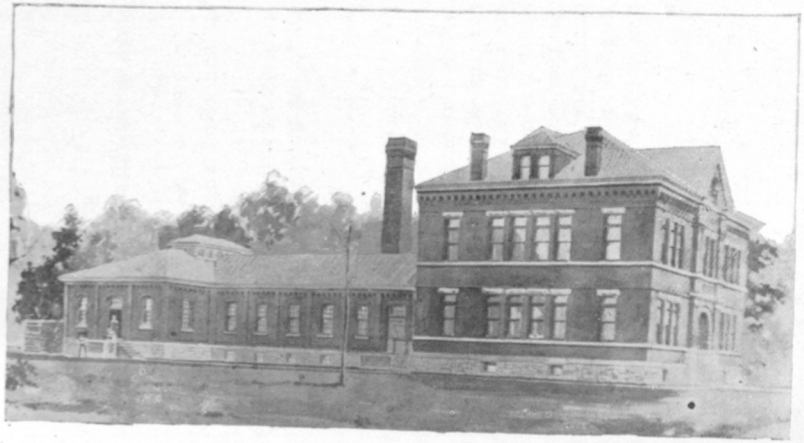
10 Wood Turning Lathes.
1 Scroll Saw.
1 Double Circular Saw.
1 Power Grindstone.
1 Pattern Maker's Large Wood Turning Lathe.
1 Wood Trimmer.
10 Carpenters' Benches.
10 Complete Sets of Bench Tools.
11 Complete Sets of Wood Turning Tools.
Set of Iron Clamps.
Set of Wooden Clamps.

### FORGE SHOP.

This shop contains the following appliances for forge work:

8 Down-Draft Forges.
8 Anvils on Blocks.
8 Hardies.
8 Hammers.
8 Sets of Tongs.
8 Squares.
8 Calipers.
Set of Bottom and Top Swages.
Set of Top and Bottom Fullers.
Set of Heading Tools.
6 Hot Chisels.
6 Cold Chisels.
Combined Punch and Shear.
Combined Exhaust and Blast Fan.
Hand Forge.

The blast and exhaust piping is concealed under the floor.



SCIENCE HALL.

### MACHINE SHOP.

The machine shop contains the following equipment.

Sharper, 16-inch stroke.
Drill Press, 25-inch Swing.
Sensitive Drill.
Water Emery Grinder.
Dry Emery Grinder.
Vises for Metal Working.
Power Hack Saw.

Machines for turning, milling and planing will soon be added to the above list.

### TOOL ROOM.

This room contains the small supplies, special tools, and appliances for special work in the various shops.

A check system has been instituted which facilitates the keeping of the tools in their proper places and the giving out of the same.

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## DEPARTMENT OF FREE HAND DRAWING.

This department is supplied with a set of geometric solids; papier mache reliefs of decorative designs, leaves, flowers, and heads; and an adequate number of plaster casts. The casts are so chosen as to afford gradual advancement for the student. They consist of leaves, flowers, and vase forms; parts of the body, as, the eye, nose, mouth, hand, and foot; animal heads; and human masques, among which are the following: St. Francis, Voltaire, Cupid of Donatello, the Dying Alexander, Venus de Milos, and Michael Angelo's Slave.

# Collegiate Departments of Instruction.

Note.—Roman numerals indicate the number of the course; Arabic indicate the number of recitations per week. Courses extend through one semester.

## COURSES OF STUDY IN THE DEPARTMENT OF HISTORY AND PHILOSOPHY.

### HISTORY.

I. The History of England and the English Constitution. 4.

II. American History, with especial reference to the development of Political, Social, and Industrial Institutions. 4.

III. Studies in Ancient History, including the Kingdoms of the East, Egyptian Civilization, the Grecian States, and the Roman Empire.

IV. The History of Civilization in Mediaeval and Modern Europe.

### PHILOSOPHY.

I. The Elements of Psychology. Especial prominence will be given to the practical phases of the subject as relates to Mind Culture. 3.

II. Ethics. Lectures and Recitations. An attempt will be made to apply the scientific method to the investigation of the right in human conduct and individual relation. 2.

III. History of Philosophy, Text-Book and Lectures. 4.

IV. An examination of the leading theories in Modern Philosophy, Lectures and Library Work. 4.

### POLITICAL ECONOMY.

I. The Elements of Political Economy. The subject will be treated from the historical standpoint, and especial attention will be given to those subjects which directly relate to the industrial, social and practical life of the people.

II. Modern Economic and Social Questions. Rise of the Historical School, Modern Socialism, and recent tendencies in legislation.

## DEPARTMENT OF RHETORIC AND LITERATURE.

### COURSES IN RHETORIC.

1. Class room work will be divided between theory and practice. Themes affording practice in narration, exposition, summarizing and argument will be required.

A portion of the time will be devoted to the analysis and study of the oration.

Lectures will be given upon the history of the English language. Four times per week, first semester.

II. Critical reading of selections from prose masterpieces, having in view the verifying of the principles of rhetoric. Essays and papers will be required throughout the course.

Lectures upon the formation and growth of English prose will be reinforced by collateral reading. Second semester.

Open to students who have taken Course I or its equivalent.

### COURSES IN LITERATURE.

I. Middle English. A working knowledge of Middle English will be acquired, and selections read from Early English authors, with special reference to Chaucer. First semester.

II. Elizabethan Drama. A general study of the Miracle Plays and the pre-Elizabethan period is pursued to obtain an historical setting. Selected plays from Greene, Peele, Lyly, Marlowe, Jonson, Beaumont and Fletcher, Webster, Messinger and Shirley.

Papers from time to time will be required upon assigned subjects. Must be preceded by Course I. First semester.

III. Shakespearian Drama. The critical study of Macbeth and King Lear, in addition to the rapid reading of fifteen plays in which the attention is especially directed to plot analysis and character presentation.

One hour per week will be devoted to literary history in Courses II and III. Must be preceded by Course II. Second semester.

IV. Nineteenth Century Literature. Representative selections from the verse and prose of Wordsworth, Coleridge, Southey, Shelley, Keats, Carlyle, Lamb, DeQuincey, Arnold, Emerson, and Ruskin.

The preparation of papers will be required from time to time upon assigned subjects bearing directly upon the work as outlined.

Must be preceded by Courses II and III. First semester.

V. Tennyson and Browning. The critical study of selections from Tennyson and Browning, comparing the style, philosophical ideas and theories of the authors. Papers will be required as designated in Course IV. Must be preceded by Courses II and III. Second semester.

VI. English Epic Poetry. The following topics will be studied: The characteristics of Epic Poetry; The Classification of Epics; The Theory of Epic Growth; The Iliad as the model of Epic Poetry; The Boewulf (translation); English Ballads; Paradise Lost. Must be preceded by Course I. Second semester.

VII. The Poetry of Pope. The critical interpretation of the poems of Pope and the relation of his theories and system of philosophy to the spirit of the time. Graduate course.

VIII. Browning. The extended and critical study of the poems of Browning, with comparative readings from authors reinforced by papers on subjects illustrative of the comparative work of the course. Graduate course.

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## ELOCUTION.

In addition to the work in Elocution outlined in connection with the Preparatory English, special classes may be formed affording training in Voice Culture and Rendering.

The aim of the Vocal Culture is to strengthen, purify, and enrich the voice by acquiring a correct method of breathing, paying due regard to the hygiene of the voice, and by engaging in systematic drills to develop the flexibility, and to control the pitch, force and energy of the voice.

The initiative steps in Rendering will be followed by Thought, Conception and Analysis, Memory Work, Reading of Dramatic Literature, Study of Comedy and Study of Life.

When desired special lessons will be given in any of the work outlined above, also in Individual Recitals, Monologue Work and Impersonation.

## PHYSICS.

This subject is taught by both lectures and laboratory work. In the preparatory courses the students perform nearly all of the experiments themselves after having had the subject presented to them and explained in the recitation.

For the advanced work the subject will be presented in two courses. One of lectures and recitation work only, and one of laboratory work only, accompanying or following the lecture course. In this way the illustrative part of the subject is presented to the student by the lecturer, and the quantitative part is done by the student himself. This arrangement gives the greatest efficiency to the department both for the student and for the professor. The equipment in the way of apparatus is very well arranged for both lecture experiments and for physical measurements, while the laboratories are well equipped with the modern forms of tables, piers, etc., as described under Equipment.

Course I. College Physics. Mechanics, Sound and Light. Required of all students in Engineering, and in the Scientific Course. Must be preceded by Courses I and II, Preparatory, or their equivalents, by Mathematics I and II. Not open to freshmen except by special permission. Students conditioned in the required Mathematics may not take this course. Four hours credit, two lectures and two recitations. Course begins in first semester. Lectures accompanied by experiments of illustrative rather than quantitative nature.

Course II. College Physics, Heat, Electricity and Magnetism. Second semester. A continuation of Course I, and cannot be taken independently of that course. Four hours.

Course III. Physical Experiments. Theory and Methods of Physical Measurements. Includes laboratory experiments illustrating general laws in all branches of Physics, and instruction in the use of the instruments of precision employed in Mechanics, Heat, Light and Electricity. Required of Engineers and will be found of value to Science students who expect to teach the subjects. Must be preceded by Courses I and II. Students electing this course are strongly advised to prepare themselves by first taking Mathematics III and IV, which will be required of the Mechanical Engineering students before taking this work. This course is expected to give laboratory work that usually accompanies Courses I and II.

The preparation of papers will be required from time to time upon assigned subjects bearing directly upon the work as outlined.

Must be preceded by Courses II and III. First semester.

V. Tennyson and Browning. The critical study of selections from Tennyson and Browning, comparing the style, philosophical ideas and theories of the authors. Papers will be required as designated in Course IV. Must be preceded by Courses II and III. Second semester.

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## ELOCUTION.

In addition to the work in Elocution outlined in connection with the Preparatory English, special classes may be formed affording training in Voice Culture and Rendering.

The aim of the Vocal Culture is to strengthen, purify, and enrich the voice by acquiring a correct method of breathing, paying due regard to the hygiene of the voice, and by engaging in systematic drills to develop the flexibility, and to control the pitch, force and energy of the voice.

The initiative steps in Rendering will be followed by Thought, Conception and Analysis, Memory Work, Reading of Dramatic Literature, Study of Comedy and Study of Life.

When desired special lessons will be given in any of the work outlined above, also in Individual Recitals, Monologue Work and Impersonation.

## PHYSICS.

This subject is taught by both lectures and laboratory work. In the preparatory courses the students perform nearly all of the experiments themselves after having had the subject presented to them and explained in the recitation.

For the advanced work the subject will be presented in two courses. One of lectures and recitation work only, and one of laboratory work only, accompanying or following the lecture course. In this way the illustrative part of the subject is presented to the student by the lecturer, and the quantitative part is done by the student himself. This arrangement gives the greatest efficiency to the department both for the student and for the professor. The equipment in the way of apparatus is very well arranged for both lecture experiments and for physical measurements, while the laboratories are well equipped with the modern forms of tables, piers, etc., as described under Equipment.

Course I. College Physics. Mechanics, Sound and Light. Required of all students in Engineering, and in the Scientific Course. Must be preceded by Courses I and II, Preparatory, or their equivalents, by Mathematics I and II. Not open to freshmen except by special permission. Students conditioned in the required Mathematics may not take this course. Four hours credit, two lectures and two recitations. Course begins in first semester. Lectures accompanied by experiments of illustrative rather than quantitative nature.

Course II. College Physics, Heat, Electricity and Magnetism. Second semester. A continuation of Course I, and cannot be taken independently of that course. Four hours.

Course III. Physical Experiments. Theory and Methods of Physical Measurements. Includes laboratory experiments illustrating general laws in all branches of Physics, and instruction in the use of the instruments of precision employed in Mechanics, Heat, Light and Electricity. Required of Engineers and will be found of value to Science students who expect to teach the subjects. Must be preceded by Courses I and II. Students electing this course are strongly advised to prepare themselves by first taking Mathematics III and IV, which will be required of the Mechanical Engineering students before taking this work. This course is expected to give laboratory work that usually accompanies Courses I and II.

Course IV. Laboratory Work Only. Hours to be taken, optional with the student, but not less than three hours may be taken. May be taken during either or both semesters.

## GEOLOGY AND MINERALOGY.

At present this work is included in one Department and all courses offered are elective. The subjects treated will be general work in Mineralogy and Petrography, and in Dynamic Geology and Physical Geography. Courses in Paleontology and Stratigraphic Geology will be given and the subjects will receive treatment as a part of Dynamic Geology.

The immediate locality offers unsurpassed opportunities for study of the many and varied processes in geological changes, and of a wonderful diversity of different geological formations, while the State of Montana and neighboring states are noted for the large number of crystallized minerals found within their borders. These states being distinctively mining states all must realize the importance of thorough knowledge of the principles of Mineralogy and Geology as applied to ores of economic importance. Special attention is given to Economic Geology after the students have prepared themselves in the fields of these two sciences.

The subjects are taught by lectures and laboratory work. For Mineralogy and Lithology the preparatory work is the examination of the minerals in museum (see museum), and the determination of minerals by mocroscopic and blow-pipe tests. For Geology the laboratory work is applied as field work and excursions to the different exposures of characteristic rocks, and to localities where important geological changes have taken place and left their trace.

Course I. Mineralogy. A study of the minerals from their crystallographic and chemical properties. Subject of Crystallography thoroughly reviewed before the study of minerals is taken up. Must be preceded by Chemistry I. The following courses are recommended as precedents, or to accompany this work: Chemistry II, Mathematics I and II, and Physics I and II. Students deficient in preparatory Mathematics or Physics may not take this course. Four hours credit. Two lectures or recitations, and two laboratory practices. This latter work will include blow-pipe analysis which will be studied during the latter portion of the term. Students electing this course should arrange work

so as to have three lectures with one practice for the first part of the term, and extra laboratory work in the latter portion. First semester.

Course II. General Geology. Lectures accompanied by field and laboratory work. Four hours distributed between lectures and field work like course in Mineralogy. Especial attention is given to Dynamic Geology, but Physical Geography is also fully treated. Second semester. Must be preceded by Mineralogy, Course I.

Course III. Lithology. A study of rocks from their physical and chemical properties without the use of the microscope. Particular attention is paid to their geological history. Must be preceded by Courses I and II. First semester. Three hours credit, two lectures and one laboratory practice.

Course IV. Economic Geology. Deals with the minerals of gold, silver, copper, lead, iron, zinc, antimony, etc., which occur in quantities of economic importance, modes of occurrence of same, and effect of different gangues on values of ores. Must be preceded by Courses I and II. Second semester. Four hours, lectures.

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## COURSES IN CHEMISTRY.

The courses in Chemistry are arranged as nearly as possible like those in the best chemical laboratories in the United States. As an introduction to all courses in this subject, and as a prerequisite for many others, a course extending over one semester is given in General Chemistry. This is presented by recitations and laboratory work, together with some lectures on points which involve the use of apparatus too complicated or too delicate for the average student. For the present this one course will be given to all students choosing it, instead of making separate classes for Mechanical Engineers, and for general course students. Remsen's Briefer Course and Trevor's Molecular Theory are used as text books, and Kortright and Trevor's Laboratory Guide for the practices. In this year's work students gain a clear conception of chemical elements, chemical changes, and the philosophy in general of Chemistry—principles too often indistinctly learned, but absolutely essential for all future work in this Science.

One-half year in Qualitative Analysis follows this work. It is taught by recitations, but the larger proportion of the student's

time is spent in the Laboratory. It is expected that another semester will be devoted to Quantitative Analysis which involves the principles of Analysis, by both Gravimetric and Volumetric methods.

These two years of work should be considered as essential for all other work in Chemistry and for advanced work in Mineralogy. It is recommended that Assaying be not taken up until after this amount of work has been finished, although only the first three semesters of work are required.

Advanced courses in Chemistry are taken up at the student's option. At present a course in Organic Chemistry involving lectures and laboratory work on the chemistry of the compounds of carbon is offered for those students fitted for the work. Additional courses in advanced Quantitative Analysis, Organic and Inorganic Chemistry, and Agricultural Chemistry, will be given when sufficient demand is made by students properly prepared for the work.

Ample apparatus is at the disposal of the students (see equipment) and with the fine laboratories every inducement is offered to students to make themselves proficient in this interesting line of science.

Course I. General Inorganic Chemistry, required of all general course students and of Engineers. Open to students in the Freshman year who have no entrance conditions in Mathematics. Five hours credit. Three recitations or lectures per week. Two laboratory practices (two and one-half hours of laboratory work count as one hour recitation).

Text Books, Remsen's Briefer Course, Trevor's Molecular Theory, Trevor and Kortright's Laboratory Guide.

Course II. Qualitative Analysis, required of all students specializing in Chemistry, and must be preceded by Course I, or equivalent in some laboratory of acknowledged standing. First or second semester. Five hours credit. One recitation and eight hours laboratory work. Eight determinations by gravimetric and six by volumetric methods will be the minimum amount of work accepted for this course.

This course is required of all students specializing in Chemistry.

Reference book, Fresenius Quantitative Analysis.

Course IV. Assaying. Must be preceded by Course I, and if possible by II and III. Students specializing in Chemistry and Assaying will not be permitted to take this course unless preceded by Course II, and accompanied or preceded by Course III. Includes laboratory work in grinding and sampling ores, and the

fire assay for gold, silver, lead and copper, and bullion assay. Determinations involving Volumetric methods, or the so-called wet methods, will be given as part of courses III or V, depending upon the needs of the student.

Lectures on occurrences of ores, methods of sampling and fluxing for the assays of all of the principal metals will be given. Students desiring to specialize in this work are required to precede the course by Mineralogy I.

Text book, Brown's Manual of Assaying. Other standard works, as Ricketts and Miller, Hiorns, Mitchell, and Furman, are in the library. Hours dependent upon the needs of the student, but not less than three may be taken, of which one will be lecture and two laboratory work. Second semester only.

Course V. Quantitative Analysis, Advanced Work. Analyses of milk, butter and cheese, fodder and fertilizers, electrolysis of metals as copper, lead, silver, etc., by Classen's method, volumetric assays for lead, copper, antimony, etc., water analysis by sanitary and microscopic methods, analysis of iron and steel. Must be preceded by Courses II and III, and Physics I and II. Hours to suit the needs of the student but not less than three may be taken, all of which will be laboratory work. Free use of reference books in library required for this work. Either semester.

Course VI. Organic Chemistry. The chemistry of the compounds of Carbon. Lectures, recitations and laboratory work. Six hours credit, of which three are laboratory practices. Must be preceded by Courses II and III. The laboratory work is mainly synthetical, in which the student prepares the compounds studied in the lectures. Required of all students specializing in Chemistry.

Second semester.

Text book, Remsen's Organic Chemistry, and Orndorff's laboratory Guide. Deposit $10.00.

*Course VII. Metallurgy. First semester. Required of Mechanical Engineers. Deals particularly with the metallurgy of iron and steel, of the composition and properties of the different forms of iron. Presupposes Chemistry I and II, and recommends Mineralogy I. Lectures illustrated by lantern slides. Three hours.

*Course VIII. Metallurgy, continuation of Course VII. Deals with the extraction and refining of the metals gold, silver, lead, copper and zinc. Lectures and excursions to principal mills in the State. Three hours. Second semester. Requires Chemistry I and II. Mineralogy I and IV.

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*Courses VII and VIII will not be given in year 1899-1900, but may be expected in 1900-1901.

## DEPARTMENT OF BIOLOGY.

This department offers elementary work in general Biology looking toward a specialization either in Botany, Zoology or Microscopy, with advanced work in some lines in either of these three subjects. The rooms for the use of the department are in the basement and on the first floor of University Hall, are commodious and well lighted, and offer ample facilities for present needs. The material equipment is given elsewhere in this catalogue under the head of equipment.

The collections of working material are being constantly augmented. In addition to those mentioned under the head Museum there is a good series of marine alcoholics, containing both vertebrates and invertebrates, and a good collection of alcoholics from this region. For comparison in elementary work there is a collection of several hundred mounted slides, additions being constantly made. The University is situated under the shadow of University Mountain, altitude 6,000 feet, is within a short distance of Missoula River, is but a few miles from the Bitter Root River, and is in the famous Missoula Valley, an agricultural region of great fertility. A few miles away Mt. Lo Lo rises to an altitude of 9,500 feet. The opportunities botanically and zoologically are excellent.

The aim of the department is to bring the student into direct contact with the truths of nature. To do this there are lectures and recitations to give broad and general views, while in the laboratory each student is taught to get the facts for himself first hand. The rich and new field in which the University is located gives students good opportunity for work.

It is the intention of the State Board of Education to make the work of the University as nearly free to residents of the State of Montana as possible. In carrying out this generous plan there are no laboratory fees. The student makes a deposit to cover breakage only. At the close of the semester the balance is returned.

To carry on the work of the department a knowledge of Latin or Greek will be found of great advantage. In all courses an ability to draw well free hand is anticipated, while a knowledge of German and French is very desirable, and for research work almost indispensable.

In all laboratory work of the department each student works

individually at an individual table. Each student is supplied with microscope, glassware, and necessary apparatus, which material is kept in the drawer space of the table. The material is charged to the student and he is held accountable for it. At the close of the work when the material is returned, in good order, he is credited with the amount returned. Every facility is offered students for successful work in the courses outlined.

The tables have been planned specially for the work to be done upon them. The tops are of oak, stained and paraffined. They are low enough for students to work with microscope vertical, giving all the comfort possible with the least fatigue possible. There is abundant drawer space for drawings, notes, glassware, etc. The beginners and advanced students work in separate rooms.

A nucleus of a department library is at the service of the students in Biology. The professor has loaned for use a portion of his library, consisting of several hundred volumes and pamphlets, and several hundred others belonging to the library give good opportunity for references in general work. The literature in a few special lines is somewhat extensive.

The following courses are offered for the year 1899-1900; for the year of required Biology the student may take Courses I and II, or V and VI.

## COURSES IN BIOLOGY.

Course I. General Biology. An introduction to the study of living things. It is designed to illustrate by the study of a few organisms the fundamental structure and properties of living matter. A series of animal and vegetable forms is studied in the laboratory, to harmonize with the recitations. Two recitations and five hours of laboratory per week. First semester. Required, four hours credit.

In this course Parker's Biology was used the past year. The students have each a microscope and all necessary material for work. The dissections include Amoeba, Paramecium, Haematococcus, Diatom, Vorticella, Hydroid, Aurelia, Mucor, Penicillium, Yeast, Earthworm, Starfish, Lobster, Dogfish. Each student prepared and mounted a series of slides, and was taught to embed in paraffine and use the microtome. To aid in the work reference was made to such works as Marshall and Hurst's Zoology, Brooks' Invertebrate Zoology, Bumpus's Invertebrate Zoology, Dodge's Elementary Biology, Colton's Zoology, Huxley and Martin's Biology, Howes' Atlas of Biology, etc.

At the close of the work of the semester a thesis is written on some approved subject, and presented for criticism. Accurate

drawings are required, which are handed in from time to time for inspection.

Course II. General Biology. Continuation of Course I, and necessary for the completion of the work therein indicated. Second semester. Required, four hours credit.

Course III. Invertebrate Zoology. A general course in the morphology and classification of Invertebrates. Laboratory and Class Work. Dissection of typical invertebrates, such as Grantia, Leucosolenia, Metridium, Pennaria, Campanularia, Sea-Urchin, Sea-Cucumber, Star-fish, Squid, Lobster, Earthworm, Nereis, Phascolosoma, King Crab, Clam, and Insects. In this as in other work in the department, accurate drawings are required. At the close of the semester a thesis is presented, written on some topic in conection with the work. During the study constant reference is made to such works as Packard, Claus and Sedgwick, Huxley, and Lang. The dissections are from the list of laboratory books referred to under Course I, with others. A fair portion of the time is devoted to the laboratory technique, and each student mounts a series of slides from some of the specimens as the work progresses. The course must be preceded by Courses I and II, but none of the work therein given is duplicated. First semester. Elective, four hours credit.

Course IV. A continuation of Course III. Vertebrate Zoology. The dissections include Balanoglossus, Amphioxus, Trout, Frog, Cat, etc. Second semester, elective.

Course V. Structural Botany. In this course the plan is to give an intelligent idea of the scope of modern Botany. Recitation twice and laboratory practice five hours per week. Bessey's Briefer Course is used, with reference to other works on the subject. In addition to the general exercises as given in the text the student studies such types as Spirogyra, Diatoms, Protococcus, Mucor, Agaricus, Moss and Fern, and a flowering plant, using such laboratory guides as Arthur, Barnes and Coulter's Plant Dissection, Dodge's Elementary Biology, Huxley's Biology, etc. Each student is supplied with a microscope and all necessary reagents, is taught to use the camera lucida and measure with a micrometer scale, and to prepare material for the microtome. First semester. Required, four hours credit.*

Course VI. Systematic Botany. To be preceded by Course V. The region near the University has a rich flora, of great botanical interest. The valley has an altitude of 3,223 feet above the sea, and plants may be had from this height to 9,500 feet, the height of Mt. Lo Lo some miles distant. This Course and Course V may be taken at any time without previous biological study. Laboratory and field work, with lectures. Second semester. Required, four hours credit.*

Additional botanical study may be had under Courses VII and VIII, special work.

Course VII. Microscopy. In this Course, which must be preceded by either Course I or V, and preferably by a year's work, the student is supposed to have a knowledge of the general use of

the microscope and its manipulations. The student must have taken sufficient chemistry to work intelligently with various stains, reagents, and other chemicals. The study of these and their effects on different histological material, and the various modes of preparing sections, will be studied by taking up some problem which will admit of such study. Mostly laboratory work, a total of ten hours a week for four hours credit, with Seminary. May be taken either semester. Elective.

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*See note preceding courses in Biology.

Courses VIII and IX. Special Work. Under this heading additional study along biological lines will be outlined for students desiring it, considering both the demands of the students and the capacity of the department for carrying on the work. Special subjects will be assigned under the following heads: Entomology or ornithology within certain limits, physiology with special reference to the histology of the human body, or investigative work on limited groups of animals or plants. Those entering this work must have finished four of the preceding courses, and must have a reading knowledge of French or German. Laboratory work, ten hours per week for four hours credit, or twelve and one-half hours for five hours credit, with work in Seminary. Only students of special fitness will be admitted. They will be encouraged to take up some of the problems which the new field of work about the University presents, and will be offered every facility which the laboratory can afford, and will be given free use of the material collected from the region. Elective, either semester.

Seminary. Advanced students will meet once per week at an hour to be agreed upon, to make reports of work or investigations. Occasional themes will be presented for discussion, as also reports on current literature.

## DEPARTMENT LIBRARY.

In addition to the publications mentioned under equipment, the following publications are at the disposal of the student:

Nature.
Popular Science Monthly.
Psyche.
Entomological News.
American Monthly Microscopical Journal.
Journal of Applied Microscopy.
Zoologischer Anzeiger.
Annals and Magazine of Natural History.
Natural Science.
American Naturalist.
Botanical Gazette.
Zeitschrift fur Microscopie.

## THE DEPARTMENT OF LATIN AND GREEK.

### GENERAL INFORMATION.

1. The primary aims of this department are the acquisition of such a mastery of the languages as to enable the student to read them with some degree of facility, to read the greatest possible amount of the best Greek and Roman literature, and to make the work subservient to general culture in the English language and literature.

The scope of this department is conceived to include, not only the study of the language and literature of the ancient Greeks and Romans, as narrowly defined, but also some attention to all phases of their civilization. Without this broader view, some of the most important results of classical studies cannot be attained. For this reason, the study of the arts, institutions, and life of the Greeks and Romans will be given due prominence; and provision has been made for this part of the work.

2. In the required courses, the study of grammar will be pursued in connection with the reading, not as an end in itself, but as a means of intelligently reading the language, with or without translation. The more systematic and scientific study of grammar will be provided for in elective courses.

3. In connection with the prose reading, exercises in writing Latin and Greek will be used. The training in syntax will be largely given in connection with this work.

4. There will be almost daily practice in reading and translating at sight, generally from that portion of the text assigned for the next day's reading.

5. "Bennett's Latin Grammar" and "Hadley-Allen's Greek Grammar" will be used for the ordinary class room work. Editions of the texts will be chosen as far as possible from those which have reference to these grammars. Students are advised to bring with them any Latin and Greek text books they may have; but not to purchase books before definite directions are given. The most essential aids for study, such as maps, charts, and works of reference, are provided by the University.

6. The work of the college courses outlined below will be advanced as fast as it seems practicable to advance the requirements for admission, and should not be regarded as presenting the ultimate standard or ideal.

### Courses In Latin.

I. Vergil's Aeneid—First three books. Elements of prosody. 4.

II. Vergil's Aeneid—Books IV., V., and VI. 4.

III. Horace—First half, selected Odes. 4.
Cicero—Second half, Essays, Letters.

IV. Livy and Tacitus—Selections. 4.

V. Plautus and Terence—One play from each.

VI. Private Life of the Romans. Descriptive, no knowledge of Latin required for this course, open to all students. 4.

This course is given in the second semester and should be preceded by the course in Greek life.

VII. Rapid Reading Course, selected from Latin Poetry. 4.

VIII. Rapid Reading Course, selected from Latin Prose. 4.

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### Courses In Greek.

I. A First Greek Book; elements of Greek Grammar. 4.

II. First Book of Anabasis; sight reading, writing Greek; study of Grammar in connection with the reading and writing. 4.

III. Anabasis continued; sight reading; writing Greek; Grammar with topical outlines. 4.

IV. Homer's Iliad, selections. 4.

V. Homer continued—First half, selections from Odyssey. 4.
Herodotus and Thucydides—Second half, selections.

VI. Plato—First half, selections. 4.
Demosthenes—Second half, selections.

VII. Greek Dramatists—One play each from Aeschylus, Sophocles, and Euripides, selections from Aristophanes. 4.

VIII. Greek Archaeology, elective in first semester of Senior Year, open to all students. 3.

IX. Private Life of Greeks—Descriptive, no knowledge of Greek required for this course, open to all students, given in first semester.

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## DEPARTMENT OF MATHEMATICS.

All students are required to take one course in Mathematics. Students in Scientific Course must take Courses I and II. In addition to these, students in Engineering Course are required to take courses III, IV, and V. Students in Classical or the Philosophical Course may choose between Courses I and II.

Courses not required are open to all students as electives, but must be taken in the order prescribed under Courses in Mathematics.

## Courses In Mathematics.

I. Trigonometry. First semester. 4.

II. Higher Algebra. Ratio; Proportion; Variation; Binomial Theorem; Arithmetic, Geometric, and Harmonic Progressions; Permutations and Combinations; Undetermined Co-efficients; Summations of Series; Higher Equations. 4.

III. Analytical Geometry. First semester. 4. Must be preceded by Courses I and II.

IV. Differential and Integral Calculus. Second semester. 3. When required, must be preceded by Courses I, II and III. If elected, must be taken after Courses I and II.

V. Differential and Integral Calculus. First semester. 3. Must be preceded by Course IV.

VI. Problems in Geometry. Devoted entirely to original work. Either semester. 1. May be taken by any one who has passed the entrance requirements in Mathematics.

VII. Plane Surveying. Second semester. 4. Must be preceded by Courses I and II.

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## Modern Languages.

The aim of the beginning year in the Modern Language Courses is to give the student a thorough knowledge of grammar; to this is added reading of easy prose; this is followed in the second year with Syntax and intermediate readings, the translation of scientific (biological, chemical), and technical monographs. Writing short essays in the languages will be required during the year, and some conversation will be given. In the third year, which is elective, more difficult readers will be used, such as "Faust" or "Wallenstein" in German; "Esther Athalie," Moliere in French, and Cervantes in Spanish.

During this third year conversation and composition will be made one of the chief aims of instruction.

If time permits a class will be organized purely conversational.

A course of three years has been planned. During the first and second, Course I, II, III, IV, Joyne's Meissner's Grammar will be used and Joyne's Reader, followed by a course of reading. "Peter Schlemihl," Wilhelm Tell, etc.

The third year (Courses V and VI) will be devoted to a study of the classics, some of Schiller's and Goethe's works, as Schiller's Ballads, and Goethe's Faust, Part I and scientific monographs. These latter will be given to those students taking the

Scientific Course. Essays will be required in the various subjects which students are pursuing, such as chemical, etc.

FRENCH.

Courses I and II devoted to the study of Chardenal's Complete French Course. Reading (Daudet, 3 contes), followed by Courses III and IV, consisting of intermediate readings, such as Colomba, translations of various selections from modern writers, with exercises in composition and conversation, followed by Courses V and VI (Elective), which will be devoted to a study of the French classics and scientific writings.

SPANISH.

A three years elective course will be given if called for. The first year, or Courses I and II, will be taken up with the study of Grammar and very easy readings from modern prose, followed by Courses III and IV, which will be devoted to readings of Spanish classics and literature; Syntax, Idwin's. Exercises in composition and conversation will be given.

A third year, or Courses V andVI, will be continuation of Courses III and IV. Conversation and composition, recitations will be held in Spanish.

Tests will be given in the different classes from time to time. Elective classes will be organized only upon the application of three or more students for the work.

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**Department of Free Hand Drawing.**

Required Course. One year of Free-Hand Drawing is required of all students. The purpose is not only to give a firm foundation in drawing to those students that desire to devote considerabel time to art, but also to make the work a means of culture, beneficial to all.

First Semester. 1. Drawing in outline and light and shade from geometric solids. 2. Drawing in outline from reliefs of decorative designs, leaves, flowers, and heads. 3. Drawing in outline from single pieces of furniture, and from the interiors of rooms, thus involving the principles of perspective.

Second Semester. 1. Drawing in charcoal from the cast, hands, feet, heads, etc. 2. Drawing in sepia from the interiors of rooms. 3. Drawing in pen and ink.

Elective Course. For those that wish to devote more time to

the subject another course has been added as a free elective. 1. Drawing in charcoal from the cast. 2. Painting in oil or water colors from still life. 3. Sketching from life, models being members of the class. 4. Informal talks on the History of Art.

## SCHOOL OF MECHANICAL ENGINEERING.

This department makes a specialty of those technical branches that are associated with the profession of mechanical engineering. Systematic instruction is given along practical as well as theoretical lines.

Below will be found the special work required in this department. For the general work and the arrangement of the theoretical and practical work according to the years see tabular statement of the Mechanical Engineering Course.

### DRAWING.

Freshman Drawing. Throughout the year instruction is given in free-hand drawing from models and objects and also in mechanical drawing. The work in the latter during the first semester (Course I) includes lettering, symbolic cross-hatching, line shading, drawing from copy, and orthographic projection. In the second semester (Course II) drawings to scale are made of machines and machine parts. Some of these drawings are tinted.

Sophomore Drawing. During the first semester attention is given to Descriptive Geometry problems and to elementary machine designs (Course III).

In the second semester the work in elementary machine design is continued and the making of detail shop drawings is given attention (Course IV).

Junior and Senior Drawing. Courses V, VI, VII, VIII. In the Junior and Senior years drawing is embodied in the designs of machines, machine parts, boilers, valves, engines, etc., that are required in these years.

### SHOP WORK.

Instruction in shop work is given in the afternoon throughout the Freshman and Sophomore years. There are three shop periods per week of three hours each.

Freshman Wood Work. During the first semester attention is given to acquiring a knowledge of the use and the care of the

tools in this shop. A systematic course of exercises has been laid out to accomplish this, involving the use of the tools at the disposal of the student. On the bench the exercises in carpentry consist of sawing, planing, joining, splicing, mortising, dovetailing, framing and paneling. On the lathes exercise is given in turning of cylinders, cones, beads, ogee curves, etc., and in chucking and face turning.

During the latter part of the semester some cabinet making is done that the student may apply the principles already learned.

In the second semester attention is given to pattern making. This work consists in making patterns of machine parts, and also core boxes for the same should they be required. The making of patterns involves a knowledge of both lathe and carpentry work and requires careful and accurate workmanship.

Sophomore Iron Work. The first semester is devoted to work in iron and steel forging. This work consists in drawing out, upsetting, welding, punching, and forming. After a thorough knowledge is gained of the various manipulations, steel tools are made for use in the machine shop.

The second semester's work is in the machine shop. Here the exercise system is again observed and the student is acquainted with the working of the various machines and tools used for cutting and shaping the metals used in construction.

The principal work in this shop consists in the making of machine parts and the construction of complete machines.

The special studies of this department are the following: (Unless otherwise stated they continue through one semester.)

Mechanical Drawing and Design;
Courses I, II, III, IV, V, VI, VII, VIII.
Lectures on Wood Working Tools. 1.
Theory of Pattern Making and Foundry Practice. 1.
Wood Shop Work:
Bench and Lathe. 3.
Pattern Making. 3.
Forge Shop Work. 3.
Machine Shop Work. 3.
Descriptive Geometry. 4.
Kinematics.
Lectures on Machine Shop Practice. 1.
Graphical Statics. 2.
Analytical Mechanics. 4.

Strength of Materials. 4.
Heat. 4.
Magnetism and Electricity. 3.
Valve Gearing. 4.
Theory of the Steam Engine. 3.
Hydraulics. 2.
Steam Boilers. 3.
Pumping Machinery. 2.
Theory of Engine Designs. 3.
Transmission of Power. 2.
Thesis Work. 5.

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## DEPARTMENT OF MUSIC.

MRS. BLANCHE WHITAKER, Director.

The Department of Music of the University of Montana provides instruction in vocal and instrumental music and opportunities for the study of chorus work.

One of the principal features is the Pianoforte School, which is in a very satisfactory and encouraging condition, both as regards number of students and their proficiency. The school is divided into Upper and Lower, and each of these again into two grades, Senior and Junior. The Juniors of the Lower School use as studies the New England Conservatory Method, Bertini's, Czerny's or Heller's Easier Exercises, little pieces by Bach, Reinecke, Gurlitt and others.

The Seniors continue the above with scales in similar and contrary motion, and major arpeggios of the common chord. More advanced pieces given.

In the Upper School the work of the Junior Grade comprises scales in thirds, sixths and tenths, similar and contrary motion, major and minor common chord arpeggios, Cramer's Etudes, Czerny's Virtuosen Schule, and Clementi's Gradus ad Parnassum. The Senior Grade, in addition to the above, takes Arpeggios of the Dominant and Diminished Sevenths and studies by Chopin, Henself, Moscheles and others.

There will be classes formed for sight reading, elementary harmony, musical form and literature.

The standard set is both high and conscientious, and the

students are already showing in a very gratifying manner the result of the training received.

Public recitals are given at least three times during the University year, and are of great benefit to the students, both in encouraging exactness and overcoming nervousness.

The piano used in the assembly room of University Hall is the gift of the manufacturer, Mr. George P. Bent, of Chicago, Ill.

When possible, artists of distinction will be brought to the University, to give a stimulus and example to the students. During the past year Mr. Godowsky, Mr. Max Benedix, Miss Jeanne Scott and Miss Jennie Osborne have been introduced to Missoula by the management, students receiving tickets at reduced rates.

The fees for this department are payable monthly, and no deductions are made for lessons missed unless due notice has been received and a reasonable excuse tendered.

Lower School, two lessons weekly.....$4.00 per month
Upper School, two lessons weekly.....$6 per month

## VOCAL DEPARTMENT.

Miss Grace Herndon, Instructor.

Voice placing and development of the method of M. Sabrilia.

The studies used are Concone's Fifty Lessons, and Twenty Vocalises by Mantasi. The latter are sung in Italian, in which language instruction is given.

Songs are studied as soon as it is thought advisable, and the frequent musicales afford opportunity for public appearance.

### TERMS.

Two lessons per week .....$8.00 per month
One lesson per week .....$5.00 per month

Lessons missed will be made up.

## COLLEGIATE COURSES OF STUDY.

The University offers the following general courses of instruction:

A.—A classiscal course, leading to the degree of A. B.

B.—A Philosophic course, leading to the degree of B. Ph.

C.—A Science course, leading to the degree of B. S.

A course in Mechanical Engineering leading to the degree of B. M. E.

The work of the year is divided into two equal semesters. For convenience in classification, the work of each department of study is divided into courses and fractional courses. One course means the equivalent of one hour's lecture or recitation four times a week for one semester. Two and one-half hours of laboratory work, shop work, or drawing counts the same as one of the lecture or of recitation. At least thirty-two full courses as here defined are required ıor graduation. A student's choice of elective work is subject to the approval of the Faculty, which reserves the right of refusing to give any elective course for which there are less than three approved applicants.

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### Admission to Collegiate Courses.

Candidates for admission to the Freshman class in any of the collegiate courses of the University, must be at least sixteen years old and present evidences of good moral character.

Students coming from other colleges and universities must bring certificates of honorable dismissal.

Admission may be made:

(a)—By Certificate.

1. Graduates of the accredited High Schools of Montana are admitted to the Collegiate Departments of the University on presentation of their Diplomas accompanied by a certificate from the Superintendent of their respective schools.

2. Students coming from any other school or college are requested to bring all grade cards, certificates or diplomas that they may possess, together with written statements from teachers, superintendents or principals, in order that a proper estimate may be had of their past work.

(b)—By examination.

Examinations for entrance will be given on days set in calendar of this catalogue.

Preparation is required or may be presented in the following subjects:

I. Algebra. Fundamental operations (including special rules for Multiplication and Division); Factoring; Highest Common Factor; Lowest Common Multiple; Equations of the First Degree containing one or more unknown quantities (including problems in the same); Involution and Evolution; Fractional and Negative Exponents; Radicals; Quadratic Equations of one or two unknown quantities. The equivalent of Chapters I, XVII, XIX and XX of Wentworth's New School Algebra.

II. Geometry, Plane and Solid. Demonstrations, constructions and the solution of numerical problems involving the metric system and logarithms. The equivalent of Wentworth's text and Estill's Numerical Problems in Plane Geometry.

III. English Language and Literature.

The requirements are:—

1. Grammar. A good knowledge of the elements of grammar, including the parts and properties of speech, the various kinds of sentences as to form and meaning, parsing, sentential analysis, and the classification of the elements of sentences.

2. Composition and Rhetoric. Ability to write clear and idiomatic English, and make practical use of the essentials of Rhetoric, not only form, construction, syntax and punctuation, but also the principles of good style and rhetorical figures.

3. Literature. Applicants will be expected to be familiar with the form and substance of the works in group (a), and to possess a general knowledge of the subject matter in group (b).

For 1899 (a) Shakespeare's Julius Caesar and Macbeth, the Sir Roger de Coverly Papers in the Spectator, Milton's Paradise Lost, Books I and II, Burke's Speech on Conciliation with America, DeQuincey's Flight of a Tartar Tribe, Coleridge's Ancient Mariner, and Lowell's Vision of Sir Launfal. (b) Holmes's Autocrat at the Breakfast Table, Dickens's David Copperfield, Webster's Bunker Hill Oration, Irving's Sketch Book, Pope's Translation of the Iliad, and Longfellow's Courtship of Miles Standish.

For 1900. (a) Shakespeare's Merchant of Venice and Macbeth, Milton's Paradise Lost, Books I and II, Burke's Speech on Conciliation with America, Macaulay's Essay on Milton, Macaulay's Essay on Addison. (b) Tennyson's The Princess, DeQuincey's Flight of a Tartar Tribe, The Sir Roger de Coverley Papers, Pope's Translation of the Iliad, Dryden's Palamon and Arcite,

Lowell's Vision of Sir Launfal, Goldsmith's Vicar of Wakefield, Scott's Ivanhoe, and Cooper's Last of the Mohicans.

A fair knowledge of the main facts in the literary history covering the periods treated in the books in the first list, ability to answer simple questions on the lives of the authors, and a general knowledge of the great periods in the development of English Literature.

IV. History. General History, the equivalent of one year's work, with special reference to Rome, England, France, and the United States of America.

V. Physics. One year of Elementary Physics, the equivalent of Carhart and Chute's Elementary Physics, Gage's Principles of Physics, or Avery's Elements, one-half of the time having been devoted to laboratory work. The student's note book in laboratory practice will be considered evidence of having done this work.

VI. Latin. The reading of four books of Caesar, and four orations of Cicero, or their equivalents, with the grammatical knowledge which must be acquired in the preparation for and performance in a thorough manner of this reading. Practice in writing Latin to the extent presented in Bennett's or Jones' Latin Composition or similar works.

VII. German. Grammar, Joynes Meissner, Whitney's or their equivalents. Ability to read easy prose fluently, and to translate at sight such a work as "Hauffs Maerchen" (Goold).

VIII. French. Grammar, Chardenal's Complete, Edgren's or their equivalents. Ability to read easy prose fluently and to translate at sight such a work as "La Pierre de Touche" (Harper).

IX. Biology. One year's work in Biological Science, with half the time given to laboratory work.

X. Chemistry. One year's work, the equivalent of Remsen's Beginning Course. One-half of the time must be given to laboratory work, as certified by student's note book.

XI. Physical Geography. One-half year, the equivalent of Tarr's Elementary Physical Geography.

XII. Physiology. A half year. Martin's Human Body. Briefer Course, or its equivalent.

XIII. Mechanical Drawing and Shop Work, one year.

The subjects required for admission to the various courses are as follows:

Classical Course, I, II, III, IV, V, and VI.

Scientific Course, I, II, III, IV, V, either IX or X, and two years of study in either ancient or modern languages.

Philosophical Course, I, II, III, IV, V, VI. For VI, wholly or in part, the student may make substitutions from VII, VIII, IX or X.

Mechanical Engineering Course. I, II, III, IV, V, with any one of the following: VI, which may be substituted by VII or VIII, wholly or in part, or by either IX or X with XI, XII and XIII.

The above described requirements for admission as relating to Science subjects will take effect in September of 1900.

## GRADUATION AND DEGREES.

In order to secure the recommendation of the Faculty for graduation from the University in any of the respective lines of work that have been outlined, it is necessary for the student to complete the equivalent of at least thirty-two full courses, as already defined in the section concerning collegiate courses, including an acceptable thesis. The thesis may represent a maximum of two courses, or such a proportion thereof as in the judgment of the professor in charge it may merit.

That the needs and special inclinations of the different students may be consulted as far as possible, certain of these courses are required for each of the respective degrees and the rest are left for the student's selection.

The work required for the completion of the three courses in the College of Letters and Science shows at a glance the difference in the courses. Certain subjects are required of all students, others are required in special courses, others must be elected from definite lines of work, and still others are free electives. It must be understood that the choice in free electives must in part be governed by the arrangement of subjects on the daily program, and precedence will always be given to required partial elective subjects in case of conflicts on the program.

The following is a statement of the amount of required work for the different degrees and the number of elective courses allowed.

GENERAL WORK REQUIRED FOR DEGREES, EXCEPTING B. M. E.

| | |
|---|---|
| Drawing, twice per week for one year | 1 course |
| Rhetoric | 1 " |
| Political Economy | 1 " |
| Psychology and Ethics | 1¼ " |
| Literature | 2 courses |
| Biology | 2 " |
| Chemistry | 1¼ " |
| Gymnasium practice | ½ " |
| General required work | 10 courses |

WORK REQUIRED FOR DEGREE B. A.

| | |
|---|---|
| General required work (given above) | 10 courses |
| Special required work, Latin | 5 " |
| Special required work, Greek Life | 1 course |
| Special required work, Roman Life | 1 " |
| Partial Electives, in Greek, Latin, Modern Languages | 6 courses |
| Partial Electives, Trigonometry or Higher Algebra | 1 course |
| Free Electives | 8 courses |
| Total | 32 course |

WORK REQUIRED FOR DEGREE B. S.

| | |
|---|---|
| General required work (given above) | 10 courses |
| Special required work, Trigonometry | 1 course |
| Special required work, Higher Algebra | 1 " |
| Special required work, Physics | 2 courses |
| Partial Electives, Modern Languages | 4 " |
| Partial Electives, Science and Mathematics | 6 " |
| Free Electives | 8 " |
| Total | 32 courses |

WORK REQUIRED FOR DEGREE PH. B.

| | |
|---|---|
| General required work (given above) | 10 courses |
| Partial Electives, Ancient and Modern Languages | 6 " |
| Partial Electives, History, Literature and Philosophy | 8 " |
| Partial Electives, Trigonometry or Higher Algebra | 1 course |
| Free Electives | 7 courses |
| Total | 32 courses |

FOR THE DEGREE OF B. M. E.

| | |
|---|---|
| In Mathematics, I., II., III., IV., V | 4½ courses |
| Model and Object Drawing, I., II | 1 course |
| Physics, I., II | 2 courses |
| Political Economy, I | ¾ course |
| German, I., II | 2 courses |
| Chemistry, I | 1¼ courses |
| Literature | 1 course |
| Heat | 1 " |
| Gymnasium Practice | ½ " |

For the technical work required in the Mechanical Engineering course see tabular statement following.

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**Degrees.**

The University grants the following degrees: For the completion of the Scientific Course the degree of B. S.; Philosophical Course, Ph. B.; Classical Course, A. B. Graduates from the School of Mechanical Engineering are given the degree B. M. E.

The University does not grant the degrees M. A. and M. S. pro honore or in cursu. These degrees will be given graduates of this institution, or other institutions of good standing, on the completion of two years of resident work or three years of non-resident work, and the presentation of an acceptable thesis. In case the student can spend but one year at the University, a fair equation will be made. Courses leading to the degrees M. A. and M. S. will be outlined for candidates when they present themselves for work.

# Scheme of Courses Offered by the University.

*These courses are the general requirements for college courses.

!Technical course in Mechanical Engineering.

## MATHEMATICS.

| First Semester. | Second Semester. |
|---|---|
| Trigonometry. | Higher Algebra, II. |
| !Descriptive Geometry. | Problems in Geometry, VI |
| Analytical Geometry, III. | Plane Surveying, VII. |
| Calculus, V. | Calculus, IV. |
| Problems in Geometry, VI. | |

## PHYSICS.

| | |
|---|---|
| Physics, I. | Physics, II. |
| Physical Experiments, III. | Physical Experiments, III. |
| !Graphical Statics. | !Heat. |
| !Analytical Mechanics. | !Strength of Materials. |
| !Machine Design. | !Machine Design. |
| !Valve Gearing. | !Magnetism and Electricity. |
| !Steam Engine. | !Pumping Machinery. |
| !Steam Boiler. | !Engine Design. |
| !Hydraulics. | !Power Transmission. |
| !Boiler Design. | !Kinematics. |

## CHEMISTRY.

| | |
|---|---|
| *General Inorganic, I. | *General Inorganic, II. |
| Qualitative Analysis, III. | Quantitative Analysis, IV. |
| Quantitative Analysis, VI. | Assaying, V. |
| Organic Chemistry, VII. | Organic Chemistry, VII. |
| Metallurgy, VIII. | Metallurgy, IX. |

## BIOLOGY.

| | |
|---|---|
| *General Biology, I. | *General Biology, II. |
| Invertebrate Zoology, III. | Vertebrate Zoology, IV. |
| Structural Botany, V. | Systematic Botany, VI. |
| Microscopy, VII. | Special Work, VIII. |
| Special Work, IX. | |

## MODERN LANGUAGE.

| | |
|---|---|
| German, I. | German, II. |
| German, III. | German, IV. |
| German, V. | German, VI. |
| French, I. | French, II. |
| French, III. | French, IV. |
| French, V. | French, VI. |
| Spanish, I. | Spanish, II. |
| Spanish, III. | Spanish, IV. |

## ANCIENT LANGUAGE.

| | |
|---|---|
| Latin, I. Virgil. | |
| Latin, III. Horace and Cicero's Essays. | Latin, II. Virgil. |
| Latin, V. Comedy. | Latin, IV. Livy and Tacitus. |
| Greek, I. Grammar and Lessons. | Roman Life, VI. |
| Greek, III. Anabasis. | Greek, II. Anabasis. |
| Greek, V. Odyssey, Herodotus, Thucydides. | Greek, IV. Iliad. |
| Greek, VII. Dramatists. | Greek, VI. Plato, Demosthenes. |
| Private Life of the Greeks, IX. | Greek Archaeology, VIII. |

## HISTORY.

| | |
|---|---|
| History of England, I. | American History, II. |
| Ancient History, III. | History of Civilization. |

## PHILOSOPHY.

| | |
|---|---|
| *Psychology, I. | *Ethics, II. |
| History of Philosophy, III. | Theories in Modern Philosophy, IV. |

## POLITICAL ECONOMY.

| | |
|---|---|
| Political Economy, II. | *Elements of Political Economy, I. |

## RHETORIC AND LITERATURE.

| | |
|---|---|
| *Rhetoric, I. | Rhetoric, II. |
| Old and Middle English, III. | *Literature, V. |
| *Literature, IV. | Literature, VII. |
| Literature, VI. | Literature, VIII. |

### GEOLOGY AND MINERALOGY.

| | |
|---|---|
| Mineralogy, I. | Geology, II. |
| Lithology, III. | Economic Geology, IV. |

### DRAWING.

| | |
|---|---|
| Freehand. | Freehand. |
| Mechanical, I. | Mechanical, II. |
| Mechanical, III. | Mechanical, IV. |
| Drawing, V. | Drawing, VI. |
| Drawing, VII. | Drawing, VIII. |
| Machine Design, I. | Machine Design, II. |

### WOOD AND IRON SHOP PRACTICE.

| | |
|---|---|
| !Wood Shop. | !Pattern Making. |
| !Iron and Steel Forging. | !Machine Work. |

## The Mechanical Engineering Course.

Roman numerals indicate courses; Arabic, hours credit.

### FRESHMAN YEAR.

| First Semester. | Second Semester. |
|---|---|
| Trigonometry, I. 4. | Higher Algebra, II. 4. |
| German, I. 4. | German. 4. |
| Model and Object Drawing, I. 2. | Model and Object Drawing, II. 2. |
| Technical Instruction— | Technical Instruction— |
| Wood Working Tools. 1. | Theory of Pattern Making and Foundry Practice. 1. |
| Mechanical Drawing (I), and Wood Shop Practice. 7. | Mechanical Drawing (II), and Wood Shop Practice. 7. |

## SOPHOMORE YEAR.

Analytical Geometry, III. 4.
Descriptive Geometry. 4.
Chemistry, I. 5.
Technical Instruction—
Mechanical Drawing and Design (III), and Forging. 7.

Calculus, IV. 4.
Kinematics. 4.
Qualitative Analytical Chemistry. 3.
Literature. 4.
Technical Instruction—
Machine Shop Practice, Lecture. 1.
Mechanical Drawing and Design (IV), and Machine Shop Practice. 5.

## JUNIOR YEAR.

Calculus, V. 3.
Graphic Statics. 2.
Physics, I. 4.
Analytical Mechanics. 4.
Metallurgy. 3.
Drawing Room—
Machine Design, V. 4.

Heat. 4.
Strength of Materials. 4.
Physics, II. 4.
Theory of Machine Design. 2.
Magnetism and Electricity. 3.
Drawing Room—
Machine Design, VI. 3.

## SENIOR YEAR.

Valve Gearing. 4.
Theory of the Steam Engine. 3.
Hydraulics. 2.
Steam Boilers. 3.
Drawing Room—
Machine Design, VII. 8.

Political Economy. 4.
Theory of the Steam Engine. 3.
Pumping Machinery. 2.
Transmission of Power. 2.
Drawing Room—
Machine Design, VIII. 4.
Thesis Work. 5.

# The Preparatory Department.

The Preparatory Course covers a period of three years, outlined in semesters, after the plan employed in the College Courses. It is expected students will take subjects in the order given. Students entering in the fall of 1899, or after, will be governed by the course as outlined below. Students who have entered the Preparatory School previous to this announcement, will be governed by the announcement in the last Annual Register, 1898-99, except that such students, working under the course in the Register for 1898-99, as did not complete the work in the Preparatory by June, 1899, will be held to the three years course as here outlined.

Applicants for admission to the Preparatory Course should be at least fourteen years of age, and well grounded in the elements of an English education.

Admission may be made—

(a) By Certificate.

(1) Certificates or certified statements from superintendents, or from any graded school of good standing, showing completion of 8th grade work will be accepted in lieu of examination.

(2) Teachers' certificates given by County Superintendents will admit student to Preparatory Department without examination.

(3) Students are urged to bring when possible all record cards, certificates and diplomas, together with a written statement from superintendent, principal or teacher, on which the standing of the student is stated.

(b) By Examinations.

Examinations in Arithmetic, Grammar, U. S. History, Reading, Spelling, and Geography will be given on days stated in the calendar of this catalogue.

## Preparatory Departments of Instruction.

### MATHEMATICS.

1. Elementary Algebra. First Semester. 4. Unless admitted on certificate, applicants for admission to this course must pass a satisfactory examination in Arithmetic. This examination

will consist of an oral and a written test. Subjects covered will be Factoring, Common and Decimal Fractions, Percentage (including simple applications), elements of Involution and Evolution, and the Metric System.

II. Algebra continued. Second semester. 4.

III. Algebra continued. First semester. 4. With the work of this semester a thorough review of Factoring, Fractions, and other important subjects will be given. In addition to the mastery of principles much drill work will be required, thus enabling the student to fix those principles and to gain that facility in Algebraic calculation that comes only by practice.

IV. Geometry, Plane. Second semester. 4.

V. Geometry, Plane. First semester. 4.

VI. Geometry, Solid. Second semester. 4.

Throughout the courses in Geometry much original work will be required. This original work will consist of demonstrations, constructions, and the solution of numerical problems involving the metric system and logarithms. In addition to the regular text, Estill's Numerical Problems in Plane Geometry, or its equivalent, will be used.

## ENGLISH.

The aims of this work as pursued in the Preparatory Department is to enable the student to write good English with creditable facility, to develop a taste for the best literature, and to give the student a general knowledge of the history of the English language and the great periods in the development of English literature.

Composition and Rhetoric. The work as outlined will include drill in sentence building, a consideration of the principles of punctuation, paragraphing and outlining of Essays, a knowledge of the requisites of style and a familiarity with the figures of speech. The required written exercises will afford the means of applying the principles introduced, enlarging the vocabulary of the student, and enriching his forms of expression.

Literature. The student is directed in the careful study of form, structure and subject matter of the works included in list (a).

Written tests or papers will determine the value of the knowledge gained by the cursory reading of the works included in list (b).

Literary History will receive special attention and the student's attention directed to the relations existing between the periods of literature.

A considerable amount of prose and poetry will be committed to memory.

Voice Culture and Vocal Expression. One period per week will be devoted to the essentials of Voice Culture and Vocal Expression, the attention of the student being especially directed to correct breathing, tone production, the force, pitch, energy and flexibility of the voice, thought conception and analysis.

(a) The following list of works has been selected for critical study:

Milton's Paradise Lost, Books I and II, Burke's Speech on Conciliation with America, Shakespeare's Macbeth and Merchant of Venice, Macaulay's Essay on Milton, and Macaulay's Essay on Addison.

(b) List for Reading. Tennyson's The Princess, DeQuincey's Flight of a Tartar Tribe, the Sir Roger de Coverley Papers, Pope's Translation of the Iliad, Dryden's Palamon and Arcite, Lowell's Vision of Sir Launfal, Goldsmith's Vicar of Wakefield, Scott's Ivanhoe, and Cooper's Last of the Mohicans.

## SCIENCE.

I and II. Physics. A year's work in Elementary Physics, required of all students. The text of Carhart and Chute will be used. Two recitations per week, five hours of laboratory work. Each student works individually the experiments, and records the results, with drawings, in a note book, which is submitted from time to time for examination. A good equipment of material is supplied, and every facility will be offered to produce the most successful work.

I and II. Biology. Students preparing for Scientific Course must present a year of Biology, or in its stead a year of Chemistry. In all other courses they may substitute a year of this work for Language (see college entrance requirements). At present Biology alone is taught in the preparatory. This comes the first year, and consists of two recitations per week and two laboratory practices of two and one-half hours each. The work will be in Elementary Botany and Elementary Zoology. Special attention will be given to manipulation of material, to the formation of correct habits of work and study, and to the development

of the powers of observation. The students receive instruction from the professor of Biology, and work under the same conditions and surroundings as the college students.

Physiology. To be taken by such engineering students as do not take Latin or German. Martin's Briefer course is the text used. The study will be made as practical as possible with the appliances of the department, which are quite good.

## LATIN.

The following general remarks are here made to avoid unnecessary repetitions under the courses outlined below.

1. The Roman pronunciation will be used. Pains will be taken to form habits of correct pronunciation. In this connection, the points to be especially emphasized are that long vowels shall be pronounced as long; also that every consonant shall be distinctly enunciated. For preparatory work it is very desirable to use texts which have long vowels marked.

2. Bennett's grammar will be used and pupils are expected to master the elements of Latin grammar, at least as presented in the coarser print of this book.

3. In the preparation of pupils for the University courses, teachers throughout the state are earnestly requested to take pains to form habits of correct pronunciation; and to have almost daily some exercise in reading and translating at sight and in writing Latin. The importance of these points can scarcely be overestimated.

FIRST YEAR—

First Semester:

Collar & Daniell's "First Latin Book" accompanied by Collar's "Gradatim" as a reading book.

Second Semester:

Collar & Daniell's book finished and reading in Gradatim continued.

SECOND YEAR—

First Semester:

Reading from "The Junior Latin Book" of Rolfe and Dennison, which comprises "Roman History," "Nepos' Lives," and Books I and II of Caesar.

Review and extension of the study of Latin Syntax in connection with this reading, composition exercises and grammar lessons.

Second Semester:

The work of the first semester is continued. During the year the equivalent of four books of Caesar is read.

THIRD YEAR—

Cicero's Orations begun, composition exercises, and grammatical drill.

Second Semester:

The work of the first semester is continued. Four orations and some letters of Cicero will usually be read.

GERMAN.

Two years of German will be given in the Preparatory Classes.

First Year. Will be devoted to a thorough study of Grammar (Joyne's Meissner or Whitney's) with some easy prose reading, such as Hauff's Maerchen.

Second Year. Study of Syntax, dictation, and prose reading, such as Schiller's "Der Neffe als Onkel."

If students having finished this work wish to elect German in college that will begin with Course IV as shown on page 41.

HISTORY.

First Year. The work will deal principally with Grecian and Roman History. The aim of the instruction will be not the memorizing of dates and facts, but the understanding of the relation of the events to each other. The Library of the University contains many excellent reference books, and the work will be carried on by the library method rather than by the use of texts.

Second Year. The second year will be given to the study of Mediaeval and Modern History, with especial reference to the development of France and England. Abstracts and theses on historical themes will continue to be a marked feature of the instruction.

MECHANICAL DRAWING AND SHOP WORK.

Third year preparatory students intending to enter the Mechanical Engineering Course may take work in Mechanical Drawing and Wood Shop Work.

Mechanical Drawing. Five hours per week is devoted to this subject throughout the first and second semesters. Attention is given to lettering (including free hand lettering), cross-hatching, and drawing from copy.

Wood Shop Work. The same amount of time as that given to Mechanical Drawing is given to Shop Work. The student during the year learns the use of the bench and lathe tools by pursuing a systematic course of bench and lathe exercises. In the latter part of the year work is given in the more difficult problems of turning and carpentry.

## Course of Study.

### FIRST YEAR.

| First Semester. | Second Semester. |
|---|---|
| Algebra. 4. | Algebra. 4. |
| Composition and Literature. 4. | Composition and Literature. 4 |
| History. 4. | General History. 4. |
| *Latin or Biology. 4. | *Latin or Biology. 4. |

### SECOND YEAR.

| | |
|---|---|
| Algebra. 4. | Plane Geometry. 4. |
| Rhetoric and Literature. 4. | Rhetoric and Literature. 4. |
| General History. 4. | History. 4. |
| **Latin, German or Physical Geography. 4. | **Latin, German or Physiology. 4. |

### THIRD YEAR.

| | |
|---|---|
| Geometry, Plane. 4. | Geometry, Solid. 4. |
| Literature. 4. | Literature. 4. |
| Physics. 4. | Physics. 4. |
| ***Latin, German or Mechanical Drawing and Shop Work. 4. | ***Latin, German or Mechanical Drawing and Shop Work. 4. |

*Latin for the Classical Course; Biology for the Scientific Course; Latin or Biology for other Courses.

**Latin for the Classical; Latin or German for the Philosophical and Scientific Courses; Latin or German or Physical Geography and Physiology for the Mechanical Engineering Course.

***Latin for the Classical; Latin or German for the Philosophical and Scientific Courses; Latin or German or Drawing and Shop Work for the Mechanical Engineering Course.

# Accredited High Schools.

The State Board of Education in a meeting held June 1, 1896, took the following action:

1. Candidates seeking admission to any of the regular courses in any State Educational Institutions must be at least sixteen years of age and must possess a good moral character and good bodily health.

8. Accredited Schools. Any high school or academy whose course of instruction covers the branches requisite for admission to one or more of the courses of any State Educational Institution may be admitted to its accredited list of preparatory schools, after a satisfactory examination by a committee appointed by the State Board of Education. Application for such examination may be made by any school board to the Secretary of the State Board of Education, whereupon a committee appointed by the State Board of Education will examine the course of study and methods of instruction of the school, and on the committee's favorable recommendation, and the concurrence of the State Board of Education, it will be entered upon the accredited list of the State Educational Institution for which it applied. Any graduate of such an approved school will be received by the President of the State Educational Institution wherein said graduate is entitled to enter, on presentation of proper diploma and certificate from the Superintendent of said school, into any of the courses of said institution for which said graduate has been fitted.

Students of any accredited school who are not graduates must expect examinations as other candidates.

A school once entered upon the accredited list will remain there until its administration is changed, or until notice is given by the State Board of Education of unsatisfactory results. Upon a change of administration application for continuation upon the list, if desired, must be made. If the work of the principal coming into charge has been recently examined in connection with some other school, a new examination may not be required, but such examination should in all cases be invited.

Annual reports will be asked for by the State Board of Education from all accredited schools.

## Course of Study for Accredited High Schools.

The State Board of Education in its December meeting appointed a committee, "To formulate a uniform plan for accredited High Schools." This committee met in Helena, December 28th, 1897. The following extract from the committee's report contains the Course of Study recommended for accredited schools. "This committee decided to recommend to the Board that the work of the eight grades, when arranged shall be the standard for entrance to the High Schools. The following is the outline of the work recommended by the committee, which shall be required of all accredited High Schools."

### MATHEMATICS.

Algebra through quadratics, which shall be equivalent to the work as outlined in Milne's High School or Wentworth's School Algebra, or text-books of similar grade.

Geometry, plane and solid, equivalent to the work as outlined in Wentworth and text-books of similar grade.

The science of Arithmetic shall be studied for one-half a year after the completion of the work in Geometry.

### ENGLISH.

As a part of the work in English ten pieces of the following fifteen pieces of Literature shall be selected for critical study, and ten of the following fifteen pieces shall be selected for reading, the work to be distributed throughout the entire High School course.

### CRITICAL STUDY.

Julius Caesar.
Macbeth.
The Princess.
The Ancient Mariner.
The Vision of Sir Launfal.
The Sir Roger de Coverly Papers.
Burke's Speech on the Conciliation with America.
Paradise Lost.
The Flight of a Tartar Tribe.
Essays on Milton and Addison.
Evangeline.
Gray's Elegy in a Country Churchyard.

Il Penseroso.
Ivanhoe.
The Vicar of Wakefield.

LIST FOR READING.

David Copperfield.
Vicar of Wakefield.
Last of the Mohicans.
Autocrat at the Breakfast Table.
First Bunker Hill Oration.
Life of Samuel Johnson.
Sketch Book.
Gulliver's Travels.
Pope's Iliad, Books I, VI, XXII.
Prisoner of Chillon.
Marmion.
Franklin's Autobiography.
Courtship of Miles Standish.
Enoch Arden.
Heroes and Hero Worship.

GRAMMAR, COMPOSITION AND RHETORIC.

Grammar and the fundamental principles of practical Composition and Rhetoric, with illustrative exercises and essays, shall be required for the first two years of the course.

LITERATURE.

One year of Literature shall follow the work in Rhetoric, which shall give a general knowledge of the life and growth of the English Language and Literature.

CHEMISTRY AND BIOLOGY.

Either one year in Chemistry or one year in Biology shall be required. One year in Physics shall be required, following Chemistry or Biology. In all Science work, one-half the time shall be devoted to Laboratory work.

GENERAL HISTORY.

General History shall be studied for one year, the work to be confined principally to Grecian, Roman and English History.

UNITED STATES HISTORY AND CIVICS.

The last half-year of the High School Course, U. S. History and Civics shall be studied.

LATIN.

Latin shall be required as follows: Grammar and Prose Composition, four books of Caesar, and four orations of Cicero.

MODERN LANGUAGES.

Three years work in Modern Languages, other than English, shall be accepted in lieu of the work in Latin for admission to any course except the classical.

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## List of Accredited Schools.

| City. | Superintendent. |
|---|---|
| Helena | J. E. KLOCK. |
| Butte | J. P. HENDRICKS. |
| Great Falls | S. D. LARGENT. |
| Anaconda | M. A. STAPLETON. |
| Missoula | J. M. HAMILTON. |
| Dillon | H. A. HULL. |
| Kalispell | E. A. STEERE. |
| Bozeman | W. E. HARMON. |
| Miles City | N. C. TITUS. |

# Degrees Conferred.

COMMENCEMENT. 1899.

The Degree of Master of Science, upon—

Earl Douglass, B. S., Ames, Iowa.....Medford, Minn.

The Degree of Bachelor of Arts, upon—

Zoe Bellew .....Missoula.
Anna Louise Hatheway.....Missoula.
Helen McCrackin .....Hamilton.

The Degree of Bachelor of Science, upon—

George Hempstead Kennett.....Missoula.
Charles Pixley .....Missoula.

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# Catalogue of Students.

GRADUATE STUDENTS.

Earl Douglass, M. S.....Medford, Minn.

COLLEGIATE DEPARTMENT.

| Name. | Course. | Credits. | P. O. |
|---|---|---|---|
| Frederick Anderson | B. M. E | 41 | Missoula. |
| Charles Avery | Ph. B | 80 | Missoula. |
| Lillian Beauchaine | Ph. B | 45 | Missoula. |
| Zoe Bellew | B. A | 137 | Missoula. |
| Edith Bickford | B. Ph | 44 | Missoula. |
| Laura Brown | B. Ph | | Butte. |
| Estella Bovee | B. A | 58 | Glendive. |
| Gertrude Buckhouse | B. S | 94 | Ft. Missoula. |
| William Oscar Craig | B. S | 36 | Missoula. |
| Fred Crain | B. S | 10 | Missoula. |
| Caroline Cronkrite | B. S | 110 | Missoula. |
| Lawrence Ebert | B. S | 58 | Vaucouver, Wsh. |
| Anna Faherty | B. A | | Denver, Col. |
| Hugh Graham | B. S | 49 | Bonner. |
| Louise Hatheway | B. A | 140 | Missoula. |
| Georgia Fenwick | B. Ph | 70 | Bonner. |
| Ethel Grant | B. A | 42 | River Falls, Wis. |
| Josephine Hatheway | B. A | | Missoula. |
| Miriam Hatheway | B. A | 36 | Missoula. |

| | | | |
|---|---|---|---|
| Daniel Heyfron | B. M. E. | 29 | Missoula. |
| William Jamison | B. M. E. | 41 | Victor. |
| Hugh Kennedy | B. M. E. | 41 | Missoula. |
| George Hempstead Kennett | B. S. | 128 | Missoula. |
| Helene Kennett | B. Ph. | 50 | Missoula. |
| Maude Kimmerly | B. Ph. | 24 | Kalispell. |
| Lu Knowles | B. S. | 104 | Missoula. |
| Helen LaCaffe | B. Ph. | 32 | Florence. |
| Dora Lehsou | Ph. B. | 34 | Missoula. |
| Mary Lewis | B. S. | 52 | Missoula. |
| Sue Lewis | B. A. | 58 | Missoula. |
| Fannie Maley | Ph. B. | 49 | Missoula. |
| Claude McAllister | B. S. | 36 | Missoula. |
| Helen McCrackin | B. A. | 147 | Hamilton. |
| Homer McDonald | B. S. | 39 | Missoula. |
| Agnes McDonald | B. S. | 36 | Missoula. |
| Grant McGregor | B. M. E. | 28 | Stevensville. |
| Jimmie Mills | B. Ph. | 38 | Lo Lo. |
| Nettie McPhail | B. S. | 28 | New Chicago. |
| Jo Grace Million | B. S. | 28 | Stevensville. |
| Eben H. Murray | B. A. | 93 | Craig. |
| Edna Parsons | B. Ph. | 21 | Missoula. |
| Charles Pixley | B. S. | 131 | Missoula. |
| Jeannette Rankin | B. Ph. | 40 | Missoula. |
| Lulu Rathbun | B. S. | 43 | Missoula. |
| Harriett Reid | B. S. | 39 | Missoula. |
| Percy Rennick | B. Ph. | 82 | Missoula. |
| Lenore Rennick | B. S. | | Victor. |
| Beulah Rheim | B. Ph. | 44 | Missoula. |
| Margaret Ronan | B. S. | 32 | Ronan. |
| Katherine Ronan | B. S. | 32 | Ronan. |
| Howard Schroeder | B. M. E. | | Missoula. |
| Pearl Scott | B. S. | 32 | Philipsburg. |
| Ellis Sedman | B. S. | 73 | Missoula. |
| Bertha Simpson | B. Ph. | 57 | Stevensville. |
| Guy Sheridan | B. S. | 48 | Missoula. |
| Sidney Ward | B. S. | 65 | Hamilton. |
| Dora Ward | B. Ph. | 17 | Deer Lodge. |
| George Westby | B. M. E. | 84 | Missoula. |
| Kathrynne Wilson | B. Ph. | 66 | Helena. |
| Leslie Wood | B. M. E. | 22 | Glendive. |

*Deceased.

SPECIAL STUDENTS.

Charles Allard ..... Ronan.
Frank Latimer ..... Grass Valley.
Anna Marshall ..... Missoula.
Helen McDonald ..... San Francisco, Cal.
Willard Reavis ..... Corvallis.
Oscar Sedman ..... Adobetown.
Fred Irwin Wagstaff ..... Belt.
Josephine Wagstaff ..... Belt.
Thomas Westby ..... Missoula.

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## Preparatory Department.

THIRD PREPARATORY.

Oral Jay Berry ..... Drummond.
Edmund James Calloway ..... Virginia City.
Ethel May Day ..... Glendive.
Herbert Day ..... Glendive.
William Dickinson ..... Missoula.
Frederick Ebert ..... Vaucouver, Wash.
Michael Flynn ..... Missoula.
Daniel Gorman ..... Butte.
Nina Graham ..... Bonner.
Mabel Emily Jones ..... Missoula.
Martin Jones ..... Corvallis.
Pearl Rebecca Leedy ..... Missoula.
Lucy Likes ..... Missoula.
Rella Likes ..... Missoula.
Harriett Laura Rankin ..... Missoula.
Wellington Rankin ..... Missoula.
James Gilbert Reinhard ..... Missoula.
Paul Miller Reinhard ..... Missoula.
Luther Kennett Reinhard ..... Missoula.
Eloise Rigby ..... Carlton.
Ida Graves Rigby ..... Carlton.
Charles Savage ..... Red Lodge.
Leslie Mitchell Sheridan ..... Missoula.
Robert Hugh Sloane ..... Missoula.
Edith Watson ..... Red Lodge.
Horace Worden ..... Missoula.

## SECOND PREPARATORY.

Joseph Buckhouse ..... Ft. Missoula.
Belle Buker ..... Missoula.
Edna Greenough ..... Missoula.
Lawrence Lina Heckler ..... Helena.
Gilbert Heyfron ..... Missoula.
Edna Lucile Jones ..... Missoula.
Emily Marshall ..... Missoula.
Estelle McClain ..... Carlton.
Edward Miller ..... Ft. Missoula.
Nellie Laughlin Newport ..... Bonner.
Forrest Kavanaugh Rheim ..... Missoula.
Maude Rose ..... Deer Lodge.
Anna Geneva Simons ..... Missoula.
Edward Martin Tucker ..... Belt.
Sidney Williams ..... Missoula.
Pyrene Flora Woody ..... Missoula.

## FIRST PREPARATORY.

Sophia Albert ..... Hall.
Samuel Gottfried Ackerlund ..... Missoula.
Kate Anderson ..... Bearmouth.
Alice Avery ..... Missoula.
Julia Baker ..... Grantsdale.
Herbert Bartholomew ..... Sand Coulee.
Jennie Rebecca Beard ..... Missoula.
Saidee Beckwith ..... Missoula.
Grace Buker ..... Missoula.
Pearl Malinda Card ..... Florence.
Pearl Clayton ..... Missoula.
William Dingwall ..... New Chicago.
Arthur Seymour DuBry ..... Butte.
Charles Effinger ..... Missoula.
James Flynn ..... Missoula.
Thomas Leo Greenough ..... Missoula.
Sadie Harris ..... Martina.
Nellie Harvey ..... Missoula.
Herbert Hughes ..... Missoula.
Kathleen Hughes ..... Missoula.
Irene Italia Jamieson ..... Stevensville.
Clifford Clarence Jones ..... White Sulphur Springs

John Davis Jones ..... Ovando.
Maude Pearl Jones. ..... Missoula.
Sarah Clarinda Jones..... Corvallis.
Ralph Latimer ..... Grass Valley.
John Reuben Latimer ..... Grass Valley.
George Lyons. ..... Drummond.
Myrtle Anna Mahony..... Missoula.
Julia Manheim ..... Missoula.
Charles McCauley ..... Ft. Missoula.
George McCauley ..... Ft. Missoula.
Herman McGregor ..... Stevensville.
Alice Funk Mehargue ..... Hamilton.
Arthur Wellsley Merrit..... Plains.
William Gilbert Mills..... Missoula.
Beulah Morgan ..... Stevensville.
Avriel Philip Morse ..... Drummond.
Fay Abernathy Murray ..... Missoula.
Floy Leffingwell Olds ..... Victor.
Ivy Ranche ..... Missoula.
Henry Warde Rathbun..... Missoula.
Lulu Josephine Reynolds ..... Florence.
Curtis Robinson ..... Missoula.
Blanche Mae Simpson..... Missoula.
Jessie Ethel Stivers..... Missoula.
Maggie Olive Stephens..... Missoula.
William Strom ..... Plains.
Gordon Albert Stuart..... Independence, Mo.
Dora Hazel Tabor..... Como.
Ray Walters ..... Missoula.
Maggie Ward ..... Deer Lodge.
Ernest Williamson..... Stevensville.

SCHOOL OF MUSIC.

Lucy Arnett ..... Missoula.
Willie Beck ..... Missoula.
Saidee Beckwith ..... Missoula.
Coral Blaisdell ..... Missoula.
Ivy M. Ross ..... Missoula.
Elmer Carter ..... Missoula.
Miss Cassel ..... Missoula.
Bessie Clynick ..... Missoula.
Mrs. George Cook ..... Bonner.
Mrs. George Cook ..... Missoula.

Albert Cotter ..... Missoula.
Mrs. Charles Day ..... Missoula.
Mrs. Daily ..... Missoula.
Jennie Darbee ..... Missoula.
Mary Elrod ..... Missoula.
Mrs. Esmitt ..... Missoula.
Laura Fairly ..... Missoula.
Hattie Fenwick ..... Bonner.
Georgina Fenwick ..... Bonner.
Alice Hatheway ..... Missoula.
Mary Hollensteiner ..... Lo Lo.
Miss Holloway ..... Missoula.
Agnes Hughes ..... Missoula.
Evaline Luderman ..... Missoula.
Viva Luderman ..... Missoula.
Mildred Jones ..... Missoula.
Lucile Jones ..... Missoula.
Clara Keith ..... Missoula.
Gertrude Kohn ..... Missoula.
Pearl Leedy ..... Missoula.
Helen LaCaff ..... Carlton.
Helen McCrackin ..... Hamilton.
Alice Mehargue ..... Hamilton.
Helen McLeod ..... Missoula.
R. W. McKay ..... Missoula.
Nettie McPhail ..... New Chicago.
Ethel Manville ..... Missoula.
Edna Mentrum ..... Missoula.
Fay Murray ..... Missoula.
Victoria Menard ..... Missoula.
Jessie Osborn ..... Missoula.
Nettie Owen ..... Missoula.
Edna Parsons ..... Missoula.
Mary Rankin ..... Missoula.
Lulu Rathbun ..... Missoula.
Mary Reynolds ..... Missoula.
Beulah Rheim ..... Missoula.
Margaret Ross ..... O'Keefe.
Mamie Ross ..... O'Keefe.
Annabel Ross ..... Missoula.
Mrs. Schmitz ..... Missoula.
Geneva Simons ..... Missoula.

Maggie Stephens ..... Missoula.
Vida Williams ..... Stevensville.
Cora Webster ..... Missoula.

SUMMARY.

| | |
|---|---|
| College Students | 60 |
| Special | 9 |
| Third Preparatory | 26 |
| Second Preparatory | 16 |
| First Preparatory | 53 |
| School of Music | 54 |
| Total | 218 |
| Counted twice | 12 |
| Net total | 206 |

# Miscellaneous.

## CONVOCATIONS.

All students are required to attend the regular weekly convocations which are held on Wednesday at 10:30 A. M. Special convocations may be held from time to time as the interests of the University demand.

## SOCIETIES.

Two literary societies, the Hawthorne and Clarkia, are open to students. The first-named Society is composed of young men and the second of young women. Both societies are alive and a credit to the University. Students attending the University will find membership in either of these societies most helpful and pleasant. The Athletic Association is well organized and has a large mmebership of both young men and women.

## PRIZES.

### THE H. N. BUCKLEY ORATORICAL PRIZE.

Through the generosity of Dr. J. J. Buckley, of Missoula, this prize has been founded in memory of his father, H. N. Buckley.

The amount of the prize is twenty dollars and this amount is derived from a permanent investment made to secure its endowment. The conditions of the oratorical contest at which the prize is bestowed are subject to the control of the Faculty.

This prize was awarded in 1896 to Miss Anna Gray; in 1897 to Charles Pixley, and 1898 to Louise Hatheway, and in 1899 to Guy H. Sheridan.

### PRIZE CONTEST IN DECLAMATION.

This is open only to preparatory students. The first prize is twenty dollars and the second ten dollars. The winner of the first prize in 1898 was Miss Nina Thibault. In 1899 the first prize was won by Gilbert Heyfron, and the second by William Dickinson.

The friend of the University who so liberally donates this prize desires his name to be withheld.

## FEES AND DEPOSITS.

| | |
|---|---|
| Preparatory, or any College Course, per year (Matriculation fee) | $10.00 |
| Physical apparatus (deposit) per semester | 3.00 |
| Chemical apparatus (deposit) per semester | 7.50 |
| Qualitative apparatus (deposit) per semester | 5.00 |
| Quantitative apparatus (deposit) per semester | 15.00 |
| Assaying apparatus (deposit) per semester | 10.00 |
| Deposit, Biological Laboratory, per semester | 3.00 |
| Deposit, Mechanical Engineering Laboratory, per semester | 5.00 |

## THE UNIVERSITY PAPER.

The Kaimin, through the effective efforts of its corps of editors, has become a permanent factor in the University life. The various difficulties, incident to the launching of a new enterprise, have been met and the success of the University paper is assured.

The Board of Editors elected the past year was as follows:

| | |
|---|---|
| Editor-in-Chief | Ellis D. Sedman |
| Literary Editors | Louise Hatheway and Kathryn Wilson |
| Local Editor | Zoe Bellew |
| Exchange Editor | Percy D. Rennick |
| Business Manager | George H. Kennett |

## SCIENTIFIC EXPEDITIONS.

It is the policy of the University to send out expeditions from time to time to study the geological, biological, and mineral resources of the State. During the summer of 1897, an expedition consisting of four, with proper equipment, spent some three weeks in the Flathead Indian Reservation, returning with a large number of botanical specimens, fishes, insects and birds. These specimens became a part of the museum material, to be used in student classwork, as well as to represent the State's resources.

The opening of the Summer School of Science and Biological Station at Flathead Lake, for which see under that head, will add much to the material collected in the state, and to the opportunities for securing specimens both for class work and for the museum, in different lines.

An expedition will spend the summer collecting fossils in Montana to add to the Douglass collection, for which see Museum.

## The Weather Service.

On the departure of the 25th U. S. Infantry from Fort Missoula, the instruments belonging to the Weather Bureau were placed in the keeping of the University. The instruments consist of a set of maximum and minimum thermometers, a standard thermometer, instrument shelter and rain gauge. A pair of wet and dry bulb thermometers for determining the dew point has been added, and also a standard barometer of the Fortin pattern.

The records at Fort Missoula had been taken continuously for nineteen years. As the University is but four miles from the Fort in practically the same climatic conditions, the continuation of the observations is very desirable.

The work has been placed in charge of Prof. M. J. Elrod of the Department of Biology.

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## The United States Geological Survey.

A topographical map of a portion of the state having Missoula as the center is being prepared by the government. This region is later to be worked up geologically, and will be given in the series of geological maps now being issued by the U. S. Geological Survey. The University is aiding in this work in every way possible, and will be very much benefitted by the results reached by the survey. At the present writing a bench mark for altitude has been placed in the stone at the left entrance to the main building, the altitude being 3,212 feet above sea level. This has now been corrected by the survey brought in from the Pacific Ocean whereby the corrected height of 3,223 feet is established. The triangulation party has established a bench mark on the campus, with stone piers marking the meridian line, giving the latitude and longitude. The University therefore has altitude, latitude and longitude accurately determined, and these marks will no doubt be starting points for future work.

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## The Water Stations.

Within the last year the offer was made to the Hydrographic Division of the U. S. Geological Survey by the University authorities and those most interested, whereby the University agreed to take charge of such stations for measurement of river heights and discharges as the government should deem advisable to establish in the vicinity of Missoula. As a result three stations

were established by Mr. Babb of the Survey in June, '98, at the following points: At Missoula on the Missoula River, where the height gaging is made by a new gage on the north bank of the river, a short distance above the Northern Pacific Railroad bridge, and the discharge gaging on the bridge of the Bitter Root branch of the Northern Pacific Railroad; at Bonner, where both gagings are made on the highway bridge over the Blackfoot River; and at the Buckhouse bridge, over the Bitter Root, from which bridge all readings are made. A fourth station has later been established on the Vine Street bridge over the Rattlesnake Creek, where both gage heights and discharge measurements are made.

The work consists of daily readings of gage heights made by observation at each point, and of discharge measurements made at varying intervals according as the rivers are stationary or varying in height. At least monthly measurements are required.

The importance of this work is very great, since in no other way can accurate knowledge be had of the amount of water flowing through the river and of the fluctuations of the rivers. The data thus obtained of the volume of these streams for every day of the year and for many years in succession will be valued by engineers ,farmers and municipal authorities alike, and the value must increase as the data increases. Students who desire to learn the principles of water measurement as made by this system are given encouragement to take up the study of this most interesting and important science.

The results obtained have already attracted much attention when published in the daily papers, and will in the future form a series of bulletins to be issued by the University. They are also published by the Government as portions of the regular bulletins of the U. S. Geological Survey.

The University agrees to furnish protection to all of the instruments and property used in this work. The work is in charge of Professor F. D. Smith of the Department of Chemistry and Physics. Messrs. Buckhouse, Westby and McCormick have been appointed observers.

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**University Silver Cornet and Orchestral Band.**

The University is in possession of some seventeen musical instruments, the former property of the Garden City Band. An

organization has been in successful operation during a greater part of the past year. It is proposed to organize on a permanent plan with the opening of the year 1899-1900, and to place the band on a basis for doing most excellent work. The instruments are used on the same basis as other University material, and are thus accessible to any who desire to take up this kind of work.

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**Biological Station and Summer School of Science.**

Through the kindness of friends interested in the cause of education sufficient funds have been raised to open the school and station for the summer of 1899. It is expected to make arrangements so that this may be made a permanent affair.

The station is located at the outlet of Swan River, close to the Flathead Club House grounds, near the residence of Mr. E. L. Sliter. A suitable house will be built for a laboratory on the bank of the river, a few rods from the lake. It is a good spot for camping, with an excellent spring, beautiful woods, romantic scenery, and good fishing. The station may be reached via Northern Pacific to Selish (Ravalli), stage to the foot of the lake, Polson P. O. Steamer across the lake. Students via the Great Northern will get off at Kalispell, take stage to Demersville, steamer to the station at the head of the lake. Steamer runs from Kalispell to Polson and return Monday, Wednesday and Friday of each week.

Material for actual use, except as before mentioned, will be provided free of charge. Attending students will be charged for material consumed, for breakage, and for the necessary expenses, such as hired help, gasoline, etc. Students may adopt one of three plans. They may take tents and do their own cooking, in regular camp style; or they may tent and take meals; or they may secure meals and lodging, which may be had at $5.00 per week. Camping at this season will be a delight. The nights are cool and pleasant, the days warm. Rains seldom occur. Those not wishing to attend the entire time should state when and how long they may wish to attend.

The station and school will be opened for work Monday, July 17th, and continue four weeks. If desired, arrangements may be made for continuing work two weeks longer. This is certainly a good opportunity for studying, collecting, and camping, combined, with very moderate expense, under the best guidance and with the best facilities the state can afford.

The Summer School of Science and Biological Station has been opened for the purpose of extending some of the privileges of the University to the public school teachers of the state and to such others as choose to do some work in biological lines, and to make a beginning of the study of the life of the state. The state is rich in resources that are practically untouched. There are many who desire such an opportunity as the summer school and station will offer, and who cannot afford a trip to eastern summer schools of science.

The facilities of the station are ample for a beginning in work. A gasoline launch, carrying eight persons, at a speed of five to seven miles an hour, is the property of the station, through donations by friends. Nets and dredges for taking the life of the lake, nets for insects, microscopes, chemicals, necessary books and other material for the laboratory, and a dark room for photography, will be provided.

For the summer of 1899 the instruction will be by the following persons:

For the general object, organization, and management of the station and school, the director, Professor Morton J. Elrod, is responsible. Superintendent James M. Hamilton, of the Missoula public schools, will supervise the nature study work. Professor Frederick C. Scheuch, of the modern language department of the University, will have charge of the work in photography. Fred D. Smith, professor of chemistry and geology in the University, will direct the work in hydrography, preparing the countour map of the lake, and work of like nature, and the work in geology. Mr. Earl Douglas, a graduate student, who has collected fossils in Montana for several years, will collect in the lake bed deposits adjacent to the station, and will assist any one who may wish to collect in this line. The director will have charge of the plankton collectings in the lake, will give instructions in collecting and preserving specimens, and supervise and direct the work in the laboratory.

The work offered will be as follows: Teachers in high schools or in nature study will be given such lines as will enable them to collect and preserve material, working it up in the laboratory. A contour map of a portion of the lake will be made, extending it each year. Instruction will be given in photography, with special reference to its use as a scientific aid for study. Opportunity will be given for geological, paleontological, and anthropological study.

A few tables will be set apart for investigators, supplied with microscopes and the usual stains and reagents, except the expensive, as osmic acid. A number of microscopes will be supplied for use in the general work. Every opportunity and facility will be given students attending to make and prepare collections of specimens in any quantity, either for their own use or, if teachers, for the use of their classes.

Membership at the station will be limited to twenty-five. Those desiring to attend should make early application, stating the work they wish to pursue, their fitness for doing the work, and the number of weeks they can spend at the station. Other things being equal, preference will be given to teachers and students of biology in schools and colleges and to investigators.

The State Board of Education have assumed control of the Station, and have appointed Prof. M. J. Elrod as Director for this year.

EXPENSES.

There are no dormitories connected with the University, and students are expected to find rooms and board in private families. Good homes can thus be provided for all and at very reasonable rates. Expenses may be very materially lessened by the formation of boarding clubs. Students will not be allowed to board at places not approved by the Faculty.

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## Athletics and Gymnasium Work.

A committee from the Faculty, entitled the Committee on Athletics and Gymnasium Work, has general oversight of the athletic sports and gymnasium practice. The details of the management are in the hands of the Board of Directors of the Athletic Association. Regular gymnasium practice has been organized, and is required of all students to the extent of one hour each week. This has been made possible by one of Missoula's foremost citizens, Mr. C. H. McLeod, who has very kindly equipped the gymnasium with all of the apparatus to be found in a first-class gymnasium. The list includes parallel and horizontal bars, trapeze and swinging ring, chest weight machines, and Whitteley exerciser, vaulting horse, punching bag, boxing gloves, fencing foils, Indian clubs, dumb bells, wrist and finger machines, and rowing machine. Besides these there are two small mats for the bars,

and a large gymnasium rug, sixteen feet square, for wrestling and boxing.

The gymnasium is open to the students every afternoon after four o'clock, under the charge of a competent and responsible person.

The athletic field, located in the northeast corner of the campus, is being put in shape. A quarter of a mile bicycle track is surveyed and partially graded. Within this track there will be a running track, the base ball diamond, the foot ball field, and the tennis courts.

The Faculty have established the following important regulations:

First. The foot ball season will extend from September 1st to Thanksgiving Day.

Second. Only bona fide students in the University, taking at least six hours per week of recitation or lecture, can represent the University in any of its games with other college teams. Teams representing the University will not be permitted to play teams representing other schools or colleges unless the latter conform to the same requirement for study.

## UNIVERSITY SURROUNDINGS.

Missoula is located in Western Montana, on the main line of the Northern Pacific Railroad, and at its junction with the Bitter Root Valley and Coeur d'Alene branches, thus affording easy railroad connections with all parts of the State and the Northwest.

The City of Missoula is noted as being one of the most beautiful in the west; and is unexcelled as regards pure water, healthful surroundings, beautiful scenery, and all of those things that contribute to make student life pleasant and agreeable.

Situated at the head of the Missoula valley and near the outlet of the Bitter Root valley, it is within the limits of the great agricultural and fruit growing regions of the state.

# INDEX.