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1897-1898 Course Catalog

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THE UNIVERSITY OF MONTANA

ANNUAL REGISTER, 1897-1898.

With Announcements for

1898-99,
THE
Third Annual Register
OF THE
University of Montana
Missoula, Montana.
1897-98.

With an outline of the Course of Study and the Departments of Instruction for
1898-99.

HELENA, MONTANA
STATE PUBLISHING COMPANY
PRINTERS AND BINDERS
1898
The Montana State Board of Education.

Ex-Officio.

Governor Robert B. Smith, President.
E. A. Carleton, Supt. Public Instruction, Secretary.

Appointed.

J. E. Klock, Helena....................Term Expires February 1st, 1899
O. F. Goddard, Billings.................. " " " 1899
O. P. Chisholm, Bozeman.................. " " " 1900
E. B. Howell, Butte.......................... " " " 1900
Henry R. Melton, Dillon.................. " " " 1901
M. J. Garrett, Lewiston.................. " " " 1901
J. M. Hamilton, Missoula.................. " " " 1902
H. H. Grant, Grantsdale.................. " " " 1902

............................................Clerk of the Board

Executive Committee of the State University.

J. H. T. Ryman, President.......................... Missoula
T. C. Marshall..................................... Missoula
Hiram Knowles.................................. Missoula
### Calendar for 1898-99

#### July to December, 1898

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#### January to July, 1899

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Entrance Examination begins Monday, September 5, 10:00 A. M.
First Semester begins Wednesday, September 7.
Thanksgiving Vacation begins Wednesday, November 23, 12:30 P. M.
Thanksgiving Vacation ends Monday, November 28, 10:30 A. M.
Christmas Holidays begin Thursday, December 22, 12:30 P. M.

Christmas Holidays end Tuesday, January 3, 8:30 A. M.
First Semester ends Friday, February 3.
Annual Entertainments of Literary Societies, February 16 and 17.
Annual Lecture before Literary Societies, June 2.
Instruction ends, Friday, June 2, 5 P. M.
Prize Contest in Declamation, Preparatory Students, June 3.
Annual Recital School of Music, Monday, June 5.
Field Day, Tuesday, June 6.
H. N. Buckley Oratorical Contest, June 6, 8:30 P. M.
Commencement, Wednesday, June 7.
THE FACULTY.

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

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.,
Instructor in English Literature and Latin.

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.

LOUISE HATHEWAY,
Assistant in Mathematics.

*DANIEL HEYFRON,
Assistant in the Chemical Laboratory.

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

*The first Semester.
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 ($15,000) dollars 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 pur-
poses. 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.

The University lands have all been selected. They comprise some of the very best land 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 canon 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 canon 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 last 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 have been sold at a premium, a Building Commission appointed, and the work of constructing the buildings is being vigorously pushed to completion.

An ample sewerage system has been planned and completed, contracts for furnishing the necessary brick have been let and an adequate water supply secured.

Two buildings are in process of construction, one to be known as University Hall and to contain provisions for the Library, Museum, Biological Lecture Room and Laboratory, President's Office, Assembly Room, and Lecture rooms for Languages, His-
tory, Mathematics, Literature, etc.; the other to be known as Science Hall, and to contain the necessary rooms for work in Chemistry, Physics, and Mechanical Engineering. Science Hall will also contain the steam plant for heating the buildings 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 Building Commission confidently expects to have both buildings ready for occupancy October 1, 1898, and hence all descriptions of lecture rooms, laboratories and appliances have reference to the new buildings.

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, pigeon holes and racks for periodicals and papers.

There are at present in the library 2,543 volumes, and 2,252 pamphlets unbound, exclusive of periodicals. So far the library contains but little except that material most needed for reference in the work already in progress in the University. This list, for the most part, includes Dictionaries, Encyclopedias, Histories, standard works in Literature, Science, Politics, Philosophy and Economics.

The following periodicals are on file:

- The Forum.
- Popular Science Monthly.
- North American Review.
- Atlantic Monthly.
- The Cosmopolitan.
- The Arena.
- The American Naturalist.
- Science.
- Journal of Geology.
- The Scientific American.
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 Blatter.
Merek'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.
Democrat-Messenger, Missoula.
Glendive Independent, Glendive.
The Troy Times, West Troy.
The Plainsman, Plains.
Montana Silverite, Missoula.
Flathead Herald-Journal, Kalispell.
Montana Fruit Grower, Missoula.
Belt Valley Times, Belt.
The Columbian, Columbia Falls.
Helena Independent, Helena.
The Citizens Call, Philipsburg.
Western Mining World, Butte.
The Darby Sentinel, Darby.
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 Jefferson County Sentinel, Boulder.
The Sylvanite Miner, Sylvanite.

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 four tables provided with gas are arranged for the work in determinative mineralogy and blowpipe analysis. The lecture room, like all rooms in the building, 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, gas analysis by Hempel-Dennis methods, complete analysis of milk and water, as well as the special analysis of milk, by the Babcock method. The current
for electrolysis is provided by a storage battery of five cells of the chloride-accumulator style, and regulated by the usual german-silver resistances.

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, and one Ainsworth balance No. .043 for the work in Assaying. In the same room is the Department Library of 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. Besides having the equipment of the general laboratories at the disposal of this laboratory there is provided a Sar-torius balance sensitive to one-tenth mg. for special work.

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 purposes noted. Students have no access to this room.

A larger store room for larger quantities of material is provided in the basement of the building. This room is well lighted, cool and safe for storing of acids and chemicals.

**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 laboratory for 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 muffles 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 an Ainsworth No. 043 sensitive to one-fiftieth of a mg. The electrolytic assay for copper is done as a part of 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 scientific 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. Two stone piers built from the solid earth up through the floor and independent of any jarring are for the use of apparatus which would be disturbed by the jarring of the building.
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 will be provided with an individual table, made after the latest and best plans. The tables have oak tops, paraffined, each student having the use of two drawers and space for microscope, in which to store material. The rooms are well lighted, and contain ample case room for storage. Each desk will be fitted with gas.

The equipment consists of three microscopes manufactured by Leitz, of Germany; seven by Bausch & Lomb Optical Co.; three camera lucidas after Abbe; a student microtome after Bausch & Lomb; Anthony's copying, reducing and enlarging camera, with accessories for making lantern transparencies; a camera for photomicrography; a pair of balances; a Miller's paraffine bath and a Naples Water bath; an adjustable drawing board for camera lucida; injecting apparatus; freezing and embedding attachments for the microtome; turn tables, razors, knives, etc., with a good assortment of glassware for carrying on histological work; a battery of ten additional objectives, with powers ranging from 25 to 800 diameters.

One of the microscopes made by Leitz 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 emersion. It has also a revolving stage, with substage condenser after Abbe, and the Iris diaphragm. It has eye and stage micrometers, and accessory Nichol prisms for polarization, and also a camera lucida after Abbe.

There is a large dissecting microscope after the same makers, provided with camera lucida after Abbe; and a student's microscope with rack and pinion and micrometer adjustment, two eye pieces, and three objectives.

The microscopes made by Bausch & Lomb are provided with rack and pinion and micrometer screw, substage attachment, one
eye piece and two objectives each. There are two camera lucidas after Abbe that fit any of these instruments.

The department has a large amount of 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.

The other working material consists of alcoholic invertebrates, land and marine, a series of some 1,400 mounted slides, an articulated skeleton, a collection of mounted and unmounted insects, an herbarium of some 3,000 species of phanerogams, and a collection of fishes.

The professor in charge has loaned for the use of the department a portion of his library, consisting of some 700 volumes and pamphlets, which makes a good nucleus for a department library.

A number of valuable additions have been made in the line of laboratory guides and reference books, and others will be added as they become necessary in carrying on the work of the department.

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 large room in University Hall is set apart for the museum, and the cases planned for it are of the most convenient and serviceable pattern, and will be finished in the most artistic style. They will be not only very serviceable, but also models of the workman's skill, and will show attractively the numerous collections of the University. The cases include two large display cases for minerals and two 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 large cases will contain the alcoholic fishes and other specimens. The herbarium will be housed in cases of special design, dust proof, portable and convenient. In addition to these will be 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 relabeled 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. From the same source another set is soon to be sent. Many specimens have also been added by collection. The collection of minerals will be augmented rapidly 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 collected 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 when possible, 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 exchanges, 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. The main additions have been a large number of fossil plants and ferns from the lower Carboniferous of Iowa, presented by Professor Elrod, and many excellent fossils from the chalk beds of England, presented by Mr. Geo. W. Westby, of Missoula. 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.

The following persons have very kindly donated specimens to our museum during the last college year.

P. Andree, Garnet, Montana, sample ore for Economic Geology collection.

R. M. Cobban, Butte, Montana, samples Covellite, Enargite, Melanterite and Wad for Mineralogy collection and ores for Economic Geology collection.
Dr. O. J. Craig, set Confederate Monies, and Archaeological Specimens.

M. J. Elrod, fossils, and minerals from Yellowstone National Park.
Larson & Greenough, Mullan, Idaho, specimens of native silver, and collections of silver-lead ores from the Morning and You Like Mines.

J. R. Latimer, Quartz Crystals, and prospect ores.
W. J. Moore, City, sample lead-silver ore from Silver Bell Mine.
H. W. Lehsou, Garnet, Montana, ores from Garnet mines.
Dr. W. Robinson, City, sample ores from Granite mines.
H. Schroeder, City, Fossils from Montana Bad Lands, Lava from Dawson.
A. L. Stone, City, sample ore from Copper Cliff district.
S. J. Ward, Hamilton, Montana, specimens Stream Tin, Native Lead, Siderite.
L. J. Warner, City, Pyrite and Quartz Crystals.
Rev. R. N. Sawyer, City, Specimens Garnets, and other minerals from Colorado.

Department of Biology. Several hundred species of plants from the vicinity of the University, almost a complete collection of the fishes of the state, two hundred bird skins, several mounted birds, and a collection of miscellaneous alcoholics.

From Duncan McDonald, Ravalli, a pair of fine moose antlers.
From Mrs. Pearson, Missoula, a centipede and a couple of horned toads from Texas.
From Woods Holl, by purchase, a number of vertebrates and invertebrates, alcoholic.
From Prof. M. J. Elrod, a collection of shells.
From Prof. Wm. M. Aber, sponges and fish from the coast of Maine.

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 supplied with the most important and essential works of reference for this department.

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DEPARTMENT OF MATHEMATICS.

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This department is supplied with forms, solids, spherical blackboard, etc. An excellent equipment for surveying and other field work is being provided.

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

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ATHLETICS.

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Athletic sports are under the supervision of the Athletic Association of the University of Montana. This is a duly organized society made up of students attending the University and of members of the Faculty. The details of the management of all work are in the hands of a Board of Directors chosen by the students from members of the Association. The Board of Directors also includes one member of the Faculty.

A portion of the University grounds has been set off for an athletic field, which will be put in shape for the fall work in football. This field is located in the northeast corner of the campus, where it is easy of access from the city and for students doing work in the gymnasium.

It will contain a quarter of a mile track, a straight track for 100 yards dash. The diamond for baseball and the gridiron for football will be within the circle of the track.

A gymnasium is provided on the third floor of University Hall, where class drills and floor exercise will be given.
SCHOOL OF MECHANICAL ENGINEERING.

DRAWING ROOM.

There have been provided for the use of students in Mechanical Engineering ten drawing tables. These accommodate two students each, and each contains 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 Band Saw.
1 Double Circular Saw.
1 Power Grindstone.
1 Pattern Maker's Large Wood Turning Lathe.
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:

10 Down-Draft Forges.
10 Anvils on Blocks.
10 Hardies.
10 Hammers.
10 Sets of Tongs.
10 Squares.
10 Calipers.
Set of Top and Bottom 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.

The blast and exhaust piping is concealed under the floor.

MACHINE SHOP.

The machine shop contains the following equipment:

- Shaper, 16-inch Stroke.
- Milling Machine.
- Planer 24x24 inch x 8 foot.
- Drill Press, 25-inch Swing.
- Sensitive Drill.
- Water Emery Grinder.
- Dry Emery Grinder.
- 16-inch Engine Lathe.
- 14-inch Engine Lathe.
- 6 Vises for Metal Working.

TOOL ROOM.

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

The instruction aims to train the student in probable reasoning; and to guard him against hasty generalization in those departments of the science where facts are not well determined and known. 3.
DEPARTMENT OF RHETORIC AND LITERATURE.

I. Rhetoric.—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. Rhetoric.—(Open to students who have taken Course I or its equivalent.)

Critical reading of 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.

III. Literature.—Old and Middle English. A working knowledge of Old and Middle English will be acquired, and selections read from Early English Authors, with special reference to Chaucer. Must be preceded by Course I. First semester.

IV. Literature.—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, Mesinger and Shirley.

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

V. Literature.—One-half Course (a) Shakespearian Drama. Critical and careful study of representative Shakespearian plays with the literary history they cover.

One-half Course (b) Comparative Literature. The work will be outlined for each class, as the needs and desires of the students dictate. Must be preceded by Courses I and IV. Second semester.

VI. Literature.—Nineteenth Century Literature. Representative selections from the prose and verse of Wordsworth, Coleridge, Southey, Carlyle, Lamb, De Quincey, Shelley, Keats, Ruskin and Arnold.

The preparation of the papers required from time to time upon assigned subjects will necessitate the study of Comparative Literature. Must be preceded by Course I, IV and V. First semester.

VII. Literature.—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 VI. Must be preceded by Courses I, IV, V and VI. Second semester.
VIII. Literature.—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 Beowulf (translation) English Ballads; Paradise Lost. Must be preceded by Course I. Second semester.

ELOCUTION AND PHYSICAL CULTURE.

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.

The movements of the Swedish system are introduced to further the development of muscular power. This is supplemented by the Delsarte system of Physical Culture which enables the student to become possessed of that grace and ease of movement which characterizes a refined bearing.

The work as outlined will include General Gymnastics, Marching, Poise, First Steps in Gesture, Expressive Power of the Body, and Grace in Action.
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, and, except in Engineering Course, Chemistry 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. Text-book, Carhart's University Physics.

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 the 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. No courses in Paleontology and Stratigraphic Geology will be given and the subject will receive its only 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 numbers 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 Petrography the laboratory work is the examination of the minerals in museum (see museum,) and the determination of minerals by microscopic 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 and II. The following courses are recommended as precedents or to accompany this work. Chem. III. Math. 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 blowpipe 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 Physiographic Geology 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 value of ores. Must be preceded by Courses I and II. Second semester. Four hours, lectures.

Courses III and IV will not be given in the year 1898-99, but may be expected in year 1899-1900.

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 pre-requisite for many others, a course extending over one year 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 the 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 the remainder of the year 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.
CHEMISTRY.

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. Course begins first semester. Four hours credit. Two recitations or lectures per week. Two laboratory practices (two 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. Deposit for breakage, $5.00 per term.

Course II. Continuation of Course I through second semester.

Course III. Qualitative Analysis, required of all students specializing in Chemistry, and must be preceded by Courses I and II, or equivalent in some laboratory of acknowledged standing. First semester. Five hours credit, one or two hours recitations as needed, and six or eight hours of laboratory work dependent upon the recitations.

Text Book, Caldwell's Chemical Analysis, with Prescott and Johnson's Qualitative Analysis for reference. Deposit for breakage, $5.00.

Course IV. Introductory Quantitative Analysis. Must be preceded by Course III and Mathematics I and II. 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.

Text books, same as for Qualitative Analysis, with Fresenius Quantitative Analysis for reference.

Course V. Assaying. Must be preceded by Courses I and II, and if possible by III and IV. Students specializing in Chemistry and Assaying will not be permitted to take this course unless preceded by Course III and accompanied or preceded by Course IV. 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 IV or VI depending upon the needs of the student.

Lectures on occurrence 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 and III.

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.
Course VI. 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, analysis of gases by Hempel'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 III and IV, 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 VII. Organic Chemistry. The chemistry of the compounds of Carbon. Lectures, recitations and laboratory work. Five hours credit, of which three are laboratory practices. Must be preceded by Courses III and IV. The laboratory work is mainly synthetical, in which the student prepares the compounds studied in the lectures. First semester, to be followed by second semester of work along same lines. Required of all students specializing in Chemistry.


*Course VIII. 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 IX. Metallurgy, continuation of Course VIII. 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, II and III, Mineralogy I and IV.

*Courses VIII and IX will not be given in year 1898-99, but may be expected in 1899-1900.

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 cata-
logue under the head of Equipment.

The collections of working material are being constantly aug-
mented. In addition to those mentioned under the head Mu-
seum 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 con-
stantly 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 alti-
tude of 12,000 feet. The opportunities botanically and zoologi-
cally 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 labor-
atory 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 re-
turned.

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 Ger-
man or French is very desirable, and for research work almost in-
dispensable.

The following courses are offered for the year 1898-99; for the
year of required Biology the student may take courses I and II,
or V and VI.
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 four hours of laboratory per week.

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 included 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.

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 one, and necessary for the completion of the work therein indicated.

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, Lencosolenia, Metridium, Pennaria, Campanularia, Sea-Urchin, Sea-Cucumber, Starfish, Squid, Lobster, Earthworm, Nereis, Balanoglossus, 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 connection 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 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.

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

Course V. Structural Botany. In this course the idea is to give an intelligent idea of the scope of modern Botany. Recitation twice and laboratory practice four 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 a flow-
ering 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.

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 3,250 feet above the sea, and plants may be had from this height to 12,000 feet, the height of Mount Lo Lo some miles distant. This course and course V may be taken at any time without previous biological study. Not only is the student expected to make an herbarium, but he will be expected to study the chemical and medicinal properties of a large number of plants as well as to work out some problems in geographical distribution. Laboratory and field work.

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

Courses VII and VIII. 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. Advanced microscopical manipulation, 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 with seminary.

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

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 literatures, 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 references 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. Horace—First half, selected Satires and Epistles. 4.
   Plautus and Terence—Second half, one play from each.
VI. Private Life of the Romans. Descriptive, no knowledge of Latin required for this course, open to all students. 4.
VII. Rapid Reading Course, selected from Latin Poetry. 4.
VIII. Rapid Reading Course, selected from Latin Prose. 4.

COURSES IN GREEK.

I. A First Greek Book; elements of Greek Grammar. 5.
II. First Book of Anabasis; sight reading, writing Greek; study of Grammar in connection with the reading and writing. 5.
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 the Greeks—Descriptive, no knowledge of Greek required for this course, open to all students. 4.

DEPARTMENT OF MATHEMATICS.

All students are required to take one course in Mathematics. Students in the Scientific Course must take courses I and II. In
addition to these, students in the Engineering Course are required to take courses III, IV, and V. Students in the 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.
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, may 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 with any of the courses.
VII. Plane Surveying. Second semester. 4.

DEPARTMENT OF MODERN LANGUAGES.

The special aim of the first two years in German and French is to give the student a good knowledge of the grammar and syntax; much attention is given to the study of composition, enabling the student to get a practical knowledge of the languages, as well as a means of culture. In the last year the chief aim of the work will be linguistic and literary.

The whole course as laid out in Spanish is elective.
GERMAN.

I and II. This first year is devoted to the study of Grammar (Joynes' Meissner) and Joynes' German Reader.

III and IV. During this year a select course of reading is followed with exercises in composition and conversation.

V and VI. (Elective.) Reading of German classics and scientific monographs. Recitations will be required to be made in the German language. Essays will be required.

FRENCH.

I and II. This first year is devoted to French Grammar (Charde-nal's Complete Course); Reading (3 Contes Choises, Daudet; Mercinles, Colomba, etc.) 5.

III and IV. Readings; translations of various selections from classical and modern writers, with a study of syntax, idioms, etc., and with exercises in conversation and compositions.

V and VI. Reading of French Classics and Scientific writings; recitations in the French language. Essays in French will be required.

SPANISH.

A two years course in Spanish has been laid out.

I and II. Devoted to the study of Grammar, with some easy reading and translations from Modern Prose.

III and IV. Reading of Spanish Classics; study of Spanish Literature; study of Syntax and Idioms; exercises in Composition and Conversation.

Recitations required in the Spanish language in the second semester.

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 depart-
ment. 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.**

In the Third Preparatory year instruction is given in Free Hand Lettering to those students intending to take the mechanical Engineering work. This is given three times a week throughout the first and second semesters.

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, engines, etc., that are required in those years.

**SHOP WORK.**

Instruction in shop work is given in the afternoon throughout the Freshman and Sophomore years.

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 dis-
posal of the student. On the bench the exercises in carpentry consist of sawing, planing, joining, splicing, mortising, dove-tailing, 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 work and carpentry 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:
  Freshman, two semesters. 10.
  Sophomore, two semesters. 8.
Lectures on Wood Working Tools. 2.
Theory of Pattern Making and Foundry Practice. 2.
Wood Shop Work:
  Bench and Lathe. 10.
  Pattern Making. 10.
Forge Shop Work. 10.
Machine Shop Work. 10.
Descriptive Geometry. 4.
Kinematics. 4.
Lectures on Machine Shop Practice. 1.
Graphical Statics. 2.
Analytical Mechanics. 4.
Strength of Materials. 4.
Heat. 4.
Magnetism and Electricity. 3.
Machine Design:
  I. 4.
  II. 3.
  III and IV. 6.
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.
Machine, Valve and Boiler Design. 18.
Engine Design. 9.
Thesis Work. 10.
COLLEGIATE COURSES OF STUDY.

The University offers the following general courses of instruction:

A.—A classical course, leading to the degree of A. B.
B.—A Philosophical 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 hours of laboratory works counts the same as one of lecture or of recitation. At least thirty-two full courses as here defined are required for 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.

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.

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

I. Algebra through quadratics.
II. Geometry, Plane and Solid.
III. English Language and Literature.

The requirements are:

1. In 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. In 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. In Literature. Evidence of a good knowledge of the form, structure and substance of the following English masterpieces: Julius Caesar, Macbeth, Vision of Sir Launfal, The Sir Roger de Coverly Papers, Burke's speech on the Conciliation with America, Paradise Lost, The Princess, Flight of Tartar Tribe, the Vicar of Wakefield and The Ancient Mariner; also of a general knowledge of the substance of this list: Autocrat at the Breakfast Table, David Copperfield, First Bunker Hill Oration, Life of Samuel Johnson, Sketch Book, Pope's Illiad, Books I, IV and XXII, Prisoner of Chillon; Courtship of Miles Standish, Heroes and Hero Worship.

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.


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 "Hauff's 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. An equivalent amount of work in Chemistry may be presented.
The subjects required for admission to the various courses are as follows:

Classical Course, I, II, III, IV, V, VI.
Philosophical Course, the same as for the classical, except that IX, with either VII or VIII, may be substituted for VI, wholly or in part.
Scientific Course, the same as for the Philosophical Course. Preparation in IX is recommended.
Mechanical Engineering Course, I, II, III, IV, V.

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.

The above described requirements for admission as relating to Science subjects will take effect in September of 1899.

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.

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 either 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 or 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.**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Required Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drawing, 3 times per week for one year</td>
<td>3-4 course</td>
</tr>
<tr>
<td>Rhetoric</td>
<td>1 &quot;</td>
</tr>
<tr>
<td>Political Economy</td>
<td>1 &quot;</td>
</tr>
<tr>
<td>Psychology and Ethics</td>
<td>1 1-4 &quot;</td>
</tr>
<tr>
<td>Literature</td>
<td>2 courses</td>
</tr>
<tr>
<td>Biology</td>
<td>2 &quot;</td>
</tr>
<tr>
<td>Chemistry</td>
<td>2 &quot;</td>
</tr>
<tr>
<td>General required work</td>
<td>10 courses</td>
</tr>
</tbody>
</table>

Drawing must be taken the first year; Rhetoric, within the first two years; the other courses may be taken when the student is prepared for them.

**WORK REQUIRED FOR DEGREE A. B.**

<table>
<thead>
<tr>
<th>Category</th>
<th>Required Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>General required work (given above)</td>
<td>10 courses</td>
</tr>
<tr>
<td>Special &quot; &quot; Latin</td>
<td>5 &quot;</td>
</tr>
<tr>
<td>&quot; &quot; Greek Life</td>
<td>1 course</td>
</tr>
<tr>
<td>&quot; &quot; Roman Life</td>
<td>1 &quot;</td>
</tr>
<tr>
<td>Partial Electives, in Greek, Latin, Modern Languages</td>
<td>6 courses</td>
</tr>
<tr>
<td>&quot; &quot; Trigonometry or Higher Algebra</td>
<td>1 course</td>
</tr>
<tr>
<td>Free Electives</td>
<td>8 courses</td>
</tr>
<tr>
<td>Total</td>
<td>32 courses</td>
</tr>
</tbody>
</table>

**WORK REQUIRED FOR DEGREE PH. B.**

<table>
<thead>
<tr>
<th>Category</th>
<th>Required Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>General required work (given above)</td>
<td>10 courses</td>
</tr>
<tr>
<td>Partial Electives, Ancient and Modern Languages</td>
<td>6 &quot;</td>
</tr>
<tr>
<td>&quot; &quot; History, Literature and Philosophy</td>
<td>8 &quot;</td>
</tr>
<tr>
<td>&quot; &quot; Trigonometry or Higher Algebra</td>
<td>1 course</td>
</tr>
<tr>
<td>Free Electives</td>
<td>7 courses</td>
</tr>
<tr>
<td>Total</td>
<td>32 courses</td>
</tr>
</tbody>
</table>
WORK REQUIRED FOR DEGREE B. S.

<table>
<thead>
<tr>
<th>General required work (given above)</th>
<th>10 courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special</td>
<td></td>
</tr>
<tr>
<td>&quot; &quot; Trigonometry</td>
<td>1 course</td>
</tr>
<tr>
<td>&quot; &quot; Higher Algebra</td>
<td>1 &quot;</td>
</tr>
<tr>
<td>&quot; &quot; Physics</td>
<td>2 courses</td>
</tr>
<tr>
<td>Partial Electives, Modern Languages</td>
<td>4 &quot;</td>
</tr>
<tr>
<td>&quot; &quot; Science and Mathematics</td>
<td>6 &quot;</td>
</tr>
<tr>
<td>Free Electives</td>
<td>8 &quot;</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>32 courses</td>
</tr>
</tbody>
</table>

FOR THE DEGREE OF B. M. E.

<table>
<thead>
<tr>
<th>In Mathematics, I., II., III., IV., V.</th>
<th>4 1-2 full courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model and Object Drawing, I., II.</td>
<td>3-4 &quot;</td>
</tr>
<tr>
<td>Physics, I., II.</td>
<td>2 &quot;</td>
</tr>
<tr>
<td>Political Economy, I</td>
<td>1 &quot;</td>
</tr>
<tr>
<td>Metallurgy</td>
<td>3-4 &quot;</td>
</tr>
</tbody>
</table>

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

DEGREES.

The University grants the following degrees: For the completion of the Scientific Course the degree 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 of 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.

Trigonometry, I.
†Descriptive Geometry.
Analytical Geometry, III.
Calculus, V.
Problems in Geometry, VI.

Second Semester.

Higher Algebra, II.
Problems in Geometry, VI.
Plane Surveying, VII.
Calculus, IV.

PHYSICS.

Physics, I.
Physical Experiments, III.
†Graphical Statics.
†Analytical Mechanics.
†Machine Design.
†Valve Gearing.
†Steam Engine.
†Steam Boiler.
†Hydraulics.
†Boiler Design.

Physics, II.
Physical Experiments, III.
†Heat.
†Strength of Materials.
†Machine Design.
†Magnetism and Electricity.
†Pumping Machinery.
†Engine Design.
†Power Transmission.
†Kinematics.

CHEMISTRY.

*General Inorganic, I.
Qualitative Analysis, III.
Quantitative Analysis, VI.
Organic Chemistry, VII.
Metallurgy, VIII.

*General Inorganic, II.
Quantitative Analysis, IV.
Assaying, V.
Organic Chemistry, VII.
Metallurgy, IX.
## BIOLOGY.

<table>
<thead>
<tr>
<th>Course</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>*General Biology, I.</td>
<td>*General Biology, II.</td>
</tr>
<tr>
<td>Invertebrate Zoology, III.</td>
<td>Vertebrate Zoology, IV.</td>
</tr>
<tr>
<td>Structural Botany, V.</td>
<td>Systematic Botany, VI.</td>
</tr>
<tr>
<td>Special Work, VII.</td>
<td>Special Work, VIII.</td>
</tr>
</tbody>
</table>

## MODERN LANGUAGE.

<table>
<thead>
<tr>
<th>Language</th>
<th>Language</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>German, I.</td>
<td>German, II.</td>
<td>German, III.</td>
</tr>
<tr>
<td>German, III.</td>
<td>German, IV.</td>
<td>German, V.</td>
</tr>
<tr>
<td>German, V.</td>
<td>French, II.</td>
<td>French, III.</td>
</tr>
<tr>
<td>French, I.</td>
<td>French, IV.</td>
<td>French, V.</td>
</tr>
<tr>
<td>French, III.</td>
<td>Spanish, II.</td>
<td>Spanish, III.</td>
</tr>
<tr>
<td>Spanish, V.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spanish, V.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## ANCIENT LANGUAGE.

<table>
<thead>
<tr>
<th>Language</th>
<th>Language</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greek, I. Grammar and Lessons.</td>
<td>Latin, VII. Greek Archaeology.</td>
<td>Greek, II. Anabasis.</td>
</tr>
<tr>
<td>Greek, II. Anabasis.</td>
<td>Greek, III. Iliad.</td>
<td>Greek, IV. Odyssey, Herodotus, Thucydides.</td>
</tr>
<tr>
<td>Greek, III. Anabasis.</td>
<td>Greek, V. Plato, Demosthenes.</td>
<td>Greek, V. Odyssey, Herodotus, Thucydides.</td>
</tr>
<tr>
<td>Greek, IV. Odyssey, Herodotus, Thucydides.</td>
<td>Greek, VI. Private Life of the Greeks.</td>
<td>Greek, VII. Dramatists.</td>
</tr>
<tr>
<td>Greek, V. Odyssey, Herodotus, Thucydides.</td>
<td>Greek, VIII. Private Life of the Greeks.</td>
<td>Private Life of the Greeks, IX.</td>
</tr>
<tr>
<td>Greek, VII. Dramatists.</td>
<td>Greek, IX. Private Life of the Greeks.</td>
<td>Greek Archaeology, VIII.</td>
</tr>
</tbody>
</table>

## HISTORY.

<table>
<thead>
<tr>
<th>Course</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of England, I.</td>
<td>American History, II.</td>
</tr>
<tr>
<td>Ancient History, III.</td>
<td>History of Civilization, IV.</td>
</tr>
</tbody>
</table>
## PHILOSOPHY.

<table>
<thead>
<tr>
<th>Psychology, I.</th>
<th>Ethics, II.</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of Philosophy, III.</td>
<td>Theories in Modern Philosophy, IV.</td>
</tr>
</tbody>
</table>

## POLITICAL ECONOMY.

| *Elements of Political Economy, I. |

## RHETORIC AND LITERATURE.

<table>
<thead>
<tr>
<th>Rhetoric, I.</th>
<th>Rhetoric, II.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old and Middle English, III.</td>
<td>*Literature, V.</td>
</tr>
<tr>
<td>*Literature, IV.</td>
<td>Literature, VII.</td>
</tr>
<tr>
<td>Literature, VI.</td>
<td>Literature, VIII.</td>
</tr>
</tbody>
</table>

## GEOLOGY AND MINERALOGY.

<table>
<thead>
<tr>
<th>Mineralogy, I.</th>
<th>Geology, II.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithology, III.</td>
<td>Economic Geology, IV.</td>
</tr>
</tbody>
</table>

## DRAWING.

<table>
<thead>
<tr>
<th>Freehand.</th>
<th>Freehand.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical, I.</td>
<td>Mechanical, II.</td>
</tr>
<tr>
<td>Mechanical, III.</td>
<td>Mechanical, IV.</td>
</tr>
<tr>
<td>Drawing, V.</td>
<td>Drawing, VI.</td>
</tr>
<tr>
<td>Drawing, VII.</td>
<td>Drawing, VIII.</td>
</tr>
</tbody>
</table>

## 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 per week.

## FRESHMAN YEAR.

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trigonometry, I. 4</td>
<td>Higher Algebra, II. 4</td>
</tr>
<tr>
<td>Model and Object Drawing, I. 3</td>
<td>Model and Object Drawing, II. 3</td>
</tr>
<tr>
<td>Wood Working Tools, 2</td>
<td>Theory of Pattern-making and Foundry Practice, 2</td>
</tr>
<tr>
<td>Mechanical Drawing, I. 10</td>
<td>Mechanical Drawing, II. 10</td>
</tr>
<tr>
<td>Laboratory Practice in Wood Shop.</td>
<td>Laboratory Practice in Wood Work.</td>
</tr>
<tr>
<td>Bench and Lathe Work, 10</td>
<td>Pattern-making, 10</td>
</tr>
</tbody>
</table>

## SOPHOMORE YEAR.

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytical Geometry, III. 4</td>
<td>Calculus, IV. 3</td>
</tr>
<tr>
<td>Descriptive Geometry, 4</td>
<td>Kinematics, 4</td>
</tr>
<tr>
<td>Physics, I. 4</td>
<td>Physics, II. 4</td>
</tr>
<tr>
<td>Elementary Design and Mechanical Drawing, III. 8</td>
<td>Lectures on Machine Shop Practice, 1</td>
</tr>
<tr>
<td>Laboratory Practice in Forge Shop.</td>
<td>Elementary Design and Mechanical Drawing, IV. 8</td>
</tr>
<tr>
<td>Iron and Steel Forging, 10</td>
<td>Laboratory Practice in Machine Shop.</td>
</tr>
<tr>
<td>Machine Work and Vise Work in Metal, 10</td>
<td></td>
</tr>
</tbody>
</table>

## JUNIOR YEAR.

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculus, V. 3</td>
<td>Heat, 4</td>
</tr>
<tr>
<td>Graphical Statics, 2</td>
<td>Strength of Materials, 4</td>
</tr>
<tr>
<td>Chemistry, I. 4</td>
<td>Chemistry, II. 4</td>
</tr>
<tr>
<td>Analytical Mechanics, 4</td>
<td>Theory of Machine Design, 2</td>
</tr>
<tr>
<td>Metallurgy, 3</td>
<td>Magnetism and Electricity, 3</td>
</tr>
<tr>
<td>Drawing Room: Machine Design. 6</td>
<td>Drawing Room: Machine Design. 6</td>
</tr>
<tr>
<td>Chemical Laboratory, 4</td>
<td>Chemical Laboratory, 4</td>
</tr>
</tbody>
</table>
### SENIOR YEAR

<table>
<thead>
<tr>
<th><strong>First Semester</strong></th>
<th><strong>Second Semester</strong></th>
</tr>
</thead>
</table>

*Drawing Room:* Valve and Machine Design, 10.

*Drawing Room:* Thesis Work, 10.
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 1898, 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, 1896-97, except that such students, working under the course in the Register for 1896-97, as do 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. Students who bring a certificate from any reputable school of having completed the work ordinarily laid out in the eighth grade, will be admitted without examination. Others will be examined in Arithmetic, Grammar, United States History, Reading and Spelling.

PREPARATORY DEPARTMENTS OF INSTRUCTION.

MATHEMATICS.

I. 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. Constructive Geometry. Second semester. 4. The object of this course is to familiarize the student with the fundamental facts of Plane and Solid Geometry and the Geometric conceptions employed in the courses in demonstrative Geometry which follow.

V. Geometry. (Plane.) First semester. 4.

VI. Geometry (Plane and Solid.) Second semester. 4. Much original work will be required in courses V and VI.

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, four 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 in the Scientific and Philosophical courses may present one year of Biology and two of German in place of the three years of Latin. Biology comes the first year in the course, and will have two recitations per week with four hours of laboratory practice. This is the first laboratory work required, and special attention will be given to manipulation of material and to the forming of correct habits and methods of work, as this but paves the way for other laboratory practice.

III. Physiology. A practical study, recitations with laboratory work, required in the first semester, of all students. This will be made of special value to teachers, and will be made interesting and instructive through use of the specimens and apparatus in the department.

ENGLISH.

The aims of the English work as pursued in the Preparatory Department are 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 great periods in
the development of English Literature, and a knowledge of the history of the English Language.

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. Constant practice in them and essay writing will afford the means of making application of the principles introduced, of 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 pieces included in list (a). Literary history and criticism will receive special attention. Written tests will determine the value of the general knowledge gained by the cursory reading of the works included in list (b).

The student will also be lead “To know by Wholes” and to examine 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 English and American masterpieces has been selected for critical study: Julius Caesar, Macbeth, The Princess, The Vision of Sir Launfal, the Roger de Coverly Papers, Burke’s Speech on the Conciliation with America, Paradise Lost, The Flight of a Tartar Tribe, Evangeline, and The Vicar of Wakefield.

(b.) List for Reading. David Copperfield, Autocrat at the Breakfast Table, First Bunker Hill Oration, Life of Samuel Johnson, Sketch Book, Pope’s Iliad, books I, IV, and XXII, Prisoner of Chillon, Courtship of Miles Standish, and Heroes and Hero Worship.

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 the 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 over-estimated.

**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:**

**Second Semester:**
Caesar continued in connection with grammar lessons and composition exercises.

**Third Year:**

**First Semester:**
Caesar finished, selections read to the extent of four books. Cicero's Orations begun. Grammatical drill in connection with the reading and composition.
Second Semester:

Cicero's Orations and Letters, to the extent of four or five orations, including orations and letters. Composition and grammatical drill.

GERMAN.

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

1st Year. Will be devoted to a thorough study of Grammar (Joyne's Meissner's or Whitney's) with some easy prose reading, such as Hauff's Maerchen.

2nd Year. Study of Syntax, dictation, and prose reading, such as Schiller's "Der Neffe als Onkel."

Written recitations will be required every two or three weeks.

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

CIVICS AND HISTORY.

First Year:

All first year Preparatory students will in the first semester have four exercises per week in civics. The work will consist of the study of the organization of government, and will serve as an introduction to the General History of the second semester.

The second semester’s 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 first semester of 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.
## COURSE OF STUDY.

### FIRST YEAR.

<table>
<thead>
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<th>Second Semester</th>
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### SECOND YEAR.

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<td>Literature, 4.</td>
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<tr>
<td>Physics, 4.</td>
<td>Physics, 4.</td>
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<tr>
<td>*Latin or German, 4.</td>
<td>*Latin or German, 4.</td>
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</tbody>
</table>

*Latin must be taken for the Classical Course; Latin or Biology and German may be taken for other courses.
SCHOOL OF MUSIC.

The Department of Music in the University of Montana is under the direction of Mrs. Walter Whitaker, a teacher of many years successful experience both in England and America.

Instruction is given in Pianoforte and organ playing, voice culture and ballad singing, part singing and singing at sight. Very considerable progress has been made during the past year by the great majority of the pupils in the various grades. Elementary, Intermediate and Advanced Musicales, with Lectures by the Director are held at frequent intervals and are participated in by the more diligent students in the classes. This is found to be of decided benefit to pupils who otherwise might be lethargic or of careless habits of playing and singing. They are free, open to the public and are largely attended and well appreciated. The fees in the Department of Music, are quite moderate and may be had on application.
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.

2. 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 com-
ing 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 this 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, 6, 22.
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.

Two 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.
LIST OF ACCREDITED SCHOOLS.

CITY.                              SUP'T.
Helena..................................................J. E. Klock.
Butte....................................................J. P. Hendricks.
Great Falls...........................................E. O. Marsh.
Anaconda...............................................M. A. Stapleton.
Missoula..............................................J. M. Hamilton.
Dillon....................................................H. A. Hull.
Kalispell...............................................F. L. Green.
Bozeman................................................W. E. Harmon.
Miles City.............................................N. C. Titus.
DEGREES CONFERRED.

COMMENCEMENT, 1898.

The Degree of Bachelor of Arts, upon
Mrs. Ella Robb Glenny...............................Missoula, Montana.
The Degree of Bachelor of Philosophy, upon
Miss Eloise Knowles...............................Missoula, Montana.

CATALOGUE OF STUDENTS.

COLLEGIATE DEPARTMENT.

Lillian Albertha Beauchaine....................Missoula.
Zoe Bellew...........................................Missoula.
Edith May Rickford...............................Missoula.
Harold Niles Blake...............................Ft. Missoula.
Estella Bovee......................................Glendive.
Gertrude Buckhouse...............................Bitter Root.
William Oscar Craig.............................Missoula.
Fred Orville Crain...............................Great Falls.
Caroline Cronkrite................................Missoula.
Laurence Rudolph Ebert.........................Ft. Missoula.
Georgia Fenwick..................................Bonner.
Michael Flynn......................................Missoula.
Ella Robb Glenny................................Missoula.
Ethel Grant........................................River Falls, Wis.
Mabel Grant........................................River Falls, Wis.
Daniel Heyfron.................................Missoula.
Anna Alina Hollensteiner......................Lo Lo.
Bella Jamieson....................................Missoula.
May Kemp..........................................Missoula.
George Hemstead Kennett.......................Missoula.
Helene Kennett..................................Missoula.
Eloise Knowles...................................Missoula.
Lu Knowles........................................Missoula.
William Nice Landers..........................Missoula.
Dora Christine Lehsou..........................Missoula.
Sue Lewis.........................................Victor.
Mary Lewis........................................Victor.
Florence Long....................................Rossland, B. C.
Fanny Maley......................................Missoula.
Claude Jay McAllister..........................Missoula.
HELEN MCCrackin................................. Hamilton.
HONORA McCORMICK.............................. Missoula.
ESTELLA McLAin................................. Carlton.
GRACE MILLION.................................... Stevensville.
LYDIA Jimmie Mills............................. Missoula.
EDMUND MURRAY................................... Pictou, Nova Scotia.
Lois NewPort..................................... Bonner.
EDNA Parsons..................................... Missoula.
Charles Pixley.................................... Missoula.
JEANNETTE Rankin.............................. Missoula.
LULU Brainard Rathbun.......................... Missoula.
Harriett Reid.................................... Missoula.
Lloyd ReImel..................................... Hamilton.
Percy Rennick................................... Missoula.
BEULAH RheIm.................................... Missoula.
CLIFFORD Rittenour............................. Missoula.
 JOHN Ellis SedMan.............................. Missoula.
Howard Schroyder.............................. Missoula.
Guy Sheridan................................... Missoula.
Bertha Adams Simpson........................ Stevensville.
GUSTAVUS Adolphus Steward................ Ft. Missoula.
T. G. Stewart.................................... Ft. Missoula.
Allie Thompson................................ Donnan, Iowa.
Sidney Mire Ward.............................. Hamilton.
George Westby................................... Missoula.
Kathryn Wilson................................. Helena.

PREPAREATORY SCHOOL.

SOPHIA ALBERT.................................. Hall.
FREDERICK Anderson........................... Missoula.
Alice avery...................................... Stevensville.
Julia Baker...................................... Grantsdale.
Robert Bell..................................... Stevensville.
Nannie Fidelia Bell............................ Stevensville.
Oral Jay Berry................................ Drummond.
Anna Bier......................................... Missoula.
Theresa Bodeau................................ Missoula.
Ida Brandis...................................... Gibbonsville, Idaho.
Joseph Buckhouse.............................. Bitter Root.
Belle Buker..................................... Missoula.
Edmond James Calloway...................... Virginia City.
<table>
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<tr>
<td>Edith Carnegie</td>
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**SPECIAL STUDENTS.**

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FRANK LATIMER ...................................................... Grass Valley.
ANNIE LOREE ...................................................... Missoula.
ANNA CLARE MARSHALL ........................................ Missoula.
JULIUS WHITETWELL PRICE ...................................... Waukesha, Wisconsin.
GERTRUDE SLOANE .............................................. Missoula.
EVA STEPHENS ..................................................... Missoula.
ADALINE STEPHENS .............................................. Missoula.
JIMMIE STRAUGHN ............................................... Missoula.
MARY TREMBLAY .................................................. Butte City.
ALICE WOODY ...................................................... Missoula.

“SCHOOL OF MUSIC.”

JULIA BAKER .................................................... Grantsdale.
EMMA BECKWITH ................................................ Missoula.
SADIE BECKWITH ................................................ Missoula.
CAROLINE BYE .................................................... Missoula.
BESSIE CLYNICK ................................................ Bonner.
MRS. DAILY ....................................................... Missoula.
JENNIE DARBY ..................................................... Missoula.
MARY ELKOD ...................................................... Missoula.
HELEN EDWARDS ................................................ Ft. Missoula.
MARGARET EDWARDS ............................................ Ft. Missoula.
HATTIE FENWICK ................................................ Bonner.
GEORGIA FENWICK ............................................. Bonner.
NETTIE FLYNN ..................................................... Missoula.
MISS FOX .......................................................... Missoula.
GRACE HAMMOND ............................................... Bonner.
ALICE HATHEWAY ................................................ Missoula.
JESSIE HODGES .................................................... Ft. Missoula.
HARRIETT HORD ................................................ Missoula.
AGNES HUGHES ................................................ Missoula.
BERTIE HYDE ...................................................... Missoula.
MRS. INCH ........................................................ Missoula.
MILDRED JONES .................................................. Missoula.
CLARA KEITH ..................................................... Missoula.
CLARA KENNY .................................................... Missoula.
MISS KEUP ........................................................ Missoula.
PEARL LEEDEY ..................................................... Missoula.
DORA LEHSOU .................................................... Missoula.
HELEN LA CAFF ................................................ Lo Lo.
ANNA MARSHALL ................................................ Missoula.
EMILY MARSHALL ................................................ Missoula.
RECAPITULATION.

COLLEGIATE DEPARTMENT .................................................. 60
PREPARATORY SCHOOL ...................................................... 95
SPECIAL STUDENTS ......................................................... 15
SCHOOL OF MUSIC .......................................................... 47

217

COUNTED TWICE ............................................................. 14

NET TOTAL ................................................................. 203
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 the Clarkia, are open to students. The first named society is composed of young men and the second of young women. The Y. M. C. A. has an organization, and in time will exert a very salutary influence. The Athletic Association is well organized and has a large membership 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 in 1898 to Louise Hatheway.
FEES AND DEPOSITS.

Preparatory, or any College Course, per year (Matriculation Fee) .......................................................... $10.00
Physical Apparatus (deposit) per semester ........................................ 3.00
Qualitative Apparatus (deposit) per semester ............................... 5.00
Quantitative Apparatus (deposit) per semester ............................ 5.00
Assaying Apparatus (deposit) per semester .................................. 10.00
Deposit. Biological Laboratory, per semester .............................. 3.00
Deposit for Material used in Shops, per semester ....................... 5.00

THE UNIVERSITY PAPER.

During the past year the students effected an organization for the purpose of issuing a paper that should represent the literary and social life of students at the University. A board of editors was chosen, and the first issue was put out previous to commencement. The paper is named The Kaimin, an Indian word meaning "anything that is written." The paper will have a regular issue hereafter. The board of editors for the ensuing year is as follows:

Editor-in-Chief .............................................................. Charles Pixley
Literary Editors ............................................................ Ellis D. Sedman and Louise Hatheway
Local Editor ................................................................. Zoe Bellew
Exchange Editor ........................................................... Percy Rennick
Business Manager ......................................................... George 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 num-
ber of botanical specimens, fishes, insects and birds. These spec-
imens become a part of the museum material, to be used in stu-
dent classwork, as well as to represent the State's resources.

THE UNIVERSITY SILVER CORNET BAND.

During the past year the University received all the instru-
ments, some twenty in number, from the Garden City Band. This gives the University a valuable set of band instruments. An
organization was immediately effected and incorporated, under the
name of the University Silver Cornet Band. The band has made
many public appearances, and gives promise of a successful career.

Frank Esmay, Leader and Director.
Luther Reinhard, Wm. O. Craig,
Sidney Williams, George McCauley,
Fred Anderson, Wellington Rankin,
Charles Marshall, Will Dickinson,
Gilbert Heyfron, Henry Mahoney,
Wm. Jamieson, Hugh A. Graham,
Jos. Deschamps, Wm. W. White,
Otis Worden, Thos. Kemp,
Eddie Simons, J. R. Latimer,
Will Beck, Ray Stevens.

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 forma-
tion of boarding clubs. Students will not be allowed to board at
places not approved by the Faculty.
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.
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