

SCIENCE

GENERAL GUIDELINES

To graduate, a student must pass two years of laboratory science. Students are required to be enrolled in science during their freshman and sophomore years. Although only two years of science are required, all students are encouraged to take more than two years of science in order to meet all of the science standards set forth by the state of Montana. College bound students should consult the admission requirements of their prospective colleges as many require or strongly recommend at least three years of science. All science courses require a signature by a **science teacher** before registration.

Students taking two years of science:

Grade 9 Biology

Grade 10 Earth Science, Earth Science Basic, Earth Science Honors, Biology, Chemistry, Semester Chemistry, Semester Physics

Students taking three or more years of science:

Grade 9 Biology

Grade 10 Earth Science, Earth Science Honors, Biology, Chemistry, Semester Chemistry, Semester Physics

Grade 11 and 12 Full year offerings – Earth Science, Earth Science Honors, Biology, Chemistry, Organic Chemistry, Biology 1 IB, Biology 2 IB, Physics 1 IB, Physics 2 IB, Environmental Systems and Society 1 IB, Environmental Systems and Society 2 IB, Sports Medicine

Semester offerings – Semester Chemistry, Semester Physics, Forensics, Wildlife Biology, Introduction to Biotechnology.

Note: Many 11th and 12th grade courses have prerequisites, so please refer to the course descriptions.

COURSE DESCRIPTIONS

BIOLOGY

Credit: 1.0; Full year; Grade 9, 10, 11, or 12.

Course Objective: Biology is the “study of living organisms”. This course is designed to meet the minimum state and national requirements for Biology. In accordance with standards, main areas of study will include: historical developments/contributions, chemistry of life, cells, DNA, genetics & heredity, energy use in photosynthesis & cellular respiration, classification, ecology, evolution, and human systems. Biology also emphasizes lab skills, experimental design, and data analysis. As an introductory course in biology, students are prepared for college and international baccalaureate courses. Students will be introduced to various moral and environmental issues being brought to the fore by research in bioengineering and other areas of biological research. They will be provided with tools to make educated decisions regarding these new technologies and developments. Methods of study will be diversified and include labs, mini-labs, research, writing, projects, video support and possibly fieldwork to keep students actively learning.

You supply the enthusiasm and good work ethic and we will be off and running!

BIOLOGY 1 IB (HL firsts year)

Credit: 1.0; Full year; Grade 11 or 12

Note: This is the first year of a two-year IB Biology sequence. Students are welcome to take this course without continuing to the second year if they are interested in an advanced biology class and are not seeking an IB certificate.

Prerequisite: Successful completion of two years of laboratory science including earning a “C” or higher in Biology. It is recommended, but not required, to have successful completion of Chemistry.

Course Objective: This course is open to any student meeting the prerequisites and specifically meets the IB full diploma science requirement. The IB biology curriculum is designed to provide students with the conceptual framework, factual knowledge and analytical skills necessary to deal critically with the rapidly changing and expanding science of biology in the modern world. The successful student will develop experimental and statistical skills required to complete the individual investigation required in IB Biology 2. This is a rigorous, in depth, two-year biology sequence designed to be taken the junior and senior years, however students may complete year one only during junior or senior year. Biology 1 IB will cover cell biology, physiology, ecology and plant science. In addition, a required group project will be completed with another IB science class and a field trip will be taken out of state to complete required ecology lab hours.

BIOLOGY 2 IB (HL second year)

Credit: 1.0; Full year; Grade 12

Prerequisite: Successful Completion of Biology IB 1 (HL)

Course Objective: This course is open to any student meeting the prerequisites and specifically meets the IB full diploma science requirement. The Biology IB curriculum is designed to provide students with a conceptual framework, factual knowledge and analytical skills necessary to deal critically with the rapidly changing and expanding science of biology in the modern world. The successful student will develop his or her experimental and investigative skills. This rigorous, in depth, two-year

biology sequence is designed to be taken the junior and senior years. Biology 2 IB will cover biochemistry, genetics, and evolution. Additionally, all students will be required to complete a 10 hour individual investigation. To earn the IB designation on higher level courses, students must take the IB external assessments. See fee schedule and the details included in the IB portion of this handbook.

CHEMISTRY SEMESTER

Credit: .5; One semester; Grades 10, 11, or 12

Prerequisite: None

Course Objective: The semester Chemistry is an overview of the topics described in the Chemistry course as well as an introduction to laboratory design and execution. This course will emphasize conceptual understanding and an appreciation for chemistry. It will include topics such as understanding the universe, the periodic table, atomic theory, bonding and measurement.

CHEMISTRY YEAR

Credit: 1.0; Full year; Grades 10, 11, or 12

Prerequisites: Completion of Algebra 1 with a “C” or higher.

Course Objective: The goals of this chemistry course are to develop problem solving skills for everyday life and to understand the chemical interactions related to our world. This course is highly recommended for any student who wishes to continue beyond two years of science. Chemistry is the study of electrons and their interactions as they relate to matter. Chemistry units include measurement, atomic structure, bonding, chemical reactions, stoichiometry, nuclear chemistry, gas laws, thermodynamics, kinetics, equilibrium, acids and bases. Theory and practicality will be interwoven to engage students in predicting, designing, experimenting and describing the chemical interactions of everyday life. Mathematical relationships are emphasized, as well as the explanations of observed phenomena in terms of modern scientific theory. This course is recommended as an IB prep science course.

EARTH SCIENCE BASIC

Credit: 1.0; Full year; Grades 10, 11 or 12

Prerequisite: Placement is based on recommendations from instructors and counselors with reference to assessment data. The course is designed to meet the needs of students with learning disabilities, and/or novice reading abilities. **Students enrolled in basic earth science must also qualify for and be enrolled in the Reading Intervention program.**

Course Objective: A lab-based course that explores the solid earth and space systems, giving students the opportunity to discover how the dynamic earth affects their lives. Guided by the same key questions as Standard Earth Science, but designed to meet the needs of students who are at least two grade levels behind in reading. Investigations will provide opportunity for students to practice skills in the science including: asking questions, planning and carrying out investigations, interpreting data, constructing explanations and arguing from evidence. Local earth science topics will be incorporated into the curriculum wherever possible.

EARTH SCIENCE

Credit: 1.0; Full year; Grades 10,11 or 12

Prerequisite: None

Course Objective: Earth Science is a lab-based course that explores the systems of the solid earth and space systems, giving students the opportunity to discover how the dynamic earth affects their lives. Students will make connections involving human interactions with our earth systems and the environment. Our areas of study will be guided by the key questions outlined by our state standards.

- How do the major Earth systems interact?
- How do the properties and movements of water shape Earth’s surface and affect its systems?
- What is the Universe and what goes on in stars?
- How do people reconstruct and date events in Earth’s planetary history?
- What regulates weather and climate?
- How do humans depend on Earth’s resources?

Investigations will improve student skills in the science practices including: asking questions, planning and carrying out investigations, interpreting data, constructing explanations and arguing from evidence. Local earth science topics will be incorporated into the curriculum wherever possible.

EARTH SCIENCE HONORS

Credit: 1.0; Full year; Grades 10,11 or 12

Prerequisite: Completion of Biology with a “C” or higher

Course Objective : Honors Earth Science is designed to meet the needs of students with above average or college capable academic skills. The objective is to improve student science skills in preparation for upper level science classes while exploring the dynamic earth. Our core areas of study will be guided by the key questions outlined in standard Earth Science. In addition: honors will cover topics in greater depth and use higher level reading material to supplement the curriculum. Investigations will improve student skills in the science practices including: asking questions, planning and carrying out investigations, interpreting data, constructing explanations and arguing from evidence. Students will work toward more independence in all aspects of investigation and communication.

ENVIRONMENTAL SYSTEMS and SOCIETIES 1 IB (SL First Year)

This course is the PREREQUISITE for the ENVIRONMENTAL SYSTEMS and SOCIETIES 2 IB (SL)

Credit: 1.0; Full year; Grades 11 or 12

Note: This is year one of the two year IB Environmental Systems and Societies sequence designed for IB diploma and IB certificate candidates. However, students are welcome to take this course without going on to the second year if they are interested in only one year of an environmental science course.

Prerequisite: Completion of two years of lab science including earning a C or higher in Biology.

Course Objective: The intent of this course is to provide students with a coherent perspective of the interrelationships between environmental systems and societies; one that is scientific and enables the adoption of an informed personal response to the wide range of environmental issues societies around the world face. This course emphasizes the scientific method, field studies, analysis of quantitative data, and strong lab design skills. Topics to be covered are systems and models, ecosystems and ecology, biodiversity and conservation, and atmospheric systems and pollution. Students will be participating in field trips to Glacier National Park, the Flathead River, and either Newport Oregon, or Moab, Utah. Further class details can be found online at www.mscores.com.

ENVIRONMENTAL SYSTEMS and SOCIETIES 2 IB (SL Second Year)

Credit: 1.0; Full year; Grade 12

Note: This is the second year of the two year Environmental Systems and Societies IB sequence designed for IB diploma and IB certificate candidates.

Prerequisite: Successful completion of Environmental Systems and Societies IIB.

Course Objective: The intent of this course is to provide students with a coherent perspective of the interrelationships between environmental systems and societies; one that is scientific and enables the adoption of an informed personal response to the wide range of environmental issues societies around the world face. This course emphasizes the value of empirical, quantitative, and objective data in describing and analyzing environmental systems. This course also provides students with the experiences and skills necessary to quantitatively examine the environment. Field research is a REQUIRED portion of the curriculum. Topics to be covered are water and aquatic food production systems, soil systems, food production/agriculture, human systems and resource use, energy resources, natural capital, and climate change. Students will be participating in field trips to Glacier National Park, the VoAg Center, and either Newport, Oregon or Moab, Utah to complete ecological field studies. Further class details can be found online at www.mscores.com.

FORENSICS

Credit: .5; One semester; Grades 11 or 12

Prerequisite: Successful completion of two years of lab science, including Biology. This course cannot be used to meet the two year laboratory science requirement.

Course Objective: Forensic science is the application of science to those criminal and civil laws that are enforced by police agencies in a criminal justice system. In this course, students will employ the disciplines of chemistry, physics, biology and psychology into the understanding of how forensic science is used in the analysis of the many types of evidence that may be recovered during a crime investigation. Typical areas of study include: Hair analysis, Fingerprint Analysis, DNA fingerprinting, Psychological Profiling, Conventional Serology, Blood Spatter Analysis and Toxicology. The scientific method will be emphasized throughout the course.

INTRODUCTION TO BIOTECHNOLOGY

Credit: 0.5; FVCC Credit: 3 for BIOB 105; One Semester; Grade 11 or 12;

Prerequisites: Successful completion of 2 years of lab science. This course cannot be used to meet the two year laboratory science requirement.

Course Objective: Introduction to Biotechnology is a dual credit course offered in conjunction with Flathead Valley Community College. This course will provide the student an overview of the fascinating field of biotechnology through case studies, lab experiments and projects. This course includes an introduction to the rapidly-expanding field of biotechnology and its application to human and veterinary medicine, agriculture, biofuels, bioremediation, and bioinformatics. Laboratory exercises will include basic laboratory safety, measurement methods, microbial cell culture, bacterial transformation, and other core skills used in the biotechnology laboratory.

ORGANIC CHEMISTRY

Credit: 1.0; Full year; Grades 11 or 12

Prerequisite: Successful completion of two years of laboratory science including earning a "C" or higher in semester Chemistry or yearlong Chemistry. This course cannot be used to meet the two year laboratory science requirement.

Course Objective: The course is for students who have a need or desire to acquire a knowledge of elementary organic chemistry and whose interests are in agriculture, forestry, engineering, home economics, nursing, dentistry, pharmacy, veterinary, human medicine, criminology and forensic science. This course is designed to prepare students for college Organic Chemistry. Students will learn the laboratory techniques used in Organic Chemistry research. They will also do analysis, syntheses, and research investigation using both instrumental analysis such as nuclear magnetic resonance, infrared spectrometry, and wet chemistry. Students will gain a strong understanding of the names, properties, reactions and synthesis of the functional groups such as alkanes, alkenes, aromatics, alcohols, and ethers.

PHYSICS SEMESTER

Credit: .5; One Semester; Grades 10,11 or 12

Prerequisite: None

Course Objective: This semester physics class is intended to give a brief survey of the world around us from the physical standpoint. The semester physics class is an overview of the topics described in the yearlong physics class. This class will emphasize conceptual understanding and an appreciation for physical science.

PHYSICS 1 IB (SL First Year)

Credit: 1.0; Full Year; Grades 11 or 12

Note: *This is year one of the two year IB Physics sequence designed for IB diploma and IB certificate candidates. However, students are welcome to take this course without going on to the second year if they are interested in only one year of a challenging physics class.*

Prerequisites: Successful completion of two years of lab science and completion of Algebra 2 with a “C” or better or currently enrolled in Algebra 2.

Course Objectives: This course is designed to meet the needs of college bound students and will fulfill the IB full diploma science requirement. It is a course designed to provide students with the conceptual framework, factual knowledge, and analytical skills necessary to deal with diverse physics topics and their applications in the dynamic, modern world. Topics studied include measurements and uncertainties, mechanics, thermal physics, waves, circular motion and gravitation, and energy production. Laboratory work is emphasized and requires structured labs, research papers and experimental projects. Instruction is student-centered with cooperative learning as well as teacher direction, thus offering the student a college-level physics experience. Only those students choosing to enroll in both years of IB Physics, will sit for the standard level exam, offered in the spring of the second year. An interdisciplinary group project helps students realize that all scientific disciplines share the common goal of understanding how the world works, and that scientists can work together on problems to discover solutions to a common goal. Students entering the program may be given a summer assignment, which will review basic mathematical skills and introduce concepts of analytical reasoning.

PHYSICS 2 IB (SL Second Year)

Credit: 1.0; Full Year; Grade 12

Note: This is year two of the two year Physics IB sequence designed for IB diploma and IB certificate candidates.

Prerequisites: Successful completion of Physics 1 IB.

Course Objectives: This course is designed to meet the needs of college bound students and will fulfill the IB full diploma science requirement. It is a course designed to provide students with the conceptual framework, factual knowledge, and analytical skills necessary to deal with diverse physics topics and their modern world. Topics studied include atomic and nuclear physics, energy and power, and astrophysics. Laboratory work is emphasized and requires structured labs, research papers, and experimental projects. Instruction is student-centered with cooperative learning as well as teacher direction, thus offering the student a college-level physics experience. Only those students choosing to enroll in both years of IB Physics, will sit for the standard level exam, offered in the spring of the second year. An interdisciplinary group project helps students realize that all scientific disciplines share the common goal of understanding how the world works, and that scientists can work together on problems to discover solutions to a common goal. Students entering the program may be given a summer assignment, which will review basic mathematical skills and introduce concepts of analytical reasoning.

SPORTS MEDICINE

Credit: 1.0; Full year; Grades 11 or 12

Materials Fee: \$15 lab fee

Prerequisite: 1.0 credit of required Physical Education, Health, and successful completion of 2.0 credits of Lab Science, including Biology.

Course Objectives: This year-long course in applied Anatomy and Physiology is directed towards students interested in the Allied Health Professions. Students interested in careers such as nursing, athletic training, physical therapy, orthopedic medicine, emergency care, and general health care will be benefited by this course.. This class covers functional anatomy and physiology, emergency procedures, skeletal-muscular injury evaluation, assessment and treatment, internal medicine, preventative taping and bracing techniques, special medical testing and treatment, athletic sport conditioning, nutrition, drugs and supplements, and much more. The students will be exposed to skeletal-muscular injury management, sport event emergency coverage, medical professional guest speakers, taping labs, and orthopedic clinic visits. Students will also participate in anatomy dissections. This college prep course is challenging, but rewarding for its students. Students in this course will also have the opportunity to be certified in First Aid, CPR and AED use. This college prep course is challenging, but rewarding for students.

WILDLIFE BIOLOGY

Credit: .5; One semester; Grades 11 or 12

Prerequisites: Successful completion of two years of lab science, including Biology. This course cannot be used to meet the two year laboratory science requirement.

Course Objective: The overall objective for this course is to introduce students to the world of wildlife biology as it relates to flora, fauna, and management. Students will explore, through active research and guest presenters, wildlife management history, habitat components, population estimation, plant and animal identification, big game management, critical species management, and local perceptions of wildlife and their value.