

# SCIENCE

## **Biology/Honors Biology (offered yearly)**

### **Grade level: 9 or 10 Required**

The Biology courses are designed to provide a strong background in the discipline of biology with a focus on the core themes of cells, genetics, evolution, and ecology. Specific topics to be covered include: biochemistry, cell structure and function, respiration and photosynthesis, inheritance patterns, bacteria and viruses, populations, and the environment. The use of scientific methods, current research, and critical thinking skills are integrated throughout the year. Course coverage includes independent research, collaborative projects and presentations, case study discussions and innovative approaches to scientific topics. Biology and Honors Biology will be taught concurrently. Students seeking honors credit will be required to complete additional independent course work.

## **Human Anatomy & Physiology (offered next in 2020-21)**

### **Grade level: 11-12 Elective**

#### **Prerequisite: Biology**

Human Anatomy and Physiology covers the names and functions of the body systems and their associated organs. The course will enable students to expand and explore their knowledge of the human body while applying that understanding to their own health and the issue of health in our society. This course is for students interested in a career in health related fields, as well as those curious about their own bodies work. This course will involve memorization of organs, body parts, and some basic medical terminology; it will also include the dissection of a fetal pig.

## **Environmental Science (offered next in 2021-22)**

### **Grade level: 11-12**

#### **Prerequisite: Biology Elective**

Environmental Science covers current events, trends, and controversies involving human interaction with the environment. Topics discussed will include ethical decision making based in all scientific backgrounds: geology, biology, ecology, chemistry, & environmental studies. There is a focus on class discussion and learning the steps to making your own informed decisions about the events around you.

**AP Biology (offered next in 2021-22)****Grade level: 11-12 Elective****Prerequisite: Honors Biology, summer coursework.**

AP Biology is structured around four big ideas (Evolution, Energy Processes, Information, and Interactions) which encompass the core scientific principles, theories, and processes governing living organisms and biological systems. Students will experience science as a process with an emphasis on labs and application of core concepts. Students will become knowledgeable and responsible citizens in understanding biological issues that could potentially impact their lives. Upon completion of this course, all students are required to take the AP Biology Exam.

**Chemistry (offered yearly)****Grade level: 10-11 Required (if not taking Hon Chem)****Prerequisite: Algebra I**

Chemistry is designed to provide strong background knowledge in the discipline of chemistry with an emphasis on the core themes of matter, energy, atomic theory, chemical reactions and bonding, solution stoichiometry, gas laws, and acid-base concepts. Chemistry will focus on utilization of the laboratory for experimentation and investigation, developing critical thinking, analyzing and compiling data, and collaborative projects and presentations.

**Honors Chemistry (offered yearly)****Grade level: 10-11 Required (if not taking Chemistry)****Prerequisite: Algebra II (completed or concurrent), department recommendation, summer coursework.**

Honors Chemistry is a laboratory science course designed to investigate a variety of topics, including the properties of matter, energy, atomic theory, chemical reaction types, chemical bonding, solution stoichiometry, thermochemistry, gas laws, acid-base concepts, and chemical equilibrium. Emphasis is on concept development and the utilization of the laboratory for experimentation, knowledge acquisition, and development of critical thinking skills. Students should have strong math skills including a working knowledge of dimensional analysis, graphing, and algebra. Due to the rigorous pace and depth of the material covered in Honors Chemistry, students are expected to be highly motivated and come to class prepared for discussion and laboratory. This course is designed to provide a strong introduction to chemistry and builds a foundation for advanced studies in chemistry.

**AP Chemistry (offered next in 2020-21)****Grade level: 11-12 Elective****Prerequisite: Honors Chemistry, department recommendation, and summer coursework.**

Equivalent to one year of college chemistry, AP Chemistry expands on concepts learned in honors chemistry with an indepth study of topics such as atomic structure, chemical bonding, molecular geometry, states of matter, kinetics, equilibrium thermodynamics, electrochemistry, nuclear chemistry, and organic chemistry. Students will further apply the scientific method to chemical problems, analyze and interpret data logically and effectively, and physically manipulate laboratory equipment and apparatus in order to observe and record data.

**Engineering Design (offered next in 2021-22)****Grade level: 11-12 Elective**

Engineering Design is for students interested in designing solutions to needs and problems. Students learn about practices, concepts, and core ideas by working towards understanding and solving current and historical problems in engineering. Students develop need-based “innovation projects” throughout the year and present them to key stakeholders including students, mentors, and professionals. Students learn skills in Computer Aided Design (CAD), rapid prototyping, and simulation while being introduced to manufacturing, civil, and mechanical engineering fields.

**Physics (offered yearly)****Grade level: 11-12 Elective****Prerequisites: Algebra II (completed or concurrent)**

Physics is a natural science in which students learn about laws that govern motion, gravity, forces, energy, waves, sound, light, and electronics. Students learn physics through a combination of mathematical, graphical, and laboratory problem-solving techniques.

**AP Physics C: Mechanics (offered yearly)****Grade level: 11-12 Elective****Prerequisite: AP Calculus (completed or concurrent), department recommendation, and summer coursework.**

AP Physics is a rigorous and fast-paced calculus-based physics course that is the equivalent of a college semester course in mechanics. Topics covered include kinematics, Newton’s laws of motion, work, energy, power, linear momentum, circular motion, rotation, oscillations, and gravitation. This course is intended for students who are interested in science majors in college. Students must

independently learn calculus over the summer, and successful completion of summer homework and assessment of calculus knowledge at the beginning of the course are required for continued enrollment.

**Independent Research (offered yearly)**

**Grade level: 11-12 Elective**

**Prerequisite: Teacher Recommendation/Approval**

Students will investigate a scientific topic and report their findings using several media formats. The course is intended to expose the participant to all phases of independent research through an apprenticeship with a teacher-mentor. This is an advanced class meant to prepare students for future scientific training at an industrial or university level. A mutually agreed upon topic will be investigated throughout the course and is limited only by the resources available and the expertise of the teacher-mentor. Additionally, students will teach a topic related to their field to an appropriate audience (i.e., a class at Marshall). The course is open to students who have demonstrated an intense interest in a field of study.