

SCIENCE DEPARTMENT

The O'Fallon Township High School science curriculum offers a variety of courses designed to meet the needs of all students. Students are required to complete two years of science by the end of their junior year. The two required years of science must include one Life science course and one Physical Science course. After meeting this requirement, students are encouraged to take additional science courses.

Many OTHS science courses have prerequisites. Consult the course descriptions for prerequisites and descriptions for all science courses.

FIRST-YEAR SCIENCE COURSES

Life Science Courses: Biology 1, Honors Biology 1

Physical Science Courses: Physical/Earth Science

SECOND-YEAR SCIENCE COURSES

Life Science Courses: Biology 1, Integrated Life Science

Physical Science Courses: Physical/Earth Science, Geology 1, Chemistry 1, Honors Chemistry 1, Physics 1

ADDITIONAL SCIENCE COURSES

(These courses may be taken after meeting the two-year science requirement, assuming other prerequisites are met.)

Life Science Courses:

Biology 1
Integrated Life Science
Environmental Science
Honors Human Anatomy & Physiology
AP[®] Biology

Physical Science Courses:

Introduction to Astronomy (1 semester only)
Forensics (1 semester only)
Physical/Earth Science
Geology
Chemistry 1
Honors Chemistry 1
Chemistry 2
AP[®] Chemistry
Physics 1
Physics 2
AP[®] Physics 1
AP[®] Physics 2

PHYSICAL SCIENCE COURSE OFFERINGS

PHYSICAL/EARTH SCIENCE

NCAA

Full Year (Physical) 1/2 credit per semester

Open to all levels

General

Prerequisite: None

Physical/Earth Science is a course designed to give introductory students an understanding of basic Physical Science concepts. The topics of motion, energy and matter will be taught and reinforced by analyzing the interaction of these concepts with Earth Science. The Earth Science concepts of planetary systems, weather and physical processes will be related to current events and information along with the relationship humans have with the environment. Lab work will be inquiry based and used to reinforce the concepts presented in class. This framework will create a comprehensive understanding of and appreciation for the physical workings of the Earth.

GEOLOGY 1

NCAA

Full Year (Physical) 1/2 credit per semester

Open to sophomores, juniors and seniors

General

Prerequisite: Successful completion of a first-year life science course

Geology 1 is designed for average science students who have an interest in the earth and earth processes. The course will focus on four general areas of study: Earth Materials, Interpretation of the Earth's Surface, Physical Geology, and Earth's History. The course has been designed to be a hands-on, activity-centered course with the teacher supplying background information. During the course, the students will use various techniques (specimen study, maps, in-class activities, etc.) to reinforce information about geologic principles.

INTRODUCTION TO ASTRONOMY

NCAA

1 Semester

1/2 credit

Open to juniors and seniors

General

Prerequisite: Successful completion of the two-year Science graduation requirement.

This course surveys in one semester the history of astronomy, the nature of planetary systems (particularly our own Solar System), as well as the nature and evolution of stars, galaxies, and the Universe. Big ideas/concepts covered in this course include:

- *Why does the Moon have phases?*
- *Why does the Earth have seasons?*
- *Why did ancient people believe the Earth is not moving?*

- *Why are there different kinds of planets in our Solar System?*
- *How do stars shine?*
- *How do stars evolve and die?*
- *What are black holes?*
- *How do we know our Universe is expanding?*
- *Why is the sky dark at night?*
- *What is the nature of "dark matter" and "dark energy"?*
- *Is there life elsewhere in the Universe?*

FORENSICS

NCAA

1 Semester

1/2 credit

Open to juniors and seniors

General

Prerequisite: Successful completion of the two-year Science graduation requirement.

This course surveys in one semester the science of crime scene forensics. Concepts in biological sciences and physical sciences will be integrated into the study of Forensic Science. Big ideas/concepts covered in this course include:

- *Introduction – history, evidence, crime scenes, etc.*
- *Fingerprints*
- *Hairs and Fibers*
- *Questioned Docs*
- *Blood and DNA*
- *Processing Crime Scenes*

CHEMISTRY 1

NCAA

Full Year (Physical) 1/2 credit per semester

Open to sophomores, juniors and seniors

General

Prerequisite: Successful completion of a first-year life science course AND completion of Advanced Algebra 1 with a grade of "C" or better, Accelerated Algebra 1 with a grade of "C" or better, or Honors Algebra 1 with a grade of "C" or better

Chemistry 1 is a one-year course dealing with the study of matter, its forms, and changes. It is a highly-recommended college preparatory course. The

Chemistry 1 curriculum is structured to enhance students' problem-solving skills. Areas covered include matter, atomic structures, equations, mass relationships, gas laws, solution chemistry and qualitative analysis. A significant amount of class time will be spent performing laboratory activities designed to reinforce these concepts. These activities are also designed to improve critical thinking and science reasoning skills. A strong mathematics background is critical to student success in this course.

HONORS CHEMISTRY 1**NCAA**

Full Year (Physical) 1/2 credit per semester

*Open to sophomores, juniors and seniors***Honors***Prerequisite: Successful completion of a first-year life science course AND Honors Algebra 1 or Honors Geometry with a grade of "B" or better*

Honors Chemistry 1 is a first-year chemistry course designed to prepare students who plan on taking AP Chemistry. Honors Chemistry 1 encompasses all areas of study and laboratory work as Chemistry 1, but with a much more accelerated level of difficulty and pace. Expanded areas of study including acid-base equilibria and gas laws require the student to have a much greater depth in problem solving ability and higher mathematical skills. Additional areas covered include introduction to nuclear chemistry, organic chemistry, and reaction kinetics.

CHEMISTRY 2**NCAA**

Full Year (Physical) 1/2 credit per semester

*Open to juniors and seniors***Enriched***Prerequisite: Completion of Chemistry 1 with a grade of "C" or better OR Chemistry 1 teacher consent*

Chemistry 2 is designed for students who have successfully completed Chemistry 1. It is a continuation of Chemistry 1 with an emphasis on the following concepts: solution chemistry, chemical kinetics, chemical equilibrium, acid base chemistry, gas laws, nuclear chemistry, thermochemistry, organic chemistry, and qualitative analysis. Active learning strategies will be employed throughout the course. Inquiry-based laboratory activities will reinforce all topics covered. Students will be introduced to APA-formatting for research papers. Practical applications of chemistry will be discussed in relationship to careers in chemistry and other relevant topics.

AP[®] CHEMISTRY**NCAA**

Full Year (Physical) 1/2 credit per semester

SLU Dual Credit Course*Open to juniors and seniors***Honors***Prerequisite: Completion of Honors Chemistry 1 with a grade of "B" or better OR Chemistry 1 with a grade of "A" and Chemistry 1 teacher consent*

AP[®] Chemistry is designed to be the equivalent of the general chemistry course usually taken during the first year of college. For most students, the course enables them to undertake, as a freshman, second year work in the chemistry sequence at their institution or to register in courses in other fields where general chemistry is a prerequisite. The course is structured around the six big ideas articulated in the AP[®] Chemistry curriculum framework provided by the College Board. They are:

Big Idea 1: Structure of matter

Big Idea 2: Properties of matter—characteristics, states, and forces of attraction

Big Idea 3: Chemical reactions

Big Idea 4: Rates of chemical reactions

Big Idea 5: Thermodynamics

Big Idea 6: Equilibrium

Special emphasis will be placed on the seven science practices, which capture important aspects of the work scientists engage in, with learning objectives that combine content with inquiry and reasoning skills. AP[®] Chemistry is open to all students that have completed a year of chemistry who wish to take part in a rigorous and academically challenging course.

PHYSICS 1**NCAA**

Full Year (Physical) 1/2 credit per semester

*Open to sophomores, juniors and seniors***Enriched***Prerequisite: Completion of or concurrent enrollment in Advanced Algebra 2 or Honors Algebra 2 AND successful completion of a first-year life science course*

Physics 1 is a two-semester course exploring the workings of the physical universe. Physics 1 is a highly beneficial college preparatory course. This course is designed to prepare students who will be taking physics in college. However, due to the incorporation of higher-level thinking skills, physics will be a benefit to any student planning to attend college. Topics covered include vectors, motion, mechanics, thermodynamics, electrostatics, electric circuits, and magnetism. Labs and projects constitute a significant portion of the class. Students will be introduced to a variety of scientific equipment and tools. Successful completion of the first semester is required to continue to the second semester.

AP[®] PHYSICS 1**NCAA**

Full Year (Physical) 1/2 credit per semester

SLU Dual Credit Course*Open to juniors and seniors***Honors***Prerequisite: Completion of or concurrent enrollment in Advanced Pre-Calculus with Trigonometry or Honors Pre-Calculus OR concurrent enrollment in Honors Algebra 2 AND physics instructor consent*

AP[®] Physics 1 is a two-semester introductory college-level physics course in which students will explore science practices as they cultivate an enduring understanding of physics and the fundamental physical universe. This course is designed for students with a strong math background and an interest in pursuing a career in a science, engineering, or technology field. Topics covered include Kinematics, dynamics: Newton's Laws, circular motion and gravitation, Simple harmonic motion, impulse and momentum, work and energy, thermal physics, electrostatics, DC Circuits, and mechanical waves/sound. Inquiry based labs and projects will constitute a significant

portion of the class. Through inquiry-based learning, students will develop critical thinking and reasoning skills, as defined by the AP[®] Science Practices.

PHYSICS 2

NCAA

Full-Year (Physical) 1/2 credit per semester
Open to juniors and seniors **Enriched**
Prerequisite: Completion of AP[®] Physics 1 or Physics 1 with a grade of "C" or better

Physics 2 is a two-semester course that continues the course of study began in Physics 1. It is a highly beneficial college preparatory course and is designed for the student with an interest in math, engineering and the physical sciences. Topics include: engineering statics, fluids, harmonic motion, waves, sound and music, gravitation and astronomy, optics, mechanics, thermodynamics, electrostatics, nuclear physics, and solid-state electronics. Labs and projects constitute a significant portion of the class. Students will be introduced to a variety of scientific equipment and tools.

AP[®] PHYSICS 2

NCAA

Full Year (Physical) 1/2 credit per semester
Open to juniors and seniors **Honors**
Prerequisite: Completion of AP[®] Physics 1 OR Physics 1 with a grade of "A" and Physics instructor consent.

AP[®] Physics 2 is a two semester introductory college-level physics course which continues the course of study began in AP[®] Physics 1. Students will develop analytical and reasoning skills which to support future advanced coursework in the sciences. This course is designed for students with a strong math background and an interest in pursuing a career in a science, engineering, or technology field. Topics covered include: Thermodynamics, Fluid statics and dynamics, Electrostatics: electric force, electric field and electric potential, DC Circuits and RC Circuits, Magnetism and Induction, Geometric and physical optics, and Quantum physics: atomic and nuclear physics. Inquiry based labs and projects will constitute a significant portion of the class. Through inquiry based learning, students will develop critical thinking and reasoning skills, as defined by the AP[®] Science Practices.

LIFE SCIENCE COURSE OFFERINGS**BIOLOGY 1**

Full Year (Life) 1/2 credit per semester

NCAA*Open to all levels***General***Prerequisite: Completion of or enrollment in a math course above Introduction to Algebra*

Biology 1 is designed to provide students with introductory knowledge of fundamental biological principles and a general understanding of life. The natural progression from cells to simple organisms, to more complex organisms, and ultimately to man will be explored. Students will learn about the interrelationships of living things and their environmental adaptations. Students will also gain understanding of the significance and importance of biological concepts to human welfare. Students will complete laboratory exercises that reinforce the lecture material and stimulate their interests in biology and other sciences. Dissections are an integral and required component of this course.

HONORS BIOLOGY 1

Full Year (Life) 1/2 credit per semester

NCAA*Open to freshmen***Honors***Prerequisite: Invitation only based on IOWA or IAR science assessment and teacher recommendation AND concurrent enrollment in Honors Algebra 1*

Honors Biology I is designed to provide advanced students with a thorough understanding of biological principles and a comprehensive understanding of life. The course will cover a range of topics, including cellular structure and genetics, plant and animal classifications, microbiology, ecology, biochemistry, vertebrate and invertebrate anatomy, and plant structure and function. This course utilizes discussion, laboratory exercises, and hands-on activities all designed to stimulate interest and appreciation for biology and its importance to man.

AP[®] BIOLOGY

Full Year (Life) 1/2 credit per semester

NCAA**SLU Dual Credit Course***Open to juniors and seniors***Honors***Prerequisite: Completion of Chemistry 1 with a grade of "C" or better OR Honors Chemistry 1 with a grade of "C" or better AND Honors Biology 1 with a grade of "B" or better or Biology 1 with a grade of "A"*

AP[®] Biology is a two semester introductory college-level biology course for the above average student. The course is designed to allow students to cultivate their understanding of biology through a variety of means including direct instruction, case studies, and inquiry-based laboratory investigations. Topics covered include evolution, ecology, cellular processes — energy and communication, genetics, information transfer, and

systems interactions. Students will develop the ability to ask questions, make observations and predictions, design experiments, analyze data, and construct arguments in a collaborative setting, where they direct and monitor their progress. Focus is placed on reading technical literature, scientific writing, improving study skills, and development of critical thinking.

The course provides the necessary background for success on the Advanced Placement Biology Examination and SAT science subject area test.

HONORS HUMAN ANATOMY & PHYSIOLOGY

Full Year (Life)

1/2 credit per semester

NCAA**SWIC Dual Credit Course***Open to juniors and seniors***Enriched***Prerequisite: Completion of Honors Biology 1 with a grade of "C" or better OR Biology 1 with a grade of "B" or better OR Biology 1 teacher recommendation*

Human Anatomy & Physiology is an intensive college-preparatory course for the ambitious student interested in the medical sciences. This course will provide the average to above-average student with the vocabulary, understanding of human body functions, and critical thinking skills required in human anatomy & physiology. The laboratory work and case studies involving collaboration are designed to encourage problem solving and to reinforce the concepts presented in class. This one-year course moves through the human body system by system, focusing on both normal and abnormal functioning.

INTEGRATED LIFE SCIENCE

Full Year (Life)

1/2 credit per semester

NCAA*Open to sophomores, juniors and seniors. Students who have successfully completed Honors Human Anatomy & Physiology are not eligible for this course.**Prerequisite: None***General**

Integrated Life Science is a hands-on, laboratory-based course designed to explore the fundamental principles of the life sciences. It is designed for students seeking a life science course with less in-depth analysis of topics than Biology 1. Students will develop an understanding of the basic life science topics, including cellular structure and function, genetics, and classification. In addition, the course will explore and integrate the more broad-based topics in the life sciences, including human anatomy/physiology and health, marine biology, animal behavior, and ecology. Integrated Life Science students will also continue to develop critical thinking and

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Candace Caveny, Department Chairperson

laboratory skills necessary for success in future science courses as well as in college coursework.

ENVIRONMENTAL SCIENCE

NCAA

Full Year (Life) 1/2 credit per semester

Open to juniors and seniors

Prerequisite: Successful completion of a first-year physical science course AND successful completion of a first-year math class.

General

Environmental Science is designed to introduce the student to the interrelationship of man and his natural environment. The course provides the student with a background study of Ecology, renewable vs. nonrenewable resources, biomes, field ecology, environmental issues, and interactions between living and non-living units of ecosystems. Calculation, evaluation, and use of basic statistics, and proper use of the scientific method are emphasized throughout the course. Semester one topics include man's environmental historical impacts, making and evaluating environmental decisions, plate tectonics, global warming, water cycle, evolution by natural selection, biodiversity, mineral cycling, energy transfer and food webs, succession, and land biomes. Semester two topics include aquatic biomes, population ecology, human population trends, maintaining biodiversity/extinction trends, water management/ pollution, air pollution, ozone depletion, land use/land management, sustainable agriculture, mining and nonrenewable resources, renewable resources as alternatives, landfill and hazardous waste, human health concerns and biohazards, and environmental politics.

LAB ASSISTANT AND INDIVIDUALIZED INSTRUCTION

SCIENCE LABORATORY ASSISTANT

1 Semester 1/4 credit per semester

Open to juniors and seniors

2 Semester Limit

Prerequisite: Successful completion of advanced-level course works in the field of science in which the student will assist AND written consent from the instructor who they will assist

No more than two laboratory assistants will be assigned to any science teacher during a given period. Student laboratory assistants will be required to aid the teacher in preparation for instruction in the classroom and to assist the teacher in the preparation, organization, maintenance, distribution, and storage of laboratory materials and equipment.

Note: In order for a student to be a Lab Assistant, it must be their sixth class.

INDEPENDENT RESEARCH STUDY

1 Semester

NCAA

1/2 credit per semester

Open to juniors and seniors

2 Semester Limit

Prerequisite: Completion of advanced-level course work in the field of science in which the student will work AND written consent from the instructor who will oversee the work and assign a grade

No more than one individualized instruction student will be assigned to any science instructor during a given semester. Students will be required to select a topic for scientific study and research. Laboratory work **MUST** be a component of the study. The assigned science instructor must approve the topic and project for research during the first four weeks of the semester. A written contract, specifying work to be completed and criteria for grading, report to the instructor summarizing conclusions reached through their research. After grading, a copy of this report will be placed on file with the department chairperson and will be available for perusal by any member of the science department