



# 2022-23 Science Department



*Strong Values*  
**STRONG WOMEN**

# SCIENCE

## FRESHMEN

### Required Courses

Biology I (*1 credit*) or  
Honors Biology (*1 credit*)

## SOPHOMORES

### Required Courses

Chemistry (*1 credit*) or  
Honors Chemistry (*1 credit*)

### Elective Courses

Environmental Science (*.5 credit*)  
Genetics (*.5 credit*)  
Human Anatomy (*.5 credit*)  
Independent Science Research (*.5 credit*)  
Marine Sciences (2023-24) (*.5 credit*)  
Zoology (2022-23) (*.5 credit*)

## JUNIORS

### Required Courses

Physics (*1 credit*) or  
Honors Physics (*1 credit*)

### Elective Courses

Environmental Science (*.5 credit*)  
Genetics (*.5 credit*)  
Human Anatomy (*.5 credit*)  
Independent Science Research (*.5 credit*)  
Marine Sciences (2023-24) (*.5 credit*)  
Zoology (2022-23) (*.5 credit*)  
ACC Forensic Science (*1 credit*)  
ACP Astronomy (*1 credit*)  
ACP Human Anatomy & Physiology (*1 credit*)  
AP/ACP Biology (*1 credit*)  
AP/ACP Chemistry (*1 credit*)

## SENIORS

### Required Courses

### Elective Courses

Environmental Science (*.5 credit*)  
Genetics (*.5 credit*)  
Human Anatomy (*.5 credit*)  
Independent Science Research (*.5 credit*)  
Marine Sciences (2023-24) (*.5 credit*)  
Zoology (2022-23) (*.5 credit*)  
ACC Forensic Science (*1 credit*)  
ACP Astronomy (*1 credit*)  
ACP Human Anatomy & Physiology (*1 credit*)  
AP/ACP Biology (*1 credit*)  
AP/ACP Chemistry (*1 credit*)  
AP/ACP Physics (*1 credit*)

# SCIENCE

## GOAL STATEMENT

The goal of the Science Department's curriculum is to encourage our students to explore Science, Technology, Engineering, and Mathematics (STEM) from freshman through senior year. Students at St. Joseph's Academy consistently use state-of-the-art laboratory equipment, probe ware with data collection, and graphing analysis software in conjunction with their laptops to investigate principles and develop their knowledge and mastery of science. Inquiry-based labs and direct manipulation of biological specimens are also used as STEM learning endeavors. Project-based design and engineering investigations are part of several classes from freshman through senior year. Courses for students that are particularly oriented toward current STEM initiatives include *ACC Forensics*, *AP/ACP Physics*, *ACP Anatomy and Physiology*, *AP/ACP Biology*, *Zoology*, *Marine Sciences*, *Independent Science Research*, *AP/ACP Chemistry*, and *Genetics*.

## OBJECTIVES

1. Students will observe and study the physical and biological aspects of the environment.
2. Students will search for relationships among the observations.
3. Students will develop curiosity about why these relationships exist.
4. Students will apply acquired facts and concepts to new situations.
5. Students will communicate new knowledge clearly and precisely.
6. Students will develop an appreciation and respect for the surrounding world.
7. Students will accept responsibility for acting on new knowledge.

## REQUIREMENTS

Three credits of lab science are required for graduation. These required credits will be met by taking *Biology* in the freshman year, *Chemistry* in the sophomore year and *Physics* in the junior year.

Note: Any junior or senior choosing to take more than 1.0 science credit during any given school year must obtain departmental approval.

## HONORS COURSE ELIGIBILITY POLICY

Students are recommended for Honors courses based upon their math and science grades, teachers recommendation, and department approval. Students will take a math skills test to be granted access into *Honors Chemistry*, *AP/ACP Chemistry*, *Honors Physics*, *AP/ACP Physics*, and *ACP Astronomy*. To be eligible for ACC or ACP courses, students must meet the criteria of the Dual Credit programs through SLU or UMSL.



# SCIENCE

## SCIENCE COURSE DESCRIPTIONS

### SC BIOLOGY

Grade 9 1 credit Year-long course

This year-long lab-based course includes preparation for college, the study of cell structures and their functions, transport through membranes, energy and metabolism of cells, photosynthesis, cellular respiration, cellular reproduction, heredity DNA, gene expression, technology, bacteria and viruses, plants, ecology, and the theory of evolution. Instructional methods include laboratory experiments, lectures, projects and research, discussion, and an emphasis on problem-solving skills.

*Prerequisite: none*

### SC HONORS BIOLOGY

Grade 9 1 credit Year-long course

This course is designed as an intensive first year biology course in preparation for college. It will include a more comprehensive study of the concepts of biological principles than the general biology course as well as additional topics. Instructional methods include laboratory experiments, lectures, discussion, and an emphasis on problem-solving skills. Projects and research will be included.

*Prerequisite: departmental approval*



### SC CHEMISTRY

Grade 10, 11 1 credit Year-long course

This course is designed as a first year chemistry course in preparation for college. It is an introduction to the science of chemistry, its concepts and methods of theory, states and properties of matter, chemical periodicity, equation writing, the mole concept, chemical bonding, and other selected topics. The cycling of materials and the impact of human chemical activities on the environment will also be addressed. The subject matter is developed through lecture, class discussion, demonstrations, laboratory, and problem-solving experiences.

*Prerequisite: Biology or Honors Biology*

### SC HONORS CHEMISTRY

Grade 10, 11 1 credit Year-long course

This course is designed as an intensive first year chemistry course in preparation for college. It will include a more comprehensive study of the concepts of chemistry principles and properties than the general chemistry course. Instructional methods include laboratory experiments, lectures, discussion and an emphasis on mathematical formulation, and problem-solving skills. The course work will include an independent project.

*Prerequisite: Biology or Honors Biology and departmental approval which includes a test on math skills*

# SCIENCE

## SCIENCE COURSE DESCRIPTIONS

### SC PHYSICS

Grade 11

1 credit

Year-long course

This is a laboratory-based course which will cover the topics of motion, acceleration, vectors, forces, Newton's laws, the laws of conservation of energy and momentum, and circular/rotational mechanics. Energy topics in electricity, electrical circuits, and light optics will be included. Students will investigate the properties of liquids, gases, static electricity, magnetism, sound, light, and optics. The use of LabPro interface with Logger Pro software for lab data acquisition and analysis will be emphasized. The course will also study wave properties as they apply to the phenomena of sound, light, and optics.

*Prerequisite: Chemistry or Honors Chemistry*

### SC HONORS PHYSICS

Grade 11

1 credit

Year-long course

This is a laboratory-based course which will cover the topics of motion and kinematics, vectors, forces, Newton's laws, as well as the laws of conservation of energy and momentum, and circular/rotational mechanics. Topics in electricity, such as static electricity, current electricity, circuit analysis, and electromagnetic induction will be investigated. Wave mechanics, sound, light, and light optics will also be investigated through a lab-based, investigative approach. An independent project or research investigation will be completed. The use of LabPro interface with Logger Pro software for lab data acquisition and analysis will be emphasized.

*Prerequisite: Chemistry or Honors Chemistry (preferred), as well as concurrent enrollment in Honors Algebra II, and departmental approval, which includes a test on math skills*

### SC ENVIRONMENTAL SCIENCE

Grade 10, 11, 12

.5 credit

Semester course

Environmental science is the study of patterns and processes in the natural world and their modification by human activity. This course examines skills necessary to address the environmental issues we are facing today by examining the scientific principles and the application of those principles to natural systems. This course will survey some of the many environmental science topics at an introductory level, ultimately considering the sustainability of human activities on the planet.

*Prerequisite: Biology or Honors Biology and departmental approval*



# SCIENCE

## SCIENCE COURSE DESCRIPTIONS

### SC GENETICS

Grade 10, 11, 12

.5 credit

Semester course

This course will include an in-depth study of heredity, DNA, and gene expressions. Topics such as the Human Genome Project, genetically engineered organisms, and biotechnology will be an integral part of this course. Genetic counseling and the ethics concerning these issues will also be explored. Lab work will be included in this course. Priority will be given to seniors who register for this course.

*Prerequisite: Biology or Honors Biology and departmental approval*

### SC HUMAN ANATOMY

Grade 10, 11, 12

.5 credit

Semester course

*May take Human Anatomy or ACP Human Anatomy and Physiology, but not both.*

This course is designed to increase knowledge of the human body. The students will explore the structure and function of the human body by examining different human body systems. Dissection of an animal, typically a cat, is an integral part of this course.

*Prerequisite: departmental approval*



### SC INDEPENDENT SCIENCE RESEARCH

Grade 10, 11, 12

.5 credit

Semester course

This course is intended for students who are carrying out scientific research for an entry into the regional Intel International Science and Engineering Fair, for presentation at a research conference, or for another science program or competition. Students will be supervised by their mentor and be required to maintain a logbook of their research work. The student, with the advice of their mentor, will develop a schedule of deadlines. All projects require students to design an experiment or device that meets certain requirements; included in this is the gathering of background research to better focus the project. This course is scheduled as a zero hour; however, students generally meet once a week at a mutually agreed upon time, not necessarily during zero hour, with their mentor to discuss their process and progress.

*Prerequisite: departmental approval*



# SCIENCE

## SCIENCE COURSE DESCRIPTIONS

### SC MARINE SCIENCE *Offered 2023-24*

Grade 10, 11, 12

.5 credit

Semester course

This course is designed to increase the student's knowledge of the oceans and ocean life. Students will investigate topics related to the ocean such as properties of water, waves and currents, plants, animals, and ecosystems, as well as the interaction between humans and the ocean. Laboratory work and research skills will be included in this course. Priority will be given to seniors who register for this course.

*Prerequisite: Biology or Honors Biology and departmental approval*

### SC ZOOLOGY *Offered 2022-23*

Grade 10, 11, 12

.5 credit

Semester course

This is a one-semester course in which students will study the various biological aspects of animal life class by class. Evolution, body systems, physiology, ecology, behavior, and reproduction will be addressed. Laboratory work will include identification and dissection of preserved specimens. Field study and research will also be an integral part of the curriculum. Priority will be given to seniors who register for this course.

*Prerequisite: departmental approval*



### SC ACC FORENSIC SCIENCE

Grade 11, 12

1 credit

Year-long course

Forensic Science is a year-long course designed to enable students to acquire the knowledge and skills of solving crimes through the use of scientific techniques and inquiry. The lab-based course will include laboratory investigations in the study of physical evidence, examination of the crime scene, fiber and hair analysis, drugs, forensic toxicology, types of microscopes, forensic serology, DNA, trace evidence, fingerprints, blood splatter, entomology, anthropology, and document examination.

*Prerequisite: 3.0 GPA and departmental approval*

*Registering for college credit is optional for this course.*

*Students have the opportunity to earn 3 college credits for this year-long course through SLU: FRSC 2600 Survey of Forensic Science*

# SCIENCE

## SCIENCE COURSE DESCRIPTIONS

### SC ACP HUMAN ANATOMY AND PHYSIOLOGY

Grade 11, 12

1 credit

Year-long course

*May take ACP Human Anatomy and Physiology or Human Anatomy, but not both.*

This course is designed to present an in-depth coverage of the structures and functions of the human body. Lab dissections of a cat is an integral part of this course. Students anticipating careers in biological sciences or medical fields, as well as students interested in increasing their understanding of the human body, should find this course beneficial.

*Prerequisite: 3.0 GPA, Biology or Honors Biology, and departmental approval*

*Registering for college credit is optional for this course.*

*Students have the opportunity to earn 4 college credits for this year-long course through UMSL:*

*BIOL 1131 Human Physiology and Anatomy*

### SC ACP ASTRONOMY

Grade 11, 12

1 credit

Year-long course

This college credit astronomy course will utilize algebra and trigonometry to explore the fundamental concepts of astronomy. Topics will include: the celestial motions, planets and the formation of the solar system, stars and stellar evolution, galaxies, and cosmology. Advanced laboratory techniques, data analysis, and use of technology will play a critical role throughout the course.

*Prerequisite: 3.0 GPA, Chemistry or Honors Chemistry, prior or current enrollment in Algebra II, Advanced Algebra II, or Honors Algebra II, and departmental approval which includes a test on math skills*

*Registering for college credit is optional for this course.*

*Students have the opportunity to earn 3 college credits for this year-long course through UMSL:*

*ASTRONOMY 1001 Cosmic Evolution Introduction to Astronomy*

### SC AP/ACP BIOLOGY

Grade 11, 12

1 credit

Year-long course

This year-long biology course will engage the learner in the topics of molecules and cells, heredity and evolution, organisms, and populations. These three areas have been subdivided into major categories with percentage goals specified for each. The two main goals of AP/ACP Biology are to help students develop a conceptual framework for modern biology and an appreciation of science as a process. The ongoing knowledge explosion in biology makes these goals even more challenging. The course will aim to provide students with the conceptual framework, factual knowledge, and analytical skills necessary to deal critically with the rapidly changing science of biology. Laboratory work is an integral part of this course.

*Prerequisite: 3.0 GPA, Biology or Honors Biology (preferred), and departmental approval*

*Taking the AP exam, Biology, is optional for this course.*

*Registering for college credit is optional for this course.*

*Students have the opportunity to earn 4 college credits for this year-long course through UMSL:*

*BIOL 1012 General Biology (3 credits) and BIOL 1013 General Biology Laboratory (1 credit)*



# SCIENCE

## SCIENCE COURSE DESCRIPTIONS

### SC AP/ACP CHEMISTRY

Grade 11, 12

1 credit

Year-long course

AP Chemistry is a year-long course designed for students who are interested in pursuing a STEM-related degree program, including pre-health fields and engineering. The course will review and add depth to concepts covered in chemistry, and then add new topics that are typical of two semesters of a college general chemistry course. Advanced laboratory techniques, data analysis, and use of technology will play a critical role throughout the course. Topics covered will include advanced chemical reactions, thermochemistry, electronic structure, bonding theory, intermolecular forces, equilibrium, and kinetics. This is a rigorous class that will require 5-8 hours a week of outside work, including a summer packet that will review 3 chapters of material learned in Honors Chemistry. Both the recommended Advanced Placement chemistry curriculum and UMSL's Introduction to Chemistry curriculum are followed throughout the year. Up to five hours of college credit may be earned through UMSL's Chem 1111 Introduction to Chemistry I. Up to ten hours of college credit may be earned on the AP test for Chemistry I and Chemistry II, depending on the student's score.

*Prerequisite: 3.0 GPA, Honors Chemistry, current or prior enrollment in Honors Physics or AP/ACP Physics, Honors Algebra II or AP/ACC Calculus, and departmental approval which includes a test on math skills.*

*Taking the AP exam, Chemistry, is optional for this course.*

*Registering for college credit is optional for this course.*

*Students have the opportunity to earn 5 college credits for this year-long course through UMSL: CHEM 111 Introduction to Chemistry I*

### SC AP/ACP PHYSICS

Grade 12

1 credit

Year-long course

This second full year of physics is an introductory college-level course. It will utilize advanced algebra and trigonometry to deeply explore the essential concepts of physics: mechanics, force interactions, change and conservation, harmonic motion, wave phenomena, sound, and light. Advanced laboratory techniques, data analysis, and use of technology will play a critical role throughout the course.

*Prerequisite: 3.0 GPA, Honors Chemistry, Honors Physics, Honors Algebra II or AP/ACC Calculus, and departmental approval which includes a test on math skills.*

*Taking the AP exam, Physics I: Algebra Based, is optional for this course.*

*Registering for college credit is optional for this course.*

*Students have the opportunity to earn 4 college credits for this year-long course through UMSL:*

*PHYSICS 1101 Basic Physics I (3 credits)*

*PHYSICS 1101L Basic Physics I Laboratory (1 credit)*