

**Academy of Our Lady of Mercy
Lauralton Hall**

**SCIENCE DEPARTMENT
Course Descriptions 2012-2013**

The Science Department requires that all students take a minimum of three credits of high school science; most students take four credits and some students take five credits.

Students must have a minimum final average of A (93) to move from CP1 to Honors. To remain in an Honors level course, students must maintain at least a C+ (77) average.

(5111) Newtonian Physics Honors **Year** **1 Credit**
(Prerequisite: Math 411 or Math 421 taken concurrently)

This is an in-depth physics course, which is designed to develop a working vocabulary and a sound foundation in the major divisions of physics. This course includes the interpretation and the application of mathematical concepts needed to understand the laws of physics. Central to the course is the establishment of proper experimental procedure and proficient interpretation and reporting of observed phenomena. Concepts are reinforced through hands-on activities, virtual and actual demonstrations and one lab per cycle.

(5122) Newtonian Physics (CP1) **Year** **1 Credit**

This algebra based, introductory physics course is designed to introduce the student to fundamental physics concepts and how they apply to real-world situations. Topics include force and motion, energy, thermodynamics, and fluids. Concepts are reinforced through hands-on activities, virtual and actual demonstrations and one lab per cycle.

(5123) Newtonian Physics (CP2) **Year** **1 Credit**

This course explores the same basic concepts as Science 5122. This course is designed to provide more individualized instruction through simulations and web-based learning with an emphasis on vocabulary and concepts. There is one lab per cycle.

(5231) Chemistry Honors **Year** **1 Credit**
(Prerequisite: Science 5111)

This course covers the fundamental principles and classical laws of chemistry. Students master concepts through utilizing skills learned in Science 5111: mathematical interpretation, analysis and experiential lab activities. Scientific reading and writing skills are reinforced throughout the course. Lab work is included in every cycle.

(5232) Chemistry (CP1) **Year** **1 Credit**
(Prerequisite: Science 5122)

This course is a study of the structure and interaction of matter. Emphasis is placed on reinforcement of skills learned in physics: problem solving, vocabulary, formula writing, chemical equations, nomenclature and the atomic theory. The course includes one lab per cycle, which allows for the observation and study of chemical processes.

(5233) Chemistry (CP2) **Year** **1 Credit**
(Prerequisite: Science 5123)

This course covers the same basic topics and skills in chemistry as Science 5232, with more emphasis on descriptive chemistry and less emphasis on mathematical concepts. One lab is included every cycle.

(5311) Cellular and Molecular Biology Honors **Year** **1 Credit**

(Prerequisite: Science 5231)

This introductory course in biology emphasizes the molecular and cellular processes of organisms through utilization of skills and concepts learned in Science 5231. In addition, it includes an exploration of biological kingdoms, ecology, genetics and evolution. Participation in discussion and proficiency in analytical scientific writing are expected. Concepts presented in lecture are reinforced in one lab per cycle.

(5332) Cellular & Molecular Biology (CP1) **Year** **1 Credit**

(Prerequisites: Science 5122 and Science 5232)

This comprehensive exploration of cellular biology includes such topics as cell transport, cell respiration, photosynthesis, protein synthesis, genetics and evolution. Students build on skills and concepts learned in chemistry. The lab serves to reinforce topics covered during the cycle.

(5333) Cellular & Molecular Biology (CP2) **Year** **1 Credit**

(Prerequisites: Science 5123 and Science 5233)

This course covers the same basic concepts and skills as Science 5332. The course is designed to provide more individualized instruction with an emphasis on biological vocabulary and concepts. Course content is reinforced through lab activities and demonstrations.

(5511) Advanced Biology - UConn ECE **Year** **1 Credit**

(Prerequisite: Science 5311)

Three general areas of study include molecules and cells, heredity and evolution, and organisms and populations. Students are typically responsible for two chapters per week of science reading, and thus make a commitment to extended homework time. The course includes extended lab time. Students may elect to take this course for UConn credit.

(5401) Physics Advanced Placement **Year** **1 Credit**

(Prerequisites: seniors: Math 431 or Math 432 and a minimum final average of B (83) in Science 5111 or a minimum final average of 95 in Science 5122)

juniors: must be currently enrolled in or have completed math 431 and have attained a minimum final average of B (83) in Science 5111 or a minimum final average of 95 in Science 5122.)

As part of the advanced placement program, AP Physics is designed to be the equivalent of a college introductory course. The general areas of study include mechanics, heat, kinetic theory and thermodynamics, and electricity and magnetism, as well as wave theory and modern particle physics. Students further the mastery of concepts learned in Science 5111, with an integration of concepts from Chemistry and Biology. Concepts presented in lecture are reinforced in one lab per cycle to cover lab work included on the advanced placement exam. Students are required to take the Advanced Placement examination in the spring.

(5421) Anatomy and Physiology Honors **Year** **1 Credit**

(Prerequisite: Science 5311) Open to seniors.

This advanced biology course is designed for students planning to major in science or enter a premedical program. The course consists of a detailed study of the structure and function of the human systems and stresses biochemical mechanisms. Lab work is reinforced with lab practical exams. Dissection, virtual dissection and data-collection technology by all students is required.

(5422) Anatomy and Physiology (CP1) **Year** **1 Credit**
(Prerequisite: Minimum final average of C+ (77) in Science 5332, or minimum final average of B+ (87) in Science 5333.) Open to seniors.

This course is designed for students with an interest in continuing their study of biology, or students who plan to major in an allied health field. The course concentrates on the function of the human systems with an emphasis on homeostasis and regulation. Lab work reinforces concepts presented in class and is designed to relate body structure and function. Virtual dissection and data-collection technology is explored and actual dissection is required by all students.

(5431) Introduction to Forensic Science (Honors) **Year** **1 Credit**
(Prerequisite: Science 5311) Open to seniors.

This advanced forensic science course is the application of science to the examination of physical evidence obtained in the investigation of a crime scene. This course covers many topics such as crime scene analysis, collection of physical evidence, firearm analysis, DNA analysis, blood typing and spatter analysis, fingerprints, hair and fiber analysis, toxicology and pathology. Both the lecture and laboratory emphasize the role of forensic science within the criminal justice system. Lab work is reinforced with lab practical exams. When possible, guest lectures by forensic professionals supplement the class.

(5432) Introduction to Forensic Science (CP1) **Year** **1 Credit**
(Prerequisite: minimum final average of a C+ (77) in Science 5332 or a minimum final average of 85 in Science 5333.) Open to seniors.

This course is the application of science to the examination of physical evidence obtained in the investigation of a crime scene. This course covers many topics such as crime scene analysis, collection of physical evidence, firearm analysis, DNA analysis, blood typing and spatter analysis, fingerprints, hair and fiber analysis, toxicology and pathology. Both the lecture and laboratory emphasize the role of forensic science within the criminal justice system. When possible, guest lectures by forensic professionals supplement the class.

(5441) Environmental Science Advanced Placement **Year** **1 Credit**
(Prerequisite for seniors: minimum final average of C+ (77) in Science 5311, or minimum final average of B+ (87) in Science 5332)
(Prerequisite for juniors: may only be taken concurrently with Science 5311)

As part of the advanced placement program, AP Environmental Science is designed to be the equivalent of a one-semester college introductory natural resources course taught over the entire high school year. The course is designed to provide students with the content and skills needed to understand the various interrelationships in the natural world, to identify and analyze environmental problems and to propose and examine solutions to these problems. Course content encompasses human population dynamics, interrelationships in nature, energy flow, resources, environmental quality, human impact on environmental systems and environmental law. Students are required to take the Advanced Placement examination in the spring.

(5481) Chemistry Advanced Placement **Year** **1 Credit**
(Prerequisites: Minimum final average of B (83) in Science 5231)

This course is designed to provide a foundation for more advanced courses in chemistry. Topics include atomic theory, the physical and chemical behavior of gases, liquids, solids, and solutions, properties of some of the more familiar elements and their compounds, quantitative measurements illustrating the laws of chemical combination and equilibrium in solutions and qualitative reactions of the common cations and anions. Concepts presented in lecture are reinforced in one lab per cycle. Students are required to take the Advanced Placement examination in the spring.

(5461) Environmental Explorations Honors **Year** **1 Credit**
(Prerequisites: Science 5231 or Science 5232. Students are expected to complete a brief questionnaire over the summer to assist in determining their area of interest prior to ordering textbooks.) Open to seniors.

This inquiry-based course allows students to experience the environmental research process through which scientific understandings are formed and continually revised. Students discover for themselves the multifaceted nature of scientific research. By studying problems relevant to their communities, they discover interconnections between science and society. Students may select one of four key environmental topics of study (invasive species, watershed dynamics, toxicity, or microbiology) in which to develop research skills, design and conduct research-based environmental experiments, participate in mock scientific symposiums, and enhance their understanding of scientific content and the scientific process.

(5471) Physics 3D: Engineering Honors **Year** **1 credit**
(Prerequisites: Concurrent or subsequent to Science 5401 or a minimum average of A (93) in Science 5111) Open to juniors and seniors

Moving beyond the blackboard . a whole new dimension exists beyond the 2D world experienced in prior physics courses. This is a course where the world of sciences collides to apply scientific understanding to the creation, design, and construction of multiple projects. Students apply engineering skills to the principles learned in physics, chemistry and biology to forensics, accident reconstruction, building pumpkin catapults, hot air balloons, an electronic nose, headspace technology, and many more.

(5522) Marine Biology (CP1) **Semester** **.5 credit**
(Prerequisites: Science 5332 of minimum final average of 70 in Science 5333) Open to seniors.

Students dive into an exploration of diverse marine habitats and the myriad of life forms that call these places home.

(5451) Genetics Honors **Semester** **.5 credit**
(Prerequisite: Science 5311) Open to seniors.

This course covers the basic principles of genetics. Topics include Mendelian inheritance, gene mapping, molecular genetics, regulation of gene expression, population genetics, and the genetics of cancer. Upon completion, students should be able to demonstrate a broad understanding of genetics and the principles of heredity.

(5452) Genetics (CP1) **Semester** **.5 credit**
(Prerequisite: Minimum final average of C+ (77) in Science 5332, or minimum final average of B+ (87) in Science 5333.) Open to seniors.

This course covers the basic principles of genetics. Topics include Mendelian inheritance, gene mapping, molecular genetics, regulation of gene expression, population genetics, and the genetics of cancer. Upon completion, students should be able to demonstrate a broad understanding of genetics and the principles of heredity.

(5541) Sports Medicine Honors **Semester** **.5 credit**
(Prerequisite: Science 5231) Open to juniors and seniors.

This course provides an opportunity for the study and application of the components of sports medicine including but not limited to sports-related careers, prevention of athletic injuries, recognition, evaluation, and the immediate care of athletic injuries, rehabilitation and management skills, emergency procedures, nutrition, sports psychology, human anatomy and physiology, therapeutic modalities and therapeutic exercises.

(5542) Sports Medicine (CP1)

Semester

.5 credit

(Prerequisite: Science 5232, or minimum final average of C- (70) in Science 5233.) Open to juniors and seniors.

This course provides an opportunity for the study and application of the components of sports medicine including, but not limited to, sports-related careers, prevention of athletic injuries, recognition, evaluation, and the immediate care of athletic injuries, rehabilitation and management skills, emergency procedures, nutrition, sports psychology, human anatomy and physiology, therapeutic modalities and therapeutic exercises.

(5532) Food Science & Technology (CP1)

Semester

.5 credit

(Prerequisite: Science 5122 or a minimum final average of C-(70) in Science 5123.) Open to juniors and seniors.

This course parallels the classic kitchen chemistry course on the college level. It is designed to be an experimental and hands-on approach to applied chemistry (as seen in cooking). Cooking may be the oldest and most widespread application of chemistry and recipes may be the oldest practical result of chemical research. Students participate in cooking experiments to illustrate some chemical principles including extraction, denaturation, and phase change.

(5919) Laboratory Assistant

Semester 1

.25 credit

(Prerequisite: Department approval.) Open to juniors and seniors

Each science teacher is assigned a student who assists the teacher with lab preparation. The student assists with lab setup, prep, and clean up and, if available, the student may also assist during the lab period as a facilitator. Responsibilities may include time before or after school. Pass/Fail grading.

(5929) Laboratory Assistant

Semester 2

.25 credit

(Prerequisite: Department approval.) Open to juniors and seniors

Each science teacher is assigned a student who assists the teacher with lab preparation. The student assists with lab setup, prep, and clean up and, if available, the student may also assist during the lab period as a facilitator. Responsibilities may include time before or after school. Pass/Fail grading.