SCIENCE

Graduation Requirement: three credits of high school science

Core classes: offered at honors, college prep, and foundations levels

Earth Systems (9th grade) → Biology (10th grade)

In the junior and senior year, GSA offers alternating years of science courses. A small number of junior and senior courses are offered each year.

2018-2019

Physics Honors Physics	year	Physics options for students planning to pursue any medical, engineering or scientific career, including nursing
Integrated Physical Science Foundations Physics Through Technology	year year	Two physics options for students planning to go to technical school
AP Biology	year	For students interested in advanced study of life sciences
AP Environmental Science Environmental Science	year	For students interested in local and global environmental issues
Marine Ecology Research Honors	year	For students interested in marine ecology and authentic scientific research opportunities
Anatomy and Physiology A Anatomy and Physiology B	semester	For students going into the medical field
Marine Science A Marine Science B	semester	For students interested in the sea around us and the life within
Astronomy A Astronomy B	semester semester	For juniors and seniors who've already passed biology

2019-2020

Chemistry Honors Chemistry	year	For students planning to pursue any medical or scientific career, including nursing and engineering
Chemistry Foundations Science Through Technology	year year	Two science options for students planning to go to technical school
Forensics A Forensics B	semester semester	For students interested in solving crimes using science
AP Biology	year	For students interested in advanced study of life sciences
AP Environmental Science	year	For students interested in local and global environmental issues
The Maine Environment A The Maine Environment B	semester	For students interested in learning about their local environment
Astronomy A Astronomy B	semester semester	For juniors and seniors who've already passed biology

400 EXPLORING EARTH SYSTEMS, 9 (1 credit)

Prerequisites: None.

This freshmen science course explores interactions between the geosphere, atmosphere, hydrosphere, and biosphere. This course will integrate chemistry, physics, biology, and earth science while investigating issues of relevance to everyone. Lab work, fieldwork, and analysis of data will be important components of this course.

401 EARTH SYSTEMS FOUNDATIONS, 9 (1 credit)

Prerequisites: None.

Foundations of Earth Systems is designed to strengthen basic skills and stimulate interest in the sciences through an exploration of interactions between the geosphere, atmosphere, hydrosphere, and biosphere. Lab work, fieldwork, and analysis of data will be important components of this course.

405 EXPLORING EARTH SYSTEMS HONORS, 9 (1 credit)

Prerequisites: Must be enrolled in or have completed Algebra I Honors or Algebra II Honors.

This challenging freshmen science course will be an exploration of interactions between the geosphere, atmosphere, hydrosphere, and biosphere. This course will integrate chemistry, physics, biology, and earth science while investigating issues of relevance to everyone. Lab work, fieldwork, and analysis of data will be important components of this course. Students may be required to conduct independent research. Exploring Earth Systems Honors goes into greater detail in each topic and is more math-intensive than Exploring Earth Systems.

420 BIOLOGY, 10 (1 credit)

Prerequisites: Exploring Earth Systems or Exploring Earth Systems Honors or Earth Systems Foundations with teacher recommendation.

This course is designed to provide students with a survey of the science of biology, covering ecology, evolution, and cell biology, including photosynthesis, cellular respiration, and genetics. Lab work reinforces classroom study. Emphasized skills include reading for understanding of content, data organization and analysis, use of lab equipment, use of the internet for scientific research, and scientific reasoning.

425 BIOLOGY HONORS, 10 (1 credit)

Prerequisites: Exploring Earth Systems or Exploring Earth Systems Honors.

This course is designed to provide students with a survey of the science of biology. Areas of study include: ecology, the cell, photosynthesis, cellular respiration and division, reproduction, heredity, evolution and classification of organisms from each of the phyla. Biology Honors students will be expected to complete a research presentation and additional readings, as well as to read at an independent level and to be personally responsible for their work planning and budgeting of time. Biology Honors goes into greater detail on each of the topics than Biology. Lab work is coordinated with and reinforces classroom study.

428 AP BIOLOGY (1 credit)

Prerequisites: Biology or Biology Honors or teacher recommendation. Chemistry is required. Students who have not had a full year of chemistry will need to do an in-depth chemistry review the summer prior to taking AP Biology.

This college-level biology course covers the same areas of study as the basic biology courses with the understanding that students who take it will be prepared for the AP Biology exam.

433 PHYSICS THROUGH TECHNOLOGY, 11-12 (1 credit)

Prerequisites: Algebra I or Algebra 1 Foundations or Algebra I Honors

This course is activity oriented. Units are designed to help students understand that physics is used to help solve everyday problems by constructing devices to better serve our needs. Topics of study will be measuring devices, heat and temperature, properties of solids, liquids and gases, laws of motion, momentum, mechanical

energy like rotational and circular systems, electricity and magnetism principles used in circuits, motors and generators and hydraulic systems.

436 FORENSICS A 11-12 (½ credit) – Not offered 2018-19
438 FORENSICS B, 11-12 (½ credit) – Not offered 2018-19
Prerequisites: Biology or Biology Honors or Biology Foundations. 436 is NOT a prerequisite for 438, but is strongly recommended.
Forensics may be taken in the fall and/or spring semester(s). It will incorporate skills acquired in biology, chemistry, and physics while learning techniques used by FBI and local police crime scene technicians. Topics covered may include: the history of forensics, crime scene analysis, physical evidence, famous cases, hair and fiber analysis, fingerprinting, DNA, foot and tire prints, fingerprinting, chemical detection, blood analysis and patterns, ballistics, handwriting analysis, facial reconstruction, anatomy, and fire and accident reconstruction. Along with hands on labs skills, students will be solving mock crimes, requiring students to think, analyze and imagine possible scenarios. Students will be required to work individually on research projects and in teams when analyzing mock crime scenes.

437 MARINE SCIENCE A, 11-12 (½ credit)
439 MARINE SCIENCE B, 11-12 (½ credit)
Prerequisites: Biology , Biology Honors or Biology Foundations. Note that 437 is NOT a prerequisite for 439: Marine Science may be taken in the fall or the spring semester, or as a full year course.
Students will be building on information learned in biology and chemistry and will be required to complete independent presentations as well as read at an independent level. It will incorporate marine biology, marine geology, and oceanography, and may include many of the following topics during the course of the year: the study of organisms, their environment from the high water mark to the deep oceans, their interactions and classifications, examination of how coastlines are created and how they change over the course of the years and seasons, exploration of ocean currents, tides, coasts, salinity and ocean chemistry, sediments, continental margins and ocean basins, tsunamis, ocean bottom exploration, marine resources, environmental concerns, atmospheric and ocean circulation and weather phenomena created by the oceans. The first and second semester cover different information.

442 CHEMISTRY, 11-12 (1 credit) – Not offered 2018-19
Prerequisites: Biology or Biology Honors and Algebra I or Algebra I Honors
This is a laboratory and math intensive course for any student with an interest in chemistry. Students should be comfortable with Algebra and problem-solving. Students will learn the principles of chemistry through a mixture of laboratory, discussion, team-learning, and lecture formats. Topics covered include atomic structure, the states of matter, chemical names and formulas, chemical reactions, stoichiometry, the nature of energy, gas laws, electron structure and bonding, solution chemistry, and acids and bases. Laboratory investigations reinforce material covered in the class. Student evaluation will be based primarily upon reports, group work, quizzes, and tests.

443 CHEMISTRY FOUNDATIONS, 11-12 (1 credit) – Not offered 2018-19
Prerequisites: Biology or Biology Foundations. Algebra I or Algebra Foundations or Algebra I Honors is strongly recommended
This is a laboratory course for any student with an interest in chemistry, but by itself it is not intended to prepare students for college level chemistry. Through laboratory investigations, readings and discussions, students will explore chemistry as it relates to everyday life. Topics will include atoms, elements, compounds and chemical reactions as well as pressure and temperature.

445 CHEMISTRY HONORS, 11-12 (1 credit) – Not offered 2018-19
Prerequisites: Biology or Biology Honors. Students must also have successfully completed Algebra I or Algebra I Honors.
This is a laboratory problem-solving course for Honors students with a serious interest in chemistry. Students enrolled in this course should be very comfortable with algebra. This course is faster paced and covers more content

than Chemistry. Students in this course will learn the principles of chemistry through a mixture of laboratory, discussion, and lecture formats. Topics covered include atomic structure, chemical names and formulas, chemical reactions, stoichiometry, the states of matter, gas laws, electron structure and bonding, solution chemistry, reaction rates and equilibrium, acids and bases, oxidation-reduction reactions,
electrochemistry, and organic chemistry. Laboratory investigations and reports will review and reinforce material covered in the class. Student evaluation will be based primarily upon reports, group projects, quizzes,
and tests.

452 BIOLOGY FOUNDATIONS, 10 (1 credit)
Prerequisites: Earth Systems Foundations or teacher recommendation.
This course explores the basic principles of biology such as taxonomy and the diversity of life, cells, genetics, anatomy and physiology, cycles of matter, ecology, and evolution. Students will be encouraged to examine real-world issues as they relate to biological concepts. Lab investigations are an important part of this course.

454 SCIENCE THROUGH TECHNOLOGY, 11-12 (1 credit) – Not offered 2018-19
Prerequisites: Biology or Biology Honors or Biology Foundations
This course is divided into four units of work over the two semesters. The program is an activity based course that will give the student technological experiences in the areas of solar energy, fluid energy, electrical and mechanical energy. Students will study scientific principles in these areas and then put these ideas into application through technological activities and working models constructed by the students.

458 THE MAINE ENVIRONMENT A, 11-12 (½ credit)) - Not offered 2018-19
459 THE MAINE ENVIRONMENT B, 11-12 (½ credit)) - Not offered 2018-19
Prerequisites: Biology , Biology Honors or Biology Foundations. (Note: 458 is not a prerequisite for 459 but is strongly recommended.) An introduction to Maine wildlife and ecology. Topics to be covered include wildlife identification and behavior, botany, habitat analysis, tracking, wildlife and forest management, and the relationship between humans and the environment. Lab and field activities are important components of this course.

461 ENVIRONMENTAL SCIENCE, 11-12 (1 credit)
Prerequisites: Biology or Biology Honors or Biology Foundations.
This course is an introduction to environmental issues with an emphasis on Maine. Topics will include population dynamics, pollution, land use, energy, climate change, renewable and nonrenewable resources, risk assessment, and solutions to environmental problems. Lab and field activities are important components of this course.

465 AP ENVIRONMENTAL SCIENCE, 11-12 (1 credit)
Prerequisites: Biology or Biology Honors and Algebra I or Algebra I Honors.
This is a rigorous interdisciplinary course that explores the interconnections between the physical environment and living organisms, the impact of human activities on our planet, and our choices for the future. Topics to be covered include population dynamics, pollution, climate change, renewable and nonrenewable resources, risk assessment, and solutions to environmental problems. Labs and field activities are designed to encourage students to critically observe environmental systems, develop and conduct well-designed experiments, and analyze and interpret data.

470 ASTRONOMY A, 11-12 (1/2 credit)
471 ASTRONOMY B, 11-12 (1/2 credit)
This course exposes students to the practices and methods of the physical science, astronomy. Students learn concepts of modern astronomy, conduct observations through sky simulations, do laboratory and field investigations, work collaboratively, use scientific methods, and make informed decisions using critical thinking and scientific problem solving. The course covers the following topics: discovering the night sky; gravitation and the motions of the planets; light, color and telescopes; our star, the sun; the solar system,

including both the terrestrial planets and the Jovian planets; moons; comets and asteroids; the lives of stars, galaxies, cosmology, exoplanets and astrobiology, and space exploration.

473 INTEGRATED PHYSICAL SCIENCE FOUNDATIONS, 11-12 (1 credit)

Prerequisites: Biology

This laboratory course provides students with broad-based, hands-on learning experience in the various disciplines of physical science. The course centers around quarter-long sections on geology, meteorology, physics and astronomy. Although there will be some mathematics, the emphasis of the course will be on the application of knowledge to solve problems and investigate scientific principles.

474 PHYSICS, 11-12 (1 credit)

Prerequisites: Biology or Biology Honors, and students must have passed or be enrolled in Algebra II or Algebra II Honors.

This is a math intensive, problem-solving course for any student with a serious interest in mathematical problem solving and the physical sciences. Students will learn from a combination of lectures, reading, labs and problem solving. Topics to be discussed will include concepts of mechanics including motion, forces, momentum, energy and energy transfer as well as heat, light, electricity and magnetism, relativity, and quantum theory.

475 PHYSICS HONORS, 11-12 (1 credit)

Prerequisites: Biology or Biology Honors, and students must have successfully completed or be enrolled in Algebra II or Algebra II Honors.

This is a math intensive, problem-solving course for any Honors student with a serious interest in mathematical problem solving and the physical sciences. This course covers more content and goes at a faster pace than Physics. For example, vector operations in Physics will be limited to simpler cases, while in Honors Physics trigonometry will be required. Students will learn from a combination of lectures, reading, labs, and problem solving. Topics to be discussed will include concepts of mechanics including motion, forces, momentum, energy and energy transfer, as well as heat, light, electricity and magnetism, relativity, and quantum theory.

480 ANATOMY AND PHYSIOLOGY A, 11-12 (1/2 credit)
481 ANATOMY AND PHYSIOLOGY B, 11-12 (1/2 credit)

Prerequisites: Biology

This course, which may be taken for one or two semesters, is designed for those wishing to enter any health related profession or anyone generally curious about the human body. Students study most of the human body systems including muscular, nervous, skeletal, endocrine, cardiovascular, respiratory, digestive and urinary. The course emphasizes lab work. *Note: We will dissect vertebrate specimens*.

485 MARINE ECOLOGY RESEARCH HONORS, 11-12 (1 credit)

Prerequisites: Biology

This course is about marine ecology, which is the study of the interaction between organisms and their environment. It is intended for science-oriented students who have an interest in the ocean environment and want to learn how to conduct marine research. Students learn different research methods and techniques, and there will be an opportunity to conduct independent research projects to gain a better understanding of the full scientific process. The class takes advantage of our coastal campus and bases our work at field sites close to school. Investigation of the biological and physical factors that influence different habitats is the target of study, from the critters that control the rocky shore, to the open ocean dynamics that influence planktonic communities. Students will also conduct interviews with marine scientists from around the US and visit at least one marine research facility in Maine.