SCIENCE

All Rush-Henrietta students take Science 7 (in seventh grade), Earth Science (in eighth grade), and Biology (in ninth grade) in their junior high program. Students are required to take at least one additional science course during grades 10-12. Courses can be selected based on the student's individual interests and aptitude. A variety of courses are offered within our science program of study as students may select from science elective-level, New York State Regents-level, College Board approved AP-level, and a Biomedical Project Lead the Way sequence. All of our science courses provide students with a meaningful path to learn more about science.

The Rush-Henrietta science program offers continued investigation into topics related to both life and physical sciences so that students can construct a better understanding of the world around them. Practices that are common to both scientists and engineers are emphasized in all of our science courses such as: asking questions and defining problems; using mathematical and computational thinking; constructing explanations and designing solutions; engaging in arguments from evidence; developing and using models; planning and carrying out investigations; analyzing and interpreting data; and obtaining, evaluating, and communicating information. A student-centered, laboratory-based, approach is used to help students answer questions about their world while preparing them for college and career readiness.

SCIENCE COURSES

770 Science 7

302 Earth Science (R)

322 Biology (R)

Biomedical Sciences
Project Lead the Way (PLTW)

365 Principles of Biomedical Science

369 Human Body Systems

371 Medical Interventions

372 Biomedical Innovation

Foundational Science Courses offered for grades 10-12

329 Physical Science-Chemistry

339 Physical Science-Physics

332 Chemistry (R)

342 Physics (R)

335 Chemistry (AP)

343 Physics 1 (AP)

Electives offered for grades 10-12

364 Environmental Science

362 Science & Society

370 Imaging Science

373 Digital Earth

355 Environmental Science (AP)

673 Food Science

325 Biology (AP)

366 Forensic Science I
367 Forensic Science II

Science

322 BIOLOGY (R) ❖
Grade Level: 10-12
Course Length: full year
Credits: 1.0

In this course, students study the major understandings and skills correlated to the New York State Core Curriculum Guide for the Living Environment. Units of study include Scientific Method; Genetics and Molecular Biology; Reproduction and Development; Classification and Evolution; Energy, Matter, and Organization; Maintaining a Dynamic Equilibrium; and Understanding the Environment.

Scientific reasoning, written expression, and laboratory skills will be used and assessed as part of the course. Per New York State Education Department regulations, students will be required to successfully complete 1,200 minutes of lab experience with acceptable lab reports in order to take the Living Environment Regents exam given in June of the course year.

364 ENVIRONMENTAL SCIENCE ❖
Grade Level: 10-12
Course Length: one semester
Credits: 0.5

In this course, students will have an opportunity to strengthen their problem-solving, inquiry, and critical-thinking skills as they engage in the study of environmental concepts. This is a commencement-level course as outlined by the New York State Math Science and Technology standards. Students examine the impact of humans on the air, water, soil, and life on the planet. Topics include ecosystems, pollution, land management, and biodiversity as they relate to local, real-world situations. The course has a strong lab focus and an emphasis is placed on local environmental concerns. Fieldwork in local environments is part of the laboratory experience in the course.

Prerequisite: Two credits of science (one bearing Regents credit) and one credit in Algebra I

366 FORENSIC SCIENCE I
Grade Level: 10-12
Course Length: one semester
Credits: 0.5

This course is the first in a sequence and covers a variety of biology, chemistry, and physics concepts and skills correlated to the New York State Math Science and Technology standards. Concepts include crime scene processing, fingerprint analysis, microscopic analysis of trace evidence, handwriting/document analysis, blood typing and blood spatter. Students will have an opportunity to apply physical and biological science content and skills learned in previous courses, while strengthening their problem-solving, inquiry, and critical-thinking skills through high interest topics. Laboratory activities and projects are included as part of the course work.

Prerequisite: Two credits of science (one bearing Regents credit) and one credit in Algebra I

329 PHYSICAL SCIENCE-CHEMISTRY ❖
Grade Level: 10-12
Course Length: one semester
Credits: 0.5

In this course, students will have an opportunity to strengthen their problem-solving, inquiry, and critical-thinking skills by engaging in real-world problems that involve chemistry. This commencement-level course covers a variety of chemistry concepts and skills correlated to the New York State Physical Setting: Chemistry Core Curriculum Guide. Concepts include the understanding of the structure of matter, the interaction of matter and energy, and the manipulation of the properties of matter for use in everyday materials. Students are encouraged to continue the exploration of these topics in the Regents Chemistry course. Laboratory activities are included as part of the course work.

Prerequisite: Two credits in science (one bearing Regents credit) and one credit in Algebra I

339 PHYSICAL SCIENCE-PHYSICS ❖
Grade Level: 10-12
Course Length: one semester
Credits: 0.5

In this course, students will have an opportunity to strengthen their problem-solving, inquiry, and critical-thinking skills by engaging in real-world problems that involve physics. This commencement-level course covers a variety of physics concepts and skills correlated to the New York State Physical Setting: Physics Core Curriculum Guide. Concepts include forces and motion, work and energy, and alternative energy sources. Students are encouraged to continue the exploration of these topics in the Regents Physics course. Laboratory activities and projects are included as part of the course work.

Prerequisite: Two credits in science (one bearing Regents credit) and one credit in Algebra I

362 SCIENCE & SOCIETY
Grade Level: 10-12
Course Length: one semester
Credits: 0.5

This course allows students to integrate both new and previously learned physical and biological science knowledge and skills and apply them to real-world situations. Units of study include The Ethics of Science, Food Science, Human Impact on our Environment, and Energy Uses & Solutions. This is a commencement-level course as outlined by the New York State Math Science and Technology standards. Scientific literacy will be emphasized through analysis and discussion of science in the news. Use of technology, inquiry, analysis, communication, and debate will be explored and applied. Laboratory activities and projects are included as part of the course work.

Prerequisite: Two credits of science (one bearing Regents credit) and one credit in Algebra I

673 FOOD SCIENCE
Grade Level: 10-12
Course Length: full year
Credits: 1.0 (science credit OR elective credit)

This course engages students in the exploration of the science behind the food that we eat. How does the human body use carbohydrates and proteins? Why are vitamin supplements sometimes necessary? What do farmers and manufacturers consider when handling food as it travels from the ground to our dinner tables? What role does technology play in helping to provide people around the world with safe, healthy food choices? Students will participate in hands-on laboratory activities and apply basic scientific principles to explore these and other questions. This would be a good course for students who want to explore careers in health sciences or nutrition-related careers.

332 CHEMISTRY (R) ❖
Grade Level: 10-12
Course Length: full year
Credits: 1.0

This is a course in which students learn about the theory and applications of chemistry in the context of their relationships to society and the world. Concepts such as atomic structure, periodic law, bonding, behavior of matter, acids and bases, organic chemistry, and nuclear chemistry are presented in a format that heavily emphasizes student lab work, problem-solving, and decision-making about the impact of chemistry on their lives. These topics are correlated to the New York State Core Curriculum Guide for Physical Setting: Chemistry. This course is intended for students with solid math, reading, writing, and problem-solving skills. Per New York State Education Department regulations, students are required to successfully complete 1200 minutes of lab experience with acceptable lab reports in order to take the Physical Setting: Chemistry Regents exam given in June of the course year.

Prerequisite: Two Regents credits in science; one credit in Algebra I and concurrent enrollment in Geometry

342 PHYSICS (R) ❖
Grade Level: 10-12
Course Length: full year
Credits: 1.0

This course consists of five major units correlated to the New York State Core Curriculum Guide for Physical Setting: Physics. These units are mechanics, energy, waves, electricity and magnetism, and modern physics. This course is intended for students with solid math, reading, writing, and problem-solving skills. There is an emphasis on extensive problem-solving using algebra and trigonometry. Per New York State Education Department regulations, students will be required to successfully complete 1,200 minutes of lab experience with acceptable lab reports in order to take the Physical Setting: Physics Regents exam given in June of the course year.

Prerequisite: Two Regents credits in science; one credit each in Algebra I and Geometry

325 BIOLOGY (AP) ❖
Grade Level: 11-12
Course Length: full year
Credits: 1.0

This course is equivalent to an introductory college-level class in Biology. The following topics are studied: chemistry of life, cells, cellular energetics, heredity, molecular genetics, evolutionary biology, homeostasis, cell communication, and ecology. The class includes lectures, AP required laboratory exercises, and rigorous homework. The Advanced Placement exam as administered by the College Entrance Examination Board must be taken in May.

Prerequisite: Two Regents credits in science with successful completion of Regents Biology and Regents Chemistry

335 CHEMISTRY (AP) ❖
Grade Level: 11-12
Course Length: full year
Credits: 1.0

This course is equivalent to an introductory college-level class of chemistry. Students will be required to use higher level problem-solving techniques and math skills. Successful completion of this course requires a major time commitment to do the course work and meet the AP laboratory requirement. The Advanced Placement exam as administered by the College Entrance Examination Board must be taken in May.

Prerequisite: Successful completion of Regents Chemistry with successful completion or concurrent enrollment in Algebra II

355 ENVIRONMENTAL SCIENCE (AP) ❖
Grade Level: 10-12
Course Length: full year
Credits: 1.0

This course is equivalent to an introductory college-level class in Environmental Science. The following topics are studied: earth systems and resources, the living world, population, land and water use, energy resources and consumption, pollution, and global change. The class includes lectures, AP required laboratory exercises, and rigorous homework, in addition to many outdoor field experiences. The Advanced Placement exam as administered by the College Entrance Examination Board must be taken in May.

Prerequisite: Successful completion of Regents Earth Science, Regents Biology, and Algebra I

343 PHYSICS 1 (AP) ❖
Grade Level: 11-12
Course Length: full year
Credits: 1.0

This course is equivalent to an introductory college-level class of physics. The focus of this course is on Newtonian mechanics, work, energy and power, and mechanical waves and sound. The topics covered are those found in a typical first semester college course in algebra-based physics. Heavy emphasis will be placed on the development of in-depth, problem-solving skills with extensive use of group work and AP required lab projects. The Physics 1 Advanced Placement exam as administered by the College Entrance Examination Board must be taken in May.

Prerequisite: Successful completion of geometry and successful completion or concurrent enrollment in Algebra II

367 FORENSIC SCIENCE II
Grade Level: 10-12
Course Length: one semester
Credits: 0.5

This course is the second in a sequence and covers a variety of biology, chemistry, and physics concepts and skills correlated to the New York State Math, Science, and Technology (MST) standards. It is an option for those students who seek additional coursework in science. Concepts include advanced blood spatter, DNA analysis, chemical analysis of toxins, entomology, anthropology, and criminal profiling. Students will have an opportunity to apply physical and biological science content and skills learned in previous courses, while strengthening their problem-solving, inquiry, and critical-thinking skills through high interest topics. Laboratory activities and projects are included as part of the course work.

Prerequisite: Two credits in science (one bearing Regents credit); one credit each in Algebra I and Forensics I

370 IMAGING SCIENCE
Grade Level: 10-12
Course Length: full year
Credits: 0.5 science, 0.5 technology

This Science, Technology, Engineering, and Math (STEM) course combines the physics of light and optics with its application in the expanding field of Imaging Science. In the first semester of this full-year course, students will study the science of light and its properties, principles of optics, the human eye and vision, and aspects of color theory. The second semester will allow students to apply their learning through the exploration of the imaging chain and the various technologies involved in observing, capturing, processing and displaying images. Students will also explore the growing importance of Imaging Science in fields such as biomedical imaging, remote sensing, imaging of display systems (such as LCDs) and others.

Dual enrollment with Monroe Community College may be offered for this course if all requirements are met. Please see page 1 for details.

Prerequisites: Two credits in science (one bearing Regents credit); one credit each in Algebra I and concurrent enrollment in Geometry

373 DIGITAL EARTH
Grade Level: 10-12
Course Length: full year
Credits: 1.0

Global Positioning Systems (GPS) and Geographic Information Systems (GIS) technology are used to investigate characteristics of various places on earth. This course takes you way beyond Google Earth. Students will develop an understanding of how this growing technology is used by a variety of industries for planning and sustainability, natural disaster preparation, natural resource use and conservation efforts. Students will investigate a topic of their choosing and build an interactive "story-map" that can build awareness of an issue or solve a problem.

Dual enrollment with Monroe Community College may be offered for this course if all requirements are met. Please see page 1 for details.

Prerequisite: Two credits (one bearing Regents credit) in science and successful completion of Algebra I.

Project Lead the Way (PLTW)

This hands-on, project-based program engages students on multiple levels, exposes them to areas of study that they typically would not pursue, and provides them with a foundation and proven path to college and career success in STEM-related fields. The PLTW courses are listed in the science and technology sections of this secondary program course guide.

Biomedical Sciences sequence courses are listed on the next page.

Pre-engineering sequence courses are listed on p. 57-58.

Project Lead the Way (PLTW)

Biomedical Science Sequence

365 PRINCIPLES OF BIOMEDICAL SCIENCES
Grade Level: 10-12
Course Length: full year
Credits: 1.0

This is a Project Lead the Way course that introduces students to the growing field of biotechnology. In this course, students will investigate the human body systems and various health conditions, including heart disease, diabetes, sickle-cell disease, hypercholesterolemia and infectious diseases. A hands-on, problem-based approach will introduce students to human physiology, medicine, research processes and bioinformatics, while emphasizing engineering principles used to design solutions to problems.

College credit is available and is an option for all students at a reduced tuition rate. To be eligible, students must meet the criteria set by the college, which includes successful completion of both the course and the end of course assessment.

Prerequisite: One Regents-bearing science credit

369 HUMAN BODY SYSTEMS
Grade Level: 10-12
Course Length: full year
Credits: 1.0

This Project Lead the Way course allows students to continue their investigation of the biotechnology concepts learned in Principles of Biomedical Sciences. Students design experiments, investigate the structures and functions within the human body, and use data acquisition software to monitor body functions such as muscle movement, reflex and voluntary action, and respiration. Through the use of various technologies and a hands-on, problem-based approach, students will develop a deeper understanding of human anatomy and physiology.

College credit is available and is an option for all students at a reduced tuition rate. To be eligible, students must meet the criteria set by the college, which includes successful completion of both the course and the end of course assessment.

Prerequisite: Principles of Biomedical Sciences

371 MEDICAL INTERVENTIONS
Grade Level: 11-12
Course Length: full year
Credits: 1.0

In this Project Lead the Way course, students investigate a variety of interventions involved in the prevention, diagnosis and treatment of disease. The course is a "how-to" manual for maintaining overall health and homeostasis in the body. Students explore how to prevent and fight infection; screen and evaluate the code in human DNA; prevent, diagnose and treat cancer; and prevail when the organs of the body begin to fail. Through real-life scenarios, students are exposed to a range of interventions related to immunology, surgery, genetics, pharmacology, medical devices, and diagnostics.

College credit is available and is an option for all students at a reduced tuition rate. To be eligible, students must meet the criteria set by the college, which includes successful completion of both the course and the end of course assessment.

Prerequisite: Principles of Biomedical Sciences, Human Body Systems

372 BIOMEDICAL INNOVATION
Grade Level: 11-12
Course Length: full year
Credits: 1.0

In this Project Lead the Way capstone course, students work through progressively challenging open-ended problems, addressing topics such as clinical medicine, physiology, biomedical engineering, and public health. Students work on an independent research project, and design innovative solutions for a health challenge people may currently be facing. Their findings will be presented to an audience of science professionals in the community.

College credit is available and is an option for all students at a reduced tuition rate. To be eligible, students must meet the criteria set by the college, which includes successful completion of both the course and the end of course assessment.

Prerequisite: Principles of Biomedical Sciences, Human Body Systems