

Science Department Curriculum

Students in grades 9 - 12 are required to study four years of science, a method of inquiry about the essential structures of our world. Students typically engage in Earth Science, Biology, Chemistry, and Physics. Additional electives are available to students who have previously demonstrated mastery in one or more of our natural sciences. The goal of the science program, in the context of a Catholic education, is to develop and encourage both an appreciation and an understanding of significant natural occurrences, facts, and events in human experience through inquiry, exploration, and hands on activities.

Earth Science

Academic II, I, H

This course covers the fundamentals of geology, meteorology, and astronomy. Students will explore major topics to include Earth's place in the universe, dynamic Earth processes, energy in the Earth system, biochemical cycles, structure and composition of the atmosphere, the interconnection of Earth's spheres, topography, and the geology of New York. Students will have the opportunity for self-assessment, develop scientific literacy, and explore historical and cultural advances in the context of science. Emphasis is placed on open-ended laboratory investigations in which the student will discover key concepts through hands-on experiences.

Earth Science Seminar H

This inquiry driven, collaborative learning environment offers advanced science students an in-depth study of Earth, our solar system, and the universe. Detailed study of Earth's formation, internal and external processes, meteorology, astronomy, and geologic landforms are intended to encourage students toward pathways in Environmental Studies. Through lecture, small group learning, and independent research, students engage with faculty mentors and one another. This course makes extensive use of self-assessment, encourages scientific literacy, and explores historical and cultural advances in the context of science.

Chemistry

Academic II, I, H

This course consists of an immersion into the fundamental principles of chemistry. Topics covered include: measurement, atomic structure, electron configuration, the periodic table, bonding, gas laws, properties of liquids and solids, solutions, stoichiometry, reactions, kinetics, equilibrium, acids and bases, and nuclear chemistry. Computer-based and traditional laboratory techniques are used to obtain, organize, and analyze data. The main goal of this program is to provide a solid foundation in the study of matter and its changes. Through many activities students will demonstrate how theory is applicable in laboratory situations. All students will discover multiple methods of problem solving techniques and demonstrate proper laboratory etiquette.

Chemistry Seminar H

This course offers science driven students an in-depth study of chemistry. Topics covered include: measurement, atomic structure, electron configuration, the periodic table, bonding, gas laws, properties of liquids and solids, solutions, stoichiometry, reactions, kinetics, equilibrium, acids and bases, and nuclear chemistry. Computer-based and traditional laboratory techniques are used to obtain, organize, and analyze data. Inquiry-based learning, projects, and analysis of published research forge a path to greater understanding and real-world applications for chemistry.

Biology

Academic II, I, H

Concrete and abstract concepts will be covered as students master vocabulary, scientists, and numerous diagrams. Students will be challenged in both information retention and critical thinking. This course takes a thematic approach to scientific skills and investigation, biochemistry, genetics, and an in-depth approach to both cellular biology and cellular processes as well as the human body systems. Laboratory exercises are designed to illustrate and reinforce course topics. Emphasis is placed on open-ended laboratory investigations in which the student will discover key concepts through hands-on experiences.

Biology Seminar H

This inquiry driven, collaborative model offers advanced students an in-depth study of Biology through lecture, inquiry based learning, research projects, oral presentations, and laboratory investigations. Topics covered include scientific skills, energy, cellular processes, genetics, animal anatomy and physiology, evolution, classification of organisms, ecology, biochemistry, analysis of research papers and current events provide students with real world application for topics covered. Direct engagement with faculty mentors helps to foster a collaborative style in order to develop a skill set demanded in post-secondary education.

Advanced Biology H

This course will be offered to high achieving Biology students who are passionate about, and interested in, pursuing a degree in a Biology related field. After applying, these students will be selected and reviewed by the Biology department for acceptance to the course. Students will develop an enhanced understanding of course material from the previous year through a more in-depth, analytical approach - rather than conceptual - to help expand inquiry and reasoning skills to apply to the material covered in Biology or Living Environment. Because this course is designed for students interested in a Biology-based focus in college, students will be given the opportunity to choose to take the AP Biology Exam at the end of the school year, while the course material will also help increase preparedness for the SAT II Biology E/M exams as well.

Physics

Academic II, I, H

Physics is the study of the material world and the rules that govern its behavior. Our course introduces students to the material world by introducing the concepts of mechanics, gravity, energy, electricity, magnetism, thermodynamics, waves and the nature of light. Each concept is tied back to concrete examples the student will encounter in his/her daily life. Laboratory exercises and experiments are utilized to make concepts tangible for the student.

Physics Seminar H

This course offers science driven students an in-depth study of five major areas of physics. Coursework includes the concepts of mechanics, gravity, energy, electricity, magnetism, thermodynamics, fluid dynamics, pressure, waves, optics, and the nature of light. Laboratory work allows the student to take an active role in discovering the laws of physics in these areas.

Additional STEM Classes

Computer Science

The Computer Science elective will provide an understanding of computer operating systems, hardware (functions, troubleshooting, and maintenance), and the basic background knowledge of coding and computer programming. Students will learn the computer language Python and will work on individual programming projects throughout the year. Other programming languages may be introduced later in the year as time and coursework allow.

This course is recommended for students serious about studying computer science, computer engineering, information technology, and computer programming. Prior knowledge and experience with computer programming languages are not required.

Digital Media

The Digital Media elective will provide an understanding in digital media applications. Students will use the Adobe Creative Suite of products, including Adobe Photoshop, Adobe

Illustrator, and Adobe InDesign. Students will develop creative media skills in these applications in order to create digital and print media. Work will be project-based throughout the year. This course is recommended for students serious about basic digital design, print production, digital layouts, and graphics development.

Advanced Computer Applications

The Advanced Computer Applications course will provide a general overview of technology and computer

applications including their advanced uses in academic and professional environments. Students will work with both a PC and their iPad throughout the year on projects, focusing on maximizing their proficiency in the Microsoft Office Suite and Google Apps. Students will also learn how to take advantage of everyday technology in order to succeed in college and future careers. This course is recommended for students who would like to grow in proficiency and experience using common applications in everyday use.

In some courses, such as Advanced Biology H, some students do elect to take the AP exam in order to earn AP credit. Some science courses, such as Physics, Environmental Studies H, Engineering H, and Astronomy H, come with an option for students to earn college credit with local colleges and universities.

Labs for Every Subject

For Earth Sciences, emphasis is placed on open-ended laboratory investigations in which the student should discover key concepts through hands-on experiences. For Chemistry courses, students will demonstrate how theory is applicable in laboratory situations, and all students will discover multiple methods of problem solving techniques and demonstrate proper laboratory etiquette. For Biology, laboratory exercises are designed to illustrate and reinforce course topics. For Physics, laboratory exercises and experiments are utilized to make concepts tangible for the student as well as allowing the student to take an active role in discovering the laws of physics in these areas.

Science Electives

Health Sciences H

Health Science H is a course taken by seniors in the Advanced Science track who are interested in entering an undergraduate Allied Health-related program. Students will be exposed to Anatomy and Physiology of the human body systems along with an introduction to Kinesiology, Microbiology, Pathology and Forensic Science. As these topics are vital prerequisites for any Allied Health-related field, this course is aimed at early exposure to such materials before the student enters a college undergraduate program.

Environmental Studies H

This course will explore the environmental problems that the world is facing with respect to population, global warming, energy consumption, demand and resources, recycling and waste from both a scientific perspective as well as the political perspective. The course will use a hands-on approach when possible to explore the concepts. Students will learn the interconnectedness of life, energy flow and the effect of human impact on the environment while learning science skills such as data analysis, graphing and the use of technology. The class also covers the history of the environmental movement, the development of the national forests and parks and environmental laws, water and water pollution, soil and soil pollution and waste management.

Engineering H

This new interdisciplinary STEM course will be co-taught by a science

and technology education teacher. Junior and senior students will become familiar with a professional software program (MATLAB) to solve authentic engineering problems in the workplace environment. This is a project-based course in which students will work in teams to develop multidisciplinary products. Students will apply engineering principles, integrate the use of MATLAB software with an emphasis on physical science applications and develop technical communication skills through product design. This course is a required freshman course for all Hofstra engineering students. In addition, most engineering programs require a similar course integrating MATLAB software as a computational tool for solving engineering problems as a first year course. Students interested in college credit must apply to Hofstra.

Astronomy H

This course is an inquiry oriented, descriptive astronomy course that applies the basic concepts of the physical sciences to the study of the solar system, galaxy, and universe. Topics include the movements of the sun and moon, stars of the night sky, the celestial sphere, constellations with Greek mythology, and modern constellations. Students will develop detailed understanding of planets, spectra, star classification, galaxies, deep sky objects, cosmology, and the search for extraterrestrial life. They will identify the main constellations visible in the northern hemisphere as well as analyze the motions of the sun, moon, and planets in the planetarium and outdoors during night labs at the observatory.

Additional Science Programs

Senior Laboratory Assistant Program

The Senior Lab Assistant Program offers a leadership opportunity to students interested in a future career in science. Senior students assist the teacher and Lab Coordinator in the room once a cycle during their study hall period and immerse themselves in the lab experience on different levels. Additionally, students in the classroom may benefit from peer assistance in understanding material and completing experiments.

Senior Seminars

At the conclusion of the senior year, seminars are offered to seniors in Calculus, Statistics and Physics. These seminars are designed to bridge the gap between the high school and college experience of Calculus, Statistics and Physics. The seminars are offered for three hours a day two days per week throughout late May and June. It is the intention of these seminars to ease the transition to collegiate studies for those seniors who choose to avail themselves of this opportunity. These seminars are free of charge.

Chemistry Seminar

At the conclusion of the junior year, a Chemistry seminar is offered to the juniors. This seminar is designed to prepare the students for science study in college as well as the SAT II test in Chemistry. This seminar is offered at the conclusion of the school year, five days a week through the last week of summer school in July. This seminar is free of charge.



In-House Professional Presentations

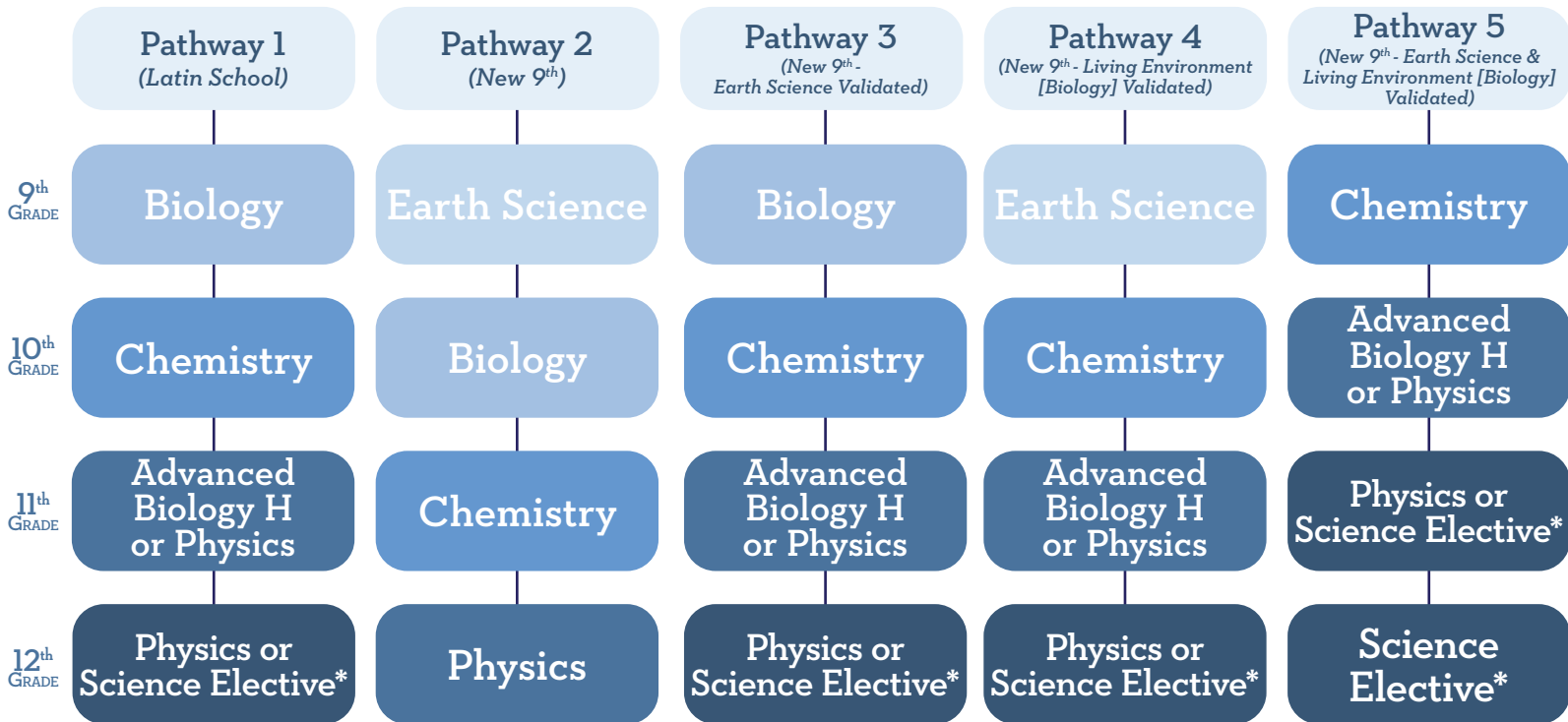
Students are offered a wide variety of in-house STEM Talks from local professionals. Many alumni from engineers to doctors return each year to educate our students during the afterschool presentations. Understanding the various paths available in fields like nursing and engineering have helped students find their future careers. Each year 12 to 15 talks reach hundreds of interested students.

AP Credit & College Credit

Students who are currently taking either Earth Science or Biology (Living Environment) in the 8th grade must email a copy of their final report card by July 1, 2019, indicating that the student both passed the course for the year and received a grade of 65% or higher on the corresponding Regents exam.

The report card must be emailed to Mr. Conrade at mrconrade@kellenberg.org by July 1, 2019 for consideration.

If a student has taken both courses previously, s/he must email a report card for each year indicating that the student passed the course and received a 65% or higher on the corresponding Regents Exam.



Science Electives: Environmental Studies H, Health Sciences H, Engineering H (course is being developed), and Astronomy H (course is being developed)

STEM Cluster Activities

Amateur Radio Club

Amateur Radio is a personal radio service authorized by the Federal Communications Commission (FCC) encouraging the advancement of the art and science of radio. The Kellenberg Memorial High School Amateur Radio Club (KM2ARC) prepares students to pass the FCC licensing tests and allows students the opportunity to get on the air and experiment with Amateur Radio.



Educational Television Service

Members of this organization are responsible for the technical production of the morning television announcements, for the taping of educational programs for classroom use and for the taping of various school functions, activities and athletics. They learn the fundamentals of videotaping, computer graphics and editing. Time is spent learning proper camera techniques and uses.



EMT Training Program

The EMT Training Program, in cooperation with the Nassau County Emergency Medical Services Academy, offers students an opportunity to become New York State Certified Emergency Medical Technicians. The program is open to seniors who will be 18 years old by May 31st of their senior year. Registration for the program takes place during the spring of junior year.

Health Sciences Club

The Health Sciences Club is open to students in all divisions. The Health Sciences Club is geared for students who are interested in careers in medicine, nursing, dentistry, physical therapy, occupational therapy and other allied health fields. Through lectures, discussions and laboratory investigations, club meetings help to enhance student's knowledge of health issues, diseases, anatomy and physiology. Additionally, students will have the opportunity to attend lectures from a variety of health professionals. Students in the Senior and Junior division may have the opportunity to tour Nassau University Medical Center.

Laboratory Squad (Veterinary Technician Club)

The Lab Squad meets during homeroom and on various afternoons each week. Students learn how to handle and take care of many types of animals. Lab squad is open to all students in grades 6 to 12.

Mathematics Club

The Mathematics Club is open to all students with an interest in mathematics. The purpose of the club is to stimulate an interest in mathematics and to challenge the students with problems and opportunities beyond those encountered in the classroom. Students challenge their mathematical skills for quickness and accuracy. The members of the High School section compete with other such students through events sponsored by the New York Math League and the Nassau County Interscholastic Math League. The Latin School Math Club competes in the Math Olympiads, Math League and Math Counts.

Robotics Club

The Robotics Club is open to all students looking to learn more about the aspects of designing, building, coding and controlling robots for specific tasks. Students will work in teams to build robots to use in competitions throughout the year. This STEM based club allows students to utilize many aspects of physics, engineering, math and computer science.



Science Olympiad Teams

Science Olympiad (SO), one of Kellenberg's premier STEM activities, exposes students to a wide range of science, mathematics, and engineering through 23 different events. SO is for students looking to explore interests in science that go beyond the classroom context and for possible future careers in STEM related fields. Normally, Kellenberg has five teams, three high school teams for grades 9-12, and two middle school teams for grades 6-8. During the course of the year, our teams compete in multiple invitationals leading to our local Regional competition. Historically, the program has been highly successful in qualifying for the State Championships year after year.

Business & Finance Club

Members of this club have a goal to gain knowledge in finance as well as learn life lessons in money management. With guest speakers from different professions, including marketing, advertising, and accounting. This club partners with Molloy College, where students are given the opportunity to achieve a Bloomberg Certification by the end of their senior year. Through this partnership, students learn how to use Bloomberg Terminals and to analyze Macroeconomy, Foreign Exchange, Markets, Equities, and Bonds.

Computer Club

The Computer Club provides students with the opportunity to learn and enhance technology skills. Some of the skills practiced include programming, working with microprocessors, and the use of technology to solve problems. The computer club also contains a service component where students assist at the Kellenberg Help Desk.

