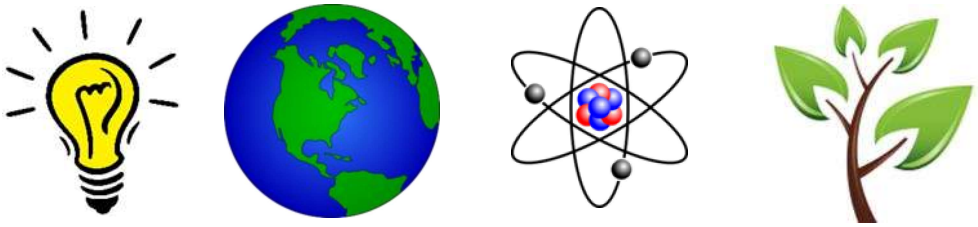
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SCIENCE DEPARTMENT

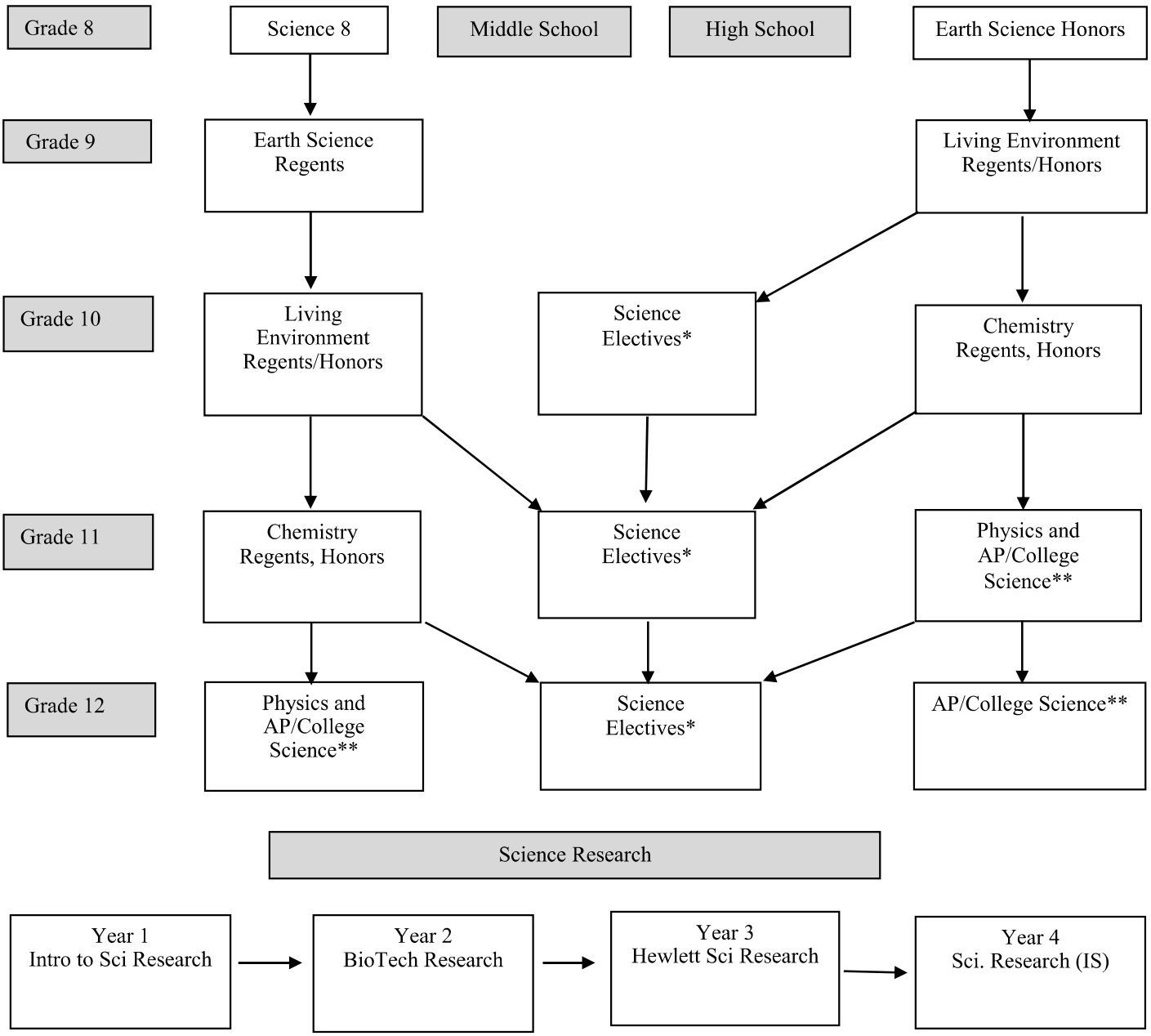
Dr. Brian H. Terry, District Chairperson

bterry@hewlett-woodmere.net
516-792-4115 (HS)
516-792-4382 (MS)



G.W. Hewlett High School

Science Department



***Science Electives:**

Astronomy, Environmental Science, Chemistry, Marine Biology, Science in Society

****Advanced Placement Science Courses:**
Biology, Chemistry, Environmental Science, Physics 1, Physics 2, Physics C

College Level Science Courses:
Forensic Science (Syracuse University Project Advance: SUPA)
Exploration of Space (State University of New York at Albany)
Human Anatomy and Physiology (Long Island University)

Science courses offered to George W. Hewlett High School students follow the New York State (NYS) Core Curriculum and provide students with the fundamental concepts and content knowledge in Earth science, biology, chemistry and physics. Students wishing to pursue a career in the sciences should speak with their science teacher before deciding on their science selections. As a general guideline, students should follow this recommended course sequence:

Physical Setting: Earth Science
Living Environment (Biology)
Physical Setting: Chemistry
Physical Setting: Physics
AP/College Science Course

Content of Honors Courses in Science
All honors-level science courses cover additional topics that are not in the NYS core curriculum. Parents and students should consider the demands of the Honors courses and the readiness level and commitment of the student. Any student who seeks the additional challenge of an Honors or AP class will have the opportunity to do so. However, the student must have taken the prerequisites for the course in which they wish to enroll. Please consult your current science teacher before making a decision.

LABORATORY REQUIREMENT (for courses that culminate in a Regents Exam)
For admission to a Regents examination in science, a student must complete the State-mandated laboratory requirement. The laboratory component must be provided in addition to the required classroom instruction associated with earning a unit of credit and must include 1200 minutes of hands-on laboratory with satisfactory laboratory reports. Laboratory reports must be kept on file for at least six months after the student takes a Regents examination in science (http://www.p12.nysed.gov/part100/pages/policyqascience.html)

EARTH SCIENCE R: THE PHYSICAL SETTING 1 YEAR
4409 1 CREDIT
Earth Science is a comprehensive problem solving course concerned with the manipulation of both materials and data. It is an integrated study of the Earth's history, composition, and structure, its atmosphere and oceans, and its environment in space. The course stresses problem solving, scientific thinking and basic skill building. The Regents Examination in Physical Setting: Earth Science will be administered in June.

TEAM 9 EARTH SCIENCE R 1 YEAR
4409T/4409TL 1 CREDIT
Team Earth Science is a Regents level course that provides a broad understanding of the fundamental principles of Earth Science. This course aligns with the Earth Science Core Curriculum (commencement level) outlined by the New York State Department of Education. Areas of exploration include: Earth's changing environment, measuring Earth, astronomy, energy in Earth processes, climate, weather, erosion, geology, meteorology, and landscape development. Regular lab work is a required part of the class. Throughout the course students will be exposed to the vocabulary needed to be successful on the Earth Science Regents. Improving reading and writing skills will be stressed throughout the course. The Regents Examination in Earth Science will be administered in June.
***Enrollment Guideline*:** Teacher/counselor recommendation

TEAM 10 LIVING ENVIRONMENT R 1 YEAR
4410T/4310TL 1 CREDIT
Team Living Environment is a Regents level course that provides a broad understanding of the fundamental principles of biology. The curriculum consists of a basic core of twelve units. Areas of exploration include: human anatomy and physiology, botany, zoology, genetics, ecology, and evolution. Regular lab work is a required part of the class. Throughout the course, students will be exposed to the vocabulary needed to be successful on the Living Environment Regents. Improving reading and writing skills will be stressed throughout the course. The Regents Examination in Living Environment will be administered in June.
***Enrollment Guideline*:** Teacher/counselor recommendation

LIVING ENVIRONMENT R 1 YEAR
4410 1 CREDIT
The course is designed to provide a broad understanding of the fundamental principles of biology with emphasis on the NYS core concepts. The basic core consists of eight units: introduction to inquiry and the scientific method; organization and maintenance; dynamic equilibrium; reproduction and development; genetics; evolution; and ecology and human impact. This is a laboratory-orientated course and culminates with the Regents examination.
***Enrollment Guidelines**:* Successful completion of Algebra 1 and Earth Science

LIVING ENVIRONMENT H 1 YEAR
4410H 1 CREDIT
This course is designed to provide students with an in-depth understanding of fundamental biological principles and concepts. It consists of selected, extended areas of biology including biochemistry and genetics. The extended areas will stress independent and collaborative work involving laboratory activities and group discussions. Additional topics may include phylogeny, genetic expression and trait linkage, photosynthetic reactions, cellular metabolic pathways, and mechanisms of plant reproduction. Other possible assessments may include creative projects, position papers, book reviews, and independent laboratory experiments. These students will take the Living Environment Regents Examination in June.
Enrollment Guidelines: 90+ average in Algebra 1, English, Earth Science

CHEMISTRY 1 YEAR
4411NR 1 CREDIT
This introductory level course will expose the students to the basic principles of chemistry and their relationships to everyday life. Equal emphasis will be placed on the study of fundamental chemistry and on its applications to issues such as fossil fuels, food chemistry, the chemistry of batteries, nuclear energy, modern materials, and other topics as time permits. Suitable laboratory activities will be used to demonstrate both chemical principles and related applications.
NOTE: This course is not intended to prepare students for the Regents Examination in Physical Setting/Chemistry.
***Prerequisite*:** Successful completion of Earth Science and Living Environment

CHEMISTRY R - THE PHYSICAL SETTING 1 YEAR
4411 CREDIT
This is a laboratory-oriented course developed in accordance with the New York State Core Curriculum using theory and fundamental mathematical skills. It deals with the interrelationships between matter and energy, with the emphasis on matter. Appropriate laboratory experiences are designed to enhance students' understanding of basic chemical principles. Core topics include: atomic concepts, Periodic Table, moles/stoichiometry, chemical bonding, physical behavior of matter, kinetics/equilibrium, organic chemistry, oxidation-reduction, acids and bases, and nuclear

chemistry. Many laboratory exercises are quantitative in nature and are designed to familiarize the student with the techniques and apparatus used in chemistry labs. The Regents Examination in Physical Setting: Chemistry will be administered in June.
Prerequisite: Successful completion of Algebra 1, Earth Science and Living Environment
Enrollment Guidelines*:* 80+ average in English, Algebra 1, Geometry and Science courses

CHEMISTRY H - THE PHYSICAL SETTING 1 YEAR
4411H 1 CREDIT

This course covers the material in the New York State Physical Setting: Chemistry Core and the extended units necessary to take the College Board SAT II exam and the AP Chemistry course. It stresses a laboratory approach. Laboratory experiments require broader skills and more extensive analyses that show their creative as well as their scientific skills. The course work stresses independent thought and work. Chemistry H deals with the structure and composition of matter and its properties. Topics include: atomic structure, chemical bonding, ionization, electrochemistry and an introduction to organic chemistry. Some additional concepts covered include Hund's Rule, Ideal Gas Law, VSPER Model, Hess' Law, and calculating pH values. Many laboratory exercises are quantitative in nature and are designed to familiarize the student with the techniques and apparatus used in chemistry labs. Students are encouraged to take the College Board SAT Chemistry Subject Test and will take the Regents exam in June.

Prerequisite: Successful completion of Algebra 1, Earth Science and Living Environment
Enrollment Guidelines*:* 92+ average in English, Algebra 1, Geometry, and Science courses

PHYSICS R - THE PHYSICAL SETTING 1 YEAR
4412 1 CREDIT

This course examines the laws of physics from the subatomic through the cosmic levels. Inherent in this course is an appreciation for the discoveries of past scientists including Galileo, Kepler, Newton, Faraday, Curie, and Einstein. The course covers five major topics: mechanics, energy, wave phenomena, electricity and magnetism, and modern physics. This course reviews all the math skills needed by the students to be successful in physics and enjoy the course. The course terminates with the Regents exam. The Regents Examination in Physical Setting: Physics will be administered in June.

***Prerequisite*:** Successful completion of three years of Regents/Honors level Science, Algebra 1 and Geometry.
Enrollment Guidelines: 80+ average in English, Algebra 1, Geometry, and Science courses

ADVANCED PLACEMENT/COLLEGE LEVEL COURSE DESCRIPTIONS

Students should have successfully completed at least **three** Regents Level sciences. Some seniors may opt to take two science AP electives. It is strongly recommended that interested students should consult with a guidance counselor, a science teacher, and their parents before they enroll in any advanced placement course. The student must take the prerequisites prior to enrolling in any course offered**.** The curriculum for all AP Science Courses follows guidelines established by the AP College Board (www.collegeboard.com).

AP BIOLOGY 1 YEAR
4410A 1 CREDIT

The AP Biology course is designed to be taken by students after the successful completion of a first course in high school biology and one in high school chemistry. It aims to provide students with the conceptual framework, factual knowledge, and analytical skills necessary to deal critically with the rapidly changing science of biology. The two main goals of AP Biology are to help students develop a conceptual framework for modern biology and to help students gain an appreciation of science as a process. The ongoing information explosion in biology makes these goals even more challenging. Primary emphasis in an Advanced Placement Biology course should be on developing an understanding of concepts rather than on memorizing terms and technical details. Essential to this

conceptual understanding are the following: a grasp of science as a process rather than as an accumulation of facts; personal experience in scientific inquiry; recognition of unifying themes that integrate the major topics of biology; and application of biological knowledge and critical thinking to environmental and social concerns. All students must sit for the AP Exam in May.

Prerequisite: Successful completion of three years of Regent/Honors level science (one of the years must be Living Environment Regents or Honors) and at least two years of mathematics courses that culminate with a Regents exam.

Enrollment Guidelines*:* 90+ average in English, mathematics and science courses.

AP CHEMISTRY 1 YEAR

4411A 1 CREDIT

Advanced Placement Chemistry is offered to 11th & 12th grade students who have taken Regents or Honors Chemistry and who wish to continue for an additional year of advanced study. The course is designed as a first level college course in general chemistry. Students in such a course should attain a depth of understanding of fundamentals and a reasonable competence in dealing with chemical problems. The course should contribute to the development of the students' abilities to think clearly and to express their ideas, orally and in writing, with clarity and logic. The college course in general chemistry differs qualitatively from the usual first secondary school course in chemistry with respect to the kind of textbook used, the topics covered, the emphasis on chemical calculations and the mathematical formulation of principals, and the kind of laboratory work done by students. Quantitative differences appear in the number of topics treated, the time spent on the course by students, and the nature and the variety of experiments done in the laboratory. The importance of the theoretical aspects of chemistry has brought about an increasing emphasis on these aspects of the content of general chemistry courses. Topics such as the structure matter, kinetic theory of gases, chemical equilibria, chemical kinetics and the basic concepts of thermodynamics are now being presented in considerable depth. All students must sit for the AP Exam in May.

Prerequisite: Successful completion of three years of Regent/Honors level science (one of the years must be Chemistry Regents or Honors) and at least two years of mathematics courses that culminate with a Regents exam.

Enrollment Guidelines*:* 90+ average in English, mathematics and science courses (with the exception of Chemistry Honors/85+)

AP PHYSICS 1 1 YEAR

4412A 1 CREDIT

AP Physics 1 is an algebra-based, introductory college-level physics course that explores topics such as Newtonian mechanics (including rotational motion); work, energy, and power; mechanical waves and sound; and introductory, simple circuits. Through inquiry-based learning, students will develop scientific critical thinking and reasoning skills. This course requires that 25 percent of the instructional time will be spent in hands-on laboratory work, with an emphasis on inquiry- based investigations that provide students with opportunities to apply the science practices. Although the Physics 1 course includes basic use of trigonometric functions, this understanding can be gained either in the concurrent math course or in the AP Physics 1 course itself. All students must sit for the AP Physics 1 Exam in May.

Prerequisite: Successful completion of three years of Regents/Honors level science and at least two years of mathematics courses culminating in a Regents examination

Enrollment Guidelines*:* 85+ average in English, mathematics and science courses. This course might not be accepted for credit for the college freshmen level physics courses required for physics, chemistry or engineering majors.

AP PHYSICS 2 1 YEAR

4413A 1 CREDIT

AP Physics 2 is an algebra-based, introductory college-level physics course that explores topics such as fluid statics and dynamics; thermodynamics with kinetic theory; PV diagrams and

probability; electrostatics; electrical circuits with capacitors; magnetic fields; electromagnetism; physical and geometric optics; and quantum, atomic, and nuclear physics. Through inquiry-based learning, students will develop scientific critical thinking and reasoning skills. Twenty-five percent of instructional time is devoted to hands-on laboratory work with an emphasis on inquiry-based investigations. Investigations will require students to ask questions, make observations and predictions, design experiments, analyze data, and construct arguments in a collaborative setting, where they direct and monitor their progress. All students must sit for AP Physics 2 exam in May.
Prerequisite: Successful completion of three years of Regents/Honors level science and at least two years of math courses that culminate in a Regents exam. *This course may not be accepted for credit for the college freshman level physics courses required for physics, chemistry or engineering majors*

AP PHYSICS C 1 YEAR
4414A 1 CREDIT
AP Physics C course is equivalent to a calculus-based, college-level physics course. It is especially appropriate for students planning to specialize or major in a physical science (physics, chemistry) or engineering. During the first semester, the course explores topics such as kinematics; Newton's laws of motion; work, energy and power; systems of particles and linear momentum; circular motion and rotation; and oscillations and gravitation. The second semester explores topics such as electrostatics; conductors, capacitors and dielectrics; electric circuits; magnetic fields; and electromagnetism. Introductory differential and integral calculus is used throughout the course. The Physics C course also includes a hands-on laboratory component and the students will spend a minimum of 20 percent of instructional time engaged in hands-on laboratory work. All students must sit for both Physics C AP Exams (Mechanics and Electricity & Magnetism) in May.
Prerequisite: Successful completion of Regents Physics or AP Physics 1. ***Corequisite****:* Calculus
Enrollment Guidelines: 90+ average in ELA, math, science courses and state assessments

AP ENVIRONMENTAL SCIENCE 1 YEAR
4465A 1 CREDIT
The AP Environmental Science course is an interdisciplinary experience which embraces a wide variety of topics from different areas of environmental study. This exciting course is for students interested in gaining an understanding of the scientific principles underlying the Earth's natural ecosystems and the implications of human impact on these ecosystems. This course includes a strong laboratory and field investigation component. Students learn about the environment through first hand observation. These diverse experiments provide students with important and enjoyable opportunities to test concepts and principles that are introduced in the classroom. Students acquire skills in techniques such as water sample analysis, investigating global temperature changes, and human population dynamics through data analysis. All students must sit for the AP Exam in May.
Enrollment Guidelines: Mastery of 3 Regents/Honors Science courses

COLLEGE FORENSICS 1 YEAR
(Syracuse University Project Advance) 1 CREDIT
4430C 4 COLLEGE CREDITS
This is the equivalent of a college level forensic science course offered at Syracuse University. This course is intended to provide an introduction to understanding the science behind crime detection. The course topics are drawn from the fields of Chemistry, Physical Science, and Biology with an emphasis on Chemistry. The laboratory exercises will include techniques commonly employed in forensic investigations. Examples of topics include fingerprinting, examining blood splatter, and hair/fiber comparisons. The course will be especially valid for those interested in a career in Law Enforcement or Criminal Justice. Credit may be earned from Syracuse University by paying tuition at the currently established rate.
Prerequisite: Successful completion of three years of Regent/Honors level science and at least two years of mathematics courses that culminate with a Regents exam
Enrollment Guidelines*:* 85+ average in English, Math and Science courses

COLLEGE EXPLORATION OF SPACE 1 YEAR
4260C .5 CREDIT
ALT DAY

This college-level course, offered in conjunction with SUNY Albany, allows students to study the fundamental physical principles governing, and the history and possible future of, human activities in space. Specific topics to be studied will include the physics of space travel, The Apollo Era, The Shuttle Era, and unmanned exploration. Upon registration with the SUNY at Albany and payment of a $150 course fee (subject to increase), students who pass Exploration of Space will receive a SUNY transcript showing 3 credits earned for Physics 103.
Prerequisite: Successful completion of three years of science courses (two at Regents/Honors level)

COLLEGE ANATOMY & PHYSIOLOGY 1 YEAR
4261C 1 CREDIT

This course, offered in conjunction with LIU Post, covers the structure and function of the human body, including basic biochemistry, cell structure, cell division, cell respiration, tissue composition, genetics, and the body's organ systems in detail including the musculoskeletal, cardiovascular, lymphatic, immune, respiratory, excretory, digestive, and reproductive systems. Relevant dissection, histological studies, and physiology are all featured in the laboratories. The course will be especially valid for those interested in a career in the health fields. Eight college credits may be earned from Long Island University (LIU) by paying tuition at the currently established rate.
Prerequisite: Successful completion of three years of Regent/Honors level science and at least two years of math courses that culminate in a Regents exam
***Enrollment Guidelines*:** 85+ average in English, math and science courses

ELECTIVE COURSES

Students are required to take three credits of science and pass one science Regents examination in order to earn the minimum requirements for a Regents diploma. The Business Department offers some computer courses to substitute as a science credit.

ENVIRONMENTAL SCIENCE 1 YEAR
4465 1 CREDIT

This is course is to investigate the role of humans in their environment. Students develop a knowledge base about their biological and physical environment. This information leads to exploration of human dependence on, technological control over, and interactions with the environment. Emphasis is placed on sustaining resources and making informed choices concerning environmental issues.

SCIENCE IN SOCIETY 1 YEAR
4456 1 CREDIT

Science in Society is designed to promote scientific literacy in relation to topics of general public interest including environmental issues, nuclear technology, food, nutrition, & health, consumer and medical issues. The course will incorporate hands-on technology in certain specific topics. Equal emphasis will be placed on both the study of course content and the development of writing, critical reading and research skills.

ASTRONOMY 1/2 YEAR
4250 .5 CREDIT

Astronomy is designed to increase students' awareness of Earth's place in the cosmos and of how the Earth and the universe came into being. Students will make scientific observations of the night sky. This course will also touch on the past, present, and future of man's exploration of space. Astronomy will make use of the vast amount of information available through the Internet such as NASA resources and pictures from the Hubble Space Telescope. It is anticipated that this course

will have the use of a portable planetarium system to make the course "come alive" to students.
***Prerequisite**:* Successful completion of Earth Science R

MARINE BIOLOGY 1/2 YEAR
4240 .5 CREDIT
Marine Biology represents man's last frontier on Earth. This course includes a study of the adaptations of marine organisms to major marine habitats. The habitats discussed include the rocky intertidal zone, our own estuarine system (L.I. Sound, the Coral Reef System, and salt marshes.) Laboratory work using live and preserved marine organisms and field trips will illustrate adaptations and provide a phylogenetic approach to the understanding of the evolution of these marine organisms. Students will be involved with the Willow Pond duck pond as an outdoor living laboratory. The course requires independent study, laboratory experiments, fieldwork, and a marine science project. Dissections are a significant part of this course. It is recommended that students who object to dissections pursue other courses.
Prerequisites: Successful completion of Living Environment R/H
Enrollment Guideline: 70+ average in all science courses

SCIENCE RESEARCH PROGRAM

The Science Research Program is a four-year program in which students choose a topic and carry out an original research project on that topic. This is usually extended through the end of their junior year. The time commitment required is during the summer months and / or after school throughout the years. The student does all that professional researchers do, from journal readings to finding a mentor, planning a project, and carrying it out to an appropriate research conclusion. As the work progresses, the student writes research papers, creates posters, and presents research findings at available competitions and symposia as determined by the instructor. *The following is the recommended sequence of Science Research course electives:*

INTRODUCTION TO SCIENCE RESEARCH –Year 1 1 YEAR
4480 1 CREDIT
This course will introduce students to some basic methodologies of research. This course is intended to prepare students for science research undertaken through high school or research internships outside of high school. Students will be required to read and analyze research journals, and design and conduct experiments. Students will compose research reports that can be submitted to various science competitions e.g. *Toshiba Exploravision, Nassau County Science Competition*, etc. This class meets daily and is open to approved freshmen and sophomores who have successfully completed or are currently enrolled in Living Environment H.
Co-requisite: Living Environment H.
***Enrollment Guidelines**:* 90+ average in English, Math and Science courses

BIOTECHNOLOGY RESEARCH H – Year 2 1 YEAR
4470H 1 CREDIT
This class continues from the Introduction to Research. Class focuses primarily on biochemistry and molecular biology. Students will learn techniques such as micro pipetting, DNA and RNA isolation, agarose gel electrophoresis, restriction endonuclease digestion, bacterial transformation, Polymerase Chain Reaction (PCR), Enzyme-Linked Immuno Sorbent Assay (ELISA), etc. Students are required to read and analyze research journals, design and conduct experiments. Students will compose research reports that can be submitted to science competitions. Students can participate in *Nassau County Science Competition* or *Long Island Science Congress*.
***Prerequisite**:* Successful completion of Living Environment Honors, Introduction to Science Research and recommendation of the Science Chairperson and/or the Research Coordinator
***Co-requisite**:* Chemistry H

HEWLETT SCIENCE RESEARCH H—Year 3 1 YEAR

4484H 1 CREDIT

This class continues the Biotechnology class. Only selected students from the Biotechnology Class are permitted. Students are selected according to their performance in the Biotechnology Class and the availability or development of research projects. Students will continue to work on these projects that will be submitted to such competitions as Long Island Science Congress (LISC), Long Island Science and Engineering Fair (LISEF), and the Siemens Competition.

***Prerequisites*:** Successful completion of Introduction to Research and Biotechnology. Students selected must meet with the research teacher to complete a research plan before the class begins (summer assignment). Moreover, these students are required to conduct a literature review of the assigned topic and write a research report

INDEPENDENT STUDY IN SCIENCE RESEARCH 1 YEAR

4483, 4485 .5 CREDIT

This course is developed for students who have completed research projects and are preparing their projects for submission to science competitions e.g. Intel STS, Intel ISEF, Siemens, Junior Science and Humanities Symposium (JSHS), Long Island Science Congress (LISC), etc. Students must have completed research studies (either in school or from outside placement) in order to enroll in this class. Students are required to with the research teacher on a regular basis, prepare their research projects according to the requirements of the various competitions, and present their research projects to these major competitions.

***Prerequisites*:** Successful completion of Introduction to Science Research (4480) and Biotechnology Research (4470H) or approval of the Science Chairperson

APPLICANTS FOR AP SCIENCE COURSES SHOULD NOTE THE FOLLOWING:

- Students who take AP courses **are required** to take the Advanced Placement Exam given in May;
- The 'AP' designation will be removed from official high school transcript if student does not fulfill the exam requirement;
- Hewlett High School cannot guarantee that students will receive advanced placement or credit at the college of their choice, regardless of how well they do on the AP exam or in the course since each college has its own requirements and procedures;
- Students should consult with college websites or check directly with the college for information concerning the policies and practices of each college.

The following Business courses may be used as a third credit of Science:

Computer Programming 1 & 2

Cisco IT Essentials H

See the Business Department section for full course descriptions