

The Academies of Hopatcong High School

STEAM Academy Science, Technology, Engineering, Arts, and Mathematics

Student/Parent/Faculty/Administrator Manual

2014-2015

www.hopatcongschools.org

Superintendent: Mrs. Cynthia Randina crandina@hopatcongschools.org

Principal: Mrs. Noreen Lazariuk nlazariuk@hopatcongschools.org

Vice Principal: Mr. David Pierson dpierson@hopatcongschools.org

Director of Guidance: Ms. Gina Cinotti gcinotti@hopatcongschools.org

Supervisor of STEAM: Dr. Olga Edgerton oedgerton@hopatcongschools.org

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INTRODUCTION

Established in 2013 by Hopatcong High School to develop talent and leadership in science, technology, engineering, the arts, and mathematics, the Hopatcong High School STEAM Academy mission is to inspire, challenge, and offer invaluable opportunities to those students who will use their exceptional abilities in the 21st Century, through motivational effects of a dynamic project-based, research-based curriculum.

OBJECTIVES

- To meet students' interest in science, technology, engineering, the arts, and mathematics to offer students a variety of career opportunities and exposure to such opportunities.
- To increase student awareness, acceptance, and respect for STEAM.
- To expose students to the importance of our natural environment as it relates to the process of STEAM.
- To expose students to engineering fields and to the science and engineering learning process that scientists experience through their careers
- To provide students with career exploration and employment skills to become independent lifelong learners & future entrepreneurs.
- To implement the Common Core State Standards in all disciplines.
- To have students demonstrate a willingness to take educational risks in exploring their interests.

ADMISSION

Admission is competitive and selection will be based on performance in previous mathematics and science classes, teacher recommendations and a personal essay. A common Academy application is available in the Guidance Office or at

www.hopatcongschools.org/hs/p/guidance/STEAM

MISSION STATEMENT

Our mission is to ignite and nurture creative, ethical scientific minds that can potentially advance the human condition. The STEAM Academy provides teaching and learning experiences outside of the typical high school curriculum that focus on imagination, inquiry, and interdisciplinary problem-solving to ultimately foster more activity-based instruction. The program also strives to establish small learning communities housed within the larger high school environment, designed to encompass a particular course of study and personalize education through a specific content focus and hand-on experiences with experts in the fields.

RECOGNITION

When students accomplish a feat such as going through four years of the STEAM Academy, there is no doubt that they should be acknowledged in a significant way at the time of their graduation. We will recognize our students in the following ways:

- Certificate awarded at Senior Awards Ceremony
- Medal presented at graduation ceremony
- Academy involvement announced at graduation

- Academy involvement indicated on transcript

Other thoughts on additional recognition could include a publication in the local newspaper highlighting the students who graduated with Academy distinction, and creating a link dedicated to the Academies of Hopatcong High School on the High School web page. In that way, parents and the community can be updated on what their sons/daughters are accomplishing on a regular basis. In addition, there are various publications around the school that can highlight accomplishments of the Academy. Finally, there is always the possibility of morning announcements and campaigning by posting fliers around the building premises.

CURRICULUM

The STEAM Academy's school-within-a-school structure supports constructive relationships between and among students and teachers by grouping students together each year to take a number of rigorous science, technology, engineering, art, and mathematics courses with increased student support and individualized attention. Students are grouped into their respective academy upon acceptance in the 9th grade. Although other non-academy students may be placed in certain academy classes, each particular STEAM Academy group will travel together each year in their core program classes. As they progress through high school, students will have more options to explore a number of curricular choices, as part of a collaborative effort established by the student, department chairs, and their guidance counselors.

By taking various suggested Academy classes on the Hopatcong High School campus, students will be able to earn college credit in many of their A.P. math and science courses. A number of the Hopatcong High School faculty members are also adjunct professors at a number

of collegiate institutions around the area, providing Academy students with the opportunity to earn a number of college credits without leaving the confines of the school building. Low cost options for a number of college credits are available. Interested students should speak to their guidance counselors for more information, or refer to the “Program of Studies” for the current school year.

In addition to having the select experience of earning a number of low cost college credits in their academy classes, students will also be able to make connections to many institutions, both academic and professional, through their Academy seminars and Internship experiences. Seminars will be organized for various career presentations from professionals in the workforce. Periodically throughout the school year, career day field trips include bringing STEAM Academy students to various universities to explore a number of potential math, science, technology, art, and engineering careers. Independent Action Research will be explored.

COURSE OF STUDY

The following is a list and brief description of the core courses the STEAM Academy students are required to take over the course of their high school career. This list is subject to change depending on the changing requirements of the state department of education and the administration of Hopatcong School District. A complete list of the remaining classes students are required to take can be found in the “Program of Studies” available in the guidance office. All academy students are expected to maintain an average no lower than a ‘B’ in all of their core courses throughout their high school career.

FRESHMAN YEAR

GEOMETRY HONORS

5 credits

Prerequisite: Algebra I (Grade 8), Teacher Recommendation, Honors Criteria, & Mandatory Summer Assignment.

Geometry Honors course is designed to provide students with an in-depth study of the relationships, properties and measurements of geometric figures, special shape relationships, trigonometry, geometric patterns, constructions, coordinate geometry and transformations. Algebraic concepts, deductive reasoning, determining the validity of arguments, mathematical proofs, and the properties of plane and spatial figures are emphasized. A greater number of theorems are presented for mastery and connections made to algebraic applications. The initial emphasis in this area is highly verbal. Projects and/or research are assigned as an outgrowth of Geometry course work.

BIOLOGY HONORS

6 credits

Prerequisite: Honors Criteria

Biology Honors employs a molecular approach and is designed to provide the high ability student with an extended, in-depth learning experience in Biology. Basic concepts are reviewed and expanded in conjunction with more advanced biological topics. There will be increased demands made on student performance in reading and mathematics to allow more complex laboratory explorations. Major topics covered will include, but will not be limited to, cells, evolution, energy, biochemistry, heredity, reproduction, regulation and development.

SOPHOMORE YEAR

ALGEBRA II HONORS

5 credits

Prerequisite: Geometry H and Algebra I H, Honors Criteria & Mandatory Summer Assignment. Course may be combined with Geometry H.

Algebra II Honors is designed for the advanced mathematics student and provides rigorous preparation for Pre-Calculus through challenging problems and in-depth development of algebraic concepts. Emphasis is placed on the study of functions, including linear, polynomial, rational, absolute value, exponential, and logarithmic; their properties and analysis of their graphs. Mastery of Algebra 1 skills is assumed. Students demonstrate algebraic applications using graphing calculators. This course is a prerequisite for Pre-Calculus Honors.

CHEMISTRY HONORS**6 credits**

Prerequisite: Algebra I CP, Biology Honors, Honors Criteria

The Honors Chemistry program includes all of the basic concepts covered in Chemistry CP class with the following differences and/or additions in process and content: Students must employ advanced, independent study guides for an in depth study of atomic structure and chemical equations. Students must solve advanced Chemistry problems involving gas laws, strength of solutions, stoichiometric ratios and the identification of unknown compounds.

AP BIOLOGY**7 credits**

Prerequisite: Biology H, meet AP Selection Criteria, & Mandatory Summer Assignment

This course is a college level course that follows closely the syllabus recommended by the College Board and prepares students for the Advanced Placement examination in Biology. This course is designed to provide a more in-depth study of the biological sciences for students who have a special interest in Biology or its related fields. It will emphasize comparative Anatomy and Physiology, Ecology, Microbiology, Genetics, Cytology, and Biochemistry. Individual research work and laboratory work will be expected of all students. Students enrolled in Advanced Placement are required to take the College Board Advanced Placement test in May.

JUNIOR YEAR**PRE-CALCULUS HONORS****5 credits**

Prerequisite: Geometry Honors, Algebra II H, & Mandatory Summer Assignment

Pre-Calculus Honors introduces aspects of higher mathematics to college preparatory students who are preparing to take AP Calculus. It includes an extension of Algebra, Trigonometry, and analytical Geometry as well as selected topics such as probability, number systems, matrices, function analysis, limits, continuity and a rigorous, graphing-intensive introduction to differential Calculus.

AP CHEMISTRY**7 credits**

Prerequisite: Algebra 1 CP, Biology H, Chemistry H, meet AP Selection Criteria, & Mandatory Summer Assignment

Chemistry AP is designed to be the equivalent of a general Chemistry course usually taken during the

first year of college. The course will focus on the following topics: Atomic Theory and Structure, Chemical Bonding, Nuclear Chemistry, Status of Matter, Chemical Reactions, Stoichiometry, Equilibrium, Kinetics, Thermodynamics, Organic Chemistry, etc. Students in this course will be expected to attain an in-depth understanding of the fundamentals of chemistry and a high degree of competence in dealing with chemical problems. Students will be prepared to take the Advanced Placement test in Chemistry. Students enrolled in Advanced Placement are required to take the College Board Advanced Placement Test in May.

PHYSICS HONORS**6 credits**

Prerequisite: Algebra 2 CP, Chemistry H, Honors Criteria

Physics Honors is designed for the advanced science student who wishes to receive a rigorous exposure to the Physics required for engineering, pre-med, computer science and other highly technical fields. Instruction will employ advanced mathematical processes, complex problem-solving skills and intuitive laboratory experiences requiring students to develop conclusions about the laws of the physical world. In addition to lab activities expanded beyond the scope of the regular college preparatory.

C.A.D. I**2.5 credits**

This entry-level drafting course will introduce the student to the most basic fundamental concepts of drafting. The course will start with the student drawing the hand tools. This will allow the student to develop an understanding of three dimensional views and isometric perspectives. The second part of the course will be all student computer interactive. In this section, the students will begin to develop a basic knowledge of C.A.D. (Computer Aided Drafting).

C.A.D. II**5 credits**

Prerequisite: C.A.D. I

In this course, the student will strengthen their knowledge base and understanding of C.A.D. by working through a series of assignments that will require them to draw more detailed drawings. This course is weighted 50/50 between computer work and hands-on work. The assignments will require the student to use their own creative skills. The making of small models and projects will provide the student with a greater understanding as to why blueprints must not only be accurate but detailed as

well. C.A.D. II will place a strong emphasis on Architectural home construction. The course will finish with each student designing a floor plan for a Dream Home with all four elevations detailed.

C.A.D. III**5 credits****Prerequisite: C.A.D. II**

This exciting course will bring to life the Dream Home, which was designed in C.A.D. II. A true 1/4 scale home will be built in class by each student using their blueprints and home elevations from C.A.D. II. Balsa wood and other supplies will be used. Many students will bring their own creative ideas to this home. The completed home will be landscaped and become a real sense of pride and accomplishment. The majority of the class time is dedicated to hands-on model construction. This course will really allow the student to understand the true construction techniques used in today's home building industry.

DESIGNING APPS**2.5 credits**

This course focuses on mobile app development and challenges students in the design, implementation, and testing process using tools chosen for their superior interactive educational value. These tools such as Adobe Flash CS5, Accelerometer programs, and Google App Inventor, allow the students to achieve an unusual classroom success—the success of being able to design, implement, test, and immediately use their designs on technology already part of daily life. Students will develop applications for mobile phones and tablets in a computer information systems class. Students will see the value of programming and also learn to think like a programmer.

VIDEO GAME DESIGN & DEVELOPMENT**2.5 credits**

This course is designed to give students a sense of design and art, plus the technical know-how to build an exciting video game. It is an appropriate starting point for students who seek a professional career as a game developer. It is also well-suited for enthusiastic amateurs and gamers looking to explore this exciting field. No prior game or graphics programming experience is necessary. Students work with a game engine software framework to design and implement several kinds of games. Additional topics include animation techniques, physics simulation, user controls, graphical methods, and intelligent behaviors.

SENIOR YEAR**AP CALCULUS****2.5 credits**

Prerequisite: Pre-Calculus Honors, meet the AP selection criteria, & Mandatory Summer Assignment

This Calculus class is designed to provide students with college-level Calculus AP studies while still in high school and aligns to the content outlined by the College Board. Calculus is the branch of mathematics dealing with change and motion. It is the tool of science and economics. Calculus is useful in sociological and psychological careers as well as those professions dealing with engineering and high technology. It is a prerequisite for further study in all branches of higher mathematics. Given the present state of technology, instruction throughout the Calculus AP course will capitalize on the graphing calculator capabilities. Specifically, students will learn to use the graphing calculator as a tool for processing data and performing calculations to investigate and solve problems. The course covers the equivalent of one semester of the average college calculus course. Students will be prepared to take the Advanced Placement Test in Calculus AB. Students enrolled in Advanced Placement are required to take the College Board Advanced Placement test in May.

AP PHYSICS**7 credits**

Prerequisite: Biology H, Chemistry H, Physics H, Algebra 2 H, meet AP selection criteria, & Mandatory Summer Assignment

This course is a college level course that follows closely the syllabus recommended by the College Board and prepares students for the Advanced Placement in Physics B (non-calculus based). This course is for students with an interest in math and science and who are contemplating a career in which a college level physics course would be necessary. The course reviews Newtonian mechanics and investigates the phenomena such as electricity, magnetism, light, sound, thermodynamics and atomic physics. Selected laboratory experiences are used to emphasize units presented. Special stress is placed on problem-solving skills.

AP ENVIRONMENTAL SCIENCE**7 credits**

Prerequisite: Biology and Chemistry (Chemistry may be taken concurrently); teacher recommendation. There is a mandatory summer assignment.

This Advanced Placement course is designed to be the equivalent of an introductory college course in environmental science. The goal of the course is to provide students with the scientific principles,

concepts, and methodologies required to understand the interrelationships of the natural world, to identify and analyze environmental problems both natural and human-made, to evaluate the relative risks associated with these problems, and to examine alternative solutions for resolving and/or preventing them. Laboratory and field investigations will be drawn from many areas of scientific study, such as biology, ecology, chemistry, physics, geology, meteorology and oceanography. This course stresses scientific principles and analysis, and includes a strong laboratory and field investigation component. Students are expected to take the AP Environmental Science Test.

PRINCIPLES OF ENGINEERING **5 credits**

This course actively involves students to learn about the fundamentals of design and manufacture. An understanding of the basic principles of mathematics and science, achieved primarily through hands-on activities, will help students develop solutions that make efficient use of manmade and natural materials. This course will help students realize the interrelatedness of history, economics, philosophy, ethics, and writing, which will prepare them for rigorous study in any of the fields of engineering.

21st CENTURY TECHNOLOGY **2.5 credits**

This course explores the skills that high school students will need to succeed in the 21st century, with emphasis on what it means to be literate in today’s technology-rich world. Students will examine their own fluency with 21st-century skills and literacies. Students will explore how different multimedia and Internet technologies can enhance learning and inquiry, support collaborative problem-solving, and prepare them for a digital information society. Students will learn strategies that will effectively prepare them for the complex challenges related to critical thinking, researching, reading, Internet Safety and Ethical Use, and communicating in the 21st century.

CAREER INTERNSHIP **5 credits**

The Academy Career Internship is offered to those seniors who are enrolled in any Academy Program offered by Hopatcong High School. By interning in local industries/businesses pertinent to the Academy, students will have the opportunity to get hands-on experience in the professional realm, in addition to utilizing the acquired skills obtained through four years of intensive Academy work. The ultimate intention of this internship is to have the Academy students acquire the real-world

experience and skills that are not possible to obtain within the confines of a high school classroom, preparing them for higher education and/or employment in industry. Internship assessment will be determined by the coordinator or department facilitator before the internship commences.

CONCLUSION

The philosophy has been consistent in creating every Academy here at Hopatcong High School; prepare our student to become informed citizens ready to excel with 21st century skills, providing them with the opportunities that would not be available in a typical high school curriculum. “Today’s graduates need to be critical thinkers, problem solvers, and effective communicators who are proficient in both core subjects and new, twenty-first century content and skills,” according to “Results that Matter: 21st Century Skills an High School Reform,” a report issued in March by the Partnership for 21st Century Skills. These include learning and thinking skills, information and communications, technology literacy skills, and life skills.

Students of today enter an increasingly globalized world in which teachers play a vital role. They must be good communicators, as well as great collaborators. The new work environment requires responsibility and self-management, as well as interpersonal and project management skills that demand teamwork and leadership.

The STEAM Academy will help to shape the lives of many of the young people who will become the leaders and effective citizens of tomorrow.

THE ACADEMIES OF HOPATCONG HIGH SCHOOL

Application for membership – please select one:

_____ STEAM Academy	_____ Future Teachers Academy
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APPLICANT INFORMATION

First Name	Last Name	School	Today's Date	Grade
Address		City	State	Zip
Home Phone Number	Student Alternate Phone Number	Parent Emergency Phone Number		

Name of Teacher Reference: _____

Prior Related Experience (summer employment, community work, clubs)

From	To	Role/Job Title	Duties
Organization or Business Name		Contact Reference Name	Contact Phone Number
From	To	Role/Job Title	Duties
Organization or Business Name		Contact Reference Name	Contact Phone Number

THE ACADEMIES OF HOPATCONG HIGH SCHOOL

Explain why you would like to participate in the academy of choice:

_____ STEAM Academy	_____ Future Teachers Academy
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Signature Section:

1. I/We verify the information on this application is true and accurate.
2. I/We have read, understand and agree with the requirements, and understand that all policy and rules for the District of Hopatcong remain in effect and apply to any volunteer or other work.
3. I/We understand that any application requires the student to attend either group or individual interview and seminar time after school.

Student Printed Name	Student Signature	Today's Date
Parent/Guardian Printed Name	Parent/Guardian Signature	Today's Date

Please return this application to the Guidance Office for further verification by the principal and your guidance counselor.

Principal referral for respect, work ethic, and dependability: (Key: 1 = Excellent, 2 = Good, 3 = Fair)

Rating	Principal Printed Name	Principal Signature	Date
Comments			

Guidance counselor:

GPA	Counselor Printed Name	Counselor Signature	Date
Comments			

THE ACADEMIES OF HOPATCONG HIGH SCHOOL

TEACHER RECOMMENDATION

ACADEMIC REQUIREMENT - as per the respective academy

The following student has applied for acceptance into one of the following Academies of Hopatcong High School:

STEAM Academy

Future Teachers Academy

Would you kindly comment of their work ethic, level of respect for others, and dependability.

Name of Student: _____

Name of Teacher: _____

Date: _____ **Rating:** _____ (1 = Excellent, 2 = Good, 3 = Fair)

Comments: _____

Teacher's Signature: _____

Please return this form *as soon as possible* to the respective department facilitator:

STEAM Academy - Dr. Olga Edgerton

Future Teachers Academy – Dr. Sumita Kaufhold

Thank you for your time.

THE ACADEMIES OF HOPATCONG HIGH SCHOOL

Dear _____

We are pleased to announce your acceptance into the _____ Academy.

Your application has been reviewed and accepted. Requirements for your participation in this program are the following:

- Completion of all assignments.
- Community service requirements pertaining to respective academy.

Ms. Randina, Ms. Cinotti, Dr. Edgerton, and Dr. Kaufhold have been actively involved in the development of the various academies. We look forward to working with you as you embark on your journey.

You may contact any of the staff members, either in person or by email at the addresses listed below, with any questions you may have. If you contact us by e-mail, please put "Academy" in the subject box.

Congratulations! We are so pleased to welcome you to this new program.

Sincerely,

Mrs. Cynthia Randina crandina@hopatcongschools.org

Mrs. Noreen Lazariuk nlazariuk@hopatcongschools.org

Ms. Gina Cinotti gcinotti@hopatcongschools.org

Dr. Olga Edgerton oedgerton@hopatcongschools.org

Dr. Sumita Kaufhold skaufhold@hopatcongschools.org