

Biology  
Chemistry  
Astronomy  
AP Biology  
AP Chemistry  
Environmental Science  
AP Environmental Science  
Earth & Space Science  
Forensic Science  
Human Anatomy & Physiology  
Introduction to Healthcare Careers  
Introduction to Organic Chemistry  
Medical Terminology  
Physics  
AP Physics I  
AP Physics C  
STEM Research  
Sustainable Urban Agriculture  
Career Internship Program

# *Science*

**Dr. Jeannine Prucha, Division Chair**  
TEL: SC (708) 579-6580, NC (708) 579-6409  
EMAIL: jprucha@lths.net

**Ms. Britt Ligmanowski, Assistant Division Chair**  
TEL: SC (708) 579-6582  
NC (708) 579-6412  
EMAIL: bligmanowski@lths.net

**Ms. Annette Orrico, Assistant Division Chair**  
TEL: SC (708) 579-6583  
NC (708) 579-6411  
EMAIL: aorrico@lths.net

## Science Department Mission Statement

To use the content of Science to develop ALL students into lifelong learners; adept at critical thinking, problem solving and collaborating.

### Science Sequences

There are many science sequences that students may select because of their interests and career plans. The sequences shown below are intended to provide a solid background in science and not restrict students in their choices. Other sequences are possible when students, with input from teachers, counselors and parents, choose different course levels for biology, chemistry, and/or physics.

### General Information

- Two credits in science are required for graduation. However, courses in biology, chemistry, and physics should be included in every student's four year academic plan to provide a balanced preparation for future vocational and/or educational goals.
- Most colleges require at least two credits of a laboratory science for admission and some (especially Illinois universities) require three. Many colleges and universities suggest a three or four year sequence for students entering engineering, medicine and the health services, home economics, and computer sciences.
- Most colleges recommend both natural and physical science experience.

### Science Placement into Academic Ability Levels

The Division Chair evaluates the performance of each incoming student. Placements is based upon the following performance indicators.

- Information from the eighth grade teacher's about the incoming freshman using current math grades and student ability.
- LT will review the results and recommend further changes based on skills and supports.

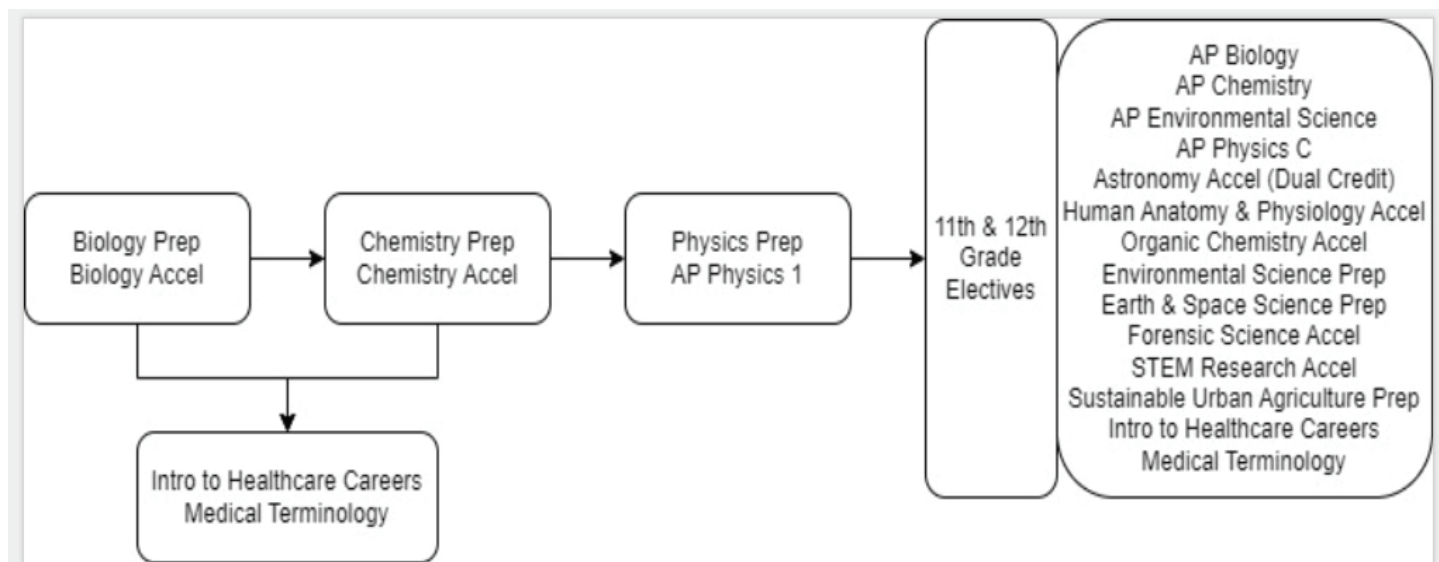
Parents are then notified of the final placement.

### Science and Advanced Placement (AP)

The Science Department offers preparation for AP examinations in four areas.

1. **AP Biology**  
AP Biology is the suggested course to prepare for the AP examination in biology or related examinations given by various colleges and universities. As the course description indicates, it is equivalent to two semesters of college biology.
2. **AP Chemistry**  
The AP Chemistry course is the equivalent of one or two semesters of college chemistry. AP Chemistry uses the College Board syllabus to prepare students for the AP examination in chemistry.
3. **AP Physics C**  
AP Physics C is a calculus-based university physics course and covers all of the material traditionally offered in the introductory college courses of engineering science and other related fields. As a result, the AP Physics C course students will be prepared for both AP Physics C examinations: Electricity and Magnetism, and Mechanics.
4. **AP Physics I**  
AP Physics I is an algebra-based physics course and covers mechanics, rotation and sound. This course is equivalent to one semester of college physics.
5. **AP Environmental Science**  
AP Environmental Science is the course to prepare students for the AP examination in environmental science. The course is equivalent to one semester of college environmental science.

## Course Sequences



## Science Department Standards

The LTHS Science Department utilizes the following eight principles in conjunction with both the Illinois State Standards and the Next Generation Science Standards. These principles and standards guide academic programs, courses, and challenge students. Additionally, specific academic course standards have also been developed. These are distributed to students at the beginning of each semester or annual course.

### LTHS Science Principles

#### NGSS Science and Engineering Practices

1. Asking Questions and Defining Problem
2. Planning and Carrying out Investigations
3. Using Mathematical and Computational Thinking
4. Developing and Using Models
5. Analyzing and Interpreting Data
6. Constructing Explanations and Designing Solutions
7. Engaging in Argument from Evidence
8. Obtaining, Evaluating, and Communication of Information

- **Independent Study** Under specific conditions as outlined on p. 25 of the **Guide**, students may make application for Independent Study. In all cases, students must secure parent, teacher, counselor, divisional, and building administration approval. Independent Study may not be taken as an 8th semester/annual course.

## Astronomy (Accel)

---

|  |                         |
|--|-------------------------|
| Credit: 1  | Level: IV               |
| Grade Offered: 11, 12  | Annual SN7311<br>SN7312 |
| Prerequisite: One year of natural science & Physics (Chemistry strongly recommended) |                         |

---

Astronomy is the oldest of all sciences. It began as an attempt by people to understand the world around them. Even today, people wonder what lies beyond our planet. Astronomy is the laboratory study of the night sky, our solar system, and objects which make up the universe. The study of astronomy and space science requires knowledge of biology, chemistry, and physics. In this course, techniques used by amateur and professional astronomers will be incorporated, students will learn to identify objects in the night sky and make predictions of celestial events such as eclipses. The origin, evolution, and future of our solar system, galaxy, and universe will be studied, and the existence of black holes and other cosmic oddities will be discussed. Students will learn about the history and future of space exploration, and how the science of astronomy, however old, is always changing. **Students may receive four lab science college credits with Moraine Valley upon successful completion of this dual credit course.**

## Biology (Prep)

---

|                      |                         |
|----------------------|-------------------------|
| Credit: 1            | Level: III              |
| Grade Offered: 9, 10 | Annual SN5116<br>SN5117 |
| 11, 12               | Annual SN5111<br>SN5112 |
| Prerequisite: None   |                         |

---

Biology is the study of living things and the basic processes of life. Students will explore scientific phenomena through the solving of problems using science practices. Classroom instruction will be based on questioning and on the use of real-world phenomena to increase student understanding and learning through application of biological concepts. Real world phenomena will elicit student questions and allow them to integrate the science ideas to gain a deep learning experience. The course involves assessing student progress throughout,

ultimately encouraging students as self-directed, competent learners.

## Biology (Accel)

---

|                      |                         |
|----------------------|-------------------------|
| Credit: 1            | Level: IV               |
| Grade Offered: 9, 10 | Annual SN7116<br>SN7117 |
| Prerequisite: None   |                         |

---

Biology is the study of living things and the basic processes of life. Students will explore scientific phenomena through the solving of problems using science practices. Classroom instruction will be based on student-driven questioning and student-led exploration of real-world phenomena. The application of biological concepts to new and different contexts are a critical piece of the deeper learning experience in this course. The phenomena presented will elicit student questions and allow them to answer these questions by integrating the science ideas to gain a deeper understanding. Though different assessment methods are used to better understand student mastery, students in this course are expected to act as self-directed, competent learners who can assess their own progress.

## AP Biology

---

|                       |                         |
|-----------------------|-------------------------|
| Credit: 1             | Level: V                |
| Grade Offered: 11, 12 | Annual SN8311<br>SN8312 |
| Prerequisite: Biology |                         |

---

AP Biology is a second course in biology offered to those students who have successfully completed the first level course. Taught at the college level, it is considered to be the equivalent of two semesters of college biology. The content is laboratory oriented, with an emphasis on inquiry-based investigations that provide students with opportunities to apply the science practices. Areas covered in the course are evolution, cellular processes, energy and communication, genetics, information transfer, ecology, and interactions. Dissection includes a cat as a representative mammal. The program prepares students for the AP examination in Biology.

## Chemistry (Prep)

---

|                   |                         |
|-------------------|-------------------------|
| Credit: 1         | Level: III              |
| Grade Offered: 10 | Annual SN5616<br>SN5617 |
| 11, 12            | Annual SN5611<br>SN5612 |

Prerequisite: Completion of Algebra Prep or higher

---

Chemistry is the study of the composition and structure of matter, the changes matter undergoes, and the energy associated with those changes. This course covers a range of topics using phenomenon driven curriculum. Chemistry concepts are reinforced through laboratory activities, classroom discussion and independent practice. A background in algebra, continuous practice and daily review are key to success in this course.

## Chemistry (Accel)

---

|                   |                         |
|-------------------|-------------------------|
| Credit: 1         | Level: IV               |
| Grade Offered: 10 | Annual SN7216<br>SN7217 |
| 11, 12            | Annual SN7211<br>SN7212 |

Prerequisite: Completion of Algebra with a B or better

---

Chemistry is the study of the composition and structure of matter, the changes matter undergoes, and the energy associated with those changes. This course covers a range of topics with depth at a fast pace. Chemistry concepts are reinforced through laboratory activities, classroom discussion and independent practice. A strong background in mathematics, continuous practice and daily review are key to success in this course.

## AP Chemistry

---

|                       |                         |
|-----------------------|-------------------------|
| Credit: 1             | Level: V                |
| Grade Offered: 11, 12 | Annual SN8211<br>SN8212 |

Prerequisite: One year of a natural science and one year of Chemistry (Accel) with a grade of B or better or Chemistry (Prep) with a grade of A (Physics strongly recommended)

---

AP Chemistry is intended to provide a college level course in chemistry for interested and capable students. Students considering careers in technical fields such as chemistry, chemical engineering, general engineering, and medicine, or for careers in areas where a knowledge of chemistry will be required, should consider this course.

Those who complete the course may take the AP examination in Chemistry. This course is equivalent to two semesters of college chemistry. Topics include electronic and atomic structure, stoichiometry, reactions, thermochemistry, periodicity, bonding, intermolecular forces, kinetics, equilibrium, acids and bases, thermodynamics, and electrochemistry.

## Earth and Space Science

---

|                                   |                              |
|-----------------------------------|------------------------------|
| Credit: 1                         | Level: III                   |
| Grade Offered: 11, 12             | Fall SN6211<br>Spring SN6212 |
| Prerequisite: One year of science |                              |

---

This course will study the environment on Earth and the Earth's environment in space. Topics include the history and formation of the Earth, geology, astronomy, and meteorology. The course will utilize science practices developed in earlier courses to explore earth and space sciences and answer the following questions: What is the universe, and what is Earth's place in it? How and why is Earth constantly changing?

## Environmental Science (Prep)

---

|                                   |                              |
|-----------------------------------|------------------------------|
| Credit: 1/2 or 1                  | Level: III                   |
| Grade Offered: 11, 12             | Fall SN6011<br>Spring SN6012 |
| Prerequisite: One year of science |                              |

---

General interest topics of ecology, population, politics, pollution, and other vital problems of survival of mankind are covered. The course provides the student with an awareness of our world and ways the student can help improve its quality. Students must participate in research in the form of discussion and reports. Field trips, lectures, and lab projects will supplement the research. The course may be taken for either semester independently or for the full year since topics do not overlap.

- **Independent Study** Under specific conditions as outlined on p. 25 of the **Guide**, students may make application for Independent Study. In all cases, students must secure parent, teacher, counselor, divisional, and building administration approval. Independent Study may not be taken as an 8th semester/annual course.

## AP Environmental Science

Credit: 1  
Grade offered: 11, 12  
Prerequisites: One year of a natural science and one year of a physical science (Chemistry or Physics) (Both Chemistry and Physics strongly recommended)

Level: V  
Annual: SN8511  
SN8512

AP Environmental Science is an ecology course which allows students to apply many of the principles learned in biology, chemistry, and physics to better understand the biosphere and the environmental and economic choices facing contemporary society. Topics include: sustaining terrestrial and aquatic biodiversity; the history of the modern environmental movement; ecological principles; climate, weather, and biomes; the harvesting and use of renewable and non-renewable energy resources; petrochemicals, hazardous wastes, and toxicology; human population growth; soil and water resources; food and agriculture; mining and solid waste; the atmosphere and air pollution; climate change and ozone depletion; renewable resource sustainability and environmental ethics. Field trips are an integral part of this course and are therefore mandatory. Students cannot level change into Environmental Science (Prep) from this class.

## Forensic Science

Credit: 1  
Grade Offered: 11, 12  
Prerequisite: One year of Biology and one year of Chemistry

Level: IV  
Annual SN7511  
SN7512

This course is designed to familiarize those individuals interested in criminalistics and/or related fields with the methods and techniques currently employed by forensic scientists. It involves the collection, examination, evaluation and interpretation of evidence through the use of biological, chemical and behavioral sciences as employed by our justice system, while gaining a basic understanding of the capabilities and limitations of the application of forensic science to the law. This course involves components from all of the sciences including content from Biology, Chemistry, Physics, Math and ELA Writing Skills. Forensic students will use critical

thinking, deductive reasoning, advanced chemical laboratory techniques and problem-solving skills. Reality and research-based activities are used to investigate criminal scenarios; the scientific method is used for collecting and analyzing evidence through case studies and simulated crime scenes such as fingerprinting, ballistics and blood spatter analysis.

## Introduction to Healthcare Careers

Credit: 1/2  
Grade Offered: 9, 10, 11, 12  
Prerequisite: None

Level: III  
Fall SN2116  
Spring SN2117  
Fall SN2111  
Spring SN2112

This course will expose students to the variety of opportunities available within the healthcare industry (e.g. nursing therapy, vision and dental care, administrative services, and lab technology) which will include classroom and community-based activities. The main purpose of this course is to assist students in further development of their self-concept and in matching personal abilities and interest to a tentative career choice. The course content will profile in-depth information into health occupation career and trends, the occupational and educational opportunities and the educational, physical, emotional and attitudinal requirements.

## Human Anatomy and Physiology (Accel)

Credit: 1  
Grade Offered: 11, 12  
Prerequisite: One year of natural science and one year of Chemistry

Level: IV  
Annual SN9511  
SN9512

Essential principles of human anatomy and physiology are presented including basic chemistry, cell and tissue studies, and an overview of body systems including skeletal, muscular, cardiovascular, respiratory, nervous, endocrine, reproductive, digestive, excretory, and immune. Dissection and computer technology will be an integral part of the course. Some comparative anatomy and physiology will be included especially while completing the dissections.



## Medical Terminology

---

|                      |               |
|----------------------|---------------|
| Credit: 1/2          | Level: III    |
| Grade Offered: 9, 10 | Fall SN2126   |
|                      | Spring SN2127 |
| 11, 12               | Fall SN2121   |
|                      | Spring SN2122 |

Prerequisite: None

---

Course presents medical terminology through the study of medical word roots, prefixes, and suffixes. Focus on relationships among symptomatic, disease, and procedural terms. This course prepares students with the oral and written skills necessary to communicate in any health care field.

## Introduction to Organic Chemistry (Accel)

---

|                       |               |
|-----------------------|---------------|
| Credit: 1             | Level: IV     |
| Grade Offered: 11, 12 | Annual SN5811 |
|                       | SN5812        |

Prerequisite: One year of natural science and one year of Chemistry

---

This course is offered to give students who will take organic chemistry in college an advantage over the usual chemistry background. This includes those students who wish to go into one of the following fields: medicine, dentistry, pharmacology, nursing, home economics, biology, chemistry, and related fields. Students become familiar with the naming and structure of organic compounds. A knowledge of some of the basic reactions of organic chemistry is gained through laboratory work and study of lecture materials. Topics include alkanes, alkenes, alkynes, aromatics, alcohols, aldehydes, ketones, acids, amines, amides, and spectroscopy.

## Physics (Prep)

---

|                       |               |
|-----------------------|---------------|
| Credit: 1             | Level: III    |
| Grade Offered: 11, 12 | Annual SN4911 |
|                       | SN4912        |

Prerequisite: Completion of Algebra (Prep) or higher

---

Physics is fundamental to all other sciences. The ideas and concepts are related to other sciences and mathematics. This course is laboratory centered. Laboratory activities are used to teach the main ideas. An activity is used to introduce an idea, then it is taught at the conceptual level, and finally an activity is used as an application of this idea. Topics include fundamental concepts of scientific thinking, motion, momentum, energy, electricity, and magnetism.

## AP Physics I

---

|                   |               |
|-------------------|---------------|
| Credit: 1         | Level: V      |
| Grade Offered: 10 | Annual SN8116 |
|                   | SN8117        |
| 11, 12            | Annual SN8111 |
|                   | SN8112        |

Prerequisite: Completion of Algebra II (Prep) or Geometry (Accel) or higher and Chemistry

---

AP Physics I is an algebra-based college level physics course. This is a laboratory study for student discovery of the physical universe. Major topics of study include: motion, energy, dynamics, momentum, light and sound. This is a first year physics course and is equivalent to one semester of college level physics. Students can take AP Physics C as a second year course.

## AP Physics C

---

|                       |               |
|-----------------------|---------------|
| Credit: 1             | Level: V      |
| Grade Offered: 11, 12 | Annual SN8411 |
|                       | SN8412        |

Prerequisite: One year of natural science and AP Physics I with a grade of B or better or Physics (Prep) with a grade of A and completion or concurrent enrollment in Calculus AB or BC

---

AP Physics C is a calculus-based college level physics course. This course would be ideal for those planning a career in engineering, medicine, science, math, health-related fields, or any technical field. Major topics studied are mechanics, electricity, and magnetism. Supplemental topics may include thermodynamics, physical and geometric optics, and modern physics. Understanding of basic principles and application of

these principles in problem solving are the major goals of this course. Those who take the course may take the AP examination in Physics. This course is equivalent to two semesters of college physics. As a result of this course, students will be prepared for both AP Physics C examinations: Electricity and Magnetism, and Mechanics.

## Sustainable Urban Agriculture

|                                 |                              |
|---------------------------------|------------------------------|
| Credit: 1/2 or 1                | Level: III                   |
| Grade Offered: 11, 12           | Fall SN8521<br>Spring SN8522 |
| Prerequisite: 1 year of science |                              |

This course provides an overview of sustainable urban agriculture with a strong focus on hands on food production. The course looks at the sustainability of food production at multiple levels: farm resources, community, regional, national and global. Students will gain a basic understanding of the environmental tradeoffs caused by conventional agriculture and understand the challenges to alternative forms of sustainable agriculture. Students will learn to think critically about where their food comes from, and be able to analyze the environmental, economic, and social costs and benefits involved in delivering food from farm to market. This class is intended for students with a general interest in sustainable food production systems. We will discuss a variety of ecological, social, and economic topics within the framework of sustainability. This course is designed to provide students with an overview of the agriculture and food industry. It will focus on introductory areas of agriscience, natural resource management, plant, animal and food science. After completing this course, students will be able to discuss the role of agriculture in our modern world, provide suggestions for conserving our air, water, soil and forestry resources, and grow and sustain crops. This course may be taken for either semester independently or for the full year since the topics do not overlap.

## STEM Research

|                                  |                         |
|----------------------------------|-------------------------|
| Credit: 1                        | Level: IV               |
| Grade Offered: 11, 12            | Annual SN7611<br>SN7612 |
| Prerequisite: 2 years of science |                         |

This course is designed for independent and academically driven juniors or seniors who have completed at least 3 years of laboratory science and math (or who are concurrently enrolled in their third year) who are interested in pursuing research in the fields of science or engineering. Each student will have the opportunity to develop an open-ended research project that he or she will have the entire year to investigate using scientific laboratory or engineering design techniques. The student will be responsible for planning and implementing each phase of their project. Each student will have the

opportunity to connect with an “e-mentor” who is an expert in the area the student is investigating and for maintaining collaboration with that professional throughout the year. Students will read scientific journals, develop hypotheses, collect and analyze data, perform statistical analyses, create a formal research poster, and write a formal research paper which will be submitted to local, state, and national/international science competitions.

## Career Internship Program

|                       |  |
|-----------------------|--|
| Credit: 1/2 (dc)      | Level: IV  |
| Grade Offered: 11, 12 | Fall SN5551<br>Spring SN5552<br>Summer SN5558 SN5559 |

This course is designed for a student who has already secured an internship in partnership with their LT teacher in this department. Detailed information about qualifying for a Career Internship Program class can be found on page 10 of the Guide. It is the sole discretion of each department team to recommend a student for a career internship. An application does not guarantee admission.



# Science Classes

When choosing Annual Courses, you will need the first and second semester codes.

## Freshman Courses

### Annual

|          |                             |
|----------|-----------------------------|
| SN5116/7 | Biology Prep                |
| SN7116/7 | Biology Accel               |
| SN2116/7 | Intro to Healthcare Careers |

## Sophomore Courses

### Annual

|          |                 |
|----------|-----------------|
| SN5116/7 | Biology Prep    |
| SN7116/7 | Biology Accel   |
| SN5616/7 | Chemistry Prep  |
| SN7216/7 | Chemistry Accel |
| SN8116/7 | AP Physics I    |

### Fall Only

|        |                             |
|--------|-----------------------------|
| SN2116 | Intro to Healthcare Careers |
| SN2126 | Medical Terminology         |

### Spring Only

|        |                             |
|--------|-----------------------------|
| SN2117 | Intro to Healthcare Careers |
| SN2127 | Medical Terminology         |

## Junior and Senior Courses

### Annual

|          |  |
|----------|--|
| SN7311/2 | Astronomy Accel                            |
| SN5111/2 | Biology Prep                               |
| SN8311/2 | AP Biology                                 |
| SN5611/2 | Chemistry Prep                             |
| SN7211/2 | Chemistry Accel                            |
| SN8211/2 | AP Chemistry                               |
| SN8511/2 | AP Environmental Science                   |
| SN6211/2 | Earth & Space Science                      |
| SN7511/2 | Forensic Science                           |
| SN9511/2 | Human Anatomy & Physiology<br>Accel        |
| SN5811/2 | Introduction to Organic Chemistry<br>Accel |
| SN4911/2 | Physics Prep                               |
| SN8111/2 | AP Physics I                               |
| SN8411/2 | AP Physics C                               |
| SN7611/2 | STEM Research                              |

### Fall Only

|        |                               |
|--------|-------------------------------|
| SN6011 | Environmental Science Prep    |
| SN6121 | Geology Prep                  |
| SN2121 | Medical Terminology           |
| SN8521 | Sustainable Urban Agriculture |

### Spring Only

|        |                               |
|--------|-------------------------------|
| SN6012 | Environmental Science Prep    |
| SN6122 | Geology Prep                  |
| SN2122 | Medical Terminology           |
| SN8522 | Sustainable Urban Agriculture |

# Did You Know?

## 20 High-Paying Science Careers for the Next Decade

- Surgeon
- Anesthesiologist
- Internist
- Dentist
- Oral Surgeon
- Nurses
- X-ray technician
- Physician Assistant
- Psychiatrist
- Environmental Consulting
- Natural Sciences Manager
- Mining
- Petroleum
- Green Energy
- Civil Engineer
- Aerospace Engineering
- Astronomy
- Engineering Manager
- Nanotechnology
- Materials Science

A recent U.S. Department of Commerce study shows that over the past 10 years, growth in Science, Technology, Engineering and Mathematics (STEM) jobs was three times greater than that of non-STEM jobs. The report also shows that STEM jobs are expected to continue to grow at a faster rate than other jobs in the coming decade.

## Have you ever considered a career as a...



Acoustical Research Engineer  
 Aeronautical Engineer  
 Agricultural Engineer  
 Anneal Physiology  
 Archeologist  
 Assembling Engineer  
 Astrogeologist  
 Astronaut  
 Astronomer  
 Astrophysicist  
 Audio Engineer  
 Bioanalyst

Biochemist  
 Botanist  
 Cardiologist  
 Chemical Engineer  
 Chemist  
 Computer Scientist  
 Cytogeneticist  
 Dentist  
 Education  
 Engineer  
 Entomologist  
 Food Science  
 Food Science Technician  
 Forensic Anthropologist  
 Forensic Chemist  
 Forensic Scientist  
 Forestry  
 Geologist  
 Geoscientist  
 Health Care Worker  
 Herpetologist  
 Horticulturist  
 Life Science Writer

Marine Biologist  
 Molecular Biologist  
 Neurobiologist  
 Oceanographer  
 Physical Trainer  
 Physicist  
 Plant Ecologist  
 Plant Geneticist  
 Plastic Surgeon  
 Psychologist  
 Quality Insurance Engineer  
 Researcher  
 Solid State Chemist  
 Space Scientist  
 Staff Scientists  
 Structural Engineer  
 Surgeon  
 Systems Engineer  
 Veterinarian  
 Water Resources Engineer  
 Wildlife Biologist  
 Wildlife Ecologist  
 Wildlife Psychologist  
 Zoo Keeper  
 Zoologist