

# SCIENCE

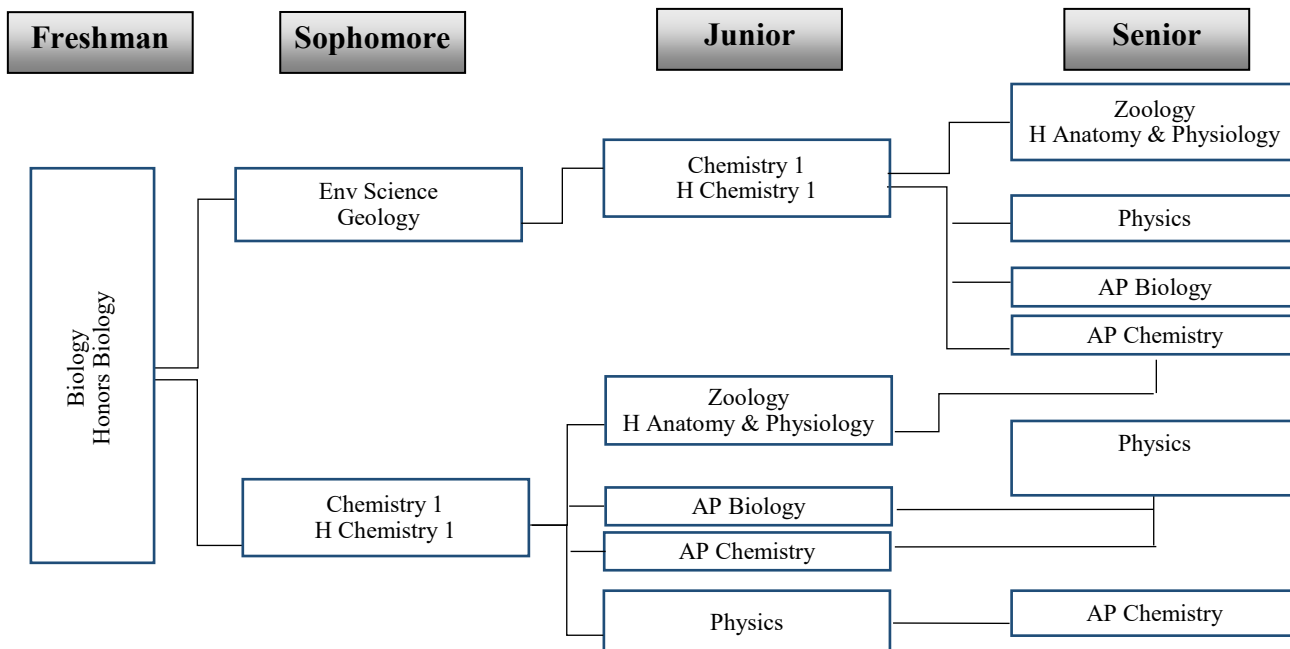
The science department strongly recommends a minimum of four science courses for those planning to attend college. It is recommended that of those four, three be biology, chemistry, and physics. Many students take two science courses in one year.

*RTHS requires a minimum of 2 earned credits in Science.*

**\*Grade level designations apply except when a student needs to make up previously failed required classes.**

<b><u>AVAILABLE 2021-2022 COURSES</u></b>			
<b>***Some courses require the purchase of a Scientific Calculator***</b>			
<b><u>COURSE</u></b>	<b><u>CREDIT</u></b>	<b><u>PREREQUISITE</u></b>	<b><u>GRADE LEVELS</u></b>
Biology	1 unit—two semesters	No	*9
Honors Biology	1 unit—two semesters	Yes	9
AP Biology	1 unit—two semesters	Yes	11, 12
Environmental Science	1/2 unit—one semester	Yes	10, 11, 12
Geology	1/2 unit—one semester	Yes	10, 11, 12
Chemistry 1 (Scientific Calculator needed)	1 unit—two semesters	Yes	10, 11, 12
Honors Chemistry 1 (Scientific Calculator needed)	1 unit—two semesters	Yes	10, 11, 12
AP Chemistry	1 unit—two semesters	Yes	11, 12
Hon Anatomy & Physiology	1/2 unit—one semester	Yes	11, 12
Zoology	1/2 unit—one semester	Yes	11, 12
Physics	1 unit—two semesters	Yes	11, 12

## SCIENCE FLOW CHART



**BIOLOGY 1**

**Prerequisite:** None

**Grade Levels:** \*9

**Credit:** 1 unit - two semesters

\*Open to 10, 11, 12 grade levels

In Biology, students will be introduced to the science of life. This course studies a range of topics, from the large scale such as ecosystems to the small scale such as DNA inside of a cell. The course acts as an overview to introduce the main ideas in biology. In this class, students will:

1. Study ecology, including the interactions between organisms and the functionality of ecosystems.  
Explore the macromolecules of life and the roles that water plays in living things.
3. Recognize cellular processes needed for an organism to survive.
4. Explore the various types of cell division and understand the significance of these processes.
5. Describe the structural similarities and differences between DNA and RNA as well as the processes of DNA replication, transcription, and protein synthesis.
6. Study heredity and genetics by examining Punnett squares, pedigrees, and gene abnormalities responsible for genetic disorders.
7. Evaluate evidence for evolution and gain an understanding of the mechanisms behind it, including genetic mutations and natural selection.

**HONORS BIOLOGY 1**

**Prerequisite:** 8th Grade Teacher recommendation

**Grade Levels:** 9

**Credit:** 1 unit - two semesters

**Purpose Statement:** Students will take an in depth exploration into the fundamental facts and concepts of the study of biology through exploring fields of the science, discovering various living organisms, and conducting inquiry on life processes in order to gain a better understanding of the world around them. This class will also prepare students who choose to take AP Biology during their Junior or Senior year of school. This curriculum follows the same standards as regular biology, but goes further in depth.

1. Study ecology, including the interactions between organisms and the functionality of ecosystems.
2. Explore the macromolecules of life and the roles that water plays in living things.
3. Recognize cellular processes needed for an organism to survive.
4. Explore the various types of cell division and understand the significance of these processes.
5. Describe the structural similarities and differences between DNA and RNA as well as the processes of DNA replication, transcription, and protein synthesis.
6. Study heredity and genetics by examining Punnett squares, pedigrees, and gene abnormalities responsible for genetic disorders.
7. Evaluate evidence for evolution and gain an understanding of the mechanisms behind it, including genetic mutations and natural selection.

**AP BIOLOGY (Honors Credit)**

**Prerequisites:** Credit in Biology or Honors Biology and Chemistry 1 or Honors Chemistry 1

**Grade Levels:** 11, 12

**Credit:** 1 unit - two semesters.

Adhering to the curricula recommended by the College Board and designed to parallel college-level introductory biology courses, AP Biology stresses basic facts and their synthesis into major biological concepts and themes. This course covers three general areas: molecules and cells (including biological chemistry and energy transformation), genetics and evolution, and organisms and populations (for example, taxonomy, plants, animals, and ecology). AP Biology includes college-level laboratory experiments.

## ENVIRONMENTAL SCIENCE

**Prerequisite:** Concurrent enrollment in or completion of Biology  
**Grade Levels:** 10, 11, 12  
**Credit:** ½ unit - one semester

Students are introduced to Environmental Science. The class emphasizes human population growth and its impact on available resources, as well as the causes and effects of climate change. The goal is to provide students with the scientific background to analyze for themselves the environmental issues we are facing now and could be facing in the future.

1. Students are introduced to renewable and nonrenewable resources we rely on, and the importance of using the resources wisely.
2. Students are introduced to what causes population growth, and the outcome population growth has on future resources.
3. Students will explore climate change including its causes and effects, and what humans can do to help reduce climate change.

## GEOLOGY

**Prerequisite:** Concurrent enrollment in or completion of Biology  
**Grade Levels:** 10, 11, 12  
**Credit:** ½ unit - one semester

In Geology, students will learn about the physical earth in some detail. This course studies planet Earth, its structure, materials, processes, and surface features. It is a broad study introducing the earth sciences and gives the students a greater appreciation of their physical surrounding. Geology is a lab-based course. In this class student will:

1. Study the structure of the earth and various properties of each layer.
2. Evaluate evidence to support continental drift and seafloor spreading.
3. Interpret the rock cycle, sequence rock layers, and demonstrate an understanding of aquifers.
4. Describe the causes of natural disasters and measure the location and strength of earthquakes.

## CHEMISTRY 1

**FEES:** Purchase of Scientific Calculator  
**Prerequisite:** C or better in Algebra 1 or Honors Algebra 1, & 1 year of Biology  
**Grade Levels:** 10, 11, 12  
**Credit:** 1 unit - two semesters

**Purpose Statement:** Students will gain a greater understanding of the fundamental composition of matter and the interactions that occur between various substances.

1. Students will gain an understanding of the fundamental concepts and skills necessary for understanding the study of chemistry such as lab safety, unit measurements, and the evaluation of lab results.
2. Students will learn about the differences between physical and chemical changes, along with various states of matter, and learn how to provide evidence and reasoning to support claims.
3. Students will gain an understanding of the development of the atomic model and the particles that comprise the atom.
4. Students will gain an understanding of the behavior of electrons and how this pertains to modern atomic theory and their relationship with other subatomic particles of the atom.
5. Students will learn how to utilize the periodic table and understand its organization.
6. Students will gain an understanding of the nature of chemical bonds, how they are involved with chemical reactions, and their effect on the macroscopic properties of a material as well as the naming conventions applied to materials based on the bonds holding them together.
7. Students will gain an understanding of the relationships between elements in a compound and between compounds and elements in reactions.
8. Students will complete mathematical problems related to elements and their mass, volume, and number of particles.
9. Students will gain an understanding of the unique properties of gas and the effects that varying characteristics, such as volume and temperature, have on other characteristics.
10. Students will gain an understanding of the composition of solutions and the interactions that dissolved particles have within solutions.
11. Students will gain an understanding of the characteristics of acidic and basic solutions along with ways of distinguishing between the two and the pH scale.



**HONORS CHEMISTRY I**

**FEES:** Purchase of Scientific Calculator

**Prerequisites:** Credit in Honors Algebra 1 or Algebra 1 and 1 year of Biology.

**Grade Levels:** 10, 11, 12

**Credit:** 1 unit - two semesters.

**Purpose Statement:** Students will gain a greater understanding of the fundamental composition of matter and the interactions that occur between various substances.

1—11. Same structure as Chemistry 1.

This course covers the topics normally taught in a first-year high school chemistry course but in more depth and in more mathematical terms than the Chemistry 1 course. Labs will require more application of knowledge, and tests and quizzes will be significantly more difficult.

**AP CHEMISTRY (Honors Credit)**

**Fees:** Registration cost for AP exam (approximately \$93) Fee waivers available for eligible students

**Prerequisite:** A or B in Honors Chemistry 1, A in Chemistry 1, credit or concurrent enrollment in Honors Algebra 2 or Algebra 2, or teacher recommendation

**Grade Levels:** 11, 12

**Credit:** 1 unit - two semesters

**Purpose Statement:** Students will attain a depth of understanding of the fundamental concepts of general chemistry, competence in solving chemistry problems, the ability to think clearly and express their ideas orally and in writing, and experience in making observations of chemical substances and reactions, recording data, and calculating and interpreting the results of experimental data.

1. Students will gain a deeper understanding of the fundamental concepts and skills necessary for understanding the study of chemistry.
2. Students will gain a deeper understanding of the mass relationships between elements in a compound and between compounds and elements in reactions.
3. Students will gain a deeper understanding of the composition of solutions, the interactions that dissolved particles have within solutions, and the effect that these dissolved particles have on the properties of the mixture.
4. Students will gain a greater understanding of the unique properties of gas and the effects that varying characteristics, such as volume and temperature, have on other characteristics.
5. Students will gain a greater understanding of the behavior of electrons and how this pertains to modern atomic theory as well as a deeper understanding of the relationship between electrons' placement within the atom and the properties exhibited by the elements.
6. Students will gain an understanding of the nature of chemical bonds and their effect on the macroscopic properties of a material as well as the naming conventions applied to materials based on the bonds holding them together.
7. Students will gain an understanding of the energy changes involved in chemical reactions as well as the factors that influence the spontaneity of those reactions.
8. Students will gain an understanding of physical and chemical equilibria during changes of state, in the gaseous state, and in solutions.
9. Students will gain an understanding of the factors that affect the speed at which a reaction occurs.
10. Students will gain an understanding of the electron transfer processes occurring in oxidation-reduction reactions and their relationship with electrochemistry.
11. Students will gain an understanding of the equilibria that occur in acidic and basic solutions as well as the effects on those equilibria caused by acid-base interactions.
12. Students will gain an understanding of nuclear reactions as well as the naming of simple organic molecules and those that include functional groups.

**HONORS ANATOMY & PHYSIOLOGY**

**Prerequisite:** Chemistry 1

**Grade Levels:** 11, 12

**Credit:** ½ unit - one semester

Anatomy & Physiology deals with the structure and function of various parts of the human body. Students taking this course will develop the ability to use anatomical language while studying the skeletal, muscular, and nervous systems. Anatomy is a lab intensive course. Students will have the opportunity to work with skeletal models, as well as dissect a cat. This is a college-preparatory course that will develop study methods which will be beneficial in college. It will also give students a better understanding of their own bodies and how they work



# SCIENCE

## ZOOLOGY

**Grade Levels:** 11, 12

**Credit:** ½ unit - one semester

Zoology focuses on animal biology. In the first 3 weeks, students will study the major divisions of the animal kingdom and the classification of organisms. The remaining weeks will be spent on in depth study of four animal groups. The first group is insects. Students will study anatomy and physiology, classification, and identification of the 30 orders of insects. This will include an insect collection project to be completed by the end of the unit. The next group is fish. Students will focus on the anatomy and physiology of fish as well as their classification. Students will dissect a lamprey, a perch, and participate in a field trip to Shedd Aquarium for a fish pathology lab. The last two groups are reptiles and birds. Students will focus on the anatomy and physiology of both. This unit will include a pigeon dissection. This is a lab intensive class. This class will help prepare students for dissection in college courses and will prepare students for entering college programs for the medical/health field and veterinary medicine.

## PHYSICS/HONORS PHYSICS

**Prerequisite:** Chemistry 1 completed or enrolled in Algebra 2. Recommended to be concurrently enrolled in Pre-Calculus.

**Grade Levels:** 11, 12

**Credit:** 1 unit - two semesters

*TI-84 Calculator recommended but not required.*

This class is to be split into Honors and Regular. All students will be enrolled in the same Physics class. Students will still be able to earn an honors credit, but they will be asked to complete certain steps in order to get that honors distinction. The students in class will be working on the same concepts and materials, but honors credit is based on a mixture of additional learning targets, additional concept building projects, and earning 4's on designated learning targets that are highlighted in the syllabus.

This course will cover concepts involving Kinematics, Laws of Conservation, Waves, Electrostatics, and Electric Circuits.

