

SCIENCE COURSES

Scientific thinking is a powerful skill to possess, and our Science Department at EHS believe that domestic and global citizenship **requires** the use of the scientific method, data analysis, and scientific literacy. For this reason, our courses emphasize data driven decision making and hands-on problem solving. Students can expect to be challenged and supported academically by our experienced teachers who are passionate about their subject area. Our department has high standards for our students, which are evident by our Science MCA test scores. Over the last decade EHS has consistently ranked in the top 5 schools in the state for these tests. At EHS students can explore a variety of paths that will challenge them throughout their high school career. We offer a comprehensive list of required and elective courses that we believe will better prepare your student for the competitive global market.

The state of Minnesota requires successful completion of 3 years of science courses for graduation. Within these three courses Biology must be completed along with one of the following courses: Chemistry, Chemistry Fundamentals or Physics. To satisfy the required state standards ISD 196 also requires our Physical Earth Science course for graduation.

The following are general course sequences that students and their parents can use as a guide when registering at EHS.

For college-bound students who desire a challenge

9th Grade	10th Grade	11th Grade	12th Grade
Honors Physical Earth Science <i>*Required to Graduate</i>	Honors Biology <i>*Required to Graduate</i>	Honors Chemistry <i>*Required to Graduate</i>	AP Physics <i>*Elective Some Colleges Require</i>

For those students who are planning on post secondary education

9th Grade	10th Grade	11th Grade	12th Grade
Physical Earth Science <i>*Required to Graduate</i>	Biology <i>*Required to Graduate</i>	Chemistry (or Physics) <i>*Required to Graduate</i>	Physics (or Chemistry) <i>*Elective Some Colleges Require</i>

For the student who has difficulty with Science

9th Grade	10th Grade	11th Grade	12th Grade
Physical Earth Science <i>*Required to Graduate</i>	General Science <i>*Bio and Chem Prep Course</i>	Biology <i>*Required to Graduate</i>	Chemistry Fundamentals <i>*Required to Graduate</i>

In addition to our core courses the science department also offers additional electives students may choose to take in conjunction with the four core courses above.

- Astronomy, Meteorology, Geology
- Biology of MN
- Summer Science Institute
- AP Biology
- AP Chemistry
- CIS Human Physiology
- Environmental Science

Note: Students with the academic ability to take A.P. Biology, A.P. Chemistry or CIS Human Physiology should do so in conjunction (second elective) with our core courses their junior and senior years (Chemistry, Physics)

There is another available academic track only for those outstanding college-bound students who are considering a career in a STEM related field, desire a challenge, and are a full year ahead in their honors math coursework.

9th Grade	10th Grade	11th Grade	12th Grade
Honors Physical Earth Science <i>*Required to Graduate</i>	Honors Biology <u>concurrently</u> with Honors Chemistry <i>*Required to Graduate</i> <i>*Must exceed math prerequisite for H. chem</i>	By completing both Honors Biology and Honors Chemistry in 10th grade students can tailor their last two years to include as many AP and CIS Science courses as they desire. One common track is to take AP Biology and AP Chemistry in 11th grade leaving AP Physics and CIS Human Physiology for 12th grade. Many students are successful “doubling up” in these courses, while others choose to only take one each year.	

Summer Experiential Learning Option

The EHS science department also offers an outstanding summer course that is unlike anything else offered in the area. Our Summer Science Institute is a one credit course where students experience a multi-day canoeing trip in northern Minnesota. Students have an opportunity to apply for Summer Science Institute during, or any year after, they take biology.

COURSES FIRST OFFERED TO STUDENTS IN GRADE 9

1001 <u>Physical Earth Science A</u>	Grades 9	
1002 <u>Physical Earth Science B</u>	Prerequisite:	None
1003 <u>Physical Earth Science C</u>		

Physical Earth Science is a year-long course required of all ninth grade students. This course will explore physical and earth science concepts through an activity-centered, laboratory based approach. The first trimester topics include scientific method, metric system, graphing, energy, energy resources, atmosphere, climate, and climate change. The second trimester topics include earth forces, volcanos, earthquakes, tectonics, rocks/minerals, geological history, and introductory chemistry. The third trimester topics include stellar astronomy, solar system, cosmology, electromagnetic spectrum, and navigating the sky.

1004 <u>Honors Physical Earth Science A</u>	Grade 9	
1005 <u>Honors Physical Earth Science B</u>	Prerequisite:	Fast paced algebra or higher math course in Grade 9, Recommendation by 8 th grade Science teacher, High math and science standardized test scores
1006 <u>Honors Physical Earth Science C</u>		

The Honors Physical Earth Science curriculum covers the three main topics of Physical Earth Science: Climate and Energy, Astronomy, and Geology. Each topic is covered in greater depth and involves more math than the regular Physical Earth Science Course. Trimester one will cover topics in climate, energy, energy resources, engineering, metrics, graphing with an emphasis on problem solving, lab designs, and project work. Trimester two is spent working on Astronomy topics such as celestial charts, electromagnetic spectrum, star formation, Newton's laws, and Cosmology. Trimester three covers the area of Geology with plate tectonics, earth history, chemistry of earth, rocks and minerals. Students completing this course with a grade of "C" or higher, may use the credit to qualify for an honors ranking.

COURSES FIRST OFFERED TO STUDENTS IN GRADE 10

1026 <u>General Science A</u>	Grades 10,11,12	
1027 <u>General Science B</u>	Prerequisite:	None
1028 <u>General Science C</u>		

General Science is a year long course designed to help the certain 10th through 12th grade students meet a second year of their science requirement. The goal of this year-long course is to develop an understanding of the major concepts in biology, chemistry and the physical world in an integrated manner. These concepts will be studied by analyzing their practical applications. Topics in the Fall focus on the nature of science, and a study of environmental science and biology.

1031 <u>Biology A</u>	Grades 10,11,12	
1032 <u>Biology B</u>	Prerequisite:	Passed Physical Earth Science or General Science
1033 <u>Biology C</u>		

Biology is a yearlong course that is required to fulfill a graduation standard for the state of Minnesota. This course is focused on developing a conceptual, but thorough understanding of the biological sciences through guided inquiry. The main topics covered throughout the year include the nature of science, ecology, biochemistry, cellular biology, genetics, and evolution.

1037 <u>Astronomy</u>	Grades 10,11,12	
	Prerequisite:	3 credits in Physical Earth Science

This course will give the students an advanced understanding of our universe. In class we will take a deeper look at our solar system, the celestial sphere, space debris, electromagnetic spectrum, stellar evolution, cosmology, and space travel. A field trip is scheduled to the planetarium that all students are encouraged to attend for a small fee.

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1038 Meteorology Grades 10,11,12
Prerequisite: 3 credits in Physical Earth Science

This course will give students an advanced understanding of our weather, climate, and atmospheric conditions and climate change here on earth. Students will engage in hands-on activities related to our atmosphere, pressure, clouds, forecasting, and severe weather. Students will have an opportunity to participate in a television forecasting simulation in the Eagan AM studio.

1039 Field Geology Grades 10,11,12
Prerequisite: 3 credits in Physical Earth Science

This course will give the students an advanced understanding of the physical world around us. In class we will take an in-depth look at Minnesota Geology through many hands-on labs and field trips. The field trips include: Crystal Cave Tour, Taylors Falls State Park, and a Sandstone Quarry. We will also become more familiar with the fossil record, earth's destructive past, and earth resources in a hands-on setting. This class has some small expenses for field trips.

1040 Environmental Science Grade 10-12

This will be a project based course that investigates the state of our environment in the past, present and future. We will cover different environments on the Earth, how the environment is studied, climate change and the relationship humans have with the environment. Students will have robust knowledge of how humans depend on the environment to live - specifically through our use of fresh water, agriculture resources and both renewable and nonrenewable energy sources. The class will include an emphasis on critical thinking and problem solving techniques

1041 Honors Biology A Grades 10,11,12
1042 Honors Biology B Prerequisite: 3 credits in Physical Earth Science or
1043 Honors Biology C Honors Physical Earth Science

This course is designed for the above average 10th grade student with a strong interest in science. To experience success, students should be self-motivated, independent learners, who also can work well in a collaborative setting. Students will work to develop learning skills using the biological sciences as their lens. The specific skills focused on within this process are: experimental design, research, scientific writing, data analysis, and scientific problem solving. Topics covered over the course of the year include: The Nature of Science, Ecology, Biochemistry, DNA, Cells, Cellular processes, Genetics, Evolution, and Biotechnology. Students completing this course with a grade of "C" or higher, may use the credit to qualify for an honors ranking.

COURSES FIRST OFFERED TO STUDENTS IN GRADE 11

0750 ACT Prep Grades 11,12
Prerequisite: Currently enrolled in Algebra 2 or above

This class is recommended for college-bound juniors and seniors planning to take the ACT exam. Almost all undergraduate colleges and universities require that prospective students take the ACT. Taking this course will prepare students for all of the question types found on the ACT. We will analyze each of the test question areas and give special consideration to math and verbal refreshers and techniques aimed at relieving test-taking anxiety. Topics include sentence completions and reading comprehension for the reading section, grammar and essay writing for the writing section, scientific concepts for the science section, and basic and advanced math concepts (including fractions, decimals, percentages, ratios, proportions) and algebraic and geometric concepts for the math sections.

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1073 Advanced Placement Biology A
1074 Advanced Placement Biology B
1075 Advanced Placement Biology C

Grades 11,12
Prerequisite: 3 credits in Biology or Honors Biology

AP Biology is designed as a 2nd year Biology class for students who intend to pursue a science or science related career. 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. Topics covered first trimester will include biochemistry, cell structure and function, and cellular energetics. Laboratory experiences will enhance the learning process throughout the year. Topics to be covered in trimester two include Molecular Genetics, Evolution, and the Diversity of Organisms. Topics to be covered in trimester three include the Diversity of Organisms, Structure and Function of Plants and Animals, and Ecology. This course is comparable to a college level general biology course and will help prepare students for the advanced placement exam which will be given in the Spring for college credit. Students completing this course with a grade of "C" or higher, may use the credit to qualify for an honors ranking.

1051 Chemistry A
1052 Chemistry B
1053 Chemistry C

Grades 11,12
Prerequisite: Biology and concurrently in Algebra II or higher

This course will introduce students to the theory and practice of chemistry. Chemistry utilizes abstract thought processes and mathematical manipulation to understand the chemical composition and interaction between substances. Students will study properties of matter, significance and validity of measurements, atomic structure, development and use of the periodic table, and gas laws, chemical nomenclature, chemical bonding, writing chemical equations, the mole concept, stoichiometry, solutions, chemical equilibrium, reaction rates, and acid/base chemistry. The course will include significant use of lab analysis and mathematical calculations.

1054 Summer Science Institute I

Grades - Completed 10th grade
Prerequisite: **By application only.**
Camping/ canoeing experience not required.
Outfitting/transportation fee is required.
passing grade in 2 years of Science
and teacher recommendation.

The institute will require two weeks of your time in the summer. There will be a classroom session at EHS where the students will design a field exploration in the area of their choice; the second week will take place on Lake of the Woods carrying out the field work while learning canoeing and camping techniques. The course work will also involve math, English/Language Arts, and social studies as they relate to the institute experience.

Students interested in this institute must be highly self-directed learners. It is imperative however, that the students chosen for this experience are also able to work successfully in a group setting.

Applications for the course are available from Mr. Kolehmainen. Institute dates: Last week of June—see website for exact dates.

1055 Biology of Minnesota A
1056 Biology of Minnesota B
1057 Biology of Minnesota C

Grades 11,12
Prerequisite: 3 credits in Physical Earth Science AND
3 credits in Biology or Honors Biology

This class is designed for students who have an interest in our local environment, its ecology, and the organisms that inhabit it. Topics to be covered in this year-long course will include studies of Minnesota's plants and animals including their identification, classification, basic physiology and behavioral characteristics with the main focus on our trees, fish, birds, amphibians and reptiles of our state. Other topics that will be mentioned include Minnesota Geology, a brief daily historical event and the study of various mammals. We will also discuss conservation issues that affect our state and how they affect Minnesota's 3 biomes.

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1058 <u>Chemistry Fundamentals A</u>	Grades 11,12
1059 <u>Chemistry Fundamentals B</u>	Prerequisite: Physical Earth Science and Biology
1060 <u>Chemistry Fundamentals C</u>	

The purpose of this course is to provide an alternative approach to our General Chemistry course that meets the Minnesota graduation chemistry standards. This course will focus on the conceptual nature of chemistry while minimizing the mathematical rigor. This course is not a college preparatory course. Topics covered during all three trimesters include: scientific thinking, atomic structure, periodic properties, chemical nomenclature, chemical reactions, stoichiometry, bonding theory, behavior of matter, solution chemistry, acid/base chemistry

1061 <u>Honors Chemistry A</u>	Grades 11,12 (10, if surpassed math prerequisite below)
1062 <u>Honors Chemistry B</u>	Prerequisite: Honors Biology and Honors Algebra II or higher
1063 <u>Honors Chemistry C</u>	

Honors Chemistry utilizes abstract thought process and mathematical manipulation to understand the chemical composition and interaction between substances. In comparison to our regular chemistry course this course will dive deeper and at an accelerated rate throughout the year. It also will utilize video instruction, online resources, and other technology heavily in our learning process. Finally, it will offer greater detail and more emphasis on independent learning than the General Chemistry course. The Science Department recommends only students with a high interest and ability in science and mathematics to take this course. Concepts to be studied include the nature of science and measurement, the organization of matter, the periodic table, chemical nomenclature, chemical reactions, stoichiometry, thermochemistry, gas laws, periodicity, mechanisms of chemical bonding, solution chemistry, reaction rates, equilibrium, acid/base chemistry, electrochemistry, nuclear chemistry and an introduction to organic chemistry. Students completing this course with a grade of "C" or higher, may use the credit to qualify for an honors ranking.

1070 <u>Physics A</u>	Grades 11,12
1071 <u>Physics B</u>	Prerequisite: Algebra II, Biology or Chemistry
1072 <u>Physics C</u>	

This course is a mathematical and conceptual survey of general physics, intended to prepare the student for general education science in college. Topics covered will include motion, forces, waves, sound, light, electricity, magnetism, and energy. Lab work will be used to examine principles of physics and to show applications in practical and common situations.

1091 <u>AP Physics IA</u>	Grade 11,12
1092 <u>AP Physics IB</u>	Prerequisite: Algebra II or higher
1093 <u>AP Physics IC</u>	

This course is designed to give students a more thorough mathematical introduction to physics than in the general sections. At the conclusion of this sequence, students will be prepared for the AP Physics 1 exam and may elect to also take the AP Physics 2 exam. Students enrolling in this course should be proficient with algebra, geometry, and trigonometry, and be prepared for a demanding schedule of work in lab and at home. Topics covered include one and two-dimensional motion, Newton's laws of motion and universal gravitation, conservation of momentum and energy, thermodynamics, static and current electricity, magnetism, light, sound, and modern physics. *Note: Those students electing to take the AP Physics 2 exam need to devote additional time in study before the test as some of the test topics will be covered during the weeks following the AP test date.* Students completing this course with a grade of "C" or higher, may use the credit to qualify for an honors ranking.

COURSES FIRST OFFERED TO STUDENTS IN GRADE 12

1064 <u>Advanced Placement Chemistry A</u>	Grades 11 or 12
1065 <u>Advanced Placement Chemistry B</u>	Prerequisite: Honors Chemistry
1066 <u>Advanced Placement Chemistry C</u>	Teacher approval if in Chemistry

This course is designed for students who have taken a year of chemistry and would like to continue their study in this area. The first trimester will consist of a fast-paced review of the previous year in chemistry. The remaining portion of the year will cover equilibrium, kinetics, acid/base, titrations, electrochemistry, and thermodynamics. The content of this course is equivalent to a college freshman chemistry class. The focus of this course will be to prepare to take the Advanced Placement Exam in the spring. Students completing this course with a grade of "C" or higher, may use the credit to qualify for an honors ranking.

1067 CIS: Human Physiology A
1068 CIS: Human Physiology B
1069 CIS: Human Physiology C

Grade 12

Prerequisite: Biology and Chemistry

College in the Schools (CIS) Human Physiology is a full year course that offers an excellent introduction to human physiology and the rigors of college coursework. It provides the students with a great opportunity to determine if they wish to pursue a major in a health science field. The CIS program is a concurrent enrollment program, with the University of Minnesota, that results in four, non-major, lab science credits should you earn a passing grade. (Notice - The credit that you earn is **not** a substitute for a more advanced anatomy and/or physiology course at any college or university.)

The students who enroll in this class must be highly self-motivated and disciplined. This course is recommended for students who earned at least a **B** in previous science classes.

The focus of the course is to learn about the structure and function of the human body at all levels of organization. To accomplish this goal, the students will work in cooperative learning groups using the language of anatomy and physiology and a scientific approach to build their understanding of the topics in class. At home, the students will be expected to build the foundation of their knowledge by reading their textbook; very little of the information will be delivered to the students through lecture. This class emphasizes individual learning outside of the classroom and collaborative learning inside of the classroom. (The process of learning to work in groups is often difficult, but necessary. Health science careers require teamwork. As a result, “learning to work in a group” is indeed on our list of course objectives.)

The topics to be covered include medical terminology, organic compounds, cells, histology, and many of the systems of the body. These include the muscular, nervous, cardiovascular, respiratory, and digestive systems. To enhance our understanding of these systems we will spend a significant amount of time in lab. Time spent in lab will include microscope work, investigations into physiology, and dissections. Currently, we dissect a pig heart, sheep brain, and cat. Students completing this course with a grade of “C” or higher, may use the credit to qualify for an honors ranking.

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