Which Science Class should I take?

If you are in the 8th Grade, your options are **Earth Science, Research Earth Science-Honors and Research Biology-Honors** (see course descriptions).

Consider the following when selecting your 9th Grade Science Course.

- Earth Science still involves math, but is less math-intensive then Research.
- Research Earth Science focuses on data driven research questions that are embedded with Earth Science concepts and students are introduced to the basic understanding of descriptive and inferential statistics.
- Be aware that Research Biology-Honors is not the same as the former Honor Biology course.
- Research Biology-Honors focuses on data driven research questions that are embedded with biological concepts. Students entering the class are expected to have a basic understanding of descriptive and inferential statistics taught during research earth science. Students should have a strong mathematical foundation and work ethic to ensure success in this rigorous and fast paced course.
- Be aware that Earth Science is a prerequisite for taking A.P. Environmental, so if you select not to take Earth Science you will not meet the prerequisite for taking A.P. Environmental.

If you are a 9th Grader and are taking Earth Science – Research Earth Science, your options are **Biology and Research Biology-Honors** (see course descriptions).

Consider the following when selecting your next Science Course.

- Be aware that Research Biology-Honors is not the same as the former Honor Biology course.
- Research biology focuses on data driven research questions that are embedded with biological concepts. Students entering the class are expected to have a basic understanding of descriptive and inferential statistics taught during research earth science. Students should have a strong mathematical foundation and work ethic to ensure success in this rigorous, fast paced course.

If you are taking Biology – Research Biology, your options are **Chemistry and Research Chemistry, Conceptual Physics and Environmental (if you have taken Earth or Research Earth Science, AP Environmental is also an option)**.

Consider the following when selecting your next Science Course.

- Continue to be aware that Research Chemistry is not the same as Chemistry.
- Research Chemistry focuses on data driven research questions that are embedded within concepts. Students entering the class are expected to have a basic understanding of descriptive and inferential statistics taught during Research Earth Science and Research Biology. Students should have a strong mathematical foundation and work ethic to ensure success in this rigorous, fast paced course.
- Students who are awarded a credit for Conceptual Physics cannot receive an additional credit for Physics to receive another credit for Physics the student must take AP Physics.
- To be able to take AP Biology, be aware that you must attain a passing score on the Biology SOL Test and have taken or concurrently be taking Chemistry. [Warning: students must have or be able to grasp chemical concepts quickly because they are foundational to being successful in AP Biology.]
- To be able to take Environmental students must have two Science Credits (Earth Science and Biology) and successful performance on 2 science SOL tests.

If you have completed Chemistry, your options are **Conceptual Physics, Physics, Environmental, AP Biology, AP Chemistry, AP Environmental, Geospatial Science — Dual Enrollment, Independent Science Research — Dual Enrollment**.

Consider the following when selecting your next Science Course.

- Environmental is considered a Biology credit.
- DUAL ENROLLMENT Students may take advantage of a program that allows them to meet the requirements for high school graduation while simultaneously **earning college credits**. (Dual Enrollment courses are unlike AP courses which may or may not count toward College Credit; Dual Enrollment courses are college credit with a college transcript and look very good on a College application). Science offers two Dual Enrollment courses, Independent Science Research and Geospatial Science.
- To be able to take Environmental students must have two Science Credits (from Earth Science, Biology, or Chemistry) and successful performance on 2 science SOL tests.
- Be aware that Earth Science is a prerequisite for taking A.P. Environmental, so if you selected not to take Earth Science you will not meet the prerequisite for taking A.P. Environmental.

***Be mindful that you starting your Junior year you may take two (2) science courses at once. If you have question talk with your guidance counselor.**

A science Course Description follows for questions about specific course

Descriptions of Science Courses

Earth Science: It is a study of the interrelationships between the Earth's composition, structure, processes, and history and its atmosphere, meteorology, oceanography, and astronomy. Various scientists and their contributions are studied. Students interpret various maps, charts, and tables and utilize technology, including GIS and GPS, to organize and analyze data.

Research Earth Science-Honors: Research Earth Science is designed to give students multiple experiences conducting research as a means to develop and reinforce. While studying the interrelationships between the Earth's composition, structure, processes, and history and its atmosphere, meteorology, oceanography, and astronomy. Various scientists and their contributions are studied. Students interpret various maps, charts, and tables and utilize technology, including GIS and GPS, to organize and analyze data.

Students begin to develop expertise needed to conduct in-depth scientific research. In particular, students gain the ability to collect and communicate data with descriptive statistics and graphical representations. In addition, students learn skills to use data and scientific knowledge to develop conclusions about their research questions. All Research Earth Science students are expected to complete an in-depth, independent Science Research Investigation (SRI) as a required part of their course work.

Biology: Students taking Biology gain detailed knowledge of living systems. Areas of study include cellular organization and processes, molecular biology, classification of organisms, genetics, evolution, and ecosystems. Students are expected to be able to demonstrate proper use of laboratory tools. Controlled experiments are performed, and results are reported. The importance of science research is emphasized

Research Biology-Honors: Students taking Biology gain detailed knowledge of living systems. Areas of study include cellular organization and processes, molecular biology, classification of organisms, genetics, evolution, and ecosystems. Research Biology is designed to give students multiple experiences conducting science research as a means to develop biology content knowledge and scientific thinking. Students interpret biological information and utilize technology, and biological protocols to organize and analyze data.

Students learn the role that scientific evidence and scientific thinking plays in development of new scientific knowledge in the field of biology. Students are expected to collect and communicate data with descriptive statistics and graphical representations. In addition, students answer research questions using scientific data and draw conclusions using their biological content knowledge.

This is a data driven research questions that are embedded with biological concepts. Students entering the class are expected to have a basic understanding of descriptive and inferential statistics taught during research earth science. Students should have a strong mathematical foundation and work ethic to ensure success in this rigorous, fast paced course. A significant portion of the basic biology curriculum in taught in a flipped classroom setting so that teachers can focus on using class time to complete labs, work with data, and answer research questions.

Chemistry: In this course students develop an appreciation for the interaction between matter and energy. Students investigate the structure, properties, and reactions of matter. Classroom study is balanced with laboratory experiences to deepen the students' understanding of Chemistry. Analytical experimental investigations are conducted using the scientific method, and proper safety precautions are employed. Students investigate kinetic theory, the Periodic Table stoichiometry, reactions and equations, and chemical equilibrium. Students report findings of both qualitative and quantitative data using effective communication skills, correct expression of significant figures and error, and factor labeling in problem solving. Chemistry is designed as a challenging course requiring advanced reading and writing skills.
Prerequisites: Algebra I. Students must attain a passing score on the Algebra I SOL Test.

Research Chemistry: In addition to the content focus of Academic chemistry this courses focuses on data driven research questions that are embedded within concepts. Students entering the class are expected to have a basic understanding of descriptive and inferential statistics taught during Research Earth Science and Research Biology. Students should have a strong mathematical foundation and work ethic to ensure success in this rigorous, fast paced course. A significant portion of the basic chemistry curriculum in taught in a flipped classroom setting so that teachers can focus on using class time to complete labs, work with data, and answer research questions.
Prerequisites: Algebra I. Students must attain a passing score on the Algebra I SOL Test.

Environmental Science: It provides the opportunity to synthesize information and knowledge of physics, chemistry, earth science, and biology while developing the Naturalist Intelligence. Students gain an understanding of ecological concepts including air, water, soil, biological diversity, and human impacts. Inquiry skills are developed through fieldwork, service projects, and collaborative investigation while using appropriate technology. Because of the interdisciplinary focus of the course, students are challenged with diverse topics, rigorous reading requirements, and opportunities for written and oral presentations.
Prerequisites: Two Science Credits (Earth Science and Biology suggested). Successful performance on 2 science SOL tests (to be chosen from Earth Science, Biology, and/or Chemistry).

Conceptual Physics: Students build on basic physical science principles by in-depth exploration of the nature and characteristics of energy and its dynamic interaction with matter. Topics include mechanics, electricity and magnetism, waves and optics, and nuclear energy. The course draws connections between the concepts of physics and many everyday applications. Students who are awarded a credit for Conceptual Physics cannot receive an additional credit for Physics.
Prerequisite: Algebra I. Students must attain a passing score on the Algebra I SOL Test.

Physics: This course uses a highly mathematical approach. Students learn and use many algebraic and trigonometric concepts while investigating physics content. Laboratory work

includes graphical analysis. Topics include mechanics, electricity and magnetism, waves and optics, the Special Theory of Relativity, and atomic structure. Physics is designed as a challenging course requiring advanced reading, writing, and mathematical skills. Students who have previously completed Conceptual Physics are not awarded another science credit for taking Physics.
Prerequisite: Algebra II

Advanced Placement Courses:

Advanced Placement Biology: This advanced course is a college-level, fast-paced course that follows the course outline of the College Board's AP program. The course emphasizes cellular biology, biochemical processes of cellular respiration and photosynthesis, vertebrate anatomy and physiology, advanced genetics, evolution, plant anatomy and physiology, and ecology. Students have the opportunity to take the AP Biology Exam in May with the possibility of earning college credit.
Prerequisites: Biology—Honors or Academic and Chemistry (completed or taken concurrently). Students must attain a passing score on the Biology SOL Test.

Advanced Placement Chemistry: Students must attain a passing score on the Chemistry SOL Test. This advanced course is a college-level, fast-paced course in Chemistry that follows the course outline of the College Board's AP Chemistry program. The course includes many extended lab procedures. In addition, such fields as organic chemistry, biochemistry, nuclear chemistry, coordination complexes, and semi-micro qualitative analysis are introduced. Students have the opportunity to take the AP Chemistry Exam in May with the possibility of earning college credit.
Prerequisites: Chemistry – Honors or Academic. Students must attain a passing score on the Chemistry SOL Test.

Advanced Placement Environmental Science: This advanced course is a college-level, fast-paced course that follows the course outline of the College Board's AP program. The goal of the AP Environmental Science 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 or preventing them. Students have the opportunity to take the AP Environmental Science Exam in May with the possibility of earning college credit.
Prerequisites: Earth Science (Research or Academic) and Biology. Students must attain a passing score on the Earth Science and Biology SOL Test.

Advanced Placement Physics: This course is a fast paced, college-level course in Physics that follows the course outline of the College Board's AP Physics program. Emphasis is placed on mechanics. Students study concepts in each of the following six content areas: kinematics;

Newton's laws of motion; work, energy and power; systems of particles and linear momentum; circular motion and rotation; and oscillations and gravitation. Pre-Calculus and Calculus skills are used to develop concepts and solve problems. Students have the opportunity to take the AP Physics C Exam in May with the possibility of earning college credit.
Prerequisite: Successful completion of Physics and Co-Requisite Calculus.

Dual Enrollment Courses:

Geospatial Science— Dual Enrollment: This course involves the use of geographic information systems (GIS) which integrate hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically-referenced information. In this course, GIS is used to organize, analyze, and communicate spatial-data relationships. In the first semester, students learn about GIS tools and acquire the essential skills necessary to use GIS software and hardware effectively. These computer/software skills form the foundation of the course and are used extensively as students conduct independent research later in the course. Teacher-directed activities gradually lead to more student-directed research. All students are expected to complete an in-depth research project as a required part of their course work during the second semester. Students may also choose a dual enrollment option offered through a partnership with James Madison University's(JMU) Department of Geology and Geography. Students have the opportunity to earn 6 college credits from JMU while completing the in-depth research project. The project (mandatory for all students regardless of whether they choose the dual enrollment option) requires students to apply all skills acquired during the first semester, identify a suitable independent research topic, and demonstrate their ability to complete and present their project to school faculty, members of the GIS community, and JMU faculty and staff. To earn the 6 credit hours, students must meet or exceed the project expectations established by JMU. This course cannot be used to satisfy one of the science requirements for the Standard or Advanced Studies Diploma.
Prerequisite: None

Geospatial Science II— Dual Enrollment: Students enrolled in Geospatial Science II deepen their expertise, gained in Geospatial Science, with an emphasis on acquiring advanced skills to capture, manage, analyze and display geographically referenced information. These skills include; displaying and analyzing data, building and working with databases, understanding and incorporating geographic and projected coordinate systems, and using remote sensing and LiDAR data. All students are expected to complete an in-depth research project as a required part of their course work during the year, with expectations of submitting their work into various competitions. Geospatial Science II is a dual enrollment course offered through a partnership with James Madison University's (JMU) Department of Geology and Geography. Students earn 6 college credits from JMU while completing an in-depth research project. The research project requires students to apply all skills acquired during Geospatial Science, identify a suitable independent research topic, and demonstrate their ability to complete and present their project to school faculty, members of the GIS community, and JMU faculty and staff. To earn the 6 credit hours, students must meet or exceed the project expectations established by JMU. This course

cannot be used to satisfy one of the science requirements for the Standard or Advanced Studies Diploma.
Prerequisite: Completion of Geospatial Science and approval of JMU faculty.

Independent Science Research— Dual Enrollment: This elective science course is intended for juniors and seniors interested in continuing their study through an independent project in science, engineering, mathematics, or computer science. Students participating in Independent Science Research (ISR) should have a significant science background prior to entering the course. ISR projects are subject to considerable peer and teacher review during all phases of development. The focus of this course is on sustained, scientific inquiry. Students are expected to take responsibility for project development, meeting timelines, collecting data, defending procedures, and presenting results. The instructor advises students on the research process, information sources, and contacts. Instruction is also provided on such topics as data collection and presentation, statistical interpretation of results, protocols for research, and presentation skills. All ISR students are required to participate in the process leading to possible selection for participation in the Loudoun County Regional Science and Engineering Fair. All students are expected to complete an in-depth research project as a required part of their course work. Students may choose a dual enrollment option offered through a partnership with George Mason University (GMU). Students have the opportunity to earn 3 college credits from GMU while completing the in-depth research project. The project (mandatory for all students (regardless of whether they choose the dual enrollment option) requires students to identify a suitable research topic, develop an investigation design and demonstrate their ability to complete and present their project to LCPS, GMU faculty and staff and the scientific community. To earn the 3 credits, students must meet or exceed the project expectations established by GMU
Prerequisite: Successful completion of at least two sciences in different disciplines (to be chosen from Earth Science, Biology, Chemistry, Physics, or AP Sciences).