

Science Department Course Bulletin

Revised, April 2024

The WJHS science department has put together this resource to help students with planning for their science courses. If you need more support with choosing the right class to help you be successful, reach out to your science teacher or counselor.

This document includes (*in order*):

- ☐ Science department course recommendations – typical WJHS pathways
- ☐ What differentiates honors science courses from on-level science courses?
- ☐ Course descriptions
- ☐ Average weekly study hours (*by science course*)
- ☐ MCPS Graduation requirements
- ☐ **Appendix:** Which WJHS physics course should I take?

Science Department Course Recommendations - Typical WJHS pathways

It is recommended that students speak with their current science teacher for assistance with choosing their next science course.

Students, keep in mind to register for classes that will challenge you but will not overwhelm you. Remember to look at the prerequisites* or corequisites for classes. This will help you build a balanced schedule. Balance is important. Consider using the course selection planning tool to help you determine if you will have a balanced schedule. Lastly, when choosing APs and electives, remember to choose classes that interest you.

***What are prerequisites and why are they important when choosing classes?** *Prerequisites* are courses taught prior to taking a new course so that students can have the background knowledge necessary to be successful in their new course selection. At the beginning of each course description, students will see the recommended course to complete prior to registering for a new course.

Typical WJHS student pathways

(Students, remember to read the course descriptions that follow to make the best choice for your learning.)

Current Grade level ...	My <u>current class</u> is...	Next Year I should enroll In...
8 th grade (Students are registering for 9th grade classes)	Math: earning C's <u>or</u> not in Algebra	Biology
	Math: earning A/B's in: Algebra, Geometry, Algebra 2	Honors Biology
9 th grade (Students are registering for 10th grade classes)	Biology	Chemistry or Physics
	H Biology	Honors Chemistry <u>or</u> Chemistry (<i>Honors chem students typically are in honors math classes</i>)
10 th grade (Students are registering for 11th grade classes)	Chemistry	Physics
	H Chemistry	H Physics
11 th grade (Students are registering for 12th grade classes)	Science Electives or APs	Science Electives or APs

What differentiates honors science courses from on-level science courses?

When choosing your science classes, consider the following information to make the appropriate course selections.

Science Course	What differentiates Honors From On-level?	Skills helpful to have for Honors (honors classes will build on on-level skills)	Relevant Indicators * (MCAP Scores & Course Grades)	Recommended Math Courses with this science course
9th grade on-level Biology	-Level of scaffolding for writing tasks(i.e. - constructing arguments)	-Constructing scientific explanations with claim, evidence and reasoning.		N/A
9th grade Honors Biology	-Level of abstract thinking required to complete tasks (i.e. - developing and using a model)	-Developing and using scientific models for abstract phenomena	ELA score: 750 or higher A or B in English Class	N/A
10th grade on-level Chemistry	-Basic algebra for problem solving	-Solving for a variable -multiplying & dividing fractions -order of operations		Algebra 1 Geometry Honors Geometry * Algebra 2 2--Year Algebra 2
10th grade Honors Chemistry	-Honors covers additional content and moves at a faster pace -Honors assessments require application of knowledge -Honors assessments require more challenging mathematical problem solving	-Using exponents & scientific notations -Constructing graphs and finding the line of best fit. -Abstract thinking skills -Strong language acquisition skills -Transferring knowledge to unfamiliar contexts.	ELA Score: 770 or higher Alg 1: 770 or higher A or B in Honors math courses	Honors Algebra 2 Honors Precalculus

* These indicators are merely correlational and should not be considered strict cut-offs. Some students do not test well but perform well in the classroom setting.

Science Course	What differentiates Honors From On-level?	Skills helpful to have for Honors (honors classes will build on on-level skills)	Relevant Indicators * (Course Grades)	Recommended Math Courses with this science course
11th grade on level Physics	-Basic algebra for problem solving	-Solving for a variable -multiplying & dividing fractions -order of operations		Algebra 2 2--Year Algebra 2 Honors Algebra 2 ** Pre-Calculus
11th grade Honors Physics	-Honors covers additional content and moves at a faster pace -Honors assessments require more distant transfer of knowledge -Honors assessments require more challenging mathematical problem solving	-Strong algebra skills, such as simplifying polynomial equations. -Strong geometry skills, such as finding angles and solving for volume and surface area. -Abstract thinking skills -Transferring knowledge to unfamiliar contexts.	A or B in Honors math courses	Honors Pre-Calculus AP Calculus AP Statistics IB Math

**Some students in these math courses tend to be successful in the Honors science course and should be considered on a case-by-case basis in a way that includes other indicators.

DESCRIPTION OF SCIENCE COURSE OFFERINGS

Courses in this section meet the [Life Science](#) graduation requirement

BIOLOGY A/B **Course number: SCI2000**
BIOLOGY A/B HONORS **Course number: SCI2001**
Offered grades: 9, 10, 11, 12

This NGSS aligned course emphasizes the patterns, process, and relationships of living organisms. Students will use observations, experiments, hypotheses, tests, models, theory and technology to explore how life works. Core ideas include structures and processes in organisms, ecology, heredity, and evolution. There will be multiple opportunities for students to apply these ideas in developing solutions to authentic problem-based scenarios while also exploring career opportunities.

Note: Beginning with the 2023–2024 school year, the Maryland Comprehensive Assessment for science (**LS-MISA**) will count as 20 percent of first time 9th graders' final grade. This 20 percent will be calculated into the second semester "Semester B" final grade. The Semester B final grade for Biology will be made up of the marking period 3 grade (40 percent), the marking period 4 grade (40 percent), and the MCAP exam (**LS-MISA**) grade (20 percent).

Physical Science

Courses in this section meet the [Physical Science](#) graduation requirement

CHEMISTRY A/B **Course number: SCI2003**
Prerequisite: Successful completion of Algebra 1
Co-requisite: Minimum of Geometry
Offered grades: 10, 11, 12

CHEMISTRY A/B, HONORS **Course number: SCI2004**
Recommended Minimum Co-requisite for Honors Chemistry: Honors Algebra II
Offered grades: 10, 11, 12

This NGSS aligned course emphasizes the study of matter through inquiry. Through the use of laboratory investigations, students will explore their world at the atomic level. Using data, evidence, and scientific modeling, students achieve a deeper understanding of changes in matter. Topics of study will include structures and properties of matter, weather and climate, chemical reactions, conservation of mass/energy, and relationships between Earth and human activity.

PHYSICS A/B **Course number: SCI2005**
PHYSICS A/B, HONORS **Course number: SCI2006**
Prerequisite: Successful completion of Geometry
Offered grades: 10, 11, 12

This NGSS aligned course investigates physical laws and theories, relationships of physical phenomena, and the interrelationships of physics to other fields of human endeavor. Topics include traditional physics subjects (Newtonian mechanics: dynamics, momentum, energy; electricity and magnetism; waves) along with related subjects in earth science (plate tectonics; earthquake activity) and astronomy (solar evolution).

AP® COURSES

AP® BIOLOGY A/B (double period) Course number: SCI2041

Prerequisite: Successful completion of Honors Biology and Honors Chemistry;

Prerequisite: AP® Biology A is a prerequisite for AP® Biology B

Offered grades 11 and 12

Topics in AP® Biology are selected from the Advanced Placement® curriculum. This is a college level course and students may elect to take the Advanced Placement® examination in order to qualify for college credit or advanced standing. AP® Biology emphasizes laboratory work in all areas of the curriculum. This is a double-period class. AP® Biology A includes biochemistry, the behavior of cells, cellular energetics, heredity, molecular genetics, and evolutionary biology. AP® Biology B includes the diversity of organisms, structure, and function of plants and animals, behavior of organisms, and ecology. Students will be prepared to take the AP® Biology exam in May. This course is NGSS aligned.

AP® CHEMISTRY A/B (double period) Course number: SCI2059

Prerequisite: Successful completion of Honors Biology, Honors Chemistry, and Algebra II. A strong ability to apply mathematical concepts from previous math classes is essential to success.

Prerequisite: AP® Chemistry A is a prerequisite for AP® Chemistry B.

Recommended: Concurrent enrollment in Honors Pre-Calculus

Offered grades 10, 11, 12

AP® Chemistry is for students with a strong interest in chemistry and related fields, such as engineering. Topics are selected from the Advanced Placement® curriculum and are taught at a college level. Students may elect to take the Advanced Placement® examination in order to qualify for college credit or advanced standing. AP® Chemistry emphasizes laboratory methods and analyzing data using statistics and logical reasoning. This is a double-period class. AP® Chemistry A covers topics in atomic theory, stoichiometry, gas laws, thermodynamics, reaction rates, acids/bases, and solutions. Students in AP® Chemistry B explore types of chemical reactions, chemical equations, reaction rates, equilibrium systems, and principles of chemical reactions. Students will be prepared to take the AP® Chemistry exam in May. This course is NGSS aligned.

AP® ENVIRONMENTAL SCIENCE A/B Course number: SCI2046

Prerequisite: Successful completion of Biology. AP® Environmental Science A is a prerequisite for AP® Environmental Science B.

Pre/Corequisite: Completion of or concurrent enrollment in Chemistry A/B.

Offered grades 10, 11, 12

This course is based on the course outline designed by the College Board. It provides 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 investigation complement the classroom portion of the program, providing opportunities to test concepts and principles that are introduced in the classroom. Fieldwork, along with an investigation and research of greenhouse ecosystems, allows students to explore specific problems in ways that are challenging, realistic, and relevant to their lives. Students will be prepared to take the AP® Environmental Science exam in May. This course is NGSS aligned.

AP® COURSES (continued)

AP® PHYSICS I A/B Course number: SCI2072

Prerequisite: Geometry

Co-requisite: Algebra II

Recommended: Concurrent enrollment in Pre-calculus

Offered grades 9, 10, 11, 12

This course is an algebra-based physics course that is the equivalent of a first-semester college physics course. This is a conceptual Physics class that covers topics from mechanics found in a first year college level, algebra based course. Students explore principles of Newtonian Mechanics (including topics related to motion, dynamics, work, energy, rotational motion, power, and simple harmonic motion). There is a strong in-class laboratory component to this class. This AP course can help you earn credit for algebra based Physics courses offered at the college level. Additionally this course provides an excellent foundation for students who intend to major in the sciences. Lastly, this course prepares students for the AP® Physics I test in May. This course is NGSS aligned. All grades are welcome, no prior Physics courses are needed.

AP® PHYSICS C Mechanics A/B Course number: SCI2064

Corequisite: Concurrent enrollment in, or completion of, either AP Calculus AB or BC and/or Calc with Apps course

Offered grades 10, 11, 12

AP Physics C: Mechanics is a year-long single period introductory course that is equivalent to the first semester of college Physics for STEM majors. This course is for students with a strong interest in the physical sciences or engineering. Students will learn about various Mechanics topics, such as kinematics, forces, rotation, energy, momentum, and wave motion. Introductory integral and differential calculus is used throughout this course, so students should be co-enrolled in Calculus. Science, Math & Engineering programs require students to take Calculus based Physics courses, and this class can help you potentially earn the college credits to place out of the first semester of Calculus-Based Physics! There is a strong laboratory component to this class. No prior Physics courses needed. This course is NGSS aligned. Students will be prepared to take the Advanced Placement® Physics C Mechanics examination in May.

AP® PHYSICS C Electricity & Magnetism A/B Course number: SCI2063

Prerequisite: successful completion of Honors Physics, AP Physics 1 or AP Physics C Mechanics (if not co-enrolled in AP Physics C: Mechanics)

Corequisite: Concurrent enrollment in (AP Calculus) or successful completion of a Calculus Course

Offered grades: 10, 11, 12

AP Physics C: Electricity & Magnetism (E&M) is a single period, year long course equivalent to the second semester of a calculus-based, college-level physics course for STEM majors. This course is for students with a strong interest in the physical sciences or engineering. Students will explore E&M topics such as electric forces and fields, Gauss' Law, Circuits, capacitance, magnetic forces and fields, electromagnetic induction, and applications of Maxwell's equations. Additional applications of integral & differential calculus covered in the AP Physics C: Mechanics course will be applied to these topics. There is a strong in-class laboratory component to this class. This course can be taken as a standalone, 2nd year AP Physics course, or concurrently with the separate AP Physics C Mechanics Course. This course is NGSS aligned. Students will be prepared to take the Advanced Placement® Physics C: Electricity & Magnetism exam in May.

Description of Elective Science Course offerings

Elective courses in this section will NOT count towards the MCPS graduation requirement.

ASTRONOMY A/B Course number: SCI2068

Prerequisite: Physics (*any level*)

Offered grade 12 only

This elective science course focuses on our Solar System and planetary astronomy. Astronomy A includes: The Earth, the Moon, the Sun, the other planets, and additional bodies such as moons, asteroids, and comets. Astronomy B includes: cosmology, stars, nebulae, pulsars, black holes, galaxies, quasars, and the Big Bang theory. Evening observing sessions with telescopes, and visits to an observatory and/or planetarium may be included. Either semester may precede the other or semesters may be taken independently.

Elective science courses: Honors level

ANATOMY AND PHYSIOLOGY, HONORS, A/B Course number: SCI2060

Prerequisite: Successful completion of Biology and either completion of or concurrent enrollment in Chemistry

Offered grades 11 and 12 only

This advanced level course is intended for students who have succeeded in biology and wish to study how the human body works in greater detail. Anatomy and Physiology is an honors level course that focuses on two main ideas. One, form relates to function (for example, how the structure of the human hand enables it to perform many tasks) and two, chemistry helps explain how living things work. Semester A begins with an introduction to anatomical terms, then a review of cells and their organelles. This is followed by a unit on histology (tissues) and how their structure relates to their function.

The body systems taught in semester A include the integumentary system, skeletal system and joints, and nervous system. Semester B completes the study of human body systems. Topics include the muscular, digestive, circulatory, respiratory, and reproductive systems. Dissection is a course requirement.

FORENSIC SCIENCE, HONORS A/B Course number: SCI2069

Pre/Corequisite: Successful completion of Biology and either completion of or concurrent enrollment in Chemistry.

Offered grade 12 only

This honors-level course focuses on modern crime scene investigation techniques. Forensic Science A covers the historical contributions of scientists to forensics and criminology, crime scene investigation, evidence collection, chemical and microscopic evaluation of evidence, estimating the time of death with entomology, serology, pathology, anthropology, and odontology. Forensic Science B explores types of physical evidence, how to analyze trace evidence using fiber burn tests, DNA analysis, PCR, toxicology, fingerprint collection and analysis, firearms, ballistics, and explosives. Either semester may precede the other semester, or a semester may be taken independently.

MOLECULAR BIOLOGY, HONORS, A/B Course number: SCI2045

Prerequisite: Successful completion of Biology and either completion of or concurrent enrollment in Chemistry

Recommended: Successful completion of Chemistry

Additional information: meets APEX-REACH requirement for advanced coursework

Offered grades 11 and 12 only

This honors-level course is intended for students who have succeeded in biology. In semester A, while focusing on molecular genetics and gene expression, students will use sterile techniques for making stock solutions, growing bacteria cultures, analyzing DNA, use recombinant DNA technology, and explore applications to research and society; from the Human Genome Project to gene therapy, and bioethics. In semester B, students will perform research in conjunction with Rutgers University and have an opportunity to become published authors.

Average Weekly Study Hours:

(Students please use this information to help you plan your schedule)

Average Study Hours By Science Course	
Course	Weekly Study Hours
Biology A/B	1- 2 hours
Honors Biology A/B	2-3 hours
Chemistry A/B	2 hours
Honors Chemistry A/B	4 - 5 hours
Physics A/B	1.5 hours
Honors Physics A/B	2 hours
AP Course offerings	
AP Biology A/B, <i>double period</i>	6 - 8 hours
AP Chemistry A/B, <i>double period</i>	6 - 8 hours
AP Environmental Science	6 - 8 hours
AP Physics I A/B	6 - 8 hours
AP Physics C - Mechanics	6 - 8 hours
AP Physics C - Electricity and Magnetism	6 - 8 hours
Science Electives	
<i>(These courses will <u>not</u> count towards the MCPS graduation requirement)</i>	
Anatomy & Physiology A/B	3 - 5 hours
Astronomy A/B	1-2 hours
Forensic Science A/B	3 - 5 hours
Molecular Biology A/B	3 - 4 hours

MCPS Graduation Requirements (updated November 2, 2022)

Maryland's Largest School District

MONTGOMERY COUNTY PUBLIC SCHOOLS

Expanding Opportunity and Unleashing Potential

Graduation Credit - Courses

Life Science Credit^{1, 2}	<ul style="list-style-type: none"> Biology A and B (Honors, AP, or IB) 	
Physical Science or Integrated Credit²	<ul style="list-style-type: none"> Chemistry³ A and B (Honors, AP, or IB) Physics³ A and B (Honors, AP, or IB) Astronomy with Physics³ A and B IB Sports Exercise and Health Science (approved 10/22) 	
Earth/Space Science or Integrated Credit²	<ul style="list-style-type: none"> Chemistry³ A and B (Honors, AP, or IB) Physics³ A and B (Honors, AP, or IB) Astronomy with Physics³ A and B Earth Systems and Sustainability⁴ A and B 	<ul style="list-style-type: none"> AP Biology³ A and B AP Environmental Science A and B IB Environmental Systems A and B

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Requirements by Class

First Year 9th Grade ¹	Graduating Class	Course Credit Requirements For Graduation (COMAR)	MCAP Expectation
2019-2020	2023	3 credits, aligned to the NGSS and approved for graduation credit. Credits must include at least 1 biology and 1 physical science course	MISA participation on record
2020-2021	2024	3 credits, aligned to the NGSS and approved for graduation credit. Credits must include at least 1 biology and 1 physical science course	MISA participation on record
2021-2022	2025	3 credits, aligned to the NGSS and approved for graduation credit. Credits must include: 1 life science credit, 1 physical science credit and 1 credit in Earth/space science or a course with the topics integrated.	LS MISA participation on record ²
2022-2023	2026	3 credits, aligned to the NGSS and approved for graduation credit. Credits must include: 1 life science credit, 1 physical science credit and 1 credit in Earth/space science or a course with the topics integrated.	LS MISA participation on record ³
2023-2024 (and beyond)	2027 (and beyond)	3 credits, aligned to the NGSS and approved for graduation credit. Credits must include: 1 life science credit, 1 physical science credit and 1 credit in Earth/space science or a course with the topics integrated.	MISA as EOC Score added to LS Course Grade

Appendix: Which physics course should I take?

WJ Physics Courses at a Glance

	Honors Physics (SCI2006) / On level Physics (SCI2005)	AP Physics 1 SCI2072	AP Physics C: Mechanics SCI2064	AP Physics C: Electricity & Magnetism SCI2063
Description of Course	Topics include traditional physics subjects of motion, dynamics, energy momentum, electricity and magnetism & waves. Along with related subjects in earth science (plate tectonics/ earthquakes) & astronomy.	Students explore principles of Newtonian Mechanics (including topics related to motion, dynamics, work, energy, rotational motion, power, and simple harmonic motion).	Students will learn about various Mechanics topics, such as kinematics, forces, rotation, energy, momentum, and wave motion. Introductory integral and differential calculus is used throughout this course.	Students will explore topics such as electric forces and fields, Gauss' Law, Circuits, capacitance, magnetic forces and fields, electromagnetic induction & applications of Maxwell's equations. Additional applications of integral & differential calculus covered in the AP C: Mechanics course will be applied to these topics.
Are there any prerequisites or Corequisites?	Recommended: Concurrent enrollment in Algebra II	Prerequisite: Geometry Co-requisite: Algebra II Recommended: Concurrent enrollment in Pre-calculus	Corequisite: Concurrent enrollment in, or completion of, either AP Calculus AB or BC and/or Calc with Apps course** (See footnote)	Prerequisite: Successful completion of Honors Physics, AP Physics 1 or AP Physics C Mechanics (if not co-enrolled in AP Physics C: Mechanics) Corequisite: Concurrent enrollment in (AP Calculus) or successful completion of a Calculus Course
Is this a 1st year Physics class?	Yes	Yes	Yes	No
Is this a single period, year long course?	Yes	Yes	Yes	Yes **May be taken concurrently with AP Physics C: Mechanics if student has prior Physics experience
Is Calculus Required?	No	No	Yes ** (See footnote)	Yes: AP Calculus or Multivariable
Will I do labs?	1 Lab per Unit	~ 1 Lab activity per week	~ 1 Lab activity per week	~ 1 Lab activity per week
Assessments	Unit based tests/quizzes	Cumulative tests every 3-5 weeks	Cumulative tests every 3-5 weeks	Cumulative tests every 3-5 weeks
Can I earn College Credit?	No	Potential credit with a qualifying score on AP exam. Equivalent to a general science credit for an algebra based course for non-STEM majors	Potential credit with a qualifying score on AP Exam, with possible placement out of 1st semester calculus based Physics course for STEM majors.	Potential credit with a qualifying score on the AP exam, with possible placement out of 2nd semester calculus based Physics course for STEM majors.