SCIENCE COURSE DESCRIPTIONS (SC)

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Students should consider taking the following Science courses if you are interested in:

Business, Management & Marketing	**Required Science courses**
Education & Human Services	**Required Science courses**
Engineering & Technology	**Required Science courses, Chemistry, Physics, Earth and Space Science, Physics Advanced Placement, Chemistry Advanced Placement**
Manufacturing & Construction	**Required Science courses, Chemistry, Physics, Earth and Space Science, Physics Advanced Placement, Chemistry Advanced Placement**
Fine Arts, Design & Communications	**Required Science courses**
Health Services	**Required Science courses, Biology, Chemistry, Physics, Anatomy and Physiology, Biology Advanced Placement, Chemistry Advanced Placement**
Legal & Government	**Required Science courses**
Natural Science & Resource Management	**Required Science courses, Biology, Earth and Space Science, Chemistry, Physics, Environmental Science, Biology Advanced Placement, Chemistry Advanced Placement**

Biology I (3024)
CGHS Course #: SC111
Grade Level: 9, 10, 11, 12
Length: 2 Semesters
Credit(s): Two
Weighted Course: No Dual Credit: No
Prerequisite(s): Science teacher recommendation

Biology I is a course based on the following core topics: cellular chemistry, structure and reproduction; matter cycles and energy transfer; interdependence of organisms; molecular basis of heredity; genetics and evolution.

Biology I (Honors) (3024)
CGHS Course #: SC113
Grade Level: 9, 10, 11, 12
Length of Course: 2 Semesters
Credit(s): Two
Weighted Course: Yes Dual Credit: No
Prerequisite(s): B average in previous science class and teacher recommendation

Biology I Honors is a course based on the following core topics: cellular chemistry, structure and reproduction; matter cycles and energy transfer; interdependence of organisms; molecular basis of heredity; genetics and evolution. This course follows the same topics as Biology I, but with more emphasis on designing, conducting, and writing laboratory assignments, analysis of scientific articles, and essay questions on tests.

Earth and Space Science (3044)
CGHS Course #: SC121
Grade Level: 9, 10, 11, 12
Length of Course: 2 Semesters
Credit(s): Two
Weighted Course: No Dual Credit:

Earth and Space Science is a course focused on the following core topics: study of the earth's layers; atmosphere and hydrosphere; structure and scale of the universe; the solar system and earth processes. Students analyze and describe earth's interconnected systems and examine how earth's materials, landforms, and continents are modified across geological time.

Integrated Chemistry-Physics (ICP) (3108)
CGHS Course #: SC251
Grade Level: 9, 10, 11, 12
Length of Course: 2 Semesters
Credit(s): Two
Weighted Course: No Dual Credit: No
Prerequisite(s): Recommended Algebra 1 (can be taken concurrently)

Integrated Chemistry-Physics (ICP) is a two-credit course focused on the following core topics: Particle Theory of Matter, Atomic Structure, Chemical Reactions, Radioactivity, Motion, Force, Energy Conversions, Waves, and Electricity & Magnetism. ICP will also prepare students for success in Chemistry, Physics, or other advanced science classes. ICP is not a substitute for a full-year of chemistry or physics, but it does satisfy Indiana Core 40 diploma requirements in the physical sciences category.

Life Science (3030)
CGHS Course #: SC050
Grade Level: 9
Length: 1 Semester
Credit(s): One
Weighted Course: No
Prerequisite(s): None

Life Science is a one semester course which examines different forms of life on Earth. Students will study cells, ecology, classification, and genetics. Students are required to complete class projects and participate in labs and activities.

Physical Science (3102)
CGHS Course #: SC100
Grade Level: 9
Length: 1 Semester
Credit(s): One
Weighted Course: No Dual Credit: No
Prerequisite(s): None

Physical Science is a one semester course. Students will develop problem solving skills and strategies while performing laboratory and field investigations of fundamental chemical, physical, and related earth and space science concepts. Students will explore the structure and properties of matter, the nature of energy, and the physical and chemical laws that govern Earth's interconnected systems and forces of nature.

Advanced Science, Special Topics; Introduction to Forensics (3092)
CGHS Course #: SC323
Grade Level: 11, 12

Length: 2 Semesters
Credit(s): Two
Recommended Lexile: 1200 - 1400
Weighted Course: No Dual credit No
Prerequisite(s): Recommended Biology I (C+ average), Chemistry (C+ average), ICP (B+ average), or Physics (B average)

Students use scientific inquiry in order to identify, collect and analyze valid forensic evidence. Topics include: historical applications, case studies in criminal justice, clean laboratory techniques, blood typing, blood spatter analysis, fingerprint, DNA analysis, forensic entomology, processing a crime scene, firearms and tool marks examination and evidence storage, and mock trials. Overly squeamish students will find this course difficult to complete.

Advanced Science, Special Topics: Astronomy (3092)
CGHS Course #: SC325
Grade Level: 11, 12
Length: 1 Semester
Credit(s): One
Weighted Course: No Dual Credit: No
Prerequisite(s): Recommended Algebra II

Astronomy is the study of the universe - the totality of space, time, matter and energy. Astronomy students study the laws of the universe including gravity, the motions of objects in the solar system, and the properties of light. Other topics include telescopes, discoveries made by early astronomers, and a collection of selected readings outside of the text. A major emphasis will be placed on observational astronomy, including the identification of constellations and planets.

Advanced Science, Special Topics: Meteorology (3092)
CGHS Course #: SC327
Grade Level: 11, 12
Length of Course: 1 Semester
Credit(s): One
Weighted Course: No Dual Credit: No
Prerequisite(s): Recommended Algebra II

Meteorology students will study the dynamics of Earth's atmosphere, including energy transfer processes, storm systems, weather forecasting, and climatic change. Students will learn how to use the Internet to access weather maps and satellite images.

Advanced Science, Special Topics: Introduction to Organic Chemistry/Biochemistry (3092)
CGHS Course #: SC330
Grade Level: 11, 12
Length: 1 Semester
Credit(s): One
Weighted Credit: No Dual Credit: No
Prerequisite(s): Recommended Biology I Honors (B average grade) and Chemistry I Honors (B average grade)

Organic chemistry is the study of carbon compounds and their reactions to produce new and unique molecules. Students will learn how and why reactions occur, and ultimately how reactions can be used to create a desired product. Biochemistry studies the chemical processes that drive biological mechanisms such as cellular respiration and enzyme function.

Chemistry I (3064)
CGHS Course #: SC331
Grade Level: 9, 10, 11, 12
Length: 2 Semesters
Credit(s): Two
Weighted Course: Yes Dual Credit: No
Prerequisite(s): Recommended B in Algebra I or concurrently enrolled in Algebra II; teacher recommendation in Biology or ICP

Chemistry I is a course based on the following core topics: properties and states of matter; atomic structure; bonding; chemical reactions; solution chemistry; behavior of gases, and organic chemistry. Students enrolled in Chemistry I compare, contrast, and synthesize useful models of the structure and properties of matter and the mechanisms of interactions.

Chemistry I (Honors) (3064)
CGHS Course #: SC333
Grade Level: 9, 10, 11, 12
Length: 2 Semesters
Credit(s): Two
Weighted Course: Yes Dual Credit: No
Prerequisite(s): Recommended B or higher in Honors Algebra I, with teacher review and recommendation

Chemistry I Honors is a course based on the following core topics: properties and states of matter; atomic structure; bonding; chemical reactions; solution chemistry; behavior of gases, and organic chemistry. Students enrolled in Chemistry I Honors compare, contrast, and synthesize useful models of the structure and properties of matter and the mechanisms of its interactions. Students study the same topics as Chemistry I, but at a faster pace and in a greater depth. Chemistry I honors emphasizes advanced laboratory techniques, more extensive mathematical modeling, and many more writing exercises. This course is designed for students who are motivated to

follow a career in a science-related field and have a strong math background. Students who plan on taking AP Chemistry should take Honors Chemistry.

Advanced Science, College Credit: ACP Chemistry (3090)
CGHS Course #: SC531
Grade Level: 10, 11, 12
Length: 2 Semesters
Credit(s): Two
Weighted Course: Yes Dual Credit: Yes
Prerequisite(s): Recommended B in Honors Algebra I or A in Algebra I

ACP Chemistry is a dual-credit class that is offered through Indiana University's Advanced College Program. Students taking this class can earn up to five college credits (three for C-101 Lecture and two for C-121 Laboratory). These college credits can potentially count as required science credits for students who are not intending to major in a science discipline at college, such as business, fine arts, nursing, English, etc. The ideal Center Grove student who will be successful in ACP chemistry is one who meets the prerequisites and has a desire to work in an environment that will earn them college credit. It is not necessary to have already taken a year of chemistry before registering for ACP chemistry. This class is not intended for the student who wishing to continue on by taking AP chemistry at Center Grove High School. Additionally, if a student has already taken regular chemistry at Center Grove High School but wishes to earn college credit, they might consider taking ACP chemistry. The amount of information covered is similar to Honors Chemistry, however ACP chemistry requires less mastery of the mathematical applications used to quantify chemical phenomena. The difficulty level of ACP Chemistry is considered to fall in between regular chemistry and honors chemistry.

Advanced Science, Special Topics: Microbiology (3092)
CGHS Course #: SC335
Grade Level: 10, 11, 12
DOE Course #: 3092
Length: 1 Semester
Credit(s): One
Weighted Course: No Dual Credit: No
Prerequisite(s): Recommended Biology I (B average) and Chemistry I (C average)

This course is designed as a laboratory-based course to challenge students with activities, experiments, critical-thinking, and problem solving. The focus of the course will primarily be on bacterial organisms and viruses with applications for medical microbiology and epidemiologic practices. Assessments will be in the form of lab reports, accurate application of laboratory techniques, oral presentations, written tests, problem solving, and written responses.

Advanced Science, Special Topics: Genetics (3092)
CGHS Course #: SC336G
Grade Level: 11, 12
Length: 1 Semester
Credit(s): One
Weighted Course: No Dual Credit:
Prerequisite(s): Recommended Biology I and Chemistry I

GC Genetics is an advanced science elective course based on the following core topics: Mendelian (classical) genetics, Molecular genetics, population genetics and genetic technology. This course is being offered global campus only.

Physics I (3084)
CGHS Course #: SC341
Grade Level: 10, 11, 12
Length: 2 Semesters
Credit(s): Two
Weighted Course: No Dual Credit: No
Prerequisite(s): Recommended B in Algebra I or Algebra II; science teacher recommendation

Physics I is a course focused on the following core topics: motion and forces; energy and momentum; temperature and thermal energy transfer; electricity and magnetism; sound, vibrations and waves; light and optics. Physics I is an algebra-based physics course. A scientific calculator is required.

Physics I (Honors) (3084)
CGHS Course #: SC343
Grade Level: 10, 11, 12
Length: 2 Semesters
Credit(s): Two
Weighted Course: Yes Dual Credit: No
Prerequisite(s): Recommended B in Honors Algebra I or A in Algebra I with teacher recommendation

Honors Physics I is a course focused on the following core topics: motion and forces; energy and momentum; temperature and thermal energy transfer; electricity and magnetism; sound, vibrations and waves; light and optics. Honors Physics I is an algebra-based physics course. The math level of this course is Algebra II. A scientific calculator is required. Students study the same topics as Physics I, but at a faster pace and in greater depth. Physics I honors

emphasizes advanced laboratory techniques, more extensive mathematical modeling, and many more writing exercises. This course is designed for students who are motivated to follow a career in a science-related field and have a strong math background.

Biology Advanced Placement (3020)
CGHS Course #: SC411
Grade Level: 10, 11, 12
Length: 2 Semesters
Credit(s): Two
Weighted Course: Yes Dual Credit: No
Prerequisite(s): Biology I (recommended Honors Biology) and Chemistry I

This course prepares students to take the AP Biology Exam through in-depth study of cellular biology, molecular biology, genetics, living systems and evolutionary theory. Students can also use this course as preparation for the SAT2 Advanced Biology Exam. For additional information on the AP Program, go to the CGHS AP Web Site or contact your school counselor.

Anatomy and Physiology (5276)
CGHS Course #: SC413
Grade Level: 11, 12
Length: 2 Semesters
Credit(s): Two
Weighted Course: Yes Dual Credit: No
Prerequisite(s): Recommended B or in Biology I and Chemistry I

Anatomy & Physiology is a course in which students investigate concepts related to Health Science, with emphasis on interdependence of systems and contributions of each system to the maintenance of a healthy body. It introduces students to the cell, which is the basic structural and functional unit of all organisms, and covers tissues, integument, skeleton, muscular and nervous systems as an integrated unit. Through instruction, including laboratory activities, students apply concepts associated with Human Anatomy & Physiology. Students will understand the structure, organization and function of the various components of the healthy body in order to apply this knowledge in all health related fields. Many of the labs require dissection of preserved tissues, including animal dissection of the rabbit or cat. This course is recommended for any student entering a Health Career pathway such as nursing, dentistry, pharmacy, and physical therapy. Please note that the completion of first year Chemistry is a required prerequisite. If both Chemistry and Anatomy are taken simultaneously, it could be a disadvantage to the student. There is significant overlap between the content in Project Lead the Way Human Body Systems and Human Anatomy & Physiology. Taking both classes simultaneously or separately is not recommended. Counts as a Directed Elective or Elective for all diplomas

Environmental Science Advanced Placement (3012)
CGHS Course #: SC421
Grade Level: 10, 11, 12
Length: 2 Semesters
Credit(s): Two
Recommended Lexile: N/A
Weighted Course: Yes Dual Credit: No
Prerequisite(s): Recommended Biology I and Chemistry I

AP Environmental Science will prepare students to take the AP exam in Environmental Science. The goal of AP Environmental Science 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 man-made, to evaluate the relative risks associated with these problems, and to examine alternative solutions for resolving and/or preventing them. For additional information on the AP Program, go to the CGHS AP Web Site or contact your guidance counselor.

Chemistry Advanced Placement (3060)
Grade Level: 10, 11, 12
CGHS Course #: SC431
Length: 2 Semesters
Credit(s): Two
Weighted Course: Yes Dual Credit: No
Prerequisite(s): Recommended Chemistry I Honors with Chemistry teacher approval. Students must have completed Algebra II and be concurrently enrolled in or have completed pre-Calculus.

Chemistry, Advanced Placement is a course based on the content established by the College Board. The content includes: (1) structure of matter; atomic theory and structure, chemical bonding, molecular models, nuclear chemistry; (2) states of matter: gases, liquids, and solids, solutions; and (3) reactions: reaction types, stoichiometry, equilibrium, kinetics and thermodynamics. This course is recommended for any student wishing to pursue a career in STEM (science, technology, engineering, or math). The course is designed to prepare students for the AP Chemistry test given in May. It is also equivalent to 1.5-2 semesters of first year college level chemistry and

provides the background for students to test out of certain chemistry courses in college. This course is an excellent opportunity for a student to be ahead academically the first year of college.

Physics C Advanced Placement: Mechanics and Electricity and Magnetism (3088)
CGHS Course #: SC441
Grade Level: 11, 12
Length: 2 Semesters
Credit(s): Two
Weighted Course: Yes Dual Credit: No
Prerequisite(s): Recommended Honors Physics I; must be concurrently enrolled in Calculus

This course prepares students to take the AP Physics calculus-based exam in Mechanics as well as the AP Physics C exam in Electricity & Magnetism. The first semester of the course focuses on kinematics; Newton's laws of motion; work, energy and power; systems of particles and linear momentum; circular motion and rotation; and oscillations and gravitation. Although Calculus and Trigonometry are used routinely in this class, students will be taught what they need to know in these areas. The second semester of the course focuses on electrostatics, conductors, capacitors & dielectrics, electric circuits, magnetic fields, and electromagnetism. This course is intended for students who expect to enter engineering, physical science or other career fields that require a more advanced preparation in Physics. Students will perform a variety of lab exercises. For additional information on the AP Program, go to the CGHS AP Web Site at or contact your guidance counselor. A graphing calculator is required.

PLTW Principles of Biomedical Sciences (5218)
CGHS Course #: SC501
Grade Level: 9, 10
Length: 2 Semesters
Credit(s): Two
Weighted Course: Yes Dual Credit: No
Prerequisite(s): Recommended C+ in 8th grade science or C+ in Biology I; students should have a strong work ethic and be able to work in a student-driven problem-based curriculum

This course is designed to provide an overview of all the courses in the Biomedical Sciences Program and to lay the scientific foundation necessary for student success in the subsequent classes. Students explore the concepts of human medicine and are introduced to research processes and to bioinformatics. Hands-on projects enable students to investigate human body systems and various health conditions, including heart disease, diabetes, sickle-cell disease, hypercholesterolemia, and infectious diseases. This class may count as CORE 40 science credit.

PLTW Human Body Systems (5216)
CGHS Course #: SC503
Grade Level: 10, 11, 12
Length of Course: 2 Semesters
Credit(s): Two
Weighted Course: Yes Dual Credit: No
Prerequisite(s): PLTW Principles of the Biomedical Sciences or teacher recommendation (upperclassmen only); students should have a strong work ethic and be able to work in a student-driven problem-based curriculum. Freshmen and sophomores must take PBS before entering

Students examine the processes, structures and interactions of the human body system to learn how they work together to maintain homeostasis (internal balance) and good health. Using real-world cases, students take the role of biomedical professionals and work together to solve medical mysteries. Hands-on projects include designing experiments, investigating the structure and functions of body systems, and using data acquisition software to monitor body functions such as muscle movement, reflex and voluntary actions and respiratory operation. Important concepts covered in the course are communication, transport of substances, locomotion, metabolic processes, defense and protection. This class may count as CORE 40 science credit.

PLTW Medical Interventions (5217)
CGHS Course #: SC505
Grade Level: 11, 12
Length: 2 Semesters
Credit(s): Two
Recommended Lexile: N/A
Weighted Course: Yes Dual Credit: No
Prerequisite(s): PLTW Human Body Systems

Medical Intervention is a course that studies medical practices including interventions to support humans in treating disease and maintaining health. Using a project-based learning approach, students investigate various medical interventions that extend and improve quality of life, including gene therapy, pharmacology, surgery, prosthetics, rehabilitation, and supportive care. Students also study the design and development of various interventions including vascular stents, cochlear implants, and prosthetic limbs. Lessons will cover the history of organ transplants and gene therapy with additional readings from current scientific literature addressing cutting edge

developments. Using 3-D imaging software, students design and build a model of a therapeutic protein. . This class may count as CORE 40 science credit.

PLTW Biomedical Innovations (5219)
CGHS Course #: SC507
Grade Level: 12
Length: Two-Semesters
Credit(s): Two
Weighted Course: Yes Dual Credit: Yes
Prerequisite(s): 4th year of PLTW sequence (PBS, HBS and MI); students who concurrently enrolled in Medical Interventions may take this course with teacher recommendation; teacher recommendation and student application may also apply

In this capstone course, students apply their knowledge and skills to answer questions or solve problems related to the biomedical sciences. Students design innovative solutions for the health challenges of the 21st century as they work through progressively challenging open-ended problems, addressing topics such as clinical medicine, physiology, biomedical engineering, and public health. They have the opportunity to work on an independent project (job shadow) and may work with a mentor or adviser from a university, hospital, physician's office, or industry. Throughout the course, students are expected to present their work to an adult audience that may include representatives from the local business and healthcare community.

Science Sequence