

COURSE PATHWAYS FOR SCIENCE

SUGGESTED BIOLOGICAL SCIENCE COURSES**		MEDICAL/BIOLOGICAL PATHWAY Science/Technical/Professional Careers	
<p><i>Two Semester Courses</i></p> <p>Anatomy and Physiology Dual Credit Anat/Phys ## AP Biology## AP Environmental Sci ## IB Biology HL## Forensics</p> <p><i>One Semester Courses</i></p> <p>Human Genetics Intro to Neuroscience Microbiology Oceanography Zoology</p>	<p><i>PLTW Courses</i></p> <p>Principles of BiomedSci (PBS) Human Body Systems (HBS) Medical Interventions# (MI) Biomedical Innovations# (BI)</p> <p># Honors weight ##AP Weight</p>	<p>Grade 9</p> <p>Biology or Honors Biology and, if desired, PBS (PLTW)</p> <p>Grade 10</p> <p>Chemistry or Honors Chemistry and/or some level of physics based on math placement, and, if desired, HBS (PLTW) or Suggested Biological Science Courses**</p> <p>Grade 11</p> <p>Dual Credit Anatomy and Physiology, AP Biology, AP Chemistry and/or AP Physics (1 or C) or Suggested Biological Science Courses** or Medical Interventions (PLTW, weighted)</p> <p>Grade 12</p> <p>Dual Credit Anatomy and Physiology, AP Biology, AP Chemistry and/or AP Physics (1 or C) or Suggested Biological Science Courses** or Medical Interventions (PLTW, weighted) and/or Biomedical Innovations (only if completed all previous PLTW courses)</p>	
SUGGESTED PHYSICAL SCIENCE COURSES		ADVANCED PLACEMENT/DUAL CREDIT PATHWAY High Level Science Career	
<p><i>Two Semester Courses</i></p> <p>AP Chemistry## AP Physics 1## AP Physics 2## AP Physics C## Chemistry (or Honors) Chemistry II Earth Space Science IB/ACP Chemistry## ICP Physics</p> <p><i>One Semester Courses</i></p> <p>Astronomy Astronomy II Meteorology Organic Chemistry</p>	<p><i>PLTW Engineering Courses at FHS</i></p> <p>Introduction to Engineering Design (IED) Principles of Engineering (POE) Digital Electronics# (DE) Robotics Design and Innovation# (RDI)</p> <p><i>PLTW Engineering Courses at HSHS</i></p> <p>Aerospace Engineering# Biotechnical Engineering# Civil Engineering and Architecture# Computer Integrated Manufacturing#</p> <p>#Honors Weight ##AP Weight</p>	<p>Grade 9</p> <p>Biology or Honors Biology</p> <p>Grade 10</p> <p>Chemistry or Honors Chemistry and/or AP Physics 1</p> <p>Grade 11</p> <p>AP Biology, AP Chemistry, ACP Chemistry, AP Physics and/or Dual Credit Anatomy and Physiology</p> <p>Grade 12</p> <p>AP Biology, AP Chemistry, ACP Chemistry, AP Physics and/or Dual Credit Anatomy and Physiology</p>	
ENGINEERING PATHWAY Science/Technical/Engineering Careers		IB PATHWAY	
<p>Grade 9</p> <p>Biology or Honors Biology and IED</p> <p>Grade 10</p> <p>Chemistry or Honors Chemistry and POE</p> <p>Grade 11</p> <p>PLTW Elective Course and AP Physics 1 and/or Robotics</p> <p>Grade 12</p> <p>AP Physics C or AP Chemistry and/or Robotics and/or Digital Electronics</p>	<p>Grade 9</p> <p>Honors Biology</p> <p>Grade 10</p> <p>Honors Chemistry</p> <p>Grade 11</p> <p>Dual Credit Anatomy/Physiology</p> <p>Grade 12</p> <p>IB Biology HL</p> <p>Grade 11</p> <p>IB/ACP Chemistry SL</p> <p>Grade 11</p> <p>AP/IB Physics 1</p> <p>Grade 12</p> <p>AP/IB Physics 2</p> <p>Grade 11</p> <p>AP/IB Physics 1</p> <p>Grade 12</p> <p>AP/IB Physics 2</p>	<p>Option 1: Biology HL</p> <p>Option 2: Chemistry SL</p> <p>Option 3: Physics HL</p> <p>Option 4: Physics SL</p>	

HAVE PRIDE - SHOW CHARACTER - BUILD TRADITION



SCIENCE

The Science Department seeks to provide students with a science foundation that will allow students to function as responsible and contributing members of society by fostering an environment where students will expand their knowledge, skills, and experiences in the various science disciplines. In support of its mission, the Science Department is committed to provide students:

- a learning community which ensures students of varying age, ethnicity, culture, learning styles, and socio-economic status are equally served
- exceptional programs and courses that provide experiences that support research, rigor, and scholarship and will facilitate the making of informed decisions regarding issues concerning science, technology, and society
- an environment that promotes a lifetime of critical inquiry and learning as well as an awareness of the manner in which science and technology affect the quality of their world

INTRODUCTORY COURSES

3024 BIOLOGY I (9, 10, 11, 12) This is a study of scientific methods, chemistry of life, cellular biology, genetics, evolution, and ecology. Students will explore the characteristics of living things, the nature and structure of life on earth and the chemical principles that underlie the process of life. Students will gain insight into the diversity of life by participating in regular laboratory activities, coop. learning experiences, research activities & class discussions on various current topics.

3024 # BIOLOGY I HONORS (9, 10, 11, 12) This is an accelerated study of chemistry of life, cells, energetics, genetics/molecular genetics, evolution, and ecology with an emphasis on laboratory collaboration and critical thinking. Each unit encompasses lab work, projects, and inquiry based activities that complement the content areas. Honors Biology is designed for the student with a strong interest and background in science who, perhaps, will be pursuing further study in some area of life science in the future. **Requirement: Recommendation from 8th grade teacher. Credit will not be given for both Honors Biology and Biology.**

3044 EARTH AND SPACE SCIENCE (9, 10, 11) This course will provide students with the basic knowledge of earth and space science as it relates to them and their own range of experiences. The course will also develop the students' abilities to appreciate the basic concepts in earth and space science through discussion, technology, and hands-on laboratory experiences. Students will be exposed to geology, meteorology, and astronomy, as well as discussions and activities concerning natural disasters, environmental influences, and space exploration. **Seniors may take this course with counselor and/or teacher approval only.**

3108 INTEGRATED CHEMISTRY PHYSICS (ICP) (10, 11, 12) Integrated Chemistry Physics (ICP) is designed to serve as an introduction to future coursework in either chemistry and/or physics while ensuring a mastery of the basics of each discipline. Physics topics include motion, forces, work, and energy. Chemistry topics include the periodic table, atomic theory, atomic structure, and chemical reactions. Students may go on to earn additional physical science credits by taking physics and/or chemistry courses. **This course is not available for students who have previously earned credit in Chemistry or Physics. One semester of ICP cannot be used to make up for a failed semester of Chemistry or Physics.**

* 1-semester course ** can be taken 1 or 2 semesters # single-weighted course ## double-weighted course

3064 CHEMISTRY I (10, 11, 12) This course is designed as an introduction to all areas of chemistry, including the basic properties of elements and compounds, relationships between matter and energy, the structure and function of atoms, and their interactions in reactions. Students have the opportunity to learn about the history as well as theoretical and practical aspects of chemistry. Hands-on laboratory experience is paired with theoretical and mathematical solutions to chemical problems. **Requirement: Algebra I. Recommendation: "B" average in Algebra I.**

3064 # CHEMISTRY I - HONORS (10, 11, 12) This course is a fast-paced survey of the states of matter, the organization and properties of the elements, behavior and interaction of elements and compounds, and the relationships between energy and matter. Students will be expected to be very competent in algebraic manipulations. Higher-level thinking will be stressed through the use of laboratory investigations. Students will be expected to complete formal lab reports. Success in Honors Biology does not necessarily predict success in this course. This course stresses mathematical applications. **STRONG Recommendation: "A" average in Algebra I. Credit will not be given for both Honors Chemistry and Chemistry.**

3084 PHYSICS I (10, 11, 12) Physics is the study of matter and energy that is foundational to how our world & the Universe works. Physics explores the study of motion, energy, wave phenomenon, electricity, and optics. There is a strong emphasis on problem solving and lab activities. A basic understanding of physics is important to understanding other branches of science and essential for anyone considering a future in any type of science, engineering, computer programming, or the medical field (doctors & nurses). **Requirement: Algebra I, Geometry, and Algebra II (or concurrent enrollment in Algebra II). Sophomores choosing to take this course must have an "A-" average in Algebra I. Recommendation: Juniors and Seniors, completion of Algebra 1 with a "B" average.**

ADVANCED SCIENCE: SPECIAL TOPICS COURSES

5276 ANATOMY/PHYSIOLOGY (10, 11, 12) This two-semester course will offer a basic study of human anatomy and physiology. The Human Anatomy/Physiology course focuses on the relationship between structure and function of human body systems. Students can expect to create projects that demonstrate their understanding of different systems and how function relates to structure. Laboratory work could include microscopic study of tissues, dissection of specimens, bone study labs, and physiological labs. Students that object to dissection will be given an alternate assignment upon parental request. **Requirement: Biology or Honors Biology with "C" or better recommended.**

3092 * ADVANCED SCIENCE --SPECIAL TOPICS – ZOOLOGY (10, 11, 12) This one semester biology course will offer an in-depth study of Zoology. This course will involve a comparative study of animals' anatomy from each phylum and will focus on many body systems. There will also be a study of their behavior, habits, where and how they live, their relationship with one another and with their environment, their classification, endangered species and parasitic disease. Activities include dissection of various animals, microscope studies, and live animal observations. **Requirement: Biology I or Honors Biology I. Recommendation: "C" average in Biology I or Honors Biology I.**

3092 * ADVANCED SCIENCE – SPECIAL TOPICS – HUMAN GENETICS (10, 11, 12) This second year biology course will offer a one semester in-depth study of Genetics. Students will study gene inheritance and expression, cytogenetics, epigenetics, genetic engineering, bioethics, stem cells, GMO foods, forensics, blood inheritance, and gender issues. Activities include microscope work, DNA fingerprinting, development of pedigrees, karyotyping, PCR, electrophoresis, and bioethical discussions. Emphasis is placed on the students' practical use of the information, as they become responsible adults. **Requirement: Biology I or Honors Biology I. Recommendation: "C" average in Biology I or Honors Biology I.**

3092 * ADVANCED SCIENCE –SPECIAL TOPICS – MICROBIOLOGY (10, 11, 12) This one semester biology course will offer an in-depth study of Microbiology. In Microbiology, students will study microorganisms such as bacteria, fungi, viruses, and parasites. Other topics include microbe-based diseases and antimicrobial medicine. Lab activities include standard staining and culture techniques, microscope work, and antimicrobial testing. **Requirement: Biology I or Honors Biology I. Recommendation: "C" average in Bio.**

3092 ADVANCED SCIENCE – SPECIAL TOPICS– FORENSIC SCIENCE (11, 12) This year long course is intended for students with an interest in the application of the methods of science to legal matters. This course will provide an overview of general forensic science, considering history, current methods, and case studies. Students will be introduced to a sequential survey of topics in General Forensics, Crime Scene Investigation, Trace Evidence, Prints & Marks, Serology, and Ballistics with an underlying emphasis of legal admissibility and evidentiary value and scientific writing skills. **Requirement: Successful completion of Biology I or Honors Biology AND ICP or Chemistry I or Honors Chemistry. Recommendation: Grade of a B or higher in Biology I/Honors Biology AND a grade of an A in ICP or a grade of a B or higher in Chemistry I/Honors Chemistry.**

3092 * ADVANCED SCIENCE – SPECIAL TOPICS – INTRODUCTION TO NEUROSCIENCE (11, 12) This one semester course will be an intensive overview of the introductory topics in neuroscience. The course will examine the neural basis of behavior through molecular, cellular, developmental, cognitive, and behavioral lenses. Topics will include: neuronal membranes, synaptic transmission, chemical senses, central visual system, auditory system, spinal/brain control of movement, brain and behavior, emotion, sleep, mental illness, and memory. Students should prepare to learn a large library of new topics and information in a short period of time. The rigor will be that of a college course. Students will learn how to read and analyze scientific papers. Each topic will have an associated scientific paper for digestion. Project-based and student-led learning will be used. Students that object to dissection will be given an alternate assignment upon parental request.. **Required: Grade of B or higher in Biology I or Honors Biology and grade of B or higher in Chemistry I or Honors Chemistry. Recommended: One or more of the following: AP Psychology or an Anatomy and Physiology class.**

3092 * ADVANCED SCIENCE – SPECIAL TOPICS -- OCEANOGRAPHY (10, 11, 12) This course is designed to incorporate many facets of S.T.E.M while students learn about the ocean and how it relates to everyday life, global warming and future water shortages that are predicted to occur during their lifetime. The course will include aspects of algebra, chemistry, physics, earth science and biology. The course is divided into two main units, physical oceanography, and life in the ocean. Physical oceanography will look at the history of the oceans, and how water moves through waves, tides, and currents. It will also include hurricanes and tsunamis. The life in the ocean section will study coral reefs, sharks, whales and dolphins, and ocean ecology. The course will use hands-on and virtual labs, documentaries, and does require detailed data evaluation and graphing. **Requirement: A positive attitude and willingness to work along with any previous biology, chemistry or physics course with a C or higher.**

3092 * ADVANCED SCIENCE – SPECIAL TOPICS -- ORGANIC CHEMISTRY (11, 12) This course is intended for students with an interest in health fields, or biological or chemical sciences. It is a challenging introduction to college-level organic chemistry. The main focus will be the study of carbon containing compounds as well as their applications. Students will learn to identify important organic functional groups, classify compounds into families, identify and evaluate a variety of reactions and apply naming rules. In addition, students will be able to describe physical and chemical properties and write equations for reactions involving these molecules. Students will explore applications of organic chemistry including petroleum chemistry, polymers, flavors and fragrances and pharmaceuticals. **Requirement: An "A" in Biology I or a "B" in Honors Biology AND an "A" in Chemistry I or a "B" in Honors Chemistry.**

3092 * ADVANCED SCIENCE –SPECIAL TOPICS -- **ASTRONOMY I** (10, 11, 12) This astronomy course is a **one semester** study of basic principles of astronomy. Topics include: the history of modern astronomy, planetary development, the study of celestial bodies, constellations, current astronomy events, and space explorations. This course incorporates lab investigations, related videos, technology based projects, web quests, and model construction. **Requirement: Students must have earned a C or higher in all previous science courses.**



3092 * ADVANCED SCIENCE – SPECIAL TOPICS -- **ASTRONOMY II** (10, 11, 12) This astronomy course is a **one semester** study of principles of astronomy not covered in Astronomy I. Topics include going beyond our solar system to study celestial bodies, stellar evolution, the sun, galaxies, living and working in space, the history of space explorations, NASA's goal to travel to Mars, and current astronomy events. This course incorporates lab investigations, related videos, technology based projects, web quests, and model construction. **Requirement: Students must have earned a C or higher in Astronomy I.**

3092 * ADVANCED SCIENCE – SPECIAL TOPICS --**METEOROLOGY** (10, 11, 12) This course is **one semester** introduction to Meteorology. The central theme of the course is the understanding and application of meteorological principles: why we have weather, how we have weather, and learn to predict the weather. The units studied: Earth-Sun Relationships; Atmospheric Properties; Warming the Earth and the Atmosphere; Humidity, Condensation, and Clouds; Precipitation; Air Pressure and Winds; Atmospheric Circulations; Air Masses, Fronts, and Middle-Latitude Cyclones; Weather Forecasting, Thunderstorms and Tornadoes; Hurricanes; Air Pollution; & others. **Requirement: Students must have earned a C or higher in all previous science courses.**



3092 * ADVANCED SCIENCE: SPECIAL TOPICS – **GEOLOGY** (10, 11, 12) This course is designed to introduce students to the fundamentals of geology. Topics will include rocks, minerals, plate tectonics, earth resources, natural hazards, climate change, and other geological processes that occur within our everyday life. This course will tie in concepts from chemistry, physics, biology, earth science, and environmental science. Throughout the course, students will be exposed to the various topics of geology through laboratory activities and project based learning opportunities that will allow them to apply learning to the real world. **Requirement: Students must have earned a C or higher in all previous science courses.**

3092 ADVANCED SCIENCE: SPECIAL TOPICS – **MATERIAL SCIENCE** (11, 12) This yearlong course explores the development, testing, and uses of various materials (concrete, paints, laminates) using integrated project-based learning in the topics of chemistry and physics. This course fulfills a science course requirement for all diplomas, including Core 40 and Academic Honors Diploma. **Recommendation: 1 Life Science and 1 Physical Science course.**

3008 SCIENCE RESEARCH, INDEPENDENT STUDY (12) This two semester course provides students with unique opportunities for independent, in-depth study of one or more specific scientific problems. Students develop familiarity with laboratory procedures used in a given educational, research, or industrial setting or a variety of such settings. Students enrolled in this course will complete an end-of-course project such as a scientific research paper, or some other suitable presentation of their findings. This counts as a science credit for all diplomas. **Must have special administrative approval to take this course. Prerequisites: 1 Life Science and 1 Physical Science credit.**

ADVANCED PLACEMENT AND DUAL CREDIT

3090 ## ADV CC FUNDAMENTALS OF HUMAN ANATOMY / PHYSIOLOGY – IB BIOLOGY HL YEAR 1 (11, 12)

This two-semester course will offer an in-depth study of Human Anatomy/Physiology. Topics covered include: the skeletal and muscular system and their interactions promoting body support, protection and mobility; the nervous system; the cardiovascular system; the respiratory system; the urinary system; the immune system; and the digestive system, all of which contribute to the balance of day-to-day body activities. Laboratory work may include microscopic study of tissues, dissection of specimens, bone study labs, cardiovascular stress activities, and other physiological labs. This course is the first in the two-year program for IB Biology HL students. **Students will be expected to purchase or rent their textbooks prior to the beginning of class.** In addition, this course gives students the option to enroll in the Ball State University courses, ANAT 201 and PHYS 215 in which they may earn 8 hours of college credit. If students elect to take the course for college credit, the tuition amount will be \$25 per credit hour payable to Ball State upon registration in the fall or \$0 per credit hour plus free books and materials for students qualifying for free or reduced lunch. The BSU credit may be transferable to other colleges. Students that object to dissection will be given an alternate assignment upon parental request. **Due to the integrated nature of IB curriculum and objectives, optional field trips may take place during this course. Any associated fees will be shared by instructors in advance. Requirement: An "A" in Biology I or a "B" in Honors Biology I AND an "A" in Chemistry I or a "B" in Honors Chemistry I. Strong Recommendation: Completion of Anatomy/Physiology (Course 5276) with a "B" average.**

3020 ## ADVANCED PLACEMENT BIOLOGY (11, 12) This course is designed to be the equivalent of a college introductory biology course usually taken by biology majors during their first year of college. The intent of the course is to expose students to higher-level biological principles, concepts and skills and allow them the opportunity to apply their knowledge to real-life applications. The AP Biology curriculum is designed around the four Big Ideas of biology: 1) The process of evolution drives the diversity and unity of life, 2) Biological systems utilize free energy and molecular building blocks to grow, reproduce and maintain homeostasis, 3) Living systems store, retrieve, transmit and respond to information essential to life processes and 4) Biological systems interact through complex properties. Many inquiry based laboratory experiences will be conducted that encompass the science practices of modeling, questioning, experimenting, analyzing, evaluating and connecting. Students that object to dissection will be given an alternate assignment upon parental request. **Requirement: Biology I or Honors Biology I and Chemistry I or Honors Chemistry I. Recommendation: Completion of Biology/Honors Biology and Chemistry/Honors Chemistry with a "B" average. AP Exam registration will take place in September & October. Standard AP fees apply.**

3032 ## IB BIOLOGY HL YEAR 2 (12) The intent of the course is to expose students to higher-level biological principles, concepts and skills and allow them the opportunity to apply their knowledge to real-life applications. This course focuses on four major themes: structure and function, universality versus diversity, equilibrium within systems, and evolution. Topics discussed in the course include: cell biology, molecular biology, genetics, ecology, conservation, evolution, biodiversity, plant biology, and metabolism. Many inquiry based experiments will be conducted. Students are expected to design and carry out independent research as part of the IB internal assessment. Students who object to dissection will be given an alternate assignment upon parental request. In addition, students will have exposure to research and information from scientists around the globe. This course is the second year of IB Biology HL sequence. An IB certificate is available for this course for seniors who have also taken Advances Science College Credit Anatomy & Physiology and who take the IB Exam in May. **Due to the integrated nature of IB curriculum and objectives, optional field trips may take place during this course. Any associated fees will be shared by instructors in advance. Requirement: Honors Anatomy and Physiology, and Chemistry I or Honors Chemistry I. Recommendation: Completion of Honors Anatomy and Physiology and Chemistry/Honors Chemistry with a "B" average.**

* 1-semester course ** can be taken 1 or 2 semesters # single-weighted course ## double-weighted course

3090 ## ADVANCED SCIENCE COLLEGE CREDIT – ACP BIOLOGY (HUMANS AND THE BIOLOGICAL WORLD) (BIO L100) (11, 12) This course is designed to be the equivalent of a college introductory biology course. The intent of the course is to expose students to higher-level biological principles, concepts and skills and allow them the opportunity to apply their knowledge to real-life applications. The curriculum is designed around several major concepts important to modern biology: biochemistry and metabolism, cellular biology, molecular genetics, evolution and ecology. Many inquiry based laboratory experiences will be conducted that encompass the science practices of modeling, questioning, experimenting, analyzing, evaluating and connecting. Students that object to dissection will be given an alternate assignment upon parental request. It is not a course that satisfies biology requirements for biology majors. See your counselor for more information and the discounted I.U. tuition costs for this course. Tuition will be determined by IU and will be communicated to students at the beginning of the semester. IU's policy with regard to submission of assignments will supersede the FHS Science Department policy on late assignments. Upon successful completion of this course (including a mandatory cumulative final exam), students will earn five (5) credit hours through Indiana University. **Requirement: Biology I or Honors Bio & Chemistry I or Honors Chem. Recommendation: Completion of Biology/Honors Biology and Chem/Honors Chem w/ a "B" average.**

3072 ## ADVANCED SCIENCE COLLEGE CREDIT -- IB CHEMISTRY –IU CHEM C101/121 ELEMENTARY CHEMISTRY (11, 12) This course is designed to be a continuation of Chemistry I, with the further depth associated with a college-level course; it is geared toward students who intend to pursue science or science-related fields as a college major. Students study eleven core topics: stoichiometry, atomic theory, periodicity, bonding, states of matter, energetics, kinetics, equilibrium, acids and bases, oxidation and reduction, and organic chemistry. Individual and group research on special topics will highlight the second semester of this course. This course gives students the option to enroll in the Indiana University course C101/C121 in which they may earn 5 hours (1 semester) of college credit. The credit is also transferable to many other colleges, and usually satisfies programs that only require 2 semesters of chemistry. It is not a course that satisfies chemistry requirements for science majors. See your counselor for more information and the discounted I.U. tuition costs for this course. This course will fulfill the requirement for IB Chemistry SL. IU requirements for admission to this course – GPA 2.7 or higher on a 4.0 scale. Tuition will be determined by IU and will be communicated to students at the beginning of the semester. IU's policy with regard to submission of assignments will supersede the FHS Science Department policy on late assignments. An IB certificate is also available for this course for juniors and seniors taking the IB exam in May. **Due to the integrated nature of IB curriculum and objectives, optional field trips may take place during this course. Any associated fees will be shared by instructors in advance.** **Requirement: Biology or Honors Biology, Chemistry I or Honors Chemistry and Algebra II. Recommendation: Completion of Chemistry I w/ an "A" average or Honors Chemistry with a "B" avg. & Algebra II with a "B" avg.**

3060 ## ADVANCED PLACEMENT CHEMISTRY – AP (11, 12) The AP Chemistry course is designed to be the equivalent of the college introductory chemistry course usually taken by science majors during their first year of college. Topics covered in the course include atomic theory, chemical bonding, nuclear chemistry, states of matter, reactions, stoichiometry, thermodynamics, kinetics, electrochemistry, equilibrium, and organic chemistry. Lecture, laboratory activities, problem solving, and student research activities are all components of this course. **Requirement: Chem I or Honors Chem; Algebra II. STRONG Recommendation: "A" in Chem 1 or "B" in Honors Chem, Algebra II.**

3012 ## ADVANCED PLACEMENT ENVIRONMENTAL SCIENCE (11, 12) The AP Environmental Science course is a rigorous, interdisciplinary science class designed to be the equivalent of a one-semester, introductory college environmental science course. 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 and/or preventing them. **Requirement: Biology I or Honors Biology I, AND either Chemistry I or Honors Chemistry I or ICP. Recommendation: "B" average in both prerequisites. AP Exam registration will take place in September & October. Standard AP fees apply.**

3080 ## ADVANCED PLACEMENT PHYSICS 1 / IB PHYSICS YEAR 1 (10, 11, 12) This course is designed to be the equivalent of a non-calculus based college physics course. The course is designed as a first year physics course that emphasizes both computational and conceptual physics. Major topics include motion, projectile motion, forces, momentum, energy, work, and power. It covers physics in greater depth and breadth with frequent connections between each topic and with ties to the big ideas in physics. Detailed laboratory work is emphasized throughout and requires individual student designed labs, research papers and experimental projects. The willingness to complete assignments outside of class and a solid foundation in algebra is recommended. IB students must take both AP-1 and AP-2 to take either the SL or HL exam. **Due to the integrated nature of IB curriculum and objectives, optional field trips may take place during this course. Any associated fees will be shared by instructors in advance. Requirement: Concurrent enrollment in Algebra II. Recommendation: "B" average in Honors Chemistry or completion of Physics 1. AP Exam registration will take place in September & October. Standard AP fees apply.**

3081 ## ADVANCED PLACEMENT PHYSICS 2 / IB PHYSICS YEAR 2 (11, 12) This course is designed to be the equivalent of a non-calculus based college physics course that follows AP-1 Physics. The course is designed as a second year physics course to follow AP-1 that continues to emphasize both computational and conceptual physics. Major topics include waves, harmonic motion, light and optics, thermodynamics, electricity and magnetism, and nuclear physics. It covers physics in greater depth and breadth with frequent connections between each topic and with ties to the big ideas in physics. Detailed laboratory work is emphasized throughout and requires individual student designed labs, research papers and experimental projects. The willingness to complete assignments outside of class and a solid foundation in algebra is recommended. IB students must take both AP-1 and AP-2 to take either the SL or HL exam. **Requirement: Concurrent enrollment in pre-calculus. Due to the integrated nature of IB curriculum and objectives, optional field trips may take place during this course. Any associated fees will be shared by instructors in advance. Recommendation: "B" average in Physics AP-1. AP Exam registration will take place in September & October. Standard AP fees apply.**

3088 ## ADVANCED PLACEMENT PHYSICS C (11, 12) is designed as a second year calculus based physics course based on content established by the College Board for the Mechanics and Electricity and Magnetism tests. The mechanics semester provides instruction in: kinematics, Newton's laws of motion, work-energy-power, systems of particles and linear momentum, circular motion and rotation, and oscillations and gravitation. The electricity and magnetism semester provides instruction in: electrostatics, conductors-capacitors-dielectrics, electric circuits, magnetic fields, and electromagnetism. Methods of calculus are used wherever appropriate in formulating physical principles and in applying them to physical problems. Strong emphasis is placed on solving a variety of challenging problems; some requiring calculus as well as student based experimental design and execution. **Requirement: Completion of Physics I, or AP-1 Physics, or teacher approval AND completion or concurrent enrollment in AP Calculus AB or Calculus BC. AP Exam registration will take place in September & October. Standard AP fees apply.**

NOTE ABOUT IB PHYSICS SL OR HL: Students may receive an IB certificate in IB Physics SL upon completion of AP Year 1 and AP Year 2 and after taking the IB Physics SL Exam in May. Students may receive an IB certificate in IB Physics HL upon completion of AP Year 1 and AP Year 2 OR AP C Physics and after taking the IB Physics HL Exam in May.

BIOMEDICAL SCIENCE: PROJECT LEAD THE WAY (PLTW)

The PLTW™ Biomedical Sciences program consists of a sequence of four courses: Principles of Biomedical Sciences, Human Body Systems, Medical Interventions, and Biomedical Innovation. The goal of the program is to provide rigorous and relevant curriculum that is project and problem-based in order to engage and prepare high school students for the post-secondary education and training necessary for success in the wide variety of careers associated with the Biomedical Sciences, such as physicians, nurses, veterinarians, medical and pharmaceutical research scientists, allied health professionals, and technicians.

5218 CTE HEALTH SCIENCES: PRINCIPLES OF BIOMEDICAL SCIENCES (9, 10, 11) This course provides an introduction to the biomedical sciences through “hands-on” projects and problems. Students investigate the human body systems and various health conditions including heart disease, heart dissection, diabetes, sickle-cell disease, hypercholesterolemia, and infectious diseases. Key biological concepts including: homeostasis, metabolism, inheritance of traits, feedback systems, and defense against disease are embedded in the curriculum. Engineering principles including: the design process, feedback loops, fluid dynamics, and the relationship of structure to function are incorporated in the curriculum where appropriate. The 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 courses. **Requirement: Completion of Algebra I and completion or concurrent enrollment of Biology (or Honors).**

5216 CTE HEALTH SCIENCES: HUMAN BODY SYSTEMS (10, 11, 12) This course is the second course after Principles of Biomedical Sciences. Students examine the processes, structures, and interactions of the human body systems to learn how they work together to maintain homeostasis (internal balance) and good health. Hands-on projects include designing experiments, investigating the structures and functions of body systems, dissection, and using data acquisition software to monitor body functions such as muscle movement, reflex and voluntary actions, and respiratory operation. Students that object to dissection will be given an alternate assignment upon parental request. **Requirement: Completion of Algebra I and completion or concurrent enrollment in Chemistry I or Honors Chemistry I.**

NOTE – Students who pass both years of Principles of Biomedical Science and Human Body Systems will have fulfilled the requirements for Health and Wellness. No grade and no credit will be earned for the Health course.

5217 # CTE HEALTH SCIENCES: MEDICAL INTERVENTION (11, 12) In the Medical Interventions™ course, students will investigate the variety of interventions involved in the prevention, diagnosis and treatment of disease as they follow the lives of a fictitious family. A “How-To” manual for maintaining overall health and homeostasis in the body, the course will explore how to prevent and fight infection, how to screen and evaluate the code in our DNA, how to prevent, diagnose and treat cancer, and how to prevail when the organs of the body begin to fail. Through these scenarios, students will be exposed to a wide range of interventions related to Immunology, Surgery, Genetics, Pharmacology, Medical Devices, and Diagnostics. These interventions will be showcased across the generations of the family and will provide a look at the past, present, and future of biomedical science. This course counts as CORE 40, AHD general elective. **Requirement: Successful completion of Principles of Biomedical Sciences and/or Human Body Systems or any level of Anatomy & Physiology; and completion or concurrent enrollment in Chemistry I or Honors Chemistry I.**

5219 # CTE HEALTH SCIENCES: BIOMEDICAL INNOVATION (11, 12) In Biomedical Innovation™, the fourth course of the PLTW Biomedical Science Program, students will use the knowledge they have to design and conduct experiments related to the diagnosis, treatment, and prevention of disease or illness. They will apply the knowledge and skills learned in the previous courses; Principles of Biomedical Science, Human Body Systems, and Medical Interventions, to answer questions or to solve problems related to the biomedical sciences. They may work with a mentor or have an advisor from a university, hospital, physician’s office, or industry during the second semester as they complete their work. Students will be expected to make a presentation of their work to an adult audience that may include representatives from the local community or the school’s PLTW® partnership team. This course counts as CORE 40, AHD general elective. **Requirement: Successful completion of Principles of Biomedical Sciences, Human Body Systems, and Medical Interventions OR permission of the instructor. Special permission may be sought to allow a student to take Medical Interventions and Biomedical Innovation concurrently.**

HAMILTON SOUTHEASTERN SCHOOLS POLICY ON DISSECTION AND DISSECTION ALTERNATIVES

Participation in hands-on science is important to learning science and dissections are a valuable learning experience in which all students are encouraged to participate.

When dissection is used in the classroom:

- Teachers will thoroughly explain the learning objectives of the lesson.
- All specimens will be treated with respect.
- All students will be informed, prior to the dissection, that they have the option of discussing individual concerns about dissection with the appropriate teacher.
- Upon completion of the dissection, the remains will be appropriately disposed of as recommended by the local board of public health.

The science courses that include dissection will also include dissection alternatives. Upon written request of a student's parent or guardian, schools will permit a student who objects to dissection activities to demonstrate competency through an alternative method.

Specific dissection activities will be listed in the course curriculum or on the course syllabi, available to students before enrolling in these courses. Alternative activities will be available and may include use of models and Internet programs.

The procedure for a student to participate in an alternative activity in place of dissection is as follows:

- The student will notify the science teacher of the student's choice to participate in an alternative activity in place of participating in a dissection.
- The student will submit a written request from his or her parent/legal guardian to the science teacher a minimum of a week prior to the dissection activity.
- The student will be provided an alternative activity to be determined by the teacher who will specify in writing what is expected of the student. Alternative activities will allow students to gain the same content knowledge as a dissection activity and will require a comparable investment of time and effort by the student.
- The student will accept responsibility for completing the alternative activity within the assigned time and is expected to learn the same content knowledge as if the student were performing the dissection activity.
- The student will be subject to the same course standards and examinations as other students in the course.