SCIENCE

EARTH AND SPACE SCIENCE I

Course 3044 *(two-semester course)*
Grade Levels: 9
Prerequisites: None

Earth and Space Science I 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. Instruction should focus on developing student understanding that scientific knowledge is gained from observation of natural phenomena and experimentation by designing and conducting investigations guided by theory and by evaluating and communicating the results of those investigations according to accepted procedures.

BIOLOGY I

Course 3024 *(two-semester course)*
Grade Levels: 9-10
Prerequisites: It is recommended that students have earned a C- or above in 8th grade science

This course emphasizes six major biological principles, scientific concepts, and theories related to living organisms in their environment. The study of biological concepts and theories develops an understanding that all life is composed of cells with similar structures that enable organisms to reproduce and transform energy. Students use the scientific method process to investigate and solve biological problems associated with personal and social issues. Students study the science of biology, genetics and inheritance, biotechnology, natural selection as a mechanism of evolution, history of life on earth, animal behavior, and ecology. Students are given opportunities to investigate various biological careers. This course is taught in an applied manner with laboratory activities of at least 25% included.

HONORS BIOLOGY I

Course 3024H *(two-semester course)*
Grade Levels: 9
Prerequisites: B+ or higher in first semester of Algebra I

This is a two-semester or full year of freshmen Core 40 Biology using the same criteria and curriculum as the general biology course, but with an emphasis on detail, depth, and pace of biology concepts.

PRINCIPLES OF BIOMEDICAL SCIENCES PLTW

Course 5218 *(two-semester course)*
Grade Levels: 9-12
Prerequisites: Biology I or concurrent enrollment in Biology I
This course counts as a Directed Elective

Principles of Biomedical Sciences PLTW provides an introduction to this field through "hands-on" projects and problems. Student work involves the study of human medicine, research processes, and an introduction to bioinformatics. Students investigate the human body systems and various health conditions including heart disease, diabetes, hypercholesterolemia, and infectious diseases. A theme throughout the course is to determine the factors that led to the death of a fictional person. After determining the factors responsible for the death, the students investigate lifestyle choices and medical treatments that might have prolonged the person's life. Key biological concepts included in the curriculum are: homeostasis, metabolism, inheritance of traits, feedback systems, and defense against disease. Engineering principles such as the design process, feedback loops, fluid dynamics, and the relationship of structure to function will be included where appropriate. The

course is designed to provide an overview of all courses in the Biomedical Sciences program and to lay the scientific foundation necessary for student success in the subsequent courses.

INTEGRATED CHEMISTRY-PHYSICS

Course 3108 *(two-semester course)*
Grade Levels: 10-12
Prerequisites: None
This course counts as a Quantitative Reasoning course

Integrated Chemistry-Physics is a laboratory-based course in which students explore fundamental chemistry and physics principles. Students enrolled in this course examine, through the process of scientific inquiry, the structure and properties of matter, chemical reactions, forces, motion, and the interactions between energy and matter. Working in a laboratory environment, students investigate the basics of chemistry and physics in solving real world problems that may have personal or social consequences beyond the classroom.

Note: Students are not allowed to take *Integrated Chemistry-Physics* if they have already passed *Chemistry I* or *Physics I* (unless administrative approval is granted) because content is repeated at a more advanced level.

CHEMISTRY I

Course 3064 *(two-semester course)*
Grade Levels: 10-12
Prerequisites: Algebra I (C+ or above is highly recommended)
This course counts as a Quantitative Reasoning course

Chemistry I is a one-year academic physical science course which covers matter and how it behaves. Topics covered include the elements and the Periodic Table, structure and nomenclature of atoms and compounds, states and properties of matter, scientific measurement, problem solving and stoichiometry, chemical quantities and reactions, solutions, acids and bases, and nuclear chemistry. Laboratory activities are an important part of this course. Emphasis will be placed on laboratory safety and proper lab techniques. Lab activities of at least 25% will apply to topics being studied and will include measurement and interpretation of both quantitative and qualitative data.

HONORS CHEMISTRY I

Course 3064H *(two-semester course)*
Grade Levels: 10-12
Prerequisites: B+ or higher in first semester of Algebra I
This course counts as a Quantitative Reasoning course

Honors Chemistry I will cover the same concepts and be taught from the same textbook as regular *Chemistry I*. These include, but are not limited to, the elements and the Periodic Table, the structure and nomenclature of atoms and compounds, states and properties of matter, scientific measurement, problem solving and stoichiometry, chemical quantities and reactions, solutions and gasses, acids and bases, and nuclear chemistry. The pace of the course may be slightly faster than that of the *Chemistry I* course; however, concepts will be discussed in more depth than in the *Chemistry I* course, including scientist profiles and current developments in scientific thinking. *Honors Chemistry I,* will also cover the same state standards as the *Chemistry I* course.

Laboratory activities are an important part of this course. Laboratory safety and proper techniques will be taught with emphasis on scientific method and experimental design. Lab activities will apply to topics being studied and will include measurement and interpretation of both quantitative and qualitative data.

PHYSICS I

Course 3084 *(two-semester course)*
Grade Levels: 10-12
Prerequisites: Algebra I (C+ or above is highly recommended)
This course counts as a Quantitative Reasoning course

Physics is the study of energy and the natural laws governing it. This includes forces, motion of objects, machines, sound and light, electricity, and magnetism. Laboratory exercises are designed to allow students to see and experience the principles discussed in class and are at minimum a 25% component of this course.

HUMAN BODY SYSTEMS PLTW

Course 5216 *(two-semester course)*
Grade Levels: 10-12
Prerequisites: Principles of Biomedical Sciences PLTW
This course counts as a Directed Elective

Human Body Systems PLTW is a course designed to engage students in the study of basic human physiology and the care and maintenance required to support the complex systems. Using a focus on human health, students will employ a variety of monitors to examine body systems at rest and under stress, and observe the interactions between the various body systems. Students will use appropriate software to design and build systems to monitor body functions.

ADVANCED SCIENCE, SPECIAL TOPICS: ZOOLOGY

Course 3092Z *(two-semester course)*
Grade Levels: 10-12
Prerequisites: Biology (C or above is highly recommended)

Advanced Science, Special Topics: Zoology is a standards-based, interdisciplinary science course that integrates biology, chemistry, and microbiology in an agricultural context. Students enrolled in this course formulate, design, and carry out animal-based laboratory and field investigations as an essential course component. Students investigate key concepts that enable them to understand animal growth, development and physiology as it pertains to agricultural science. This course stresses the unifying themes of both biology and chemistry as students work with concepts associated with animal taxonomy, life at the cellular level, organ systems, genetics, evolution, ecology, and historical and current issues in animal agriculture. Students completing this course will be able to apply the principles of scientific inquiry to solve problems related to biology and chemistry in highly advanced agricultural applications of animal development.

ENVIRONMENTAL SCIENCE

Course 3010 *(two-semester course)*
Grade Levels: 10-12
Prerequisites: Biology I and Algebra I (C or above in each is highly recommended)

Environmental Science is a one-year academic course designed to explore the interrelationships between humans, their economy, and the natural world. Using a scientific approach, students will study biodiversity, ecological concepts, population principles, endangered species and habitats, air and water pollution, environmental health, and global perspectives. Instruction in this course will be based on lab and field exercises, research projects, guest speakers, and class discussions that reinforce scientific principles.

AP ENVIRONMENTAL SCIENCE

Course 3012 *(two-semester course)*
Grade Levels: 10-12
Prerequisites: Biology I and Chemistry I (C or above in each is highly recommended)
This course counts as a Quantitative Reasoning course

STUDENTS ENROLLED IN THIS COURSE WILL BE REQUIRED TO TAKE THE AP ENVIRONMENTAL SCIENCE EXAM AT NO COST TO THE STUDENT. Because AP exams must be ordered in November, students must decide by November 1st whether they will 1) continue taking this course second semester and take the AP exam or 2) drop this course second semester and not take the AP exam.

AP Environmental Science is a course based on content established by the College Board. Students enrolled in *AP Environmental Science* investigate (via weekly labs or activities and corresponding reports) 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.

Students who score at a high enough level on the AP exam may receive credit for and/or exemption from a college science class, thus saving both classroom time and tuition fees. See the "Advanced Placement & Dual HS/College Credit Courses" section for exam fee information. Visit www.TransferIN.net for a list of college courses (and number of college credits) specific colleges will grant for a given AP exam score.

ANATOMY & PHYSIOLOGY

Course 5276 *(two-semester course)*
Grade Levels: 11-12
Prerequisites: Biology (required); Chemistry (recommended)
This course counts as a Directed Elective

Anatomy & Physiology is a course in which students investigate and apply concepts associated with human structure and function. Concepts covered include anatomical directional terms and cavities, chemistry, cells, tissues, and organ systems. Students will understand the structure, organization, and function of the various components of the healthy human body in order to apply this knowledge in all health-related fields.

The course should include ample laboratory experiences that illustrate the application of the standards to the appropriate cells, tissues, organs, and organ systems. Dissection is both appropriate and necessary. Students should be able to use basic laboratory equipment such as microscopes and dissection materials.

MEDICAL INTERVENTIONS PLTW

Course 5217 *(two-semester course)*
Grade Levels: 11-12
Prerequisites: Human Body Systems PLTW or Anatomy & Physiology
This course counts as a Directed Elective

Medical Interventions 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 will investigate various medical interventions that extend and improve quality of life, including gene therapy, pharmacology, surgery, prosthetics, rehabilitation, and supportive care. Students will also study the design and development of various interventions. Lessons will cover the history of organ transplants and gene therapy with additional readings from current scientific literature addressing cutting edge developments.

ACP BIOLOGY

Course 3026.DC *(two-semester course)*
Grade Levels: 11-12
Prerequisites: Biology I (B or above is highly recommended) and Chemistry I (C or above is highly recommended). Advanced Science, Special Topics: Zoology or Anatomy & Physiology is also recommended.
IU Prerequisites for College Credit: 2.7 cumulative GPA

Principles of biological organization, from molecules through cells and organisms to populations. Emphasis on processes common to all organisms, with special reference to humans.

ACP Biology **may be taken for I.U. L100 for 5 college credits through the ACP Program if eligibility criteria are met. (See the "Advanced Placement & Dual HS/College Credit Courses" section for specific requirements.)** For information regarding the transfer of this credit to other colleges and universities go to www.acp.indiana.edu.

AP CHEMISTRY

Course 3060 *(two-semester course)*
Grade Levels: 11-12
Prerequisites: Algebra II is required (B- or above in each is highly recommended); Chemistry I is recommended. Summer reading and problem set assignments will be required*.
This course counts as a Quantitative Reasoning course

STUDENTS ENROLLED IN THIS COURSE WILL BE REQUIRED TO TAKE THE AP CHEMISTRY EXAM AT NO COST TO THE STUDENT. Because AP exams must be ordered in November, students must decide by November 1st whether they will 1) continue taking this course second semester and take the AP exam or 2) drop this course second semester and not take the AP exam.

***** Students will be required to pick up their textbooks at the end of this school year and complete a number of reading and problem set assignments over the summer (prior to the beginning of this course) as a review of Chemistry I material. Additionally, students will be tested over this material within the first two days of the school year.

AP Chemistry is similar to a first-year college course in chemistry and is aligned with the guidelines of the College Board toward preparation for taking the *AP Chemistry* examination. It includes a review of *Chemistry I* topics and study of more advanced chemistry concepts with an increased emphasis on mathematical problem solving. Topics covered will include atomic and molecular structure, chemical bonds and valence, thermodynamics, reaction rates and equilibrium, oxidation-reduction reactions, electrochemistry, organic chemistry, and electron configuration. Laboratory work of at least 25% will apply concepts being studied and is an important part of this course. Students may opt to take the AP Chemistry exam in May upon completion of this course.

Course topics include: fluid mechanics, wave phenomena, special relativity; and thermodynamics. This class is calculus-based—the mathematics being derived naturally from the development of the physics concepts in much the same way as Newton originally developed both of these parallel disciplines.

Students who score at a high enough level on the AP exam may receive credit for and/or exemption from an introductory college chemistry class, thus saving both classroom time and tuition fees. See the "Advanced Placement & Dual HS/College Credit Courses" section for exam fee information. Visit www.TransferIN.net for a list of college courses (and number of college credits) specific colleges will grant for a given AP exam score.

ACP PHYSICS 1

Course 3086 *(two-semester course)*
Grade Levels: 11-12
Prerequisites: Algebra II is required (C+ or above is highly recommended) and concurrent enrollment in Pre-Calculus or obtain an administrative waiver; Physics I is recommended
This course counts as a Quantitative Reasoning course

ACP Physics is an extended laboratory, field, and literature investigations-based course. Students enrolled in *ACP Physics* investigate physical phenomena and the theoretical models that are useful in understanding the interacting systems of the macro- and microcosms. Students extensively explore the unifying themes of physics, including such topics and applications of physics as: energy and momentum in two dimensions; temperature and thermal energy transfer; fluids; electricity; simple and complex circuits; magnetism; electromagnetic induction; geometric optics; particle and wave nature of light; modern physics. Use of laboratory activities aimed at investigating physics questions and problems concerning personal needs and community issues related to physics are embedded within the course.

ACP Physics **may be taken for I.U. P221 for 5 college credits through the ACP Program if eligibility criteria are met. (See the "Advanced Placement & Dual HS/College Credit Courses" section for specific requirements.)** For information regarding the transfer of this credit to other colleges and universities go to www.acp.indiana.edu.