

## **BIOLOGY I (L)**

3024

(BIO I)

*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. 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.

## **CHEMISTRY I (L)**

3064

(CHEM I)

*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 its interactions. 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.

## **CHEMISTRY, ADVANCED PLACEMENT (L)**

3060

(CHEM AP)

*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. A comprehensive description of this course can be found on the College Board AP Central Course Description web page at:

<http://apcentral.collegeboard.com/apc/public/courses/descriptions/index.html>

### **EARTH AND SPACE SCIENCE I (L)**

3044

(EAS SCI I)

*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.

### **INTEGRATED CHEMISTRY-PHYSICS (L)**

3108

(ICP)

*Integrated Chemistry-Physics* is a course focused on the following core topics: motion and energy of macroscopic objects; chemical, electrical, mechanical and nuclear energy; properties of matter; transport of energy; magnetism; energy production and its relationship to the environment and economy. 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

### **PHYSICS I (L)**

3084

(PHYS I)

*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; vibrations and waves; light and optics. 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.

### PHYSICS B, ADVANCED PLACEMENT (L)

3080

(PHYS B AP)

*Physics B, Advanced Placement* is a course based on content established by the College Board that is the equivalent of a terminal, one year college physics course. AP Physics B should provide instruction in each of the content areas (1) Newtonian Mechanics (35%); (2) Fluid Mechanics and Thermal Physics (15%); (3) Electricity and Magnetism (25%); (4) Waves and Optics (15%); and (5) Atomic and Nuclear Physics (10%). A comprehensive description of this course can be found on the College Board AP Central Course Description web page at:

<http://apcentral.collegeboard.com/apc/public/courses/descriptions/index.html>

### PROJECT LEAD THE WAY - BIOMEDICAL SCIENCE

#### HUMAN BODY SYSTEMS

5216

(HUMAN SYST)

*Human Body Systems* 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 (respiratory, circulatory, and nervous) 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. Schools must agree to be part of the Project Lead the Way network and follow all training and data collection requirements.

### MEDICAL INTERVENTION

5217

(MED INTERV))

*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 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 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 will design and build a model of a therapeutic protein. Schools must agree to be part of the Project Lead The Way network and follow all training and data collection requirements.

### PRINCIPLES OF THE BIOMEDICAL SCIENCES

5218

(PRIN BIOMED)

*Principles of the Biomedical Sciences* 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 through 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. Schools must agree to be part of the Project Lead the Way network and follow all training and data collection requirements.

**BIOMEDICAL INNOVATIONS**

5219

(BIO INN)

*Biomedical Innovations* is a capstone course designed to give student teams the opportunity to work with one or more mentors from the scientific and/or medical community. Teams will identify a research topic, conduct research, write a scientific paper, and defend team conclusions and recommendations to a panel of outside reviewers. Students taking this course may consider working with peers enrolled in a PLTW: Pre-Engineering capstone course to jointly engineer a product that could impact healthcare.