URSULINE ACADEMY 2018-2019 Curriculum Guide

SCIENCE

PS 810 CONCEPTUAL PHYSICS

Grade: 9
Credit: 1 Credit
Length: 2 Semesters
Prerequisite: NONE
Description: Students learn basic principles of physics, including applications to everyday life. Topics may include scientific method, measurement, forces and motion, atomic structure, waves, sound, light, color, static and current electricity. Graphing and problem-solving skills are integrated into all topics, as well as use of lab equipment (analog and digital) and online simulations. Presentations of lab results and problem solutions within each topic will occur.
Special cost or materials: Calculator that is required for math courses

PS 819 HONORS CONCEPTUAL PHYSICS

Grade: 9
Credit: 1 Credit
Length: 2 Semesters
Prerequisite: Placement of students is based upon a composite score on the math and English placement tests, as well as performance in sixth, seventh, and eighth grade science and math.
Description: This course has the same objectives and content as PS 810. Content, as well as mathematical applications, are considered at greater depth. Presentations of lab results and problem solutions within each topic will occur.
Homework: An average of 30 minutes per night
Special cost or materials: Calculator that is required for math courses

BL 820 BIOLOGY

Grade: 10
Credit: 1 Credit
Length: 2 Semesters
Prerequisite: NONE; limited to no more than 20 students per section
Description: This course provides a foundation of basic ideas in using the scientific method, elementary chemistry, cell (structure, function and division), genetics, cellular respiration/photosynthesis, and human reproduction. Students apply this knowledge to their bodies, the organisms around them, and their place in the environment. This foundation provides a basis for student awareness of biological principles in careers, politics, literature, recreational activities, and the advanced courses. Hands-on lab activities are an important part of this course.

BL 829 HONORS BIOLOGY

Grade: 10
Credit: 1 Credit
Length: 2 Semesters
Prerequisite: A grade of "A+" in PS 810; "B+" or better in PS 819; science department recommendation;
Description: Honors biology focuses on major concepts, on the nature and methods of science, and on inquiry-based learning. The unifying principles studied in developing biological literacy are:

- Biology and the molecular perspective
- Energy, Matter, and Organization
- Growth, Development, and Differentiation
- The Cell: Homeostasis and Development
- Heredity: Continuity of Life
- Evolution: Patterns and Products of Change

All of these are studied with a focus on molecular biology. Hands-on lab activities are an important part of this course. Each student will be required to write a report and give an oral presentation on a topic that is pertinent to the course. Four hours of college credit from Missouri Baptist University are available.
Homework: An average of 35 minutes per night
Special cost or materials: Fee for college credit is payable to Missouri Baptist University.

BL 835 ECOBIOLOGY
Grade: 11, 12
Credit: 1 Credit
Length: 2 Semesters
Prerequisite: Any biology and chemistry course (chemistry must be taken concurrently by juniors)
Description: This general level course is recommended for students who would like to learn more about ecology, classification of organisms, anatomy and physiology of plants and animals, evolution, animal behavior, population studies and the geologic history of the earth and global climate issues. The plants and animals of the biogeographical regions of Missouri are emphasized along with the ecology of Ursuline's pond, trees, prairie and wildlife. A field trip to Powder Valley Conservation Nature Center is required. Hands-on lab activities including dissections (both real and virtual) along with lab write ups are an important part of the course. Each student will be required to write a report and give an oral presentation on a topic that is pertinent to the course.

BL 843 ECOLOGY
Grade: 11, 12
Credit: ½ Credit
Length: 1 Semester (1st Semester only)
Prerequisite: Any biology and chemistry course (chemistry must be taken concurrently by juniors)
Description: This general level course is recommended for students who would like to learn more about ecology, classification of organisms, anatomy and physiology of plants and animals, evolution, animal behavior, population studies, the geologic history of the earth and global climate issues. The plants and animals of the biogeographical regions of Missouri are emphasized along with the ecology of Ursuline's pond, trees, prairie and wildlife. A field trip to Powder Valley Conservation Nature Center is required. Hands-on lab activities along with lab write ups are an important part of the course. Each student will be required to write a report and give an oral presentation on a topic that is pertinent to the course.

BL 846 HONORS MICROBIOLOGY
Grade: 12
Credit: ½ Credit
Length: 1 Semester
Prerequisite: An overall grade of "B+" in any biology and chemistry; science department recommendation;
Description: This honors level course prepares students who are considering careers in medicine, nursing, medical technology, biotechnology, or other health-related fields by providing an in-depth study of the following topics: bacteria structure, function, and reproduction; cultivation and control of bacteria; biochemical identification of bacteria; interrelationships of bacteria and the environment; economic and medical aspects of microorganisms. Hands-on lab activities with lab write-ups are an important part of this course. Each student will be required to write a report and give an oral presentation on a topic that is pertinent to the course. Four hours of college credit from Missouri Baptist University are available.
Homework: An average of 30 minutes per night
Special cost or materials: Fee for college credit is payable to Missouri Baptist University

BL 844A GENERAL ANATOMY I
Grade: 11, 12
Credit: ½ Credit
Length: 1 Semester
Prerequisite: Any biology and chemistry course (chemistry must be taken concurrently by juniors)
Description: This course is aimed at students who wish to learn more about their anatomy and physiology but do not require the more in-depth information that is covered in BL 847 Human Anatomy and Physiology. The course is a generalized, less in-depth study of the human body. Integumentary, skeletal, muscular, nervous (including the senses), and endocrine systems are covered. No dissections by students are a part of this course. Each student will be required to write a report and give an oral presentation on a topic that is pertinent to the course.

BL 844B GENERAL ANATOMY II
Grade: 11, 12
Credit: ½ Credit
Length: 1 Semester
Prerequisite: Any biology and chemistry course (chemistry must be taken concurrently by juniors); **GENERAL ANATOMY I** is not a prerequisite for this course.
Description: This course is aimed at students who wish to learn more about their anatomy and physiology but do not require the more in-depth information that is covered in BL 847 Human Anatomy and Physiology. The course is a generalized, less in-depth study of the human body. Circulatory (including blood), lymphatic, respiratory, digestive, urinary, and reproductive systems are covered. No dissections by students are a part of this course. Each student will be required to write a report and give an oral presentation on a topic that is pertinent to the course.

BL 847 HONORS ANATOMY AND PHYSIOLOGY
Grade: 12
Credit: 1 Credit
Length: 2 Semesters
Prerequisite: A overall grade of "B+" in any biology and chemistry; science department recommendation
Description: This honors-level course is an intensive, in-depth study of the systems of the human body: integumentary, skeletal, muscular, nervous, cardiovascular, respiratory, digestive, excretory, endocrine, reproductive, and immune. Many lab experiments occur, including dissections and a field trip to the Practical Anatomy Workshop at St. Louis University. Each student will be required to write a research paper and give an oral presentation on topic that is pertinent to the course. Four hours of college credit from Missouri Baptist University are available.
Homework: An average of 35 minutes per night
Special cost or materials: Fee for college credit is payable to Missouri Baptist University; fee for field trip

CH 831 CHEMISTRY
Grade: 11, 12
Credit: 1 Credit
Length: 2 Semesters
Prerequisite: None
Description: This course is intended to be an introduction to the fundamental principles of chemistry for students not planning to major in chemistry in college. Topics may include scientific method, mathematics of science, data analysis, atomic structure, periodicity and the main-group elements, nomenclature, formulas, chemical equations and reaction types, stoichiometry, solutions, gas laws, acids and bases. Experiments and problem-solving are utilized to enhance comprehension of chemistry concepts.
Homework: An average of 45 minutes per night
Special cost or materials: Calculator that is required for math courses

CH 839 HONORS CHEMISTRY
Grade: 11, 12
Credit: 1 Credit
Length: 2 Semesters
Prerequisite: Concurrent enrollment in MT 532, MT538 or MT 539 or senior math and science department recommendation
Description: This honors-level course presents a challenging approach to the fundamental principles of chemistry. Topics may include scientific method, mathematics of science, data analysis, atomic structure, periodicity and the main-group elements, nomenclature, chemical equations and reaction types, stoichiometry, solutions, oxidation-reduction reactions, nuclear chemistry, thermodynamics, gas laws, acids and bases. Emphasis is placed on experimental aspects and mathematical relationships. College credit is available through the 1-8-1-8 program at St. Louis University.
Homework: An average of 45 minutes per night
Special cost or materials: Calculator that is required for math courses; if taken for college credit, a fee is payable to St. Louis University

CH 858 AP/ADVANCED HONORS CHEMISTRY
Grade: 12
Credit: 1 Credit
Length: 2 Semesters
Prerequisite: CH 839 Honors Chemistry and science department recommendation
Description: This honors-level course completes the second semester of college chemistry and gives students the requisite information for the Advanced Placement Exam. First semester topics include thermodynamics, kinetics, solution equilibrium, oxidation-reduction, electrochemistry, molecular geometry and bonding theories, coordination compounds, organic chemistry, and nuclear chemistry. Second semester topics include a review of those covered during the first three semesters with a more in-depth study of states of matter and qualitative chemistry. Second semester is lab-intensive and includes qualitative and quantitative analysis experiments. This course is recommended for anyone interested in majoring in science, engineering, or health/medical science, including pharmacy, optometry, dentistry, and veterinary medicine. College credit is available through the 1-8-1-8 program at St. Louis University.
Homework: An average of 45 minutes per night
Special cost or materials: Calculator that is required for math courses; fee for college credit (St. Louis University) and/or for the Advanced Placement Exam

CH 859 ADVANCED CHEMISTRY
Grade: 12
Credit: ½ Credit
Length: 1 Semester (first semester only)
Prerequisite: CH 839 Chemistry and science department recommendation
Description: This honors-level course completes the second semester of college chemistry. Topics include thermodynamics, kinetics, solution equilibrium, oxidation-reduction, electrochemistry, molecular geometry and bonding theories, coordination compounds, organic chemistry, and nuclear chemistry. This course is recommended for anyone interested in majoring in science, engineering, or health/medical science including pharmacy, optometry, dentistry, and veterinary medicine. College credit is available through the 1-8-1-8 program at St. Louis University.
Homework: An average 45 minutes per night
Special cost or materials: Calculator that is required for math courses; fee for college credit is payable to St. Louis University

PS 840A PHYSICS I - MECHANICS
Grade: 12
Credit ½ Credit
Length: 1 Semester
Prerequisite**:** Grade of "C" or better in any chemistry course and concurrent enrollment in MT 541, 544 or above
Description: This course is recommended for anyone interested in physical or occupational therapy, pharmacy, optometry, dentistry, veterinary medicine, engineering, or education. The course reviews the concepts of physics introduced during freshman year and develops them further into the Laws of Physics. Topics covered in this course include mechanics, Newton's laws, momentum, and energy. Emphasis is placed upon experimentation and problem solving.
Homework: An average of 30 to 45 minutes per night
Special cost or materials: Calculator that is required for math courses

PS 840B PHYSICS II – WAVES, ELECTRICITY, AND MAGNETISM
Grade: 12
Credit: ½ Credit
Length: 1 Semester
Prerequisite: Grade of "C" or better in any chemistry course and concurrent enrollment in MT 541, 544 or above; completion of Physics I is recommended but not required
Description: This course is recommended for anyone interested in physical or occupational therapy, pharmacy, optometry, dentistry, veterinary medicine, engineering, or education. The course reviews the concepts of physics introduced during freshman year and develops them further. Topics may include waves, optics, electricity and magnetism, relativity, and nuclear physics. Emphasis is placed upon experimentation and problem solving.
Homework: An average of 30 to 45 minutes per night
Special cost or materials: Calculator that is required for math courses

PS 849 HONORS PHYSICS
Grade: 12
Credit: 1 Credit
Length: 2 Semesters
Prerequisite: CH 839 Chemistry; concurrent enrollment in MT 544 or above and science department recommendation
Description: This honors-level course is recommended for anyone interested in science majors, medicine, physical or occupational therapy, pharmacy, optometry, dentistry, veterinary medicine, engineering, or education. This course is a mathematical introduction to the concepts and laws of physics. Topics covered include mechanics, Newton's laws, momentum, energy, heat and kinetic theory, waves, optics, electricity and magnetism, relativity, and nuclear physics. Emphasis is placed upon experimentation and problem solving skills. College credit is available through the 1-8-1-8 program at St. Louis University.
Homework: An average of 45 to 60 minutes per night
Special cost or materials: Calculator that is required for math courses; fee for college credit is payable to St. Louis University

SC 841 ENGINEERING
Grade: 11, 12
Credit: ½ Credit
Length: 1 Semester (first semester only)
Prerequisite: Grade of "C" or better in all science and math courses and concurrent enrollment in MT 541, 544 or above.
Description: This class is designed for students who may be interested in majoring in engineering or who are interested in learning about engineering. Students will study different aspects of engineering through the design process. Emphasis will be placed upon applying the design process to various topics and projects including robotics.
Homework: An average of 30 to 45 minutes per night
Special cost or materials: Calculator that is required for math courses

SC 845 FORENSIC SCIENCE
Grade: 12
Credit: ½ Credit
Length: 1 Semester (second semester only)
Prerequisite: Any Biology and Chemistry course
Description: This is a course in which students will be working in teams to solve “crime” scenarios using scientific knowledge and critical thinking. It will involve all areas of science, including biology, anatomy, chemistry, physics, and earth science. Using the available technology, the students will record data, draw conclusions, and formulate the best method for communicating their results to propose crime scene solutions. Hands-on lab activities with lab write-ups are an important part of this course. Each student will be required to write a report and give an oral presentation on a topic that is pertinent to the course.

SC 850 ROBOTICS
Grade: 10, 11, 12
Credit: ½ Credit
Length: 1 Semester (second semester only)
Prerequisite: Grade of "C" or better in all science and math courses and concurrent enrollment in MT 541, 544 or above.
Description: This course is for those students who would like to be immersed in the FIRST Robotics Competition experience. The design and build of the competition robot gives students an unparalleled opportunity in engineering and computer science. This design and build process will include computer aided design, fabricating and assembling, wiring, and programming. Students in this course will be expected to take lead roles in this process as they will also mentor students who join the team through the extracurricular Robotics Club. Responsibilities beyond the engineering and computer science of the robot will include implementing a fundraising plan, developing and balancing the team's annual budget, creating promotional designs, designing and updating the team's web page, and presenting information about the robot and team to various groups.
Homework: 1-2 hour after school meetings with Robotics Club (3 times per week during robot build season, 1 time per week after robot build season)
Special cost or materials: No special materials