

**Proposed Course Additions, Deletions and Changes
List #4 – Fall 2008**

SCHOOL OF SCIENCE & TECHNOLOGY

Course Deletions:

PHYS 413 Microprocessor Applications

Justification:

Course Additions:

CHEM 110 Introductory General Chemistry

Units: 3

Grade Mode: Grade

Lecture, 3 hours. Develop fundamental knowledge and necessary skills in General Chemistry for the student who plans to major in science or pre-health programs. This course assumes no previous chemistry background from the student and may be used as a first chemistry course or a refresher course to enhance an insufficient chemistry background. Topics covered in the course include significant figures, unit conversions, naming chemical compounds, chemical equations, concentration units, pH, acids and bases, the mole concept and stoichiometry. CHEM 110 may be taken to prepare for CHEM 115A. This course is not applicable to the chemistry major, minor, or GE requirement.

Justification: Developed to help students succeed in general chemistry (115A & B) courses; also CHEM 105.

Course Changes:

ASTR 100 Descriptive Astronomy

Change Description: Lecture, 3 hours. A survey designed primarily for non-science majors, including an introduction to historic astronomy, Newton's Laws, gravitation, atomic structure, light, and telescopes. Take a tour of the solar system, learn about space flight, stars and stellar evolution, galaxies and the structure of the universe. Satisfies GE, category B1 or B3 (Physical Sciences).

Justification: To reflect changes in course content with new faculty and current scientific information.

ASTR 231 Introductory Observational Astronomy

Change Description: Lecture, 1 hour; laboratory, 3 hours. Principles of astronomical measurement techniques with field and laboratory studies of astronomical objects. Identification of constellations, astronomical coordinates, use of the telescope, techniques in imaging, photometry, and spectroscopy. Satisfies GE, category B1 or B3 (Physical

Sciences) and GE laboratory requirements. Prerequisite: previous or concurrent enrollment in ASTR 100.

Justification: To reflect changes in course content with new faculty and current scientific information.

ASTR 303 Extraterrestrial Intelligence & Interstellar Travel

Change Description: Lecture, 3 hours. An open-minded appraisal of the possibilities and prospects for life in the universe and travel to the stars. Topics to be covered include a history of human thinking about extraterrestrial life; the nature of life; possible appearance and nature of extraterrestrial life; the Drake Equation; detection of extraterrestrial planets, planetary habitability, the Fermi Paradox; SETI; spaceflight; interstellar travel. Satisfies GE, category B3 (Specific Emphasis in Natural Sciences). Prerequisite: ASTR 100.

Justification: To reflect changes in course content with new faculty and current scientific information.

ASTR 305 Frontiers in Astronomy

Change Description: Lecture, 3 hours. A survey of recent developments in astronomy and how these breakthroughs are made: the discovery of planets orbiting other stars; the explosive deaths of stars and the creation of neutron stars and black holes; the study of the origin and fate of the Universe, including the search to understand dark matter and dark energy. Satisfies GE, category B3. Satisfies GE, category B3 (Specific Emphasis in Natural Sciences). Prerequisite: one course in astronomy.

Justification: To reflect changes in course content with new faculty and current scientific information.

ASTR 331 Astronomical Imaging

Change Description: Lecture, 1 hour; laboratory, 3 hours. An introduction to the methods and techniques of astronomical imaging. The course will offer a practical approach to using charged-coupled device (CCD) detectors and computer-controlled telescopes to obtain images of the moon, planets, stars, and nebulae. Topics include telescope control, planning observing programs, identifying astronomical objects, determining image sizes and exposure times, and image processing techniques. Prerequisite: ASTR 231 or consent of instructor.

Justification: To reflect changes in course content with new faculty and current scientific information.

ASTR 350 Cosmology

Change Description: Lecture, 3 hours. A survey of what we know about the Universe and how scientists have learned it. Topics include the Big Bang, cosmic inflation, surveys of galaxies, the origin and evolution of structure in the Universe, dark matter, and dark energy. Satisfies GE, category B3 (Specific Emphasis in Natural Sciences). Prerequisite: ASTR 100.

Justification: To reflect changes in course content with new faculty and current scientific information.

ASTR 482 Adv. Observational Astronomy

Change Description: Lecture, 1 hour; laboratory, 3 hours. A study of advanced observing techniques including imaging, and spectroscopy. Emphasis on the use of telescopes, instrumentation, and data processing including photometry and astrometry. Discussion of techniques across the electro-magnetic spectrum. Statistical treatment of data and error analysis. Prerequisites: ASTR 231, PHYS 209B, and 210B, and MATH 161; or consent of instructor.

Justification: To reflect changes in course content with new faculty and current scientific information.

CHEM 115A General Chemistry

Change Description: Lecture, 3 hours; laboratory 3 hours. Principles of chemistry for students in science, pre-health and related areas of study. This course will introduce students to science and scientific thought by using problem-solving strategies in both a conceptual and mathematical manner. First semester topics include atomic and molecular structure, states of matter, chemical reactions, stoichiometry and thermodynamics. Second semester topics include kinetics, equilibrium, buffers, and electrochemistry. Satisfies GE, category B1 (Physical Sciences), B3 (Specific Emphasis) and laboratory requirements. Minimum Grade of 'C' required to continue to CHEM 115B.

CHEM 15B General Chemistry

Change Description: Lecture, 3 hours; laboratory 3 hours. Continuation of CHEM 115A. Prerequisite: CHEM 115A. Satisfies GE, category B1 (Physical Sciences), B3 (Specific Emphasis) and laboratory requirements.

CHEM 125A Honors Analytical General Chemistry

Change Description: Lecture, 3 hours; discussion 1 hour; laboratory 3 hours (5 units). This is a one-year sequential honors analytical general chemistry course. This course is designed for students who have a prepared background in chemistry. Topics traditionally covered in the first semester of general chemistry (periodic trends, stoichiometry, aqueous chemical reaction and molecular geometry) will be briefly reviewed. However, this first semester of this course (CHEM 125A) will focus on bonding, kinetics, solutions, acid-base equilibrium, thermodynamics, and electrochemistry. Prerequisite: 4 or higher on the high school AP chemistry exam, or a pass on the departmental chemistry placement exam. Letter grade or Cr/NC. Fall A / Spring B. GE credit for area B1 or/and B3. Minimum Grade of 'C' required to continue to CHEM 125B

CHEM 125B Honors Analytical General Chemistry

Change Description: Lecture, 3 hours; discussion 1 hour; laboratory 3 hours (5 units). The second semester (CHEM 125B) starts by applying the topics covered in the first semester to statistics, chemical literature, chromatography, spectroscopy and biological chemistry. After completion of this course students will receive credit for the full year of general chemistry and one semester of quantitative analysis (CHEM 255). Prerequisite: 4 or higher on the high school AP chemistry exam, or a pass on the departmental chemistry placement exam. Letter grade or Cr/NC. Fall A / Spring B. GE credit for area B1 or/and B3.

CHEM 310A Fundamentals of Physical Chemistry

Change Description: Lecture, 3 hours. Development and applications of the concepts of thermodynamics, equilibrium, kinetics, quantum mechanics, and spectroscopy to chemical systems. Prerequisites: CHEM 255; CHEM 125B; MATH 211S; PHYS 210AB or 214 and 216; or consent of instructor. Minimum Grade of 'C' required to continue to CHEM 310B.

CHEM 310B Fundamentals of Physical Chemistry

Change Description: Lecture, 3 hours. Continuation of CHEM 310A. Prerequisites: CHEM 310A; CHEM 255; CHEM 125B; MATH 211S; PHYS 210AB or 214 and 216; or consent of instructor.

CHEM 335A Organic Chemistry

Change Description: Lecture, 3 hours; laboratory lecture, 1 hour; laboratory, 3 hours. Basic course in the general theory and reactions of organic chemistry. Emphasis on basic principles. Recommended for science and pre-professional majors. Prerequisite: CHEM 115B; CHEM 125A or consent of instructor. Minimum Grade of 'C' required to continue to CHEM 335B or 336.

PHYS 209B General Physics Lab

Change Description: Laboratory, 3 hours. Laboratory experiments to accompany PHYS 210B and develop the student's ability to perform measurements of physical phenomena and to increase their appreciation of the sense of the physical universe gained through experimentation. 209A satisfies GE, category B1 or B3 (Physical Sciences) and GE laboratory requirements. Prerequisites: 209A and previous or concurrent enrollment in 210B.

Justification: To reflect changes in course content with new faculty and current scientific information.

PHYS 210A General Physics

Change Description: Lecture, 3 hours. A basic course in physics for students majoring in biology, geology or preprofessional programs. Fundamentals of kinematics, Newton's laws, work, momentum, harmonic motion, and an introduction to fluids and concepts of temperature. Registration by mathematics majors requires physics and astronomy department approval. 210A satisfies GE, category B1 or B3 (Physical Sciences) requirement. Prerequisites: high school algebra and trigonometry or MATH 107. CAN PHYS SEQ A.

Justification: To reflect changes in course content with new faculty and current scientific information.

PHYS 210B General Physics

Change Description: Lecture, 3 hours. A basic course in physics for students majoring in biology, geology or preprofessional programs. Topics include: electric charges, potentials, fields and currents, magnetism, electromagnetic waves, and optics. Registration by mathematics majors requires physics and astronomy department approval. Prerequisites: 210A.

Justification: To reflect changes in course content with new faculty and current scientific information.

PHYS 320 Analytical Mechanics

Change Description: Lecture, 3 hours. This course is an exploration into the principles of Newtonian, Lagrangian, and Hamiltonian mechanics. It also includes a treatment of noninertial reference frames, rigid body rotation, central force problems, and the dynamics of a system of particles. Prerequisites: PHYS 114 and previous or concurrent enrollment in PHYS 325.

Justification: To reflect changes in course content and current scientific information.

PHYS 325 Intro to Mathematical Physics

Change Description: Lecture, 3 hours. This course examines advanced mathematical methods and serves as a foundation for future courses. Topics include coordinate systems and vectors; vector calculus; series expansions; differential equations; orthonormal functions; solutions of systems of linear equations; matrices and tensors; complex numbers; eigenvalues and eigenfunctions; Fourier series and Fourier integrals; use of mathematical symbolic processing software. Prerequisites: PHYS 214 and MATH 261 or consent of instructor.

Justification: To reflect changes in course content and current scientific information.

PHYS 340 Light & Optics

Change Description: Lecture, 3 hours. An examination of the properties of light from geometric and physical optics perspectives. Topics include: ray optics, refraction, diffraction, coherence, interference, and polarization. The course will present Fermat's principle, Huygens' principle and Fourier optics. Prerequisite: PHYS 314 or 325.

Justification: To reflect changes in course content and current scientific information.

PHYS 366 Intermediate Experimental Physics

Change Description: Lecture 2 hours; laboratory 3 hours. An introduction to contemporary techniques and problems in physics. Selected topics in lasers and photonics, materials science (including high-magnetic field measurements and surface analysis using scanning electron and atomic force microscopy), X-ray analysis, applied nuclear physics, adaptive optics. Prerequisites: PHYS 314 and 216, or consent of instructor.

Justification: To reflect changes in course content and current scientific information.

PHYS 413L Microprocessor Applications Lab

Laboratory, 3 hours. Laboratory work to accompany PHYS 413. Microprocessor programming, analog port and sensors, motion control, interfacing microprocessors with computers (high level interfacing and programming), programmable logic devices, data bus and memory data handling. Prerequisite: same as PHYS 413. Must be taken concurrently with PHYS 413.

Justification: To reflect changes in course content and current scientific information.

PHYS 430 Electricity & Magnetism

Change Description: Lecture, 3 hours. An investigation into the fundamentals of electromagnetic theory and its applications. Topics include vector analysis, electrostatics, method of images, magnetostatics, electric currents, electromagnetic induction, electric and magnetic fields in matter, Maxwell's equations, electromagnetic waves, potentials and fields. Prerequisites: PHYS 214 and previous or concurrent enrollment in PHYS 325.

Justification: To reflect changes in course content and current scientific information.

PHYS 445 Photonics

Change Description: Lecture, 3 hours. A practical examination of Gaussian beams; guided-wave optics; fiber optics; optical resonators; resonant cavities; laser oscillation and amplification; laser excitation; optical pumping; solid state, gas, dye, chemical, excimer and free electron lasers; semiconductor lasers; laser spectroscopy; fiber optic communication; photomultiplier and semiconductor radiation detectors including photoconductors, junction photodiodes; p-i-n diodes, avalanche photodiodes; detector noise. Prerequisite: PHYS 314 or consent of instructor.

Justification: To reflect changes in course content and current scientific information.

PHYS 450 Statistical Physics

Change Description: Lecture, 2 hours. An introduction to statistical methods. Topics include ideal gas, heat capacities, entropy, enthalpy, the laws of thermodynamics: Boltzmann, Bose and Fermi statistics; applications such as engines and refrigerators. Prerequisite: PHYS 314.

Justification: To reflect changes in course content and current scientific information.

PHYS 460 Quantum Physics

Change Description: Lecture, 3 hours. This course examines the Schrodinger equation and its solution for free particles, potential wells, harmonic oscillators, central potentials, and the hydrogen atom. Other topics may include Hilbert space; Hermitian operators; Dirac notation; angular momentum and spin; scattering; wave function symmetry; and elementary perturbation theory. Prerequisites: PHYS 314 and 325.

Justification: To reflect changes in course content and current scientific information.

PHYS 466 Advanced Experimental Physics

Change Description: Lecture 2 hours; laboratory 3 hours. Advanced topics in lasers and photonics, materials science (including high-magnetic field measurements and surface analysis using scanning electron and atomic force microscopy), X-ray analysis, applied nuclear physics, adaptive optics. Prerequisites: PHYS 314 and 216, or consent of instructor.

Justification: To reflect changes in course content and current scientific information.

PHYS 475 Physics of Semiconductor Devices

Change Description: Lecture, 3 hours. A detailed study of semiconductors and their applications.

Topics include semiconductor materials, crystal structure and growth; energy bands and charge carriers, conductivity and mobility; metal-semiconductor and p-n junctions; p-n

junction diodes, bipolar junction transistors, field-effect transistors, CCDs, photonic devices and integrated circuits. Conductivity and contact resistance measurements; I-V and C-V characteristics of diodes; characterization of transistors. Prerequisite: PHYS 314 or consent of instructor.

Justification: To reflect changes in course content and current scientific information.