MTH 1410. Calculus I (4)
MTH 1420. Calculus II (4)
MTH 2310. Linear Algebra (4)
MTH 2410. Calculus III (4)
MTH 3410. Differential Equations (4)
CSC 1710. Introduction to Programming (4)

Requirements for the minor in Physics (24 credits)

PHY 2010. Fundamentals of Physics I (4)
PHY 2020. Fundamentals of Physics II (4)
PHY 2030. Modern Physics (4)
One PHY elective at the 2000-level or above (4)
MTH 1410. Calculus I (4)
MTH 1420. Calculus II (4)

Course Descriptions

PHY 1000. Astronomy of the Solar System. An introduction to modern astronomy with emphasis on the solar system. Topics include observational astronomy, history and development of astronomy, formation of the solar system, and the structure and composition of the sun, planets, asteroids, and comets. *This course consists of 3 hours of lecture and 2 hours of laboratory per week. Four credits.* [N]

PHY 1050. Astronomy of Stars, Galaxies, and the Cosmos. An introduction to modern astronomy with emphasis on the Universe beyond the solar system. Topics include properties and life cycles of stars, supernovae, neutron stars, black holes, white dwarfs, interstellar medium, galaxies, and cosmology. *This course consists of 3 hours of lecture and 2 hours of laboratory per week. Four credits.* [N]

PHY 1100. Physics of Sound and Music. An introduction to the physics of sound and music. Topics include vibrations, waves, fundamentals and overtones, musical scales, harmony, and production, detection, and perception of sound. *This course is intended primarily for non-science majors and consists of 2 lecture hours and 2 laboratory hours per week. Four credits.* [N]

PHY 1200. Physics for Video Games. An introduction to laws of physics needed to produce games, simulations, and computer animations with compelling realism. Topics include kinematics, Newton's laws of motion, conservation of momentum, conservation of energy, and rotational dynamics, with applications to projectile motion, collisions, oscillations, and rotational motion. Laboratory topics include measurement, graphical interpretation and curve fits, video analysis, and simulation development. No programming experience is required. *This course is intended primarily for non-science majors and consists of 2 lecture hours and 2 laboratory hours per week. Four credits.* [N]

PHY 1510. General Physics I. An introduction to mechanics, properties of matter, waves, sound, and thermodynamics. *Prerequisite: MTH 1400. This course is offered in the fall and spring and is intended for science majors who are not required to take calculus-based physics for their major. PHY 1510 must be taken concurrently with the lab (PHY 1511). Three credits.* [N]

PHY 1511. General Physics I Laboratory. A laboratory to accompany PHY 1510. Topics include measurement, error analysis, graphical interpretation and curve fits, video analysis, and computer data acquisition interfaces and sensors. Applications are congruent with topics covered in PHY 1510. *One credit.*

PHY 1520. General Physics II. An introduction to electricity and magnetism, geometrical and physical optics, relativity, and atomic and nuclear physics. *This course is offered in the fall and spring and is intended for science majors who are not required to take calculus-based physics for their major. PHY 1520 must be taken concurrently with the lab (PHY 1521). Three credits.*

PHY 1521. General Physics II Laboratory. A laboratory to accompany PHY 1520. Topics include measurement, error analysis, graphical interpretation and curve fits, video analysis, and computer data acquisition interfaces and sensors. Applications are congruent with topics covered in PHY 1520. *One credit.*

PHY 2001. Research and Scientific Writing in Physics I. An introduction to research methods and scientific writing in the area of physics. This course emphasizes critical review of scientific literature, formulation of research problems, design of experiments, collection of experimental data, discussion of uncertainty and error analysis. The student will begin an independent year-long research project which will continue into PHY 2002. *Prerequisites: PHY 2010 or permission of the instructor. This course is offered in the fall. One credit.*

PHY 2002. Research and Scientific Writing in Physics II. An introduction to research methods and scientific writing in the area of physics. This course is a continuation of PHY 2001 and emphasizes presentation of experimental results, in written, oral, and poster formats. Each student will learn how to graphically display results with MATLAB and prepare scientific articles with LaTex. *Prerequisite: PHY 2001. This course is offered in the spring. One credit.*

PHY 2010. Fundamentals of Physics I. A calculus-based study of mechanics, waves, and thermal physics with emphasis on atomic models and fundamental principles. This course satisfies the Area II General Education elective in Natural Science. Topics include various applications of fundamental principles to matter and interactions, including classical, relativistic, and quantum systems. *Prerequisite or corequisite: MTH 1410. This course consists of 4 hours of lecture and 2 hours of laboratory per week. PHY 2010 must be taken concurrently with the lab (PHY 2010L). Four credits.* [N]

PHY 2020. Fundamentals of Physics II. A calculus-based study of electricity and magnetism, and geometrical and physical optics, with emphasis on atomic models, fields, and the classical interaction of light and matter. *Prerequisite or corequisite: MTH 1420. This course consists of 4 hours of lecture and 2 hours of laboratory per week. PHY 2020 must be taken concurrently with the lab (PHY 2020L). Four credits.*

PHY 2030. Modern Physics. An introduction to relativity, quantum mechanics, and nuclear physics. *Prerequisite: PHY 2020. This course consists of 6 hours of integrated lecture and laboratory per week. Four credits.*

PHY 2100. Electronics. An introduction to the major aspects of electronics theory and practice found in scientific and computer instrumentation. Topics include DC and AC circuit analysis, diodes and the PN junction, bipolar junction transistors, transistor amplifiers, operational amplifiers, integrated circuits, analog to digital converters, and digital logic. *Prerequisite: MTH 1420. This course is offered in the spring and consists of 6 hours of integrated lecture and laboratory. Four credits.*

PHY 2881, 3881, 4881. Special Topics. Variable credit. May be repeated.

PHY 3110. Classical Mechanics. An advanced study of Newtonian mechanics applied to particles and systems of particles. Topics include central force motion, oscillators and coupled oscillators, rotating systems and rigid bodies, calculus of variations, and the Lagrangian and Hamiltonian formulations of mechanics. *Prerequisites: PHY 2020, MTH 2410, and MTH 3410 (MTH 3610 may be taken in place of MTH 2410 and MTH 3410). This course consists of 6 hours of integrated lecture and laboratory per week. Four credits.*

PHY 3210. Electromagnetism. An advanced study of electromagnetic theory using the methods of vector calculus. Topics include electrostatics of conductors and dielectrics, electric currents, magnetic fields, Maxwell's equations, wave propagation in media, and electromagnetic radiation. *Prerequisites: PHY 2030, MTH 2410, and MTH 3410 (MTH 3610 may be taken in place of MTH 2410 and MTH 3410). This course is offered in the spring of odd-numbered years. Four credits.*

PHY 3310. Quantum Mechanics. An introduction to nonrelativistic quantum mechanics and its physical interpretation. Topics include operator mechanics, matrix mechanics, the Schrodinger equation, one-dimensional potentials, bound states, tunneling, and central potential problems in three dimensions including the hydrogen atom. *Prerequisites: PHY 2030, MTH 2410, and MTH 3610 (MTH 2310 and MTH 3410 may be taken in place of MTH 3610). This course is offered in the fall of odd-numbered years. Four credits.*

PHY 3400. Statistical and Thermal Physics. An introduction to the microscopic description of thermodynamics and its application to macroscopic systems. Topics include temperature, heat, internal energy, entropy, phase transformations, kinetic theory, classical and quantum statistical distributions. *Prerequisites: PHY 2030, MTH 2410, and MTH 3610 (MTH 2310 and MTH 3410 may be taken in place of MTH 3610). This course is offered spring of even-numbered years. Four credits.*

PHY 4000. Undergraduate Research in Physics. Research of a theoretical, computational, or experimental topic in physics. Results will be given in a written paper and an oral presentation to the seminar participants and department faculty. Students may satisfy the research component of this course through a summer research

"Our goal is to involve you in the research process because the experience and skills you obtain will make you more competitive for graduate school and industry. But more than experience and skills, you will gain confidence as a scientist."

–Department of Physics

experience, but must submit a written paper and give a department seminar on their summer research project. *Prerequisites: PHY 2002 or permission of the instructor. A total of four credits are required for the B.S. degree. May be repeated for credit. One or two credits.*

PHY 4444. Independent Study. Individual study and research under the guidance of a member of the department. *One to four credits each semester.*

PHY 4810-4815. Student Internship. Three, four, six, eight, ten or twelve credits.

NSC 2100. Physical Science for Education. An inquiry-based study of the basic concepts of physical sciences, including properties of matter, motion and forces, and electricity and magnetism. Laboratory work emphasizes the application of the scientific method to understanding physical reality. *This course is restricted to education majors and consists of 6 hours of integrated lecture and lab per week. Course is offered in both the fall and spring. Four credits.* [N]

NSC 2200. Earth Science for Education. An introduction to fundamental processes of Earth. Topics include the theory of plate tectonics, rocks and minerals, formation of the continents, mountains and oceans, the atmosphere and pollution, natural resources, and basic astronomy. *This course is restricted to education majors and consists of 3 hours of lecture and 2 hours of laboratory per week. Four credits.* [N]