PHYSICS (PHYS)

PHYS 1114 Applied Physics
Offered: Spring.
A survey of selected topics in physics. The "scientific method", mechanics, fluid mechanics, heat, electricity, sound, light, and nuclear radiation will be studied. Lecture three hours, laboratory three hours. $40 laboratory fee.
Note: May not be taken for credit after completion of PHYS 2014, PHYS 2024, PHYS 2114, or PHYS 2124.

PHYS 2000 Physics Laboratory I
Co-requisite: PHYS 2014 or PHYS 2114.

PHYS 2010 Physics Laboratory II
Co-requisite: PHYS 2024 or PHYS 2124.

PHYS 2014 Algebra-Based Physics I
ACTS Common Course - PHYS 2014.
Offered: Fall and summer (on demand).
Co-requisite: PHYS 2000.
Prerequisite: A grade of C or better in MATH 1113 or consent of the instructor.
Open to freshmen. A broad survey course emphasizing the understanding of the principles of physics necessary for students not specifically interested in advanced work in physics, chemistry or engineering. Topics include mechanics, heat, sound, wave motion, and fluid mechanics. Lecture three hours, laboratory three hours. $40 laboratory fee.

PHYS 2024 Algebra-Based Physics II
ACTS Common Course - PHYS 2024.
Offered: Spring and summer (on demand).
Co-requisite: PHYS 2010.
Prerequisite: PHYS 2014 or permission of instructor.
Continuation of PHYS 2014, covering electricity and magnetism, light, relativity, particle physics, and quantum effects. Lecture three hours, laboratory three hours. $40 laboratory fee.

PHYS 2114 Calculus-Based Physics I
ACTS Common Course - PHYS 2034.
Co-requisite: MATH 2924.
Prerequisite or Co-requisite: PHYS 2000. This course is designed for physics and engineering majors and focuses on introductory mechanics including kinematics, force, energy, work, and conservation of linear and angular momentum. Heat and fluids are also introduced. Lecture and laboratory. $40 laboratory fee.

PHYS 2124 Calculus-Based Physics II
ACTS Common Course - PHYS 2044.
Co-requisite: PHYS 2010.
Prerequisite: Permission of instructor; prerequisite or co-requisite, MATH 2934.
This course is the continuation of PHYS 2114 and focuses on introductory electricity, magnetism, and circuits. Electromagnetic waves and ray optics are also introduced. Lecture and laboratory. $40 laboratory fee.

PHYS 3003 Optics
Offered: Spring even years.
Prerequisite: PHYS 2124 or consent of instructor.
Introduction to geometrical and physical optics. Lecture two hours, laboratory two hours. $40 laboratory fee.

PHYS 3023 Mechanics
Offered: Fall even years.
Co-requisite: MATH 3243.
Prerequisite: PHYS 2114.
The conservation laws. Euler's angles. Lagrange's and Hamilton's equations.

PHYS 3042 Intermediate Physics Laboratory
Offered: On demand.
Prerequisite: PHYS 2114 and 2124.
For physical science education majors. This course expands and refines essential content and laboratory skills through the modeling and experimental investigation of topics in both classical and modern physics. Laboratory three hours. $40 laboratory fee.
Note: Will not satisfy the physics elective requirement for students majoring in physical science.

PHYS 3133 Theory of Electricity and Magnetism
Offered: Fall of even years.
Prerequisite: PHYS 2124.
Gauss's law, potential, Laplace's and Poisson's equations in rectangular, cylindrical, and spherical coordinates, inductance, capacitance, moving charges, dielectric phenomena, and Maxwell's equations.

PHYS 3153 Solid State Physics
Offered: Fall odd years.
Co-requisite: MATH 3243.
Prerequisite: PHYS 2114, 2124; CHEM 2124.
An introduction to the physics governing the crystalline state of matter. Modern theories describing lattice vibrations, energy bands, crystal binding, and optical properties are presented. These ideas are then applied to the understanding of technologically important areas such as superconductivity, doped semiconductors, ferroelectric materials, and photorefractivity. $40 laboratory fee.

PHYS 3213 Modern Physics
Offered: Fall of odd years.
Prerequisite: PHYS 2124.
Introduction to relativity, wave-particle interactions, atomic structure, quantum mechanics, quantum theory of the hydrogen atom, statistical mechanics, nuclear structure, and elementary particles.

PHYS 3991 Special Problems in Physics and Astronomy
Offered: On demand.
Prerequisite: Departmental approval.
Advanced students carry out independent research activity relating to significant problems in physics and astronomy. Supervised by faculty member. Formal report and presentation required. One to three credits depending on problem selected and effort made. $40 laboratory fee.

PHYS 3992 Special Problems in Physics and Astronomy
Offered: On demand.
Prerequisite: Departmental approval.
Advanced students carry out independent research activity relating to significant problems in physics and astronomy. Supervised by faculty member. Formal report and presentation required. One to three credits depending on problem selected and effort made. $40 laboratory fee.

PHYS 3993 Special Problems in Physics and Astronomy
Offered: On demand.
Prerequisite: Departmental approval.
Advanced students carry out independent research activity relating to significant problems in physics and astronomy. Supervised by faculty member. Formal report and presentation required. One to three credits depending on problem selected and effort made. $40 laboratory fee.

PHYS 4003 Thermodynamics and Statistical Mechanics
Offered: Spring of odd years.
Prerequisite: PHYS 2124; Prerequisite or co-requisite, MATH 3243.
Applications of the three laws of thermodynamics, partition functions and transport phenomena.

PHYS 4013 Quantum Mechanics
Offered: Spring of even years.
Prerequisite: PHYS 3213 and MATH 3243.
A formal course in wave and matrix mechanics, designed to enable a student to set up and solve the elementary practical problems of quantum mechanics.

PHYS 4023 Computational Physics
Prerequisite: PHYS 2124.
This course provides an introduction to numerical methods that are commonly used to approach physical problems. Students in the course will gain both an understanding of the construction of several common algorithms as well as hands-on experience applying these tools to routine problems such as finding, optimization, matrix manipulation, differential equations, and applications to calculus. The course includes collaborative projects meant to simulate "real world" coding tasks and provides physics students with a practical background in scientific computing. As time allows, optional additional topics could include machine learning, databases, and advanced data visualization.

PHYS 4061 Engineering Physics Design
Co-requisite: Engineering Physics major with senior standing.
This course is meant to serve as a culminating experience during Engineering Physics students' final semester. Supervised by a faculty member, students carry out engineering design activities relating to a significant problem that is based on physics and engineering skills and knowledge acquired in previous coursework. A formal written report and oral presentation are required. $40 course fee.

PHYS 4113 Advanced Physics Laboratory
Offered: Spring odd years.
Prerequisite: PHYS 3213.
An application and investigation of advanced physical topics in the laboratory. Techniques of experimental [engineering] physics, such as computerized instrumentation, vacuum technology, optics, and electron optics will be applied to investigate various areas of advanced physics. Proper data reduction and analysis will be used to yield meaningful measurements. Intended as a culminating course, previous course work is applied to solve problems in the laboratory. Lecture one hour, laboratory five hours. $40 laboratory fee.

PHYS 4213 Advanced Topics in Physics and Astronomy
Offered: On Demand.
Prerequisite: PHYS 2024 or PHYS 2124.
Introduction to relativity, elementary particle physics, quantum dynamics, big-bang cosmology, atomic nucleosynthesis, and large scale structure and exotic states of matter such as black holes. Forces and interactions between the building blocks of matter in addition to cosmological models will be studied to gain insight into the complex universe we observe today. Lecture two hours, laboratory two hours. $40 laboratory fee.

PHYS 4951 Physics or Engineering Physics Capstone
Offered: On demand.
Prerequisite: Senior Standing.
This course is meant to serve as a culminating experience during Physics and Engineering Physics students' final semester. Supervised by a faculty member, students carry out independent research activities relating to a significant problem that is based on physics and engineering design skills and knowledge acquired in previous coursework, as appropriate. A formal written report and oral presentation are required. One to four credits depending on the problem selected and the effort made. $40 laboratory fee.

PHYS 4952 Physics or Engineering Physics Capstone
Offered: On demand.
Prerequisite: Senior Standing.
This course is meant to serve as a culminating experience during Physics and Engineering Physics students' final semester. Supervised by a faculty member, students carry out independent research activities relating to a significant problem that is based on physics and engineering design skills and knowledge acquired in previous coursework, as appropriate. A formal written report and oral presentation are required. One to four credits depending on the problem selected and the effort made. $40 laboratory fee.

PHYS 4953 Physics or Engineering Physics Capstone
Offered: On demand.
Prerequisite: Senior Standing.
This course is meant to serve as a culminating experience during Physics and Engineering Physics students' final semester. Supervised by a faculty member, students carry out independent research activities relating to a significant problem that is based on physics and engineering design skills and knowledge acquired in previous coursework, as appropriate. A formal written report and oral presentation are required. One to four credits depending on the problem selected and the effort made. $40 laboratory fee.

PHYS 4954 Physics or Engineering Physics Capstone
Offered: On demand.
Prerequisite: Senior Standing.
This course is meant to serve as a culminating experience during Physics and Engineering Physics students' final semester. Supervised by a faculty member, students carry out independent research activities relating to a significant problem that is based on physics and engineering design skills and knowledge acquired in previous coursework, as appropriate. A formal written report and oral presentation are required. One to four credits depending on the problem selected and the effort made. $40 laboratory fee.

PHYS 4991 Special Problems in Physics and Astronomy
Offered: On demand.
Prerequisite: Departmental approval.
Advanced students carry out independent research activity relating to significant problems in physics and astronomy. Supervised by faculty member. Formal report and presentation required. One to four credits depending on problem selected and effort made. $40 laboratory fee.

PHYS 4992 Special Problems in Physics and Astronomy
Offered: On demand.
Prerequisite: Departmental approval.
Advanced students carry out independent research activity relating to significant problems in physics and astronomy. Supervised by faculty member. Formal report and presentation required. One to four credits depending on problem selected and effort made. $40 laboratory fee.

PHYS 4993 Special Problems in Physics and Astronomy
Offered: On demand.
Prerequisite: Departmental approval.
Advanced students carry out independent research activity relating to significant problems in physics and astronomy. Supervised by faculty member. Formal report and presentation required. One to four credits depending on problem selected and effort made. $40 laboratory fee.

PHYS 4994 Special Problems in Physics and Astronomy
Offered: On demand.
Prerequisite: Departmental approval.
Advanced students carry out independent research activity relating to significant problems in physics and astronomy. Supervised by faculty member. Formal report and presentation required. One to four credits depending on problem selected and effort made. $40 laboratory fee.

PHYS 6881 Workshop
The workshop will require the equivalency of fifteen clock hours of instruction per credit hour.

PHYS 6882 Workshop
The workshop will require the equivalency of fifteen clock hours of instruction per credit hour.

PHYS 6883 Workshop
The workshop will require the equivalency of fifteen clock hours of instruction per credit hour.

PHYS 6884 Workshop
The workshop will require the equivalency of fifteen clock hours of instruction per credit hour.