# ALL COURSES

## PHYSICS

### PHYS 4XXX: PHYSICS TRANSFER ELECTIVE
Credit transfered from another institution and articulated for physics upper division elective.

### PHYS 3XXX: PHYSICS TRANSFER ELECTIVE
Credit transfered from another institution and articulated for physics upper division elective.

### PHYS 2XXX: PHYSICS TRANSFER ELECTIVE
Credit transfered from another institution and articulated for physics lower division elective.

### PHYS 1XXX: PHYSICS TRANSFER ELECTIVE
Credit transfered from another institution and articulated for physics lower division elective.

### 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.
Note: May not be taken for credit after completion of PHYS 2014 Algebra-Based Physics I, PHYS 2024 Algebra-Based Physics II, PHYS 2114 Calculus-Based Physics I, or PHYS 2124 Calculus-Based Physics II.
Lecture three hours, laboratory three hours. $40 laboratory fee.

### PHYS 2000: Physics Laboratory I
Co-requisite: PHYS 2014 Algebra-Based Physics I or PHYS 2114 Calculus-Based Physics I.

### PHYS 2010: Physics Laboratory II
Co-requisite: PHYS 2024 Algebra-Based Physics II or PHYS 2124 Calculus-Based Physics II.

### PHYS 2014: Algebra-Based Physics I
ACTS Common Course - PHYS 2014 Algebra-Based Physics I
Offered: Fall and summer (on demand).
Prerequisite: A grade of C or better in MATH 1113 College Algebra or consent of the instructor.
Co-requisite: PHYS 2000 Physics Laboratory I
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 Algebra-Based Physics II
Offered: Spring and summer (on demand).
Prerequisite: PHYS 2014 Algebra-Based Physics I or permission of instructor.
Co-requisite: PHYS 2010 Physics Laboratory II
Continuation of PHYS 2014 Algebra-Based Physics I, 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
Prerequisite or co-requisite: MATH 2924 Calculus II
Co-requisite: PHYS 2000 Physics Laboratory I
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
Prerequisite: Permission of instructor; prerequisite or co-requisite, MATH 2934 Calculus III.
Co-requisite: PHYS 2010 Physics Laboratory II
This course is the continuation of PHYS 2114 Calculus-Based Physics I 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 Calculus-Based Physics II 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
Prerequisite: PHYS 2114 Calculus-Based Physics I
Co-requisite: MATH 3243 Differential Equations I
The conservation laws. Euler's angles. Lagrange's and Hamilton's equations.

**PHYS 3042: Intermediate Physics Laboratory**
Offered: On demand
Prerequisites: PHYS 2114 Calculus-Based Physics I 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.
Note: Will not satisfy the physics elective requirement for students majoring in physical science.
Laboratory three hours. $40 laboratory fee.

**PHYS 3133: Theory of Electricity and Magnetism**
Offered: Fall of even years
Prerequisite: PHYS 2124 Calculus-Based Physics II
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
Prerequisites: PHYS 2114 Calculus-Based Physics I, 2124; CHEM 2124 General Chemistry I.
Co-requisite: MATH 3243 Differential Equations I
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 Calculus-Based Physics II
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 Calculus-Based Physics II; Prerequisite or co-requisite, MATH 3243 Differential Equations I.
Applications of the three laws of thermodynamics, partition functions and transport phenomena.

**PHYS 4013: Quantum Mechanics**
Offered: Spring of even years
Prerequisites: PHYS 3213 Modern Physics and MATH 3243 Differential Equations I
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 Calculus-Based Physics II
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 4113: Advanced Physics Laboratory**
Offered: Spring odd years
Prerequisite: PHYS 3213 Modern Physics
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 Algebra-Based Physics II or PHYS 2124 Calculus-Based Physics II
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: Undergraduate Research in Physics**
Offered: On demand
Prerequisite: Departmental approval
Advanced students carry out independent research activity relating to a significant problem in a major field of study. Supervised by faculty member. Formal report and presentation required. One to four credits depending on problem selected and effort made.
$40 laboratory fee.

**PHYS 4952: Undergraduate Research in Physics**
Offered: On demand
Prerequisite: Departmental approval
Advanced students carry out independent research activity relating to a significant problem in a major field of study. Supervised by faculty member. Formal report and presentation required. One to four credits depending on problem selected and effort made.
$40 laboratory fee.

**PHYS 4953: Undergraduate Research in Physics**
Offered: On demand
Prerequisite: Departmental approval
Advanced students carry out independent research activity relating to a significant problem in a major field of study. Supervised by faculty member. Formal report and presentation required. One to four credits depending on problem selected and effort made.
$40 laboratory fee.

**PHYS 4954: Undergraduate Research in Physics**
Offered: On demand
Prerequisite: Departmental approval
Advanced students carry out independent research activity relating to a significant problem in a major field of study. Supervised by faculty member. Formal report and presentation required. One to four credits depending on problem selected and 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.