

PHYSICS

Office: Science and Mathematics 178, 537-6178

Faculty: Richard Flynn, Kenneth Murphy

Department: Science

The objective of the study of Physics is for the student to acquire basic concepts and principles of physics, to become familiar with various types of physical processes and instrumentation, to develop a wide variety of problem-solving skills, and to acquire the ability to make critical decisions. The minor in Physics provides a core of fundamental physics courses which will enhance any math, science, or related field of study.

Minor: Physics (28 credits)

Mathematics (10 credits)

MATH 150 Calculus I.....5

MATH 151 Calculus II.....5

Physics (14 credits)

PHYS 181 University Physics I.....5

PHYS 182 University Physics II.....5

PHYS 291 Modern Physics3

PHYS 351 Advanced Lab I.....1

Physics Electives (4 credits) *Choose one of the following:*.....4

PHYS 391 Classical Mechanics4

PHYS 392 Electricity and Magnetism4

PHYS 491 Quantum Mechanics.....4

PHYS 492 Thermal and Statistical Physics.....4

Total Credits: 28

PHYSICS COURSES (PHYS)

PHYS 100 (LAC, T) Our Physical Universe (3 credits lecture/1 credit lab)

A non-mathematical approach to the great ideas of physics and astronomy, together with their philosophical and social impact. This course is designed for non science majors. Scientific topics include the developmental history of science, mechanics, electricity, magnetism, cosmology, relativity, quantum theory, and nuclear physics. Philosophical and social topics include methods and values of science, problems related to energy sources, and implications of modern weapons.

PHYS 120 (LAC, T) Introductory Physics (3 credits lecture/1 credit lab)

A descriptive and experiential exploration of physics. Topics will be drawn from mechanics, waves, fluids, sound, heat, light, electricity, magnetism, and modern physics. Prerequisite: two years of high school mathematics or MATH 045.

PHYS 121 (LAC, T) Introduction to Astronomy (3 credits lecture/1 credit lab)

Qualitative introduction and historical outline of astronomy and development of physical laws used to describe the solar system, stars, galaxies, the universe, and some observational techniques. The laboratory includes extensive use of the planetarium.

PHYS 141 (LAC, T) College Physics I/ PHYS 142 College Physics II (3 credit lecture/1 credit lab)

Introductory physics course which makes extensive use of algebra and trigonometry. For students in the areas of biology, environmental science, health science and related pre-professional programs. Includes basic

principles of bodies at rest and in motion, periodic motion, heat, thermodynamics, electricity, magnetism, electromagnetic radiation, optics, and selected topics from modern physics. Prerequisite: Three years of high school math including trigonometry or MATH 125.

PHYS 150 Directed Research (1-3 credits)

Directed experimental and/or theoretical research on selected problems in the physical sciences. Prerequisite: consent of instructor.

PHYS 181 (LAC, T) University Physics I/ PHYS 182 University Physics II (4 credits lecture/1 credit lab)

Introductory calculus-based physics course for students pursuing fields in engineering, physics, and chemistry. Topics include Newtonian mechanics, conservation laws, simple harmonic motion, wave motion, thermodynamics, electrostatics, simple DC/AC circuits, magnetism, electromagnetic waves, and optics. Emphasizes the use of vectors and calculus in problem-solving. Prerequisite: MATH 150.

PHYS 186 Topics in Physics (1-4 credits)

PHYS 241 Engineering Statics (3 credits)

Applications of equations of equilibrium to the analysis of simple structures and machines. Use will be made of vector algebra, free body diagrams, center of gravity and moment of force acting on a rigid body. Prerequisite: PHYS 142 or 182.

PHYS 242 Engineering Dynamics (3 credits)

Vector treatment of kinematics, Newton's Laws, work and energy, impulse and momentum with applications to problems of particle and rigid body motion. Prerequisites: PHYS 182 and PHYS 241.

Effective 07/01/09

Note: While every effort is made to ensure accuracy, SMSU reserves the right to correct any clerical errors herein.

PHYS 250 Directed Studies (1-3 credits)

Directed study of selected topics in the physical sciences not covered elsewhere. Prerequisite: consent of instructor.

PHYS 260 Electronics (2 credits lecture/1 credit lab)

Basic electricity and circuit functions, time-varying and resonant circuits, semiconductors (diodes, transistors and other devices), amplifiers, waveform generators, and nonlinear devices. Prerequisite: PHYS 142 or 182.

PHYS 286 Topics in Physics (1-4 credits)

Study of physics topic not ordinarily covered in the established courses.

PHYS 290 Mathematical Physics (3 credits)

A sequel to PHYS 182 designed for pre-engineers, some math majors, and other science majors. Emphasis will be placed upon a vector calculus treatment of the physical concepts of electromagnetism. Prerequisites: MATH 151 and PHYS 182, or consent of instructor.

PHYS 291 Modern Physics (3 credits)

A historically-based development of relativity and quantum theory as seen through the breakdown of classical physics. Investigation of the Bohr model of the atom, introduction to quantum mechanics and its application to problems involving simple forms of potential energy through the application of the Schrodinger equation. Brief introduction to topics including atomic, molecular, solid state, and nuclear physics. Prerequisite: PHYS 182.

PHYS 351 Advanced Lab I (1 credit)

Advanced physics lab for student majoring or minoring in physics. Lab experiments are derived from the areas of mechanics, thermodynamics, electricity and magnetism, optics, and modern physics. Prerequisite: PHYS 291.

PHYS 352 Advanced Lab II (1 credit)

Advanced physics lab for student majoring or minoring in physics. Lab experiments are derived from the areas of mechanics, thermodynamics, electricity and magnetism, optics, and modern physics. Prerequisite: PHYS 291.

PHYS 391 Classical Mechanics (4 credits)

Rigid bodies and systems of particles analyzed with Lagrangians, Hamiltonians, and methods from vector calculus, gravitation, central field problems, and wave motion. Prerequisite: PHYS 291.

PHYS 392 Electricity and Magnetism (4 credits)

Electrostatics, magnetostatics, dielectrics, time varying electric and magnetic fields, electromagnetic induction, applications of Gauss' Law, Ampere's Law, and Faraday's Law in the development of Maxwell's equations. Prerequisite: PHYS 291.

PHYS 451 Advanced Lab III (1 credit)

Advanced physics lab for student majoring or minoring in physics. Lab experiments are derived from the areas of mechanics, thermodynamics, electricity and magnetism, optics, and Modern Physics. Prerequisite: PHYS 291.

PHYS 452 Advanced Lab IV (1 credit)

Advanced physics lab for student majoring or minoring in physics. Lab experiments are derived from the areas of mechanics, thermodynamics, electricity and magnetism, optics, and Modern Physics. Prerequisite: PHYS 291.

PHYS 480 Physics Seminar (1 credit)

Presentations by students, faculty, and guest speakers covering research topics and issues relating to physics and/or engineering. Prerequisite: junior or senior standing.

PHYS 86 Special Topics in Physics (1-4 credits)

Study of physics topic not ordinarily covered in the established courses.

PHYS 491 Quantum Mechanics (4 credits)

Basic principles of quantum mechanics including operators, one-dimensional wells and barriers, Schrodinger equation, uncertainty, wave-particle duality, Born interpretation, unstable states, bosons and fermions, central force problems, angular momentum, spin, addition of angular momentum, and various approximation methods. Prerequisite: PHYS 291.

PHYS 492 Thermal and Statistical Physics (4 credits)

A rigorous analysis of the thermal properties of physical systems at the microscopic and macroscopic levels. Introduction to the laws of thermodynamics, cyclic processes, and entropy functions. Development of the Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac distribution functions. Prerequisite: PHYS 291.

PHYS 499 Physics Internship (1-10 credits)

Supervised work assignments in physics outside the University for selected and qualified students. Prior approval by the Physics Program of the project and of credit to be received is required. Prerequisite: consent of Physics Program.