PHYS - PHYSICS (PHYS)

PHYS 101 Freshman Physics Orientation
Credit 1. 1 Lecture Hour.
Critical thinking skills and problem solving in physics: time management and teaming skills. For physics majors. Registration by non-majors requires approval of instructor.

PHYS 102 Freshman Physics Orientation II
Credit 1. 1 Lecture Hour.
Critical thinking skills and problem solving in physics: time management and teaming skills. For physics majors. Registration by non-majors requires approval of instructor.

PHYS 109/ASTR 109 Big Bang and Black Holes
Credits 3. 3 Lecture Hours.
Designed to give an intuitive understanding of the Big Bang and Black Holes, without mathematics, and de-mystify them for the non-scientist. Cross Listing: ASTR 109/PHYS 109.

PHYS 119/ASTR 119 Big Bang and Black Holes: Laboratory Methods
Credit 1. 2 Lab Hours.
Hands-on understanding of the concepts surrounding the Big Bang and Black Holes; emphasis on the evidence-based decision making process, methods and presentation; for non-scientists. Companion course for ASTR 109/PHYS 109/PHYS 109/ASTR 109.

PHYS 123 Physics for Future Presidents
Credits 3. 3 Lecture Hours.
Physics needed to be an effective policy maker or world leader but appropriate for any citizen, since all citizens need to understand the world in which they live and work; fundamental principles of physics made comprehensible and usable by those not in science- or math-related fields.

PHYS 125 Soft Matter Physics for Non-physicists
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Modern physics in action with hands-on physics experience in simple experiments for non-physicists majors; introduction to thermodynamics and soft matter physics; heat, temperature, thermodynamic efficiency, phase transitions, mechanical properties of soft matter, heat transfer mechanisms; physical measurements.

PHYS 201 College Physics
Credits 4. 3 Lecture Hours. 3 Lab Hours.

PHYS 202 College Physics
Credits 4. 3 Lecture Hours. 3 Lab Hours.
(PHYS 1302 and 1102, 1402) College Physics. Continuation of PHYS 201. Fundamentals of classical electricity and light; introduction to contemporary physics.

PHYS 205 Concepts of Physics
Credits 4. 3 Lecture Hours. 3 Lab Hours.
General survey physics course for K-8 preservice teachers integrating physics content and laboratory activities relevant to physics-related subject matter included in the current Texas and national standards for elementary school science; includes aspects of mechanics, waves, electricity, magnetism and modern physics.

PHYS 206 Newtonian Mechanics for Engineering and Science
Credits 3. 3 Lecture Hours.
Calculus-based introductory Newtonian mechanics; laws of physical motion for solution of science and engineering problems.

PHYS 208 Electricity and Optics
Credits 4. 3 Lecture Hours. 3 Lab Hours.
(PHYS 2326 and PHYS 2126, PHYS 2426) Electricity and Optics. Continuation of PHYS 218. Electricity, magnetism, and introduction to optics. Primarily for students in science and engineering.

PHYS 216/ENGR 216 Experimental Physics and Engineering Lab II - Mechanics
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Description and application of laws of physical motion to the solution of science and engineering problems; using sensing, control and actuation for experimental verification of physics concepts while solving engineering problems.

PHYS 217/ENGR 217 Experimental Physics and Engineering Lab III - Electricity and Magnetism
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Electromagnetism and electromechanical systems; use of sensing, control and actuation to demonstrate key physical relationships through the transducer relationships linking pressure, temperature and other physical stimuli to changes in electric and magnetic fields.

PHYS 218 Mechanics
Credits 4. 3 Lecture Hours. 3 Lab Hours.

PHYS 220 College Physics
Credits 4. 3 Lecture Hours. 3 Lab Hours.

PHYS 221 College Physics
Credits 4. 3 Lecture Hours. 3 Lab Hours.
(PHYS 1302 and 1102, 1402) College Physics. Continuation of PHYS 201. Fundamentals of classical electricity and light; introduction to contemporary physics.

PHYS 223 Physics for Future Presidents
Credits 3. 3 Lecture Hours.
Physics needed to be an effective policy maker or world leader but appropriate for any citizen, since all citizens need to understand the world in which they live and work; fundamental principles of physics made comprehensible and usable by those not in science- or math-related fields.

PHYS 225 Soft Matter Physics for Non-physicists
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Modern physics in action with hands-on physics experience in simple experiments for non-physicists majors; introduction to thermodynamics and soft matter physics; heat, temperature, thermodynamic efficiency, phase transitions, mechanical properties of soft matter, heat transfer mechanisms; physical measurements.

PHYS 226 College Physics
Credits 4. 3 Lecture Hours. 3 Lab Hours.

PHYS 227 College Physics
Credits 4. 3 Lecture Hours. 3 Lab Hours.
(PHYS 1302 and 1102, 1402) College Physics. Continuation of PHYS 201. Fundamentals of classical electricity and light; introduction to contemporary physics.

PHYS 229 Concepts of Physics
Credits 4. 3 Lecture Hours. 3 Lab Hours.
General survey physics course for K-8 preservice teachers integrating physics content and laboratory activities relevant to physics-related subject matter included in the current Texas and national standards for elementary school science; includes aspects of mechanics, waves, electricity, magnetism and modern physics.

PHYS 230 Newtonian Mechanics for Engineering and Science
Credits 3. 3 Lecture Hours.
Calculus-based introductory Newtonian mechanics; laws of physical motion for solution of science and engineering problems.

PHYS 232 Electricity and Optics
Credits 4. 3 Lecture Hours. 3 Lab Hours.
(PHYS 2326 and PHYS 2126, PHYS 2426) Electricity and Optics. Continuation of PHYS 218. Electricity, magnetism, and introduction to optics. Primarily for students in science and engineering.

PHYS 234 Experimental Physics and Engineering Lab II - Mechanics
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Description and application of laws of physical motion to the solution of science and engineering problems; using sensing, control and actuation for experimental verification of physics concepts while solving engineering problems.

PHYS 235 Experimental Physics and Engineering Lab III - Electricity and Magnetism
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Electromagnetism and electromechanical systems; use of sensing, control and actuation to demonstrate key physical relationships through the transducer relationships linking pressure, temperature and other physical stimuli to changes in electric and magnetic fields.

PHYS 236 Mechanics
Credits 4. 3 Lecture Hours. 3 Lab Hours.

PHYS 239 Concepts of Physics
Credits 4. 3 Lecture Hours. 3 Lab Hours.
General survey physics course for K-8 preservice teachers integrating physics content and laboratory activities relevant to physics-related subject matter included in the current Texas and national standards for elementary school science; includes aspects of mechanics, waves, electricity, magnetism and modern physics.

PHYS 240 Newtonian Mechanics for Engineering and Science
Credits 3. 3 Lecture Hours.
Calculus-based introductory Newtonian mechanics; laws of physical motion for solution of science and engineering problems.

PHYS 242 Electricity and Optics
Credits 4. 3 Lecture Hours. 3 Lab Hours.
(PHYS 2326 and PHYS 2126, PHYS 2426) Electricity and Optics. Continuation of PHYS 218. Electricity, magnetism, and introduction to optics. Primarily for students in science and engineering.

PHYS 244 Experimental Physics and Engineering Lab II - Mechanics
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Description and application of laws of physical motion to the solution of science and engineering problems; using sensing, control and actuation for experimental verification of physics concepts while solving engineering problems.

PHYS 245 Experimental Physics and Engineering Lab III - Electricity and Magnetism
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Electromagnetism and electromechanical systems; use of sensing, control and actuation to demonstrate key physical relationships through the transducer relationships linking pressure, temperature and other physical stimuli to changes in electric and magnetic fields.

PHYS 246 Mechanics
Credits 4. 3 Lecture Hours. 3 Lab Hours.
PHYS 221 Optics and Thermal Physics  
Credits 3. 3 Lecture Hours.  
Wave motion and sound, geometrical and physical optics, kinetic theory of gases, laws of thermodynamics.  
Prerequisites: PHYS 208 or concurrent enrollment; MATH 221, MATH 251, or MATH 253, or concurrent enrollment; MATH 308 or concurrent enrollment.

PHYS 222 Modern Physics for Engineers  
Credits 3. 3 Lecture Hours.  
Atomic, quantum, relativity and solid state physics.  
Prerequisites: PHYS 208; MATH 308 or concurrent enrollment.

PHYS 225 Electronic Circuits and Applications  
Credits 4. 1 Lecture Hour. 6 Lab Hours.  
Linear circuit theory and applications of solidstate diodes, bipolar and field-effect transistors, operational amplifiers and digital systems.  
Prerequisites: PHYS 208, MATH 308.

PHYS 285 Directed Studies  
Credits 1 to 4. 1 to 4 Other Hours.  
Special work in laboratory or theory to meet individual requirements in cases not covered by regular curriculum; intended for use as lower-level credit.  
Prerequisite: Approval of instructor.

PHYS 289 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 6 Lab Hours.  
Selected topics in an identified area of physics. May be repeated for credit.  
Prerequisite: Approval of instructor.

PHYS 291 Research  
Credits 0 to 4. 0 to 4 Other Hours.  
Research conducted under the direction of faculty member in physics. May be repeated 2 times for credit.  
Prerequisites: Freshman or sophomore classification and approval of instructor.

PHYS 302 Advanced Mechanics I  
Credits 3. 3 Lecture Hours.  
Classical mechanics of particles and rigid bodies; review of Newtonian mechanics and foundations of Lagrangian and Hamiltonian formalism.  
Prerequisite: PHYS 309 and PHYS 331; PHYS 332 or concurrent enrollment, or approval of instructor.

PHYS 303 Advanced Mechanics II  
Credits 3. 3 Lecture Hours.  
Applications of Lagrangian and Hamiltonian methods to selected problems of classical mechanics.  
Prerequisite: PHYS 302.

PHYS 304 Advanced Electricity and Magnetism I  
Credits 3. 3 Lecture Hours.  
Electrostatics; dielectrics; electrical current and circuits; magnetic fields and materials; induction; Maxwell's equations.  
Prerequisites: PHYS 331; PHYS 332 or concurrent enrollment, or approval of instructor.

PHYS 305 Advanced Electricity and Magnetism II  
Credits 3. 3 Lecture Hours.  
Radiation and optics. Electromagnetic waves; radiation; reflection and refraction; interference; diffraction; special relativity applied to electrodynamics.  
Prerequisite: PHYS 304.

PHYS 309 Modern Physics  
Credits 3. 3 Lecture Hours.  
Special relativity; concepts of waves and particles; introductory quantum mechanics.  
Prerequisite: PHYS 221.

PHYS 327 Experimental Physics I  
Credits 2. 1 Lecture Hour. 2 Lab Hours.  
Laboratory experiments in modern physics and physical optics with an introduction to current, state-of-the-art recording techniques.  
Prerequisites: PHYS 225; PHYS 309.

PHYS 328 Experimental Physics II  
Credit 1. 1 Lecture Hour. 1 Lab Hour.  
Laboratory experiments in modern physics and physical optics with an introduction to current, state-of-the-art recording techniques.  
Prerequisites: PHYS 327 or concurrent enrollment.

PHYS 331 Theoretical Methods for Physicists I  
Credits 3. 3 Lecture Hours.  
Methods to solve the important equations of theoretical physics, emphasizing the effects of boundary conditions and quantization on their solutions and restricted to the essential physical symmetries associated with free space, spheres, cylinders, and rectangles; if time permits, introduction to symmetries in physics and to asymptotic methods.  
Prerequisites: PHYS 331; restricted to physics majors.

PHYS 332 Theoretical Methods for Physicists II  
Credits 3. 3 Lecture Hours.  
Applications involving vectors; vector and additional methods for advanced electricity and magnetism; relationship and solutions of classical wave equation, heat equation, and Schrodinger equation; harmonic motion on finite or periodic lattice and in continuum; tensor and matrix notation in classical mechanics and electricity and magnetism.  
Prerequisite: PHYS 221 or approval of instructor.

PHYS 401 Computational Physics  
Credits 3. 2 Lecture Hours.  
Introduction to computational and simulative techniques widely used in physics applications and research, including trajectory integration, wave motion analysis, molecular dynamics, Monte Carlo methods, statistical mechanics of spin systems, phase transitions, quantum evolution, bound state problems, and variational methods.  
Prerequisites: PHYS 332; knowledge of a high level language.

PHYS 408 Thermodynamics and Statistical Mechanics  
Credits 4. 4 Lecture Hours.  
Statistical method, macroscopic thermodynamics, kinetic theory, black body radiation, Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics.  
Prerequisite: PHYS 412.

PHYS 412 Quantum Mechanics I  
Credits 3. 3 Lecture Hours.  
Postulates of wave mechanics; wave packets; harmonic oscillator; central field problem; hydrogen atom; approximation methods.  
Prerequisites: PHYS 302; PHYS 309; PHYS 332; junior or senior classification.

PHYS 414 Quantum Mechanics II  
Credits 3. 3 Lecture Hours.  
Continuation of PHYS 412. Electron spin; addition of angular momenta; atomic structure; time dependent perturbations; collision theory; application of quantum mechanics to atomic, solid state, nuclear or high energy physics.  
Prerequisite: PHYS 412.
PHYS 416 Physics of the Solid State
Credits 3. 3 Lecture Hours.
A survey of solid state physics; an introduction to crystal structures and
the physics of electrons, lattice vibrations and photons; applications
to semiconductors; magnetism; superconductivity; physics of
nanostructures; brief introduction to selected current topics in
condensed matter physics.
Prerequisites: PHYS 304 and PHYS 412.

PHYS 425 Physics Laboratory
Credits 2. 6 Lab Hours.
Experiments in nuclear, atomic, and molecular physics using modern
instrumentation and equipment of current research.
Prerequisite: PHYS 327 or equivalent.

PHYS 426 Physics Laboratory
Credits 2. 6 Lab Hours.
Experiments in solid state and nuclear physics. Modern instrumentation
and current research equipment are employed.
Prerequisite: PHYS 327 or equivalent.

PHYS 485 Directed Studies
Credits 1 to 12. 1 to 12 Other Hours.
Special work in laboratory or theory to meet individual requirements in
cases not covered by regular curriculum.
Prerequisite: Approval of instructor.

PHYS 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified field of physics. May be repeated for
credit.
Prerequisite: Approval of instructor.

PHYS 491 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in physics.
May be repeated for credit. Registration in multiple sections of this
course is possible within a given semester provided that the per semester
credit hour limit is not exceeded.
Prerequisites: Junior or senior classification and approval of instructor.