

Department of Physics

Purpose and Goals

In July 2013, Texas Higher Educational Coordinating Board (THECB) approved a joint Bachelor of Science (BS) degree in Physics (CIP 40.0801.00) as part of the Texas Physics Consortium (TPC) for the following universities: Prairie View A&M University, Tarleton State University, Texas A&M University-Corpus Christi, Texas A&M University-Kingsville, West Texas A&M University, Texas Southern University, and Mid Western State University. This consortium undergraduate BS program in Physics provides a broad and solid background in fundamental physics from introductory to advanced course work. It also provides specialized educational preparation and training in several disciplines.

Academic Standards

Students must earn a minimum grade of a "C" in all classes taken in their major disciplines and a minimum grade of a "C" in all classes taken in their minor disciplines (if applicable).

Special Focus Areas

The Physics program also provides opportunities for undergraduate students to pursue research at the frontiers of physics and for collaborations with other departments. The physics faculty members conduct research in areas that include novel materials and devices, nanostructures, high-temperature superconductivity, high magnetic field phenomena, solar and space physics, radiation physics, medical imaging, geosciences, and optical physics. These research projects provide an outstanding training environment for our undergraduate students.

The program offers several specialization focus areas that may be customized to the student's interest and potential career of choice. Examples are:

Traditional Physics (with 18 SCH of advanced courses in Physics or Physical Science)

Computational Physics (with 23 SCH of courses from Computer Science)

Applied Physics (with 23 SCH of courses from Electrical Engineering)

Medical Physics

Each student will work with an advisor and the program coordinator to develop an individual degree plan. All Physics majors must complete the core curriculum. Consult your advisor for a choice of courses within the core that would better prepare you for Physics and other professional programs.

Requirements for Physics as a Minor

Students who select Physics as a minor must complete 18 semester credit hours from the following courses with a minimum grade of a "C":

PHYS 2125	University Physics Lab I	1
PHYS 2126	University Physics Lab II	1
PHYS 2325	University Physics I	3
PHYS 2326	University Physics II	3
Physics Electives		10
Total Hours		18

Honor Societies, Clubs, and Service Organizations

Students who have had at least one course in physics above the lower division level, and whose grade point averages are B or better, are eligible for membership in Sigma Pi Sigma, the physics honor society. Students having an interest in physics may also join the Society of Physics Students, an organization dedicated to the promotion and advancement of physics throughout society.

Courses

PHYS 1101 General Physics Lab I: 1 semester hour.

General physics laboratory on concepts of mechanics to include experiments on measurement, vectors-force table, air track, projectile motion, static and kinetic friction, ballistic pendulum, centripetal force, moment of inertia, Hooke's law and simple harmonic motion, standing waves and sound.

Prerequisites: PHYS 1301 (may be taken concurrently) or PHYS 2113 (may be taken concurrently).

PHYS 1102 General Physics Lab II: 1 semester hour.

General physics laboratory to include experiments on determination of absolute zero, linear expansion, calorimetry, force of static electricity, Ohm's Law, color-coded resistors, resistors in series and parallel, RC-series transient circuit, RLC-series circuit, AC circuits, concave and convex lenses, and diffraction gratings.

Prerequisites: (PHYS 1301 or PHYS 2113) and (PHYS 1302 (may be taken concurrently) or PHYS 2123 (may be taken concurrently)).

PHYS 1301 General Physics I: 3 semester hours.

An algebra and trigonometry based introduction to general physics with topics to include measurement system, motion, vector addition, Newton's laws of motion, statics, dynamics, mechanical energy, gravitation, momentum, circular and angular motion, and torque.

Prerequisites: (MATH 1314 or MATH 1113) or (MATH 1511 or MATH 1115) or (MATH 1316 or MATH 1123).

PHYS 1302 General Physics II: 3 semester hours.

A continuation of algebra and trigonometry based General Physics I course includes sound, heat, electricity, magnetism, and optics.

Prerequisites: (PHYS 1301 or PHYS 2113) or (PHYS 2325 or PHYS 2513).

PHYS 2125 University Physics Lab I: 1 semester hour.

Calculus-based physics laboratory on concepts of mechanics to include experiments on measurement, vectors-force table, air track, projectile motion, static and kinetic friction, ballistic pendulum, centripetal force, moment of inertia, Hooke's law and simple harmonic motion, standing waves and sound.

Prerequisites: PHYS 2325 (may be taken concurrently) or PHYS 2513 (may be taken concurrently).

PHYS 2126 University Physics Lab II: 1 semester hour.

Calculus-based physics laboratory to include experiments on determination of absolute zero, linear expansion, calorimetry, string standing waves, sound resonance, force of static electricity, Ohm's Law, color-coded resistors, resistors in series and parallel. RC-series transient circuit, RLC-series circuit, AC circuits, concave and convex lenses, and diffraction gratings.

Prerequisites: PHYS 2326 (may be taken concurrently) or PHYS 2523 (may be taken concurrently).

PHYS 2325 University Physics I: 3 semester hours.

A calculus-based introductory physics course for science and engineering students. Course includes measurement, Newton's laws of motion statics, dynamics, mechanical energy, momentum, circular motion, and selected topics from torque, modules, Newton universal law, and fluid mechanics.

Prerequisites: MATH 2413 or MATH 1124.

PHYS 2326 University Physics II: 3 semester hours.

A continuation of PHYS 2513, a calculus-based introductory physics course for science and engineering students. Course includes electricity, magnetism, and selected topics from , sound and light.

Prerequisites: (PHYS 2325 or PHYS 2513) and (MATH 2414 or MATH 2024).

PHYS 3310 Mechanics I: 3 semester hours.

The course content includes elements of vector analysis, rectilinear motion of a particle, Newton's laws, damped and forced harmonic motion, Fourier series, motion of a particle in three dimensions, rotating coordinate systems, gravitation, central force motion.

Prerequisites: PHYS 2326 or PHYS 2523.

PHYS 3312 Electricity and Magnetism I: 3 semester hours.

Basic theory of electrostatics; Coulomb's Law, Gauss's Theorem, simple potential theory, Laplace's and Poisson's equations. Calculation of electric fields and potentials for point and continuous charge distributions. Computer-based demonstrations are included.

Prerequisites: PHYS 2326 or PHYS 2523.

PHYS 3316 Mathematical Physics I: 3 semester hours.

Advanced mathematics for physicists and engineers; vector analysis, curvilinear coordinates, tensor analysis, matrices and determinants, infinite series, functions of a complex variable. Emphasis throughout is on practical applications of theory and techniques as applied to problems in physics and engineering. Computer programs such as Mathematica and MAT LAB will be used.

Prerequisites: PHYS 2326 or PHYS 2523.

PHYS 3318 Modern Physics I: 3 semester hours.

Course content includes relativity, wave-particle duality, atomic structure, quantum mechanics, and quantum theory of the hydrogen atom.

Prerequisites: PHYS 2326 or PHYS 2523.

PHYS 3324 Introduction to Nuclear, Particle and Radiation Physics: 3 semester hours.

Nuclear models, nuclear reactions, fundamentals of particle physics, classification of radiation particles, radiation transport, radiation scattering, radiation decay, radiation measurement, and radiation effects.

Prerequisites: PHYS 2326 or PHYS 2523.

PHYS 4191 Physics Research Project: 1 semester hour.

The first half of a two semester sequence. A research project with a faculty advisor or mentor. Includes literature survey preparation and initiation of a research project.

Prerequisites: PHYS 3318 or PHYS 3183.

PHYS 4192 Physics Research Seminar: 1 semester hour.

The second half of a two semester sequence. A research project with a faculty advisor or mentor. Continues the initiated research from the earlier course (PHYS 4911) towards a research publication.

Prerequisites: PHYS 4191 or PHYS 4911.

PHYS 4302 Introductory Quantum Mechanics I: 3 semester hours.

Inadequacy of classical mechanics, wave-particle duality, wave function, uncertainty relation, Schrodinger equation, expectation values, operator formalism, measurement, the correspondence principle, etc.

Prerequisites: PHYS 2326 or PHYS 2523.

PHYS 4306 Thermodynamics and Statistical Mechanics: 3 semester hours.

Macroscopic thermodynamic systems, kinetic theory, black body radiation, classical and quantum statistical mechanics to include Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac Statistics.

Prerequisites: MATH 3014 or MATH 3401.

PHYS 4310 Advanced Physics Lab: 3 semester hours.

Computational physics modeling and simulations; several types of physics problem modeled and solved; software including Mathematica, MA TLAB, Numerical Recipes, Electronics Workbench, will be utilized.

Prerequisites: PHYS 2326 or PHYS 2523.

PHYS 4316 Special Topics PHYS: 3 semester hours.

Selected current and emerging topics in Physics. Courses may be repeated for credit when topics vary.

PHYS 4399 Independent Study: 1-3 semester hour.

Readings, research, and/or field work on selected topics.