Undergraduate Physics Courses

PHYS 1302. Essential Elements of Physics. 3 Credit Hours (Lecture: 2 Hours, Lab: 3 Hours).
This course introduces fundamental physics and astronomy concepts to students planning to become elementary and middle school teachers. Students are expected to design and conduct inquiry based experiments including the development of hypothesis, collection and analysis of data, and the use of appropriate laboratory equipment. Topics include motion, forces, energy, waves, light, electricity, magnetism, stellar and planetary evolution, and the atom. Enrollment in this course is restricted to Interdisciplinary Studies majors. Prerequisite: MATH 1314. Lab fee: $2.

PHYS 1401. College Physics I. 4 Credit Hours (Lecture: 3 Hours, Lab: 3 Hours).
An introduction to mechanics, heat, and wave motion. This course is a trigonometry-based physics course. A student cannot get credit for PHYS 1401 if credit has been previously received for PHYS 2425. Prerequisite: MATH 1316, MATH 2412, MATH 2413 or concurrent enrollment. Lab fee: $2.

PHYS 1402. College Physics II. 4 Credit Hours (Lecture: 3 Hours, Lab: 3 Hours).
An introduction to electricity and magnetism, light, and modern physics. This is a trigonometry-based physics course. Prerequisite: PHYS 1401. A student cannot get credit for PHYS 1402 if credit has previously been received for PHYS 2426. Lab fee $2.

PHYS 1403. Stars and Galaxies. 4 Credit Hours (Lecture: 3 Hours, Lab: 3 Hours).
A laboratory science course of study in topics of astronomy and astrophysics, including the sun and its source of energy, stellar formation and evolution, black holes, galaxies, cosmology, and the creation and evolution of the universe. Prerequisite: two semesters of high school algebra or MATH 3034. Lab fee: $2.

PHYS 1410. Great Ideas in Physics. 4 Credit Hours (Lecture: 3 Hours, Lab: 3 Hours).
Great Ideas of Physics is a laboratory science course designed to introduce the student to the concepts of physics in an elementary mathematical setting, and to discuss their significance to science, technology, and society. Topics will be drawn from both classical and contemporary physics. Prerequisite: Two semesters of high school algebra or MATH 3034. This course cannot be used for credit toward a degree in physics or mathematics. Lab fee: $2.

PHYS 1411. Introductory Astronomy I. 4 Credit Hours (Lecture: 3 Hours, Lab: 2 Hours).
A laboratory science course of study in the topics of astronomy and astrophysics, including the history of astronomy, Kepler's laws, gravitation, formation of the solar system, asteroids, comets, meteors, a detailed survey of the planets and their evolution, and discussion on the possibility of extraterrestrial life in the universe.
Prerequisite: Two semesters of high school algebra or MATH 3034. Lab fee: $2.

PHYS 2425. University Physics I. 4 Credit Hours (Lecture: 3 Hours, Lab: 3 Hours).
This is an introduction to mechanics, heat, and wave motion. This is a calculus-based physics course. Prerequisite: MATH 2413 or concurrent registration. Lab fee: $2.

PHYS 2426. University Physics II. 4 Credit Hours (Lecture: 3 Hours, Lab: 3 Hours).
This is an introduction to electricity, magnetism, optics, and modern physics. Prerequisites: PHYS 2425 and MATH 2414 or concurrent registration. Lab fee: $2.

PHYS 3331. Mechanics I. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
Particle dynamics in one, two, and three dimensions; conservation laws; dynamics of a system of particles; motion of rigid bodies; central force problems.
Prerequisites: PHYS 2426; MATH 3306 and MATH 3433 or concurrent registrations.

PHYS 3332. Electromagnetic Field Theory. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
Electrostatics; Laplace's equation; the theory of dielectrics; magnetostatic fields; electromagnetic induction; magnetic fields of currents; Maxwell's equations. Credit for both ELEN 3332 and PHYS 3332 will not be awarded. Prerequisites: PHYS 2426, MATH 3306 and MATH 3433, or concurrent registrations.

PHYS 3333. Thermodynamics. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours). [WI ([http://catalog.tarleton.edu/academicaffairs/])(http://catalog.tarleton.edu/academicaffairs/)]
Concept of temperature, equations of state; the first and the second law of thermodynamics; entropy; change of phase; the thermodynamics functions.
Prerequisites: PHYS 2426 (Prerequisite); MATH 3433 (Co-requisite).

PHYS 3334. Modern Physics I. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
Foundations of the atomic theory of matter; kinetic theory; elementary particles; radiations; atomic model; atomic structure; atomic spectra and energy levels; quantum theory of radiation; x-rays; special theory of relativity. Prerequisites: PHYS 2426 (Prerequisite); MATH 3433 or MATH 3306 (Corequisite).

PHYS 3350. Medical Physics I. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
The course will provide an introduction to the physics of human physiological processes as well as the physics used in the design of medical diagnostic tools and techniques. Prerequisite: PHYS 2426 or consent of the instructor.

PHYS 4086. Special Problems. 1-6 Credit Hours (Lecture: 0 Hours, Lab: 1-3 Hours).
This course is designed to develop the theoretical or experimental capabilities, or both, of individual senior physics majors. Prerequisites: Senior classification and approval of department head.

PHYS 4161. Physics Research Project. 1 Credit Hour (Lecture: 1 Hour, Lab: 2 Hours). [WI ([http://catalog.tarleton.edu/academicaffairs/])(http://catalog.tarleton.edu/academicaffairs/)]
Literature survey and preparation for, and initiation of, a research project agreed to between the student and a faculty advisor, to be completed and reported on in the Research Seminar course. Prerequisite: PHYS 3334.

PHYS 4162. Physics Research Seminar. 1 Credit Hour (Lecture: 1 Hour, Lab: 0 Hours). [WI ([http://catalog.tarleton.edu/academicaffairs/])(http://catalog.tarleton.edu/academicaffairs/)]
An experimental or theoretical project will be continued by the student and the results reported in a seminar. Students who have not yet taken the ETS Physics field test are required to do so while enrolled in Seminar. Prerequisites: PHYS 4161.

PHYS 4303. Astronomy and Astrophysics. 3 Credit Hours (Lecture: 3 Hours, Lab: 2 Hours).
A laboratory science course of study in the topics of astronomy and astrophysics, including Planetary Astronomy, Stellar Astrophysics, Galactic Astronomy, Cosmology and Astrobiology. Prerequisites: MATH 2413, PHYS 2425. Lab fee $8.

PHYS 4330. Mathematical Methods for Physicists and Engineers. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
Mathematical techniques from the following areas: infinite series; integral transforming; applications of complex variables; vectors, matrices, and tensors; special functions; partial differential equations; Green's functions; perturbation theory; integral equations; calculus of variations; and groups and group representatives. Credit for both ENPH 4330 and PHYS 4330 will not be awarded. Prerequisite: MATH 3306, 3433.

PHYS 4332. Optics. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
Huygen's principle applied to geometric optics; interference; diffraction; polarization; crystal optics; electromagnetic theory of light; interaction of light with matter. Prerequisites: PHYS 2442 and MATH 3306.

PHYS 4334. Modern Physics II. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
The constitution of the atomic nucleus; natural radioactivity; artificially induced nuclear transmutations; alpha, beta, and gamma decay; nuclear reactions; nuclear structure and nuclear forces; nuclear fission; neutron physics. Prerequisites: PHYS 3334 and MATH 3306 or concurrent registration.

PHYS 4335. Quantum Physics. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
The Schroedinger equation; one dimensional systems; the Heisenberg uncertainty principle; magnetic moments and angular momentum; two and three dimensional systems; approximation methods; prerequisite: PHYS 3334 (Prerequisite); MATH 3306 or MATH 3433 (Co-requisite).

PHYS 4336. Solid State Physics. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
The basic ideas and methods used in the understanding of the properties of crystalline materials to include the definition of such materials, electrical and thermal conductivity, heat capacity, crystalline binding, the nature of metals, insulators, and semiconductors, dielectric properties, and magnetic properties. Credit for both ELEN 4336 and PHYS 4336 will not be awarded. Prerequisite: PHYS 3334; MATH 3306 or concurrent registration.
PHYS 4337. Nuclear Physics and Techniques. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours). [WI (http://catalog.tarleton.edu/academicaffairs/)]
The study of nuclear phenomena and properties including mass, stability, magnetic moment, radioactive decay processes and angular momentum. The use of nuclear techniques to analyze problems in other fields of engineering with a special emphasis on the characterization of electronic materials. Prerequisite Course: PHYS 3334.

PHYS 4340. Advanced Physics Laboratory. 3 Credit Hours (Lecture: 1 Hour, Lab: 4 Hours). [WI (http://catalog.tarleton.edu/academicaffairs/)]
A laboratory course focusing on advanced techniques and experiments drawn from the full range of physics classes. The student will understand the role of experimental design, advanced data analysis and reduction, error analysis, and the use of computers while investigating physical phenomena. Prerequisites: Corequisite: PHYS 3334. Lab fee: $30.

PHYS 4350. Medical Physics II. 3 Credit Hours (Lecture: 3 Hours, Lab: 2 Hours).
The course covers the physics of ionizing radiation and its application in areas of medical physics, radiation safety, and manufacturing. Prerequisite: PHYS 3334 or consent of instructor. Lab fee $8.

PHYS 440. Advanced Physics Laboratory. 3 Credit Hours (Lecture: 1 Hour, Lab: 4 Hours).
A laboratory course focusing on advanced techniques and experiments drawn from the full range of physics classes. The student will understand the role of experimental design, advanced data analysis and reduction, error analysis, and the use of computers while investigating physical phenomena. Co-requisite: PHYS 334.