

Physics and Astrophysics

M.S. in Physics and Astrophysics (<http://und-public.courseleaf.com/graduateacademicinformation/departementalcoursesprograms/physicsandastrophysics/phy-ms>)

Ph.D. in Physics and Astrophysics (<http://und-public.courseleaf.com/graduateacademicinformation/departementalcoursesprograms/physicsandastrophysics/phy-phd>)

Five-Year B.S.-M.S. in Physics (<http://und-public.courseleaf.com/graduateacademicinformation/departementalcoursesprograms/physicsandastrophysics/phy-bs-ms>)

Courses

PHYS 509. Methods of Theoretical Physics. 3 Credits.

An introduction to the mathematical methods currently used in physics.

PHYS 510. Methods of Theoretical Physics. 3 Credits.

A continuation of Physics 509 introduction to the mathematical methods currently used in physics.

PHYS 511A. Physics for Teachers I. 3 Credits.

Prerequisite: PHYS 511L.

PHYS 511B. Physics for Teachers I. 3 Credits.

Prerequisite: PHYS 511A.

PHYS 511L. Physics for Teachers I Lab. 2 Credits.

Prerequisite: Department consent.

PHYS 512A. Physics for Teachers II. 3 Credits.

Prerequisite: PHYS 512L.

PHYS 512B. Physics for Teachers II. 3 Credits.

Prerequisite: PHYS 512A.

PHYS 512L. Physics for Teachers II Lab. 2 Credits.

Prerequisites: PHYS 511L and PHYS 511B.

PHYS 513A. Physics for Teachers III. 3 Credits.

Prerequisite: PHYS 513L.

PHYS 513B. Physics for Teachers III. 3 Credits.

Prerequisite: PHYS 513A.

PHYS 513L. Physics for Teachers III Lab. 2 Credits.

Prerequisites: PHYS 512L and PHYS 512B.

PHYS 520. Cosmology. 3 Credits.

Cosmology is the study of the origin, structure, and evolution of the Universe. This graduate-level course will provide an overview of recent developments in cosmology, including; the Big Bang model, inflation, the cosmic microwave background, baryogenesis, the expanding universe, Hubble's constant and the distance scale, and dark energy. On demand.

PHYS 525. Galaxies. 3 Credits.

This graduate-level course will provide an overview of the formation and evolution of galaxies. Topics include; galaxy classification, formation of spheroids and disk galaxies, galactic dynamics, interstellar medium, dark matter, mass models, spiral structure formation, large-scale structure, and high redshift galaxies. On demand.

PHYS 535. Solid State Physics. 3 Credits.

The crystal lattice, electron theory of metals and semiconductors, and transport phenomena in solids.

PHYS 536. Solid State Physics II. 3 Credits.

Lattice vibrations, phonon-electron interactions, and cooperative phenomena in solids.

PHYS 539. Quantum Mechanics. 3 Credits.

The Schrodinger equation, perturbation methods, and simple quantum mechanical systems.

PHYS 540. Quantum Mechanics. 3 Credits.

Matrix methods, spin, and scattering phenomena.

PHYS 541. Theory Electricity Magnetism. 3 Credits.

Electrostatics, magnetostatics, electromagnetic waves.

PHYS 542. Theory of Electricity and Magnetism. 3 Credits.

Special theory of relativity, scattering of charged particles, and radiation.

PHYS 543. Statistical Physics. 3 Credits.

The Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics, and their application to the description of physical systems.

PHYS 545. Analytical Mechanics. 3 Credits.

Variational methods. Lagrange's equations, oscillations, Hamilton equations, and special relativity.

PHYS 549. Seminar. 1 Credit.

Repeatable to 3 credits.

PHYS 550. Special Topics. 1-3 Credits.

Investigation of special topics in advanced physics; the subject matter determined by student/faculty interest. Prerequisite: Consent of department. Repeatable to 6 credits.

PHYS 590. Research. 1-16 Credits.

Repeatable.

PHYS 996. Continuing Enrollment. 1-12 Credits.

Repeatable. S/U grading.

PHYS 997. Independent Study. 2 Credits.

PHYS 998. Thesis. 1-9 Credits.

Repeatable to 9 credits.

PHYS 999. Dissertation. 1-18 Credits.

Repeatable to 18 credits.

Undergraduate Courses for Graduate Credit

PHYS 402. Computers in Physics. 3 Credits.

Computer applications in physics, that may include data analysis, numerical simulation, symbolic and algebraic programming, parallel computing, computer interfacing and/or experimental physics applications. Prerequisites: PHYS 252 and knowledge of a higher-level computer programming language, or consent of instructor. On demand.

PHYS 428. Advanced Physics Laboratory. 2 Credits.

Advanced undergraduate experiments in physics, using modern techniques and instrumentation. Classic experiments leading to the current understanding of physical theory. Prerequisite: PHYS 253 or approval of instructor. F, odd years.

PHYS 431. Quantum Mechanics I. 3 Credits.

An introduction to quantum mechanics with applications to atomic structure. Prerequisite: PHYS 253. Prerequisite or Corequisite: PHYS 317 or approval of department. F, even years.

PHYS 432. Quantum Mechanics II. 3 Credits.

Further development of basic quantum theory with application to atomic, molecular, solid state and nuclear physics. Prerequisite or Corequisite: PHYS 431 or consent of instructor. S, odd years.

PHYS 434. Nuclear Physics. 3 Credits.

Introduction to the theory of atomic nuclei, fundamental forces and sub-atomic particles. Prerequisite: PHYS 253 or approval of instructor. F, odd years.

PHYS 437. Introductory Solid State Physics. 3 Credits.

A general introduction to solid state phenomena. Prerequisite: PHYS 253 or approval of instructor. F, even years.

PHYS 460. Introduction to Astrophysics. 3 Credits.

Nature of stars. Topics include celestial mechanics, relativity, optics, stellar birth, stellar interiors and evolution, nucleosynthesis, stellar death, compact objects, black holes, neutron stars, white dwarfs, binaries and variable stars. Some topics include the use of computer tools to solve problems. Prerequisite: PHYS 253 or approval of instructor. F, even years.

PHYS 461. Introduction to Astrophysics II. 3 Credits.

Galaxies and the universe. Topics include structure and evolution of galaxies, the Milky Way, stellar populations, globular clusters, interstellar medium, big bang, Hubble and the distance scale, radio galaxies, quasars, jets, blazars, clusters and superclusters of galaxies and cosmology. Some topics include the use of computer tools to solve problems. Prerequisite: PHYS 460 or approval of instructor. S, odd years.

PHYS 492. Special Problems. 1-3 Credits.

Selected problems in physics or astrophysics. Prerequisite: Approval of the department. Repeatable to 9 credits. On demand.