Kyle L. Hathcox (1974-88, 1994). University Professor of Physics, Department Chair, and Associate Dean of Arts and Sciences. B.S. and Ph.D., University of North Texas; Additional study, Oak Ridge Associated Universities.

William Nettles (2006). Professor of Physics. B.S., Mississippi College; M.S., and Ph.D., Vanderbilt University

David A. Ward (1992, 1999). Professor of Physics, B.S. and M.A., University of South Florida; Ph.D., North Carolina State University.

The programs in physics at Union University seek to effectively serve all students within the institution, recognizing that each student's needs may be different, with different career goals. The curriculum is designed to provide basic content for students classified as physics majors/minors, non-science majors, engineers, pre-professionals, and those preparing for a teaching career in secondary school. The physics faculty seek to help students understand the physical world (the universe) by examining the laws which govern all things, the methods by which the cosmos can be studied, and physics' relationships to other aspects of human experience. The faculty endeavor to create an atmosphere in which students are challenged to acquire problem-solving skills using advanced mathematics and modern methods in science. Students are encouraged to develop in-depth analytical skills and an inquiring attitude toward scientific inquiry while maintaining a Christian worldview. The physics curriculum provides the liberal arts students with a working knowledge of science and meets the needs of students who wish to:

- pursue a teaching career in elementary or secondary school;
- enter engineering, one of the health professions, or an allied health field;
- become a professional/industrial physicist; or
- continue study of physics or a related field at the graduate level.

I. Major in Physics—38 semester hours

A. Physics 231-232, 311, 430, 424-5, 498

The **Society of Physics Students (SPS)** stimulates an awareness of physics and the related sciences, and acquaints students with professional opportunities within the discipline. The organization promotes professionalism and pride in the physical sciences and assists students in studying, preparing, and presenting technical material. Membership is open to any student interested in physics.

The **Physics Research Award** is given by the faculty of the Department of Physics to the student who presents the best research paper of the year. The research must have been an original work and must be presented at a state, regional, or national professional meeting prior to the graduation.

The **Freshman Physics Award** is given to the freshman student completing PHY 231-232 who has shown outstanding scholastic achievement, Christian service, and school spirit.

( ) Hours Credit; F-Fall; W-Winter; S-Spring; Su-Summer

111. Principles of the Physical Sciences (4) F, W, S, Su
Introduction to physics and chemistry for non-science majors including their historical, philosophical, and social signi cance. Exercises are indicative of various scienti c methods. Knowledge of basic algebra is assumed. Science credit will not be given after completion of a course in either CHE or PHY. Three lectures, one 2-hour laboratory / week.

112. Earth and Space Science (4) F, W, Su
Prerequisite: PHY 111. Reciprocal credit: GEO 112.

314. Intermediate Electricity and Magnetism (3) S—Odd Years
Prerequisites: MAT 212 & PHY 232.
Electric and magnetic fields both in media and a vacuum. Maxwell's equations are used to determine electromagnetic fields produced by a variety of charge and current distributions.

325. Thermodynamics & Statistical Mechanics (3) F—Even Years
Prerequisites: MAT 212 & PHY 232.
An intermediate survey of heat and thermodynamics including the concepts of temperature and heat, the laws of thermodynamics, thermodynamics potentials, the Maxwell relations and statistical methods applied to the thermodynamics of various states of matter, including gases, liquids, and quantum fluids.

360. Mathematical Methods in Science and Engineering (3) S—Odd Years
Prerequisites: MAT 213, PHY 232. Reciprocal Credit: EGR 360. See EGR 360 for description.

400. Optics and Lasers (3) S—Odd Years
Prerequisites: MAT 213, PHY 232.
Analyzes the behavior of electromagnetic radiation, emphasizing geometrical optics and instrumentation. The role of optics in spectroscopic measurements will be highlighted by discussing polarization and diffraction. Includes an introduction to laser physics and operations using systems, including excimer and neodymium-YAG lasers.

416. Physical Principles of Solid State Devices (3) S
Prerequisites: PHY 262 and 311. Reciprocal credit: EGR 416. See EGR 416 for description.

420. Quantum Mechanics (3) S—Even Years
Prerequisites: PHY 311 & MAT 314.
Fundamental principles of quantum mechanics, methods of calculation, and solutions to Schrodinger's equation. Applications to atomic, molecular, and nuclear physics with an introduction to operator notation. Three lecture hours / week.

424-425. Physics Research (1-3) F, S
Prerequisite: PHY 311.
Application of a simple piece of original work to include a literature search and summary paper on a topic of current interest in physics. Under faculty supervision, this work may be done off site at a national laboratory or comparable research facility.

430. Experimental Physics Laboratory (3) F—Even Years
Prerequisites: PHY 311 & MAT 213.
Modern experimentation, research, data acquisition and analysis. The theory, practice and reporting of research in a scientific format are demonstrated through experiments in atomic, nuclear, solid state, thermodynamics, and optics. One lecture, 4 lab hours / week.

498. Seminar (1-3) S
Prerequisite: 20 hours of physics and junior / senior standing.
Skills in scientific and technical presentations, written and oral, will be polished. To be used at the discretion of the department for majors / minors only.

179-279-379-479. External Domestic Study Programs (1-3) As Needed
All courses and their applications must be defined and approved prior to registering.

180-280-380-480. Study Abroad Programs (1-4) As Needed
All courses and their application must be defined and approved prior to travel.

195-6-7. Special Studies (1-4) On Demand
295-6-7. Special Studies (1-4) On Demand
Lower-level group studies which do not appear in the regular departmental offerings.

395-6-7. Special Studies (1-4) On Demand
Upper-level group studies which do not appear in the regular departmental offerings.

495-6-7. Independent Study (1-4) On Demand
Individual study under the guidance of a faculty member(s).

498-9. Seminar (1-3) As Needed
To be used at the discretion of the department.