

# PHYSICS

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## Faculty

Margarita C. K. Mattingly, *Chair*  
Gary W. Burdick  
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Robert E. Kingman  
Bruce E. Lee  
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Academic Programs	Credits
BS: Physics	40
BS: Biophysics	40
BS: Physics Education	30
Physics as a Second Major	30
Minor in Physics	20

Physics describes the world in terms of matter and energy and relates phenomena to fundamental law. Its scope includes systems that range in size from the sub-nuclear to the entire cosmos.

The BS: Physics program supports and enhances professional careers in all the physical sciences, engineering, and the life sciences. Its emphasis on problem-solving also provides a foundation for careers in medicine, business, law, and government. The BS: Biophysics program prepares the graduate for direct entry into the workforce or advanced studies in medical and bioengineering fields as well as biophysics. The BS: Physics Education program can prepare the graduate for a career in secondary teaching.

The “Second Major in Physics” is an add-on degree program that complements any baccalaureate degree without incurring additional general education requirements. It strengthens and expands marketability and interdisciplinary opportunities.

A Minor in Physics complements any baccalaureate degree and is the minimum requirement for secondary teaching certification in physics. All physics majors and minors desiring certification should consult with the School of Education throughout their program.

## Undergraduate Programs

### BS: Physics—40

**Major Requirements:** PHYS241, 242, 271, 272, 277, 377, 411, 430, 431, 477, 481, 495 plus an additional 12 credits numbered 300 and above.

**Cognate Courses:** MATH141, 142, 215, 240, 286; CHEM131, 132; and CPTR125 (FORTRAN or C++) or CPTR151.

Physics majors desiring secondary-teaching certification should also consult with the School of Education.

**Recommended Electives:** ELCT141, 142, TCED250.

### BS: Biophysics—40

**Offered by the biology and physics departments**

BIOL165, 166, 371; 372 or BCHM421\*; PHYS241, 242, 271, 272, 277, 377, 411, 416, 430 or CHEM431 and 441, PHYS431, 495

\*A student may earn a minor in chemistry by selecting BCHM421 or CHEM431 and 441.

**Cognate Courses:** CHEM131, 132, 231, 232, 241, 242; MATH141, 142, 286.

**Recommended Electives:** BCHM422, 430; CHEM432, 442; ELCT141, 142; MATH215, 240.

**Senior Thesis.** All Physics and Biophysics majors do some original research in collaboration with an established physicist on-campus or at another university, industrial, or national laboratory. If students enroll for 3 credits of PHYS495 or HONS497, they may prepare a Senior Thesis. Undergraduate Research Assistant (URA) scholarships are available through the Office of Scholarly Research when students collaborate with Andrews Physics faculty.

### BS: Physics Education Major—30

**Major Requirements:** PHYS241, 242, 271, 272, 277, 377, 411, 430, 431, 481, 495 plus an additional 6 credits numbered 300 and above in consultation with advisor.

**Cognate Courses:** MATH141, 142, 240, 286

This major is available only to those who are obtaining secondary teacher certification.

### Physics as a Second Major—30

**Major Requirements:** PHYS241, 242, 271, 272, 277, 377, 411 (or ENGR285 and PHYS412), 430, 431 or ENGR435, 481, 495 plus an additional 3.5–6 credits numbered 300 and above in consultation with advisor.

**Cognate Courses:** MATH141, 142, 240, 286

This major is available only as a second major, to those taking a major in another field.

### Minor in Physics—20

PHYS241, 242, 271, 272, 411, and electives chosen in consultation with the department chair.

PHYS110, 115, 225 are not applicable to a major or minor in Physics or a major in Biophysics.

## Graduate Program

The Department of Physics collaborates in the MS: Mathematics and Science program with the departments of Mathematics, Biology, and Chemistry. See the program description under Mathematics and Science.

**C e** (Credits)  
See inside front cover for symbol code.

**PHYS110** \$ CS (4)

Exploring the cosmic environment—the solar system, stars and their development, star clusters, the interstellar medium, galaxies, and large-scale features of the Universe. Meets the General Education Physical Science requirement. Weekly: 3 lectures, 1 recitation, and a 2-hour lab. Prerequisite: MATH145 or 166 or STAT285 or MPE P2.

**PHYS110** V \$ (3)

AU/GU course—see content above.

**PHYS115** **\$ CS (4)**

A conceptual approach to physics—forces, matter, and energy with 21st century applications. Meets the General Education Physical Science requirement. Weekly: 3 lectures, 1 recitation, and a 2-hour lab. Prerequisite: MATH145 or 166 or STAT285 or MPE P2.

**PHYS141, 142** **\$ (4, 4)**

Algebra based introduction to mechanics, relativity, heat, electricity, magnetism, wave motion, physical and geometric optics, and modern physics. Weekly: 3 lectures, 1 recitation, and one 3-hour lab. Prerequisite: A minimum of MATH167 or MATH168 or MPE P4.

**PHYS225** **\$ CS (4)**

The production, transmission, synthesis, and perception of sound as understood through the physical principles, properties, and nature of waves. Includes a survey of applications—music, speech, locomotion, and imaging—and comparisons with light and other kinds of waves. Meets the General Education Physical Science requirement. Weekly: 3 lectures and a 2-hour lab. Prerequisite: MATH145 or 166 or STAT285 or MPE P2.

**PHYS241, 242; PHYS241H, 242H** **(4, 4)**

