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DEPARTMENT OF PHYSICS
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Dear new Physics and Biophysics Majors,

Welcome to the Physics Department! The central mission of the undergraduate programs in physics and biophysics is to teach students how physicists measure, describe, and explain natural phenomena through scientific investigation and critical thinking. Students learn concepts in physics, quantitative methods for analyzing data and developing theoretical insights, and experimental techniques for testing theoretical predictions and discovering new phenomena. The study of diverse applications as well as elegant theoretical formalisms reveal physics to be an exciting and highly rewarding discipline that has important connections to other sciences, engineering disciplines, and societal goals. Our graduates go on to practice their science skills in industrial and government laboratories, enter into teaching and research careers, or enter into the fields of information technology and financial services. Many pursue further study at the graduate and professional level, whether in physics or in diverse fields like business or medicine.

The Major: The Physics Department offers B.A. and B.S. degrees in Physics and in Biophysics. Detailed course requirements can be found at http://phy.duke.edu/undergraduate/physics-major-minor, including also suggested course sequences. Students take introductory physics and have required math courses as well (single- and multi-variable calculus, differential equations and linear algebra) which are best taken as early as possible. The Physics B.S. sequence includes 6 core courses and two physics electives. The Physics B.A. sequence has three required core courses plus one physics elective. The Biophysics degrees have additional chemistry, biology and biophysics requirements, along with more flexible choices for physics core and elective courses. The B.S. degrees are suggested for students considering graduate school in physics, biophysics, or related disciplines. Double majors or students with diverse career interests will sometimes choose the B.A. While not required, a computer programming course is recommended for all majors.

Introductory Courses: The Department of Physics offers three sequences of introductory calculus-based courses designed to meet the needs of different majors: 161D/161L and 162D/162L are designed for physics and biophysics majors, 151L and 152L are designed for engineers, and 141L and 142L are designed for pre-health students and others. The first course in each sequence focuses on "mechanics" which concerns the physical laws that govern the motion of point particles and of rigid macroscopic objects, with some related material on waves, oscillations, thermodynamics, and fluid dynamics. The second course in each sequence concerns electrical and magnetic phenomenon with some material on properties of light (interference, diffraction, lenses, and mirrors). Each sequence covers similar core topics but with different emphases.

Each sequence fulfills the requirements for Physics and Biophysics majors, although **Physics 161D/161L and 162D/162L are the recommended introductory courses for majors**. These courses are different from the other sequences in that the lab components, 161L and 162L, constitute separate half-credit courses. These courses offer creative and interesting labs integrated with programming and data analysis skill development, and are intended as preparation for research experiences.

Although most students who take the 161/162 sequence have seen some physics in high school, a prior course in physics is not necessary. However, a solid working knowledge of high school math is important: algebra, geometry, trigonometry, precalculus, *and* calculus. If you have concerns about your math or physics background, please talk with the Director of Undergraduate Studies or with the instructor *before* the course begins. Students with very strong backgrounds in physics and math may occasionally skip one or both of these courses, after consultation with the DUS, but high Advanced Placement scores are *not* sufficient preparation. More information on introductory courses can be found at https://phy.duke.edu/undergraduate/course-selection/introductory-physics-course .

Research: Undergraduate majors in both physics and biophysics very frequently get involved in research. Many perform substantial senior thesis projects and graduate with distinction. Research projects are available in local laboratories or theory groups and also involve international collaboration. Information on undergraduate research, graduation with distinction, and a list of potential research advisors can be found on the Physics department web page. Physics and Biophysics majors will typically start to look for a research advisor in the spring of sophomore year, but some students start earlier or later.

Advising: Undergraduate physics and biophysics majors will be assigned a major advisor in the semester they declare their major. The Physics DUS serves as advisor for all Physics majors, and the Biophysics DUS serves as advisor for all Biophysics majors. However most students will have a primary major advisor from among the faculty. Students may request a specific advisor, who will be assigned if that person is available. Students are expected to discuss their course selection and overall plan for satisfying graduation requirements with their major advisor prior to the course registration period each semester. Your major advisor and the DUS can also be helpful in finding a research advisor.

Physics Department Community: When they declare, students will be added to a majors mailing list, which gets announcements of events in the department, including colloquia and social events. In the fall, the DUS hosts a reception for new majors, and in the spring there is an annual poster session at which students present research and awards are presented. The Society of Physics Students (https://spsduke.wordpress.com) also organizes activities; please contact the SPS advisor Prof. Phil Barbeau, psbarbeau@phy.duke.edu, for more information.

Please do not hesitate to contact us if you have any questions or would just like to chat about course planning or research opportunities. Prof. Kate Scholberg, schol@phy.duke.edu, is the Director of Undergraduate Studies in Physics. Prof. John Mercer, jmercer@duke.edu, is Associate DUS for Biophysics, and can answer questions about the Biophysics programs.

Sincerely,

Kate Scholberg
Professor of Physics and Bass Fellow
Director of Undergraduate Studies

John Mercer
Associate Professor of the Practice in Biology and Physics
Associate Director of Undergraduate Studies for Biophysics