Physics Department Learning Goals

**Introductory Narrative**
The Brandeis physics major offers students a unique opportunity to prepare for graduate school or employment in a variety of technical fields. Our undergraduate program is strongly based on a first-rate research program by our faculty, which gives students the opportunity to participate in cutting-edge research in areas including astrophysics and cosmology, biological physics, condensed matter physics, high-energy particle physics, and theoretical physics, and topics such as string theory, liquid crystals, DNA, polymers, elementary particles, distant quasars, and the early universe.

**Core Skills**
After completing the major, students will:
Be able to formulate hypotheses for the physical principles behind observed phenomena.
Be able to construct mathematical models embodying these hypotheses, such that the models are consistent with existing data and make testable predictions for further experiments.
Be able to evaluate measurement errors in scientific data sets and the effects of these errors on the interpretation of the data; and be able to calculate levels of confidence in conclusions drawn from the data.
Be able to explain to a general audience the physical principles that underlie our understanding of nature.
Know how to design experiments, computer simulations, and/or theory to test a scientific hypothesis.
Have developed their skills in applied mathematics, in laboratory techniques, and in oral and written presentation.

**Knowledge goals**
After completing this major, students will have learned at an advanced undergraduate level: Newton's laws (mechanics), Maxwell's equations (electricity and magnetism), special relativity, statistical mechanics, thermodynamics, quantum mechanics, optics, statistics, and error analysis.

**Upon Graduation**
Most of our graduates go on to graduate school, while some go into high-tech employment, medical school, or other professional studies. Our students have an excellent record of entering the best graduate programs.