



## Department of Physics and Astronomy Self-Study

### I. Goals

In the opinion of the Department of Physics and Astronomy, upon the completion of a physics major at Millikin University, a student should be able to:

1. Solve complex problems that require integrating knowledge from a variety of subfields, including classical mechanics, classical electrodynamics, thermodynamics, atomic and nuclear physics, and quantum mechanics, as well as incorporating sophisticated mathematical techniques such as partial differential equations, tensor mathematics, calculus of vector fields, and linear algebra.
2. Follow the scientific method to design and carry out informative and professionally interesting experiments, utilizing laboratory techniques sufficiently advanced as to allow an easy transition to graduate school or industry.
3. Effectively communicate scientific knowledge to general audiences as well as colleagues in the field.

and provides an adequate facility for the teaching of physics. Some of the space originally assigned to the department has been transferred to the School of Nursing, and additional space will be renovated this summer in order to facilitate the reaching of departmental goals. The department is also in the process of submitting a grant proposal designed to upgrade laboratory equipment to better fit with modern pedagogical techniques.

The number of students who are physics majors has grown significantly over the past three years. As of Fall 2004, there was one sophomore and three freshmen physics majors. By Fall 2007, we expect to have five seniors (one who is completing his degree as part of the dual-degree program at Washington University), two juniors, five sophomores, and three freshmen.

Most students who pass through courses in Physics or Astronomy are not Physics majors,

During their junior year, they would take PY 253, an introduction to Modern (20<sup>th</sup>-century) Physics, and PY 325, Mathematical Physics. In Modern Physics, students will be introduced to the use of Mathematica software package, and in Mathematical Physics, they will focus on integrating knowledge from a variety of math classes as well as filling in gaps of material not commonly covered in traditional mathematics courses. In the spring, they would take Theoretical and Applied Mechanics (PY 352) and Quantum Mechanics (PY 406). As seniors, the only core physics courses left would be the two-term Electrodynamics sequence (PY 403/404) and their Senior research project (PY481/482). The relative absence of physics courses from the senior year is intentional, so that students preparing to take the GRE in the fall of their senior year are as prepared as possible.

Along with these courses will be a number of math and other science classes, such as Physical Chemistry (cross-listed with Chemistry), depending on student interest and career goals. These courses are primarily theory-based, and will involve extensive integration of material from a variety of classes and fields.

A key component of the Physics program at Millikin is that each student will design their own major, in consultation with their advisor and any other relevant faculty. This will allow for greater flexibility in the curriculum, which experience shows is highly desirable to many students. Because of the flexibility in the program, advising is especially important. Since students take courses through Millikin, a process of regular reflection on what he or she has done and want to do is necessary to make the courses fit specific needs. The department has



Item	Criteria
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## Written Presentations:

	Excellent	Adequate	Nominal
Clarity of Writing	[5 points] Clear logic and structure of paper. Strong command of language, spelling, and grammar. Clear confidence in command of material.		





Appendix I Curriculum Map

	Problem Solving	Experimentation	Communication
PY 100 I The Planets			
PY 101 I Stars and Galaxies			