

## **The Physics Department and Augsburg's Mission**

Ever since its founding in 1957, the Augsburg Physics Department has provided high quality educational opportunities that result in the ultimate success of its students and their sharing their gifts with the community.

***To nurture future leaders in service to the world by providing high quality educational opportunities, which are based in the liberal arts and shaped by the faith and values of the Christian church, by the context of a vital metropolitan setting, and by an intentionally diverse campus community.***

- ***by providing high quality educational opportunities***

Physics Departments are the smallest science programs at most undergraduate colleges, often playing no more than a supportive role for other pre-professional and science programs. That hasn't been the case at Augsburg, however.

The department has in fact pioneered a variety of innovative general education and service courses, including Physics for the Life Sciences, Conceptual Physics, Science and Religion, Astronomy, and Introductory Meteorology, and more recently Natural Science I and II (for elementary education majors), Earth Science for Elementary Teachers, and Physics for the Fine Arts. We have also, however, also provided not only a full majors program (since 1957) but also front-line research opportunities since 1970, when Augsburg alumnus Ken Erickson (class of 1962) returned to campus to join Augsburg's faculty. The department now offers a B. A. and a more extensive B. S. degree program, as well as a B. S. with concentration in Space Physics.

Our department has also been at the forefront of what is now a nationwide effort to incorporate research into undergraduate science curricula for our majors. Since 1970 over 80 students have been involved in paid undergraduate research assistantships. Twenty three students have presented papers on their research at national scientific meetings, and twelve have been co-authors of papers published in peer-reviewed scientific journals (three as first author). Because of this research experience and our strong program in theoretical and experimental physics, over 60% of Augsburg Physics graduates, and nearly all of our student researchers, have continued their studies in graduate or professional school, most with assistantship or fellowship support. Because of their strong background, our students have entered a variety of careers: in Physics, Astronomy, Oceanography, Materials Science, Engineering, Patent Law, High school teaching, and Parish Ministry. Our students have won many nationally competitive awards, including Goldwater scholarships and Ford Foundation, Rotary, Fulbright, National Science Foundation, and NASA Graduate Fellowships. Augsburg alumni work at high-tech companies in the Twin Cities such as 3M, Honeywell, and Medtronic, as well as at National Laboratories and a variety of major universities around the nation.

***\*shaped by the faith and values of the Christian Church***

Although many in our culture wish to view science and religion as incompatible, study of the history and philosophy of science show that this view is only one of many that have been held by scholars (including many Christian thinkers). Many top scientists, now as well as centuries ago, have practiced their faith as well as their scientific profession, and have seen them as complementary or even as integrated rather than as contradictory.

The department's primary responsibility is to educate its students to understand the methods physicists use to understand the natural world, and the current knowledge base they have developed. This is not purely a matter of technique, however. Connections are made as appropriate to other areas of knowledge, including history, philosophy, and religion; to current concerns and ethical questions; to the limitations of science and its methods; and to long-range concerns about the future of this planet and the technological systems on which we all rely.

Physics faculty have for years included a unit on the ethics and philosophy of science in PHY 395, Comprehensive Laboratory I. These materials will now be included in a newly developed Keystone course offered jointly by the Departments of Biology, Chemistry, and Physics, which will explicitly connect the ideas of faith, vocation and stewardship with the issues of scientific professionalism and responsibility to the planet and future generations.

***\* shaped ... by an intentionally diverse campus community...***

Augsburg's location, tradition, and commitment lead us to:

- **educate a wide range of students from many backgrounds**

General Education courses offered by the Physics Department include Astronomy, Meteorology, Conceptual Physics, Earth Science for Elementary Teachers, Introduction to Physics, and General Physics. We help teach SCI 110-111, an interdisciplinary course pair for future elementary school teachers that combines topics in Physics, Chemistry, Earth Science/Astronomy, and Biology; and Honors 240, an interdisciplinary course for Honors program students not majoring in science. Finally, Physics for the Fine Arts (PHY 119) is a course which stresses the connection between physics and the fine arts, especially music.

Mathematics, the foundation of the sciences, is difficult for many of our students. However, a facility in mathematics is very important for a successful career in the sciences. Because of this importance, one of us participates in tutoring Augsburg students in mathematics, especially for underrepresented groups. A math/science tutoring program, starting in the January of 2007 with the St. Paul Urban League, will help minority students achieve their goals in science and engineering. These students may come to Augsburg or they may not, but the importance of a strong technically trained workforce is vital for our country's continued leadership in the world.

Physics faculty have learned to incorporate modern pedagogical techniques in a wide range of courses, in order to allow students with a wide range of learning styles and intellectual strengths to develop confidence in their ability to learn.

- **promote interdisciplinary learning and connections between divergent phenomena.**

In addition to the above, our newest faculty member, Ben Stottrup, a Biophysicist, directly brings an interdisciplinary focus to our department. His research students have included physicists, chemists, biologists, and computer scientists. Our students are well aware that exciting developments in science often occur at the boundaries of the various science disciplines.

**\* shaped ... *by the context of a vital metropolitan setting***

Students in our First Year Experience program (formerly “AugSem”) who intend to major in Physics or related fields make several off campus visits to local corporations and institutions (in some cases hosted by alumni). Many of our students have been able to work part-time during the academic year in local industrial research laboratories, and more recently several of our students have done research work in local industries to satisfy the new Augsburg Experience requirement.

Our department has also taken advantage of the proximity of the nearby University of Minnesota for its library facilities, seminars, and faculty and student research opportunities.

***The history and traditions of Physics also:***

- *foster intellectual curiosity*
- *inspire lifelong learning*
- *value freedom (autonomy of thought and interpretation)*

The above three elements are an integral part of our field. After all, this is physics, which tries to understand the universe in all its beauty and complexity! This requires a lifelong search to understand what is not understood. This understanding often comes to those who are willing to try new avenues not accepted by the orthodox scientific community.