A Guide for Physics Majors and Minors

UVM Physics (http://physics.uvm.edu) offers courses that develop and refine skills that are of a broad interest to practitioners in a wide variety of fields and disciplines. A physics major or minor indicates that you have the ability to solve a wide variety of problems and that you are comfortable in a technical setting. It tells employers that you have breadth to your technical background. Students who major in physics usually have a very broad scientific interest in a multitude of different fields. If your post-UVM plans involve professional schools such as medical school, law school or MBA programs, the problem-solving skills that come with a physics degree will get you noticed!

Physics is the discipline that describes how Nature behaves and uses observations of the world around us to make this description possible. A student of physics will be able to take a real world problem, break it apart into its components, translate each into a mathematical expression, manipulate that expression to get new results, and then translate the mathematical results back into a statement of physical reality. This skill is important for a wide variety of careers in the sciences, engineering, economics and the social sciences. Many majors require their students to take at least an elementary course in physics if only so the students can hone their skills in analytical thinking.

Academic Requirements

Bachelor of Science, Bachelor of Arts in Physics
The department offers both a Bachelors of Science (B.S.) and a Bachelors of Arts (B.A.) degree. The B.A. allows students to acquire a broad liberal arts education whereas the B.S. has a traditional Physics focus. Both degree options prepare students for graduate school or employment in industry. Students pursuing the B.S. may opt for the Astrophysics track in preparation for graduate studies in Astronomy or Astrophysics.

Bachelor of Science tracks in Applied Physics
The purpose of these tracks is to offer students the opportunity to take a series of engineering courses in addition to the core physics courses. Majors in the Applied Physics program have the breadth of knowledge generally identified with a physics degree combined with a strong foundation in one of the engineering disciplines. They will be prepared to sit the Fundamentals Exam (FE) for engineering and be very attractive prospects for entry-level applied science positions. This program is designed for those considering graduate work in one of the engineering disciplines. The various options for the Applied Physics program include: Electrical Engineering (Electronic Circuits and Devices or Signal Processing), Mechanical Engineering and Civil and Environmental Engineering.

Accelerated Masters Program
The Accelerated Masters Program allows students to receive an M.S. in Physics in one year, following their B.S. degree by allowing students to apply some of their undergraduate course work towards the completion of their M.S. degree. This program is open by invitation only; students are considered for the AMP during their junior year.

Honors and Awards

University Honors such as summa cum laude, magna cum laude, and cum laude awarded, respectively, to the top 10%, 4%, and 1% students of each graduating class.

College Honors involves an independent research project within the Department of Physics that is directed by a faculty member. The research project, which requires 6 credits of independent research, culminates in an Honors Thesis. The student receives 6 credits of HONORS-PHYSICS on his/her transcript as well as receiving recognition at Honors Day in April. Eligible students are invited by the department to participate in this program. Interested students should inquire about possible research opportunities at the end of their junior year.

Albert D. Crowell Award - for outstanding undergraduate experimental research in physics. The Crowell award is awarded to students who have exceptional ability to participate in experimental work under the direction of a faculty member.

David W. Juenker Prize - for outstanding senior physics major. The Juenker prize is awarded to those who have performed outstanding service to the department and their fellow majors as well as to those who have achieved an outstanding academic record. Recent recipients have gone on to graduate schools (often after completing their Master’s degree at UVM) like M.I.T., Stanford, Cornell, RPI, and the University of Illinois at Champaign-Urbana.

Research

Undergraduate Research Projects
Students have the opportunity to conduct a research project under the direction of a faculty member. Such projects can be carried out as part of their honors work to receive College Honors, or as a Special Topics course (Readings). Recent undergraduate research projects include:

- Jonathan Bessette, “Charge Carrier Mobility Tests for Pentacene Semiconductor Devices” (Honors)
- Ashley Laughney, “Macroscopic and Molecular Studies of Charge Transfer in DNA” (Honors)
- Keith Zengel, “Computational Investigation of the Role of Electrostatic Fields in Ligand Migration in O2-binding Metalloproteins” (Honors)

Typical Bachelor of Science in Physics Course Scheduling

Year 1:
Fall: PHYS 051, MATH 021, CHEM 031, CS 021
Spring: PHYS 152, MATH 022, CHEM 032

Year 2:
Fall: PHYS 128; MATH 121
Spring: PHYS 211, PHYS elective; MATH 271/230/124

Year 3:
Fall: PHYS 201, 213; MATH 272/230/124
Spring: PHYS 202, PHYS 265 and/or PHYS electives;

Year 4:
Fall: PHYS 273 and/or PHYS elective;
Spring: PHYS 265 or PHYS elective; PHYS 274/214

Major and Minor Requirements

Bachelor of Science
- Physics: PHYS 051, 152 (or PHYS 031 and PHYS 125 with PHYS 022), PHYS 128, PHYS 201, PHYS 202, PHYS 211, PHYS 213, PHYS 265, PHYS 273; PHYS 214 or PHYS 274; PHYS 265, twelve hours of approved physics electives at level 100 or above.
- Mathematics: MATH 021, MATH 022, MATH 121; MATH 271 or MATH 230; MATH 124 or MATH 272;
- Chemistry: CHEM 031 and one additional course in Chemistry (CHEM 032 recommended);
- Computer Science: CS 021.

Bachelor of Arts
- Physics Department Requirements: PHYS 051, 152 (or PHYS 031 and PHYS 125 with PHYS 022), PHYS 128 with 130, PHYS 201 or PHYS 202, PHYS 211, PHYS 213, PHYS 273; nine additional hours of approved physics electives at level 100 or above;
- Mathematics: Mathematics through MATH 121 and three hours of approved mathematics electives above 121.
- An additional laboratory science is strongly recommended.

Minor
- PHYS 051, 152 (or PHYS 031 and PHYS 125 with PHYS 022), PHYS 128 with 130; three additional hours at the PHYS 200 level excluding PHYS 201 and PHYS 202. Note: Mathematics through 121 is needed for 128.