Physics, Nuclear and Electrical Engineering

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Physics

Students who wish to major in physics will take courses that will prepare them for industrial or governmental positions or for graduate study in physics or allied fields.

The Department of Physics offers two undergraduate degree programs as well as a minor in physics. The Bachelor of Arts and the minor are designed for students who desire a flexible program so they can develop interdisciplinary competence. The Bachelor of Science degree places greater emphasis on physics and is designed to prepare students for careers in physics or a closely allied profession. This program consists of a set of required core courses plus a selection of courses in a particular field. The core courses include the basic physics and mathematics courses that serve as a foundation for more advanced study. A student planning to do graduate work in physics should elect to complete the Bachelor of Science in Physics.

The common objectives for students of our undergraduate programs in physics include developing: (1) broad, fundamental technical skills and knowledge, (2) strong communication skills, and (3) the capability to think critically and work independently. Each of these objectives has a “level” that is appropriate for the degree.

For the B.A. degree in physics, the technical objectives are mastery of calculus, ordinary differential equations, linear algebra, general physics, modern physics, and student-selected areas of classical mechanics, quantum mechanics, electromagnetism, and methods of nuclear measurements. For the B.S. degree in physics, the technical objectives are the learning goals of the B.A. degree, plus additional hands-on research laboratory experience and further knowledge in solid-state physics, statistical physics, nuclear physics, optics, and the conduct of research. The communication objectives at the B.A. and B.S. levels are writing and speaking skills that are sufficient for graduates to represent themselves and their organizations at regional or national scientific meetings. Our expectations are that these students will obtain critical thinking skills and an ability to work independently at a level that will require minimal or modest supervision of either management or a more senior scientist.

Nuclear Engineering

ISU offers a B.S. degree in Nuclear Engineering and M.S. and Ph.D. degrees in Nuclear Science and Engineering. The field of nuclear engineering involves harnessing the energy of the atomic nucleus for many productive applications, such as electricity production in nuclear power plants and medical diagnostics and treatment using radiation from the nucleus. The B.S. degree coursework plan provides for development of a strong foundation in mathematics and the physical sciences in the first few semesters. Upon this foundation are built the key components of nuclear engineering: nuclear and radiation physics, radiation detection and measurement, reactor physics and kinetics, nuclear power production, and the nuclear fuel cycle.

The B.S. degree in nuclear engineering will prepare the student for work in industry, government, and university settings in areas such as nuclear facility operations and support, reactor design and development, radioactive waste management, and nuclear security and safeguards.

Accreditation

The Bachelor of Science (B.S.) program in Nuclear Engineering (NE) is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

Educational Objectives for the Degree Program in Nuclear Engineering

- Our graduates will be active in the nuclear industry or related fields, making contributions to its advancement, either in industry, research, or academics.
- Our graduates will have a record of accomplishment in the nuclear industry.
- Our graduates will engage in lifelong learning, keeping abreast of advancements in their fields.

Health Physics

ISU offers the A.S., B.S., and M.S. options in Health Physics. Health Physics, an applied science, is concerned with the protection of humans and their environment from the possible harmful effects of radiation while providing for its
beneficial uses. Health Physics is a multi-disciplined profession that incorporates aspects of both the physical and biological sciences. The B.S. option in Health Physics will prepare the student for work in government, university, medical, or industrial settings dealing with such areas as operational radiation safety, regulatory issues, and environmental quality. Successful B.S. students receive a Bachelor of Science in Health Physics.

To declare a major in Health Physics, a student must have completed at least 24 semester hours and not be on probation. Declaration of major should be done as soon as possible in the student's program. For further details, please consult staff of the Department of Nuclear Engineering and Health Physics.

Accreditation

The Bachelor of Science (B.S.) and Master of Science (M.S.) programs in Health Physics are accredited by the Applied Sciences Accreditation Commission of ABET, http://www.abet.org. Students may enter the M.S. program in Health Physics from several undergraduate majors including health physics, physics, chemistry, biology, and other science or engineering majors. Additional course work to correct deficiencies may be necessary.

The Idaho State University Health Physics program is evaluated by periodically monitoring a series of programmatic outcomes that are used to indicate the extent to which our objectives are being accomplished and to provide information by which the program may be modified to optimize accomplishing these objectives.

Educational Objectives for the Degree Program in Health Physics

The objective of the Idaho State University Health Physics program is to produce Health Physicists with:

• Fundamental technical knowledge,
• Strong written and verbal communication skills,
• Well-developed professional judgment with the capability to think critically,
• Capability for solving applied health physics problems,
• The ability to work independently, and
• A thorough understanding of professional ethics

Students earning either degree in the Health Physics program must complete 8 of the 9 University General Education Objectives (a minimum of 36 credits - see the General Education Requirements in the Academic Information section of the catalog). Some of the courses listed as degree requirements will also satisfy or partially satisfy General Education Objectives, as noted.

Electrical Engineering

General Information

Idaho State University electrical engineering graduates are successfully employed in many areas. Many have chosen to continue advanced studies in a variety of specialized engineering disciplines throughout the region and nation. Every student entering electrical engineering is assigned a faculty advisor to guarantee an appropriate plan of study and to ensure continuity throughout the program. Each student completes university general education courses and electrical engineering program requirements. A student who pursues a double major should regularly consult a faculty member from each of the two major programs.

Students entering electrical engineering should have adequate preparation in algebra and trigonometry or higher to enter the calculus sequence. Students not entering at the calculus level will not be eligible to register for electrical engineering courses until meeting the mathematics requirements. This may result in a delay in graduation from the program. Other academic opportunities available include a combined MBA/BSEE degree program, as well as a BSEET degree in electrical engineering technology. Students who are interested in these degree programs should consult the Electrical Engineering Program Director for further details.

General Education Requirements

Students working toward the Bachelor of Science degree must complete 8 of the 9 General Education Objectives (a minimum of 36 credits). See the General Education Requirements in the Academic Information section of the catalog.

Fundamentals of Engineering (FE) Exam

Electrical engineering students are encouraged to take the Fundamentals of Engineering (FE) exam during their senior year, while the breadth of the engineering material covered on the examination is still fresh in their minds. This exam is considered the first step in professional licensure for engineers.

Electrical Engineering Academic Rules and Policies

A current Idaho State University electrical engineering major student who intends to transfer an engineering course to Idaho State University must obtain prior approval for the transfer either via transfer credit review (petition process) or through existing program articulation.

Transfer credits must be posted to the student’s ISU transcript prior to registering for any course that has the transfer course credits as a prerequisite or co-requisite.

To maintain “academic satisfactory progress” and avoid academic probation and/or academic dismissal, undergraduate students must maintain a cumulative Idaho State University GPA of 2.0 or higher every semester.

Accreditation

The Bachelor of Science (B.S.) program in Electrical Engineering (EE) is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

Educational Objectives

• **PEO1 Depth and Breadth:** Produce graduates who demonstrate broad and in-depth knowledge in the practice of, or advanced study of, electrical engineering.
• **PEO2 Career Development:** Produce graduates who will demonstrate and maintain the necessary knowledge and skills throughout their careers to solve problems in the complex modern work environment.
• **PEO3 Professionalism:** Produce graduates who demonstrate professional responsibilities.

Student Outcomes

Idaho State University's Electrical Engineering program has the following Student Outcomes:

a. An ability to apply knowledge of mathematics, science, and engineering
b. An ability to design and conduct experiments, as well as to analyze and interpret data
c. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d. An ability to function on multidisciplinary teams
e. An ability to identify, formulate, and solve engineering problems
f. An understanding of professional and ethical responsibility
g. An ability to communicate effectively

h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

i. A recognition of the need for, and an ability to engage in, life-long learning

j. A knowledge of contemporary issues

k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

**Declaring an Electrical Engineering Major**

To declare an Electrical Engineering major, a student must meet with an EE faculty advisor to develop a plan of study leading to degree completion. Declaration of major should be done as soon as possible upon consultation with the program staff.

**Faculty** (http://coursecat.isu.edu/undergraduate/scienceengineering/physicsnuclearandelectricalengineering/faculty)

**Physics (PHYS) Courses** (http://coursecat.isu.edu/undergraduate/allcourses/phys)

**Nuclear Engineering (NE) Courses** (http://coursecat.isu.edu/undergraduate/allcourses/ne)

**Health Physics (HPHY) Courses** (http://coursecat.isu.edu/undergraduate/allcourses/hphy)

**Electrical Engineering (EE) Courses** (http://coursecat.isu.edu/undergraduate/allcourses/ee)

**Electrical Engineering Technology (EET) Courses** (http://coursecat.isu.edu/undergraduate/allcourses/eet)