Engineering Physics

Department of Electrical Engineering

Engineering Physics
School of Engineering and Applied Sciences
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Department of Physics

Engineering Physics
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Overview

This program leads to a bachelor of science degree in engineering physics and is intended for those students whose interests center on the more fundamental aspects of electrical engineering and physics, but who also wish extensive contact with the applied aspects (instrumentation, circuit design) of those subjects. The program is designed such that a student can pursue a graduate program in electrical engineering or applied physics, depending on interest.

This course of study provides students with a unique combination of the fundamental principles of modern electronics, as well as a thorough education in electrical measurements and instrumentation. This program should be considered only by students whose academic performance is very strong. Only courses in which a grade of C or better has been earned are considered for application to this program.

Note: Course descriptions may be found in the Electrical Engineering section at http://undergrad-catalog.buffalo.edu/academicprograms/ee.shtml and in the Physics section at http://undergrad-catalog.buffalo.edu/academicprograms/phy.shtml.

About our Degrees

Acceptance Criteria
See the School of Engineering and Applied Sciences for acceptance criteria.

Acceptance Information

Students interested in being accepted into this program should meet with an advisor from the School of Engineering and Applied Sciences. The advisors are located in 410 Bonner Hall.

Degree Requirements

Please see Degrees and Policies.

About our Courses

The program offers lecture courses, lecture/lab courses, and lab courses. The courses taken only by physics majors typically have ten to twenty students in them; the electrical engineering courses have somewhat more. TAs are only used as recitation or lab instructors in the introductory courses. Students interested in pursuing a degree in engineering physics should begin by taking CHE 107-CHE 108, EAS 140, MTH 141-MTH 142, and PHY 107 (or PHY 117, preferred) or equivalent honors courses. This is particularly important for PHY 107, which has PHY 117 as the equivalent honors course (preferred), and is designed to benefit physics majors and strong engineering students.

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For course descriptions, please see Courses.

About our Faculty

The Directors of Undergraduate Studies for this program are Professor Jonathan Bird, who can be contacted at jbird@buffalo.edu; or 716-645-1015 and Professor Bernard Weinstein, who can be contacted at phyugadv@buffalo.edu; 716-645-6730 or 3645; or 209 Fronczack Hall.

Please see the Department of Electrical Engineering's faculty listing for descriptions of the specializations of our faculty in Engineering. Some of the distinctions received by our electrical engineering faculty include: Tau Beta Pi Teacher of the Year, Milton Plesur Excellence in Teaching Award, the Chancellor's Award for Excellence in Teaching

The physics faculty is comprised of approximately equal number of theorists and experimentalists. Faculty are involved in all areas of physics including condensed matter physics, biophysics, high energy physics, and astrophysics/cosmology.

Five physics faculty members have received the SUNY Chancellor's Award for Excellence in Teaching, and eight are Fellows of the American Physical Society.

Extracurricular Activities

Undergraduate Physics Club

This organization is an active group open to all students. It sponsors special speakers and workshops, and organizes open houses and social activities. For more information, call 716.645.2017. Students in the club also belong to the Society of Physics Students (SPS), which is affiliated with the American Physical Society, and with GPA above 3.5 are eligible for election to the Sigma Pi Sigma National Physics Honor Society.

See the UB Student Association.

Practical Experience and Special Academic Opportunities

Undergraduate Research and Practical Experience

Undergraduate majors regularly become involved in the research activities of the faculty. This can involve independent study, part-time employment, and/or full-time employment during the summer.

Honors, Awards, and Scholarships

Departmental Honors
By completing a senior thesis and obtaining satisfactory grades, it is possible to graduate from the program with Departmental Honors.

Outstanding Senior Award

Each year the department of physics chooses an outstanding senior. This student receives a certificate and a monetary award from the department, and also receives a College of Arts and Sciences Dean's Outstanding Senior Award.

Sekula Scholarship

Each year the department of physics awards up to seven scholarships to undergraduate majors involved in one of its programs. This award is based on merit, as well as financial need.

Career Information and Further Study

People with degrees in physics typically pursue careers in teaching, research, or some combination of the two. Teaching can be at the high school, community college, college, or university level. University teachers generally also engage in research. People who pursue a non-teaching research career work in industries, such as the computer chip and other electronic high-technology industries, or work in government labs such as Argonne or Brookhaven.

Approximately 90% of physics students go on to graduate school, mostly in physics and/or related research engineering fields, but a significant

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number go into other areas such as law, medicine, biophysics, and medical physics. Our students regularly get into outstanding graduate schools such as Princeton, Cornell, University of Chicago, MIT, and UB.

Degrees Offered

Undergraduate: BS

Links to Further Information About this Program

- Undergraduate Catalog
- Undergraduate Admissions
- Graduate Admissions
- Department of Physics
- Department of Electrical Engineering
- Undergraduate Studies in UB Physics

Engineering Physics - B.S.

Acceptance Criteria

See the School of Engineering and Applied Sciences for acceptance information.

Prerequisite Courses

CHE 107 General Chemistry for Engineers
CHE 108 General Chemistry for Engineers
EAS 140 Engineering Solutions
MTH 141 College Calculus I
MTH 142 College Calculus II
PHY 107 General Physics I or PHY 117 Honors Physics I (preferred)

Required Courses

EAS 230 Higher-Level Language
EE 202 Circuit Analysis I
EE 310 Electronic Devices and Circuits I
EE 311 Electronic Devices and Circuits II
EE 352 Introduction to Electronics Lab
EE 353 Electronic Circuits Lab
EE 410 Electronic Instrument Design I
MAE 335 Fluid Mechanics
MTH 241 College Calculus III
MTH 306 Introduction to Differential Equations
MTH 417 Survey of Multivariable Calculus
MTH 418 Survey of Partial Differential Equations
PHY 108 General Physics II or PHY 118 Honors Physics II (preferred)
PHY 158 General Physics II Lab
PHY 207 General Physics III or PHY 217 Honors Physics III
PHY 208 General Physics IV
PHY 257 General Physics III Lab
PHY 301 Intermediate Mechanics I
PHY 307 Modern Physics Lab
PHY 401 Modern Physics I
PHY 402 Modern Physics II
PHY 403 Electricity and Magnetism I
PHY 404 Electricity and Magnetism II
PHY 405 Thermal and Statistical Physics I
PHY 407 Advanced Laboratory or PHY 408 Advanced Laboratory

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Three technical electives

Summary
Total required credit hours for the major...111

See Baccalaureate Degree Requirements for general education and remaining university requirements.

Recommended Sequence of Program Requirements

FIRST YEAR
Fall CHE 107, EAS 140, MTH 141, PHY 107 or PHY 117 (preferred)
Spring CHE 108, MTH 142, PHY 108 or PHY 118 (preferred), PHY 158

SECOND YEAR
Fall EE 202, MTH 241, MTH 306, PHY 208
Spring EAS 230, PHY 207 or PHY 217, PHY 257, one technical elective

THIRD YEAR
Fall EE 310, EE 352, PHY 301, PHY 401
Spring EE 311, EE 353, MTH 418, PHY 307, PHY 402

FOURTH YEAR
Fall EE 410, MTH 417, PHY 403, PHY 405, PHY 407 (if PHY 408 not taken)
Spring MAE 335, PHY 404, PHY 408 (if PHY 407 not taken), two technical electives

Electives and Course Groupings

Technical Electives

Technical electives can be chosen from the approved list of required courses or approved technical electives for either the BS in physics or the BS in electrical engineering program. At least one technical elective must be chosen from the electrical engineering list. Recommended technical electives appropriate to this program are:

EE 489 and EE 490
PHY 425 Intermediate Optics
PHY 406 Thermal and Statistical Physics II
PHY 407 or PHY 408 Advanced Laboratory