

## Engineering And Applied Sciences, School Of

### School of Engineering and Applied Sciences

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#### Overview

The School of Engineering and Applied Sciences offers nine programs leading to the degree of bachelor of science (BS) in engineering: aerospace, biomedical, chemical, civil, computer, electrical, environmental, industrial, and mechanical engineering. These programs, except our new degree program in Biomedical Engineering, are accredited by the Engineering Accreditation Commission (EAC) of [ABET, Inc.](#) Accreditation for Biomedical Engineering will be sought in the next accreditation cycle.

BA and BS degrees in computer science are offered through the Department of Computer Science and Engineering, and a BS degree in engineering physics is offered jointly with the Department of Physics.

As part of the accreditation process, each engineering program defines their educational objectives (see engineering program descriptions) and program outcomes. To meet accreditation requirements, engineering programs must demonstrate that graduates can:

- (a) apply knowledge of mathematics, science, and engineering,
- (b) design and conduct experiments, as well as to analyze and interpret data,
- (c) design a system, component, or process to meet desired needs within realistic constraints,
- (d) function on multi-disciplinary teams,
- (e) identify, formulate, and solve engineering problems,
- (f) understand professional and ethical responsibility,
- (g) communicate effectively.

In addition, graduates must have:

- (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.

The undergraduate engineering program provides a solid background in engineering fundamentals and gives students an opportunity for hands-on experience throughout the engineering curriculum. The program provides students with a strong technical foundation, enables them to integrate their engineering education within the broader social, economic and technological environment, and fosters a desire for continued learning. The curriculum allows students flexibility in their programs of study and encourages interaction between students and faculty. The undergraduate educational experience prepares students for professional practice and advanced study. Special programs including our Career Development Curriculum program, Engineering Career Institute, and Co-op opportunities provide professional development skills and experiences and facilitate placement of our graduates in high-quality engineering positions.

**UB Engineering Mission Statement.** The mission of the School of Engineering and Applied Sciences is to provide effective and high-quality engineering education at the undergraduate, graduate, and continuing education levels. Integral to this mission is an infrastructure of expertise and facilities that can support professional engineering education, advanced degree programs and research in important areas of applied science and technology. We will be a leader in forging and maintaining significant, mutually committed partnerships between our faculty and staff and students, alumni, industry, government, and other national and international educational institutions. Our specific mission objectives are to:

1. Educate students to think critically and creatively, to identify and solve important technological problems, and to practice engineering with technical skill, a high regard for ethical principles and an understanding of economic and environmental realities.
2. Perform high-quality research that advances applied science or technology while preparing future researchers for industrial, academic, and government positions.
3. Contribute to interdisciplinary educational and research and to meet complex technological and societal needs.
4. Provide and coordinate educational, technical, and information services to industry, government, practicing engineers, educators, and the public.
5. Become a leading catalyst for attracting and increasing the private sector to Western New York and New York State.
6. Reach out internationally for cooperation in education and research.

**UB Engineering Code of Professional Conduct.** In carrying out their professional obligations, engineers and scientists are guided by fundamental ethical canons and rules of practice. The UB Engineering community is guided by the following principles.

UB Engineers and Applied Scientists:

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- Act with honesty, integrity and fairness
- Show respect for others
- Accept responsibility
- Give credit where credit is due
- Serve the larger community
- Take pride in being a part of UB Engineering

### Acceptance Information

Candidates from secondary schools (high schools) must have completed mathematics through trigonometry, and should have completed higher-level courses such as pre-calculus, calculus, chemistry, and physics.

Students should apply for admission to the School of Engineering and Applied Sciences when they apply to UB as freshmen or transfers by indicating the curriculum code for their desired engineering major on either the UB or SUNY application form (0229 if undecided about the particular engineering major) or by citing the major (or listing "engineering" if undecided) in the "Possible area(s) of academic concentration/major(s)" on the Common Application. The Office of Admissions coordinates the review with the School of Engineering. High school grades, class standing, Regents exam scores, and either Scholastic Aptitude Test (SAT) or American College Testing (ACT) scores are considered in the admission process.

Incoming freshmen are admitted to their designated major or to the School of Engineering and Applied Sciences if an engineering major has not been selected. Engineering majors can be changed easily during the freshman year.

Current UB students not enrolled in the School of Engineering and Applied Sciences are eligible for admission to engineering if they meet the following criteria:

- (1) Good academic standing
- (2) Completion of at least three courses in their desired major
- (3) Minimum GPA of 2.5 for all required technical classes completed (including courses taken at other institutions)

Students meeting these requirements should apply for admission in the Office of Undergraduate Education, School of Engineering and Applied Sciences, 410 Bonner Hall, (716) 645-2774.

Freshmen are admitted to the major in two ways: 1) Upon admission to UB if they meet the criteria (see above), or 2) After their first semester, if they have completed at least two courses at UB required for their desired major with minimum cumulative 3.0 Technical and UB GPAs.

### Transfer Policy

Admission of transfer students is granted on the basis of previous college academic performance. Student transcripts are evaluated by the Office of Undergraduate Education, 410 Bonner Hall. Course content, contact hours, and grades are evaluated to determine acceptance. Courses completed at other universities and colleges are not automatically accepted for credit. Admission to engineering as an approved major requires the following:

- (1) Admission to the University at Buffalo
- (2) Completion of at least three courses in their desired major
- (3) Minimum GPA of 2.5 for all math, science, and engineering courses required in the major

Notices of acceptance are sent by the university Office of Admissions and the Office of Undergraduate Education in engineering. Normally, transfer students who have completed an engineering science program at a community college or the first three years of a 3+2 program at a four-year college can expect to enter the third year of an engineering program at the University at Buffalo. Graduates of technology programs receive limited transfer credit and can expect three to four additional years of study at the university to complete the engineering degree requirements.

### Academic Requirements

Students seeking an undergraduate engineering degree from the School of Engineering and Applied Sciences must have a minimum GPA of 2.0 in technical classes (engineering, math, technical elective, and science classes) required in the major and must complete 30 undergraduate credit hours of junior/senior level courses required in their major at the University at Buffalo. Please refer to the degree program sections of the catalog for additional requirements.

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A student is in academic good standing in the School of Engineering and Applied Sciences if his/her:

- (1) cumulative Technical Grade Point Average (Technical GPA) is 2.0 or greater, and
- (2) most recent semester Technical GPA is 2.0 or greater.

Failure to maintain the required GPA results in academic probation or dismissal from the School. A student will be dismissed if he/she has not been in academic good standing for three semesters and possesses a cumulative Technical GPA  
The total number of repeat attempts to satisfy the required courses in a student's major must not exceed four. Students who exceed four repeat attempts will be dismissed from the School. A student is allowed two 'R' grades (official resignations) without penalty; additional R grades are then counted as repeated classes. Repeat attempts for courses where the original grade was C or better are not counted in this policy, nor are repeats for courses when the initial grade was 'W'.

It is the responsibility of the School of Engineering and Applied Sciences, the academic programs, and the faculty to advise students of course prerequisites and co-requisites. Course prerequisites and co-requisites are published in the university catalog. Additional information about prerequisites and co-requisites is published on web sites, course syllabi, or in program documents. It is the right of the School of Engineering and Applied Sciences, the academic programs, and the faculty instructor to cancel a student's registration in a course if the student has not satisfied the published prerequisites for the course. Students are ultimately responsible for knowing and adhering to course prerequisites and co-requisites. Failure to follow such requirements may place a student at academic risk. For additional information on this policy go to [www.eng.buffalo.edu/prereqpolicy](http://www.eng.buffalo.edu/prereqpolicy).

General Education. Entering engineering freshman and transfer students must meet the general education requirements of the University at Buffalo (See the General Education section in this catalog) and the School of Engineering and Applied Sciences. Information regarding these requirements is available in the Engineering Office of Undergraduate Education, 410 Bonner Hall.

### Degree Options

In addition to the degrees listed above, some students pursue a double major by satisfying additional course requirements. The most popular double majors are mechanical/aerospace and electrical/computer engineering. Note that double majors receive only one B.S degree; satisfaction of the requirements for a double major is indicated on the student's transcript and diploma.

Another degree option is to satisfy the requirements of an [approved minor](#). The approved minor most frequently selected by engineering majors is mathematics.

Within the School of Engineering and Applied Sciences, it also is possible to pursue a combined BS/MBA program. This option is explained in the sections of the catalog for School of Engineering and Applied Sciences degree programs.

### Degrees Offered

**Undergraduate:** BS in [Aerospace](#), [Biomedical](#), [Chemical](#), [Civil](#), [Computer](#), [Electrical](#), [Environmental](#), [Industrial](#), and [Mechanical Engineering](#); [Engineering Physics](#); [Computer Science](#) (BS and BA) See sections of the catalog for each of these programs for detailed information on program requirements and course offerings.

#### **EAS 104: Special Topics**

**Credits:** 4  
**Type:** LEC/LAB

*The content of this course is variable and therefore it is repeatable for credit. The [University Grade Repeat Policy](#) does not apply.*

#### **EAS 140: Engineering Principles**

**Credits:** 3  
**Semester(s):** Fall  
**Pre-requisites:** Engineering majors only.  
**Co-requisites:** Student must register for EAS 140LLB and EAS

140DIS in the same term.  
**Type:** LEC/LAB

A first course in engineering. Introduces students to fundamental principles used in engineering analysis and design. Students will gain experience and skills in the application of these principles to projects and case studies. Students also will be introduced to the engineering professions and aspects of professionalism including ethics and etiquette.

#### **EAS 202: Engineering Impact on Society**

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**Credits:** 1  
**Type:** SEM

*The content of this course is variable and therefore it is repeatable for credit. The [University Grade Repeat Policy](#) does not apply.*

[EAS 202](#), a follow-on to [EAS 140](#), is a one credit freshman seminar course aimed at broadening students' vision of engineering problem solving, and elucidating how engineers can make a difference in meeting key societal needs. The course focus is the National Academy of Engineering's 'Grand Challenges' for the future. It includes a series of interactive presentations by engineering faculty who are experts in these areas, offering an understanding both of these problems and engineering approaches to solving them. Students also explore a self-selected area of personal interest as a step toward identifying possible niches for their own career path.

### EAS 207: Statics

**Credits:** 3  
**Semester(s):** Fall, Spring, Summer  
**Pre-requisites:** [PHY 107](#) or [PHY 117](#); [MTH 142](#)  
**Co-requisites:** [MTH 241](#) (recommended)  
Approved Engineering Majors Only  
**Type:** LEC/REC

Applies mechanics to studying static equilibrium of rigid and elastic bodies. Topics include composition and resolution of forces, moments and couple, equivalent force systems, free-body diagrams, equilibrium of particles and rigid bodies, forces in trusses and beams, friction forces, first and second moments of area, moments and product of inertia, and methods of virtual work and total potential energy.

### EAS 208: Dynamics

**Credits:** 3  
**Semester(s):** Fall, Spring, Summer  
**Pre-requisites:** [EAS 207](#) and [MTH 241](#)  
**Co-requisites:** [MTH 306](#) (recommended)  
Approved Engineering Majors Only  
**Type:** LEC/REC

Applies mechanics to studying the motion of particles and rigid bodies. Topics include kinematics and kinetics of particles, relative motion, work-energy methods, impulse-momentum methods, kinematics and kinetics of rigid bodies, and simple vibration.

### EAS 209: Mechanics of Solids

**Credits:** 3  
**Semester(s):** Fall, Spring, Summer  
**Pre-requisites:** [EAS 207](#)  
Approved Engineering Majors Only  
**Type:** LEC/REC

Studies the mechanical behavior of solid bodies under various types of loading. Topics include stresses and strain, stress-strain relationships, plane stress and plane strain; shear and bending moments in beams, stresses in beams; deflection of beams, torsion of shafts, buckling of columns, energy methods, and failure criteria.

### EAS 230: Engineering Computations

**Credits:** 3

**Semester(s):** Fall, Spring  
**Type:** LEC/LAB

An introductory computing course for students in engineering and the sciences. The course covers basic programming concepts, structures, and algorithms, with applications for solving scientific and engineering problems. Case studies of computer use in the engineering disciplines.

### EAS 305: Applied Probability

**Credits:** 4  
**Semester(s):** Fall, Spring  
**Pre-requisites:** [MTH 241](#)  
Approved Engineering Majors Only  
**Type:** LEC/REC

Introduces probability and its application to engineering problems. Examines sample space, random variables, expected values, limiting theorems, error analysis, and provides introduction to random processes. Students may not receive credit for this course and [CIE 308](#).

### EAS 396: Engineering Career Institute

**Credits:** 1  
**Semester(s):** Spring  
**Pre-requisites:** Sophomore standing in engineering.  
Approved Engineering Majors Only  
**Type:** LEC

Provides one academic credit for pre-employment classes with instruction on how to conduct a successful student employment job search. The semester culminates with one week [30 hours] of presentations from industrial managers on essential career-success subjects such as leadership, communication, teamwork, total quality management, and value engineering. This course enables students to obtain engineering credit-worthy employment along with the business success skills needed to be effective on the job. Subsequent to this course, students with jobs will enroll in [EAS 496](#), Engineering Co-op.

### EAS 495: Supervised Undergraduate Teaching

**Credits:** 3  
**Pre-requisites:** Junior status, 3.0 QPA; A- or better in course in which the student will assist; and permission of instructor.  
**Type:** DIS

*The content of this course is variable and therefore it is repeatable for credit. The [University Grade Repeat Policy](#) does not apply.*

Enrollees participate as undergraduate teaching assistants under the supervision of faculty of the School of Engineering and Applied Sciences.

### EAS 496: Engineering Co-Op

**Credits:** 1-3  
**Semester(s):** Fall, Spring, Summer  
**Pre-requisites:** Senior standing  
Approved Engineering Majors Only  
**Type:** TUT

*Graded P/F.*

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Up to three work periods of engineering-related employment. Co-op students are employed in technical assignments in industry, with emphasis on practical application of engineering coursework. Students are registered for 1-3 credit hours, but are afforded full-time status at the University. This protects the student's insurance, loan and possible INS status. The course goal is to provide valuable experience for students, while making positive contributions to employers. A faculty instructor supervises the academic component of the experience, usually a report and/or presentation.

### **EAS 498: Undergraduate Research and Creative Activity**

**Credits:** 1-3

**Semester(s):** Fall, Spring, Summer

**Pre-requisites:** Permission of Instructor.

**Type:** TUT

*The content of this course is variable and therefore it is repeatable for credit. The [University Grade Repeat Policy](#) does not apply.*

Students collaborate with faculty research mentors on an ongoing faculty research project or conduct independent research under the guidance of a faculty member. This experience provides students with an inquiry-based learning opportunity and engages them as active learners in a research setting.

### **EAS 499: Independent Study**

**Credits:** 1-12

**Pre-requisites:** Permission of instructor.

**Type:** TUT

*The content of this course is variable and therefore it is repeatable for credit. The [University Grade Repeat Policy](#) does not apply.*

Individualized student work under the guidance of a faculty member, intended to pursue topics that are not currently offered through regular coursework at the university.