Electrical Engineering

College of Science, Engineering and Mathematics
Department of Electrical and Computer Engineering
(907) 474-7137
www.uaf.edu/ece/

B.S. Degree

Minimum Requirements for Degree: 134 credits

Electrical and computing engineering encompasses telecommunications, electrical power generation, transmission and distribution, control systems, and computer applications and design. Electrical engineers can typically expect gainful employment in one or more of these areas after graduation.

Communication engineers design, build and operate communication devices and systems, including satellites, antennas, wireless devices and computer networks. Electric power engineers design and oversee the construction, installation and maintenance of electrical systems that provide light, heat and power. Power engineers are also instrumental in the development of systems using modern power electronic devices to control power generation and distribution and build electric drives. People trained in computer engineering automate businesses, factories, pipelines and refineries. They design control systems and computers that guide trains, planes and space vehicles. Electrical engineers design the integrated circuits and automatic control systems used in many areas of science and engineering. Process controls in the mining and petroleum industries are also largely the responsibility of the electrical and computer engineer.

Undergraduate research and design project opportunities are available at UAF in the areas of communications, radar, sonar, and lidar remote sensing, instrumentation and microwave circuit design, electric power and energy systems, digital and computer engineering and nanotechnology. The Student Rocket Project brings electrical and computer engineering and mechanical engineering students together to build and launch rockets at the Poker Flat Research Range, the only university-affiliated rocket range in the country. This program offers real engineering experience as well as fellowships, paid internships and scholarships.

The curriculum is designed to ensure that basic fundamentals and specialized skills are acquired by the student. The program prepares engineers to enter practice upon graduation and provides the theoretical background for students entering graduate studies. Candidates for the B.S. degree are required to take the state of Alaska Fundamentals of Engineering Examination in their general field.

The department's mission is to offer the highest quality, contemporary education at the undergraduate and graduate levels, and to perform research appropriate to the technical needs of the state of Alaska, the nation and the world.

Major—B.S. Degree

Concentrations: Communications, Computer Engineering, Power and Control

1. Complete the general university requirements (page 106. As part of the core curriculum requirements, complete: MATH 200X, CHEM 105X and CHEM 106X or PHYS 213X.)

2. Complete the B.S. degree requirements (page 112. As part of the B.S. degree requirements, complete: MATH 201X, PHYS 211X and PHYS 212X.)

3. Complete the following program (major) requirements:*
   - EE 102—Introduction to Electrical Engineering 3
   - EE 203—Electrical Engineering Fundamentals I 4
   - EE 204—Electrical Engineering Fundamentals II 4
   - EE 303—Electrical Machinery 4
   - EE 311—Applied Engineering Electromagnetics 3
   - EE 331—High Frequency Lab 1
   - EE 333W—Physical Electronics 4
   - EE 334—Electronic Circuit Design 4
   - EE 343—Digital Systems Analysis and Design 4
   - EE 353—Circuit Theory 3
   - EE 354—Engineering Signal Analysis 3
   - EE 471—Fundamentals of Automatic Control 3
   - ES 101—Introduction to Engineering 2
   - ES 201—Computer Techniques (3) or CS 201—Computer Science I (3) 3
   - ES 208—Mechanics 4
   - ESM 450W—Economic Analysis and Operations 3
   - MATH 202X—Calculus 4
   - MATH 302—Differential Equations 3
   - Approved EE elective 3-4
   - Approved EE design elective 3-4
   - Approved engineering science elective** 3
   - Approved mathematics elective*** 3

4. Complete state of Alaska Fundamentals of Engineering examination.

5. Complete 1 of the following concentrations:*

Communications

a. Complete the following:
   - EE 312—Electromagnetic Waves and Devices 3
   - EE 332—Electromagnetics Laboratory 1
   - EE 461—Communication Systems 4
   - Approved engineering science elective** 3

b. Minimum credits required 134

Computer Engineering

a. Complete the following:
   - EE 443—Computer Engineering Analysis and Design 4
   - EE 451—Digital Signal Processing 4
   - EE 461—Communication Systems 4

b. Minimum credits required 134

Power and Control

a. Complete the following:
   - EE 404—Electric Power Systems 4
   - EE 406—Electrical Power Engineering 4
   - Approved engineering science elective** 3

b. Minimum credits required 134

** Student must earn a C grade or better in each electrical engineering course.*

*** Engineering science elective to be chosen from ES 331, ME 334, ES 341 and ES 346.*

**** Mathematics elective to be chosen from the following advanced topics: linear algebra and matrices, probability and statistics, partial differential equations, numerical analysis, advanced calculus or complex variables.*

Note: Students must plan their elective courses in consultation with their electrical engineering faculty advisor, and all elective courses must be approved by their electrical engineering faculty advisor.

Note: Page numbers refer to the UAF 2004-2005 academic catalog, which can be viewed online at www.uaf.edu/catalog/.

General University Requirements

All degrees (e.g. B.A., B.S., etc.) require additional courses. Refer to specific degree and program requirements.

COMMUNICATIONS (9)
Complete the following:
ENGL 111X ..... (3) _____
ENGL 211X **OR** 213X ..... (3) _____
COMM 131X **OR** 141X ..... (3) _____

LIBRARY & INFORMATION SKILLS (0–1)
Complete the following:
LS 100X **OR** 101X ..... (0-1) _____
OR Successful completion of library skills competency test.

PERSPECTIVES ON THE HUMAN CONDITION (18)
Complete either the following six courses:
ANTH 100X **OR** SOC 100X ..... (3) _____
ECON/PS 100X ..... (3) _____
HIST 100X ..... (3) _____
ART/MUS/THR 200X, HUM 201X **OR** ANS 202X ..... (3) _____
ENGL/FL 200X ..... (3) _____
PHIL 322X, NRM 303X, COMM 300X,
PS 300X **OR** JUST 300X ..... (3) _____
OR Complete 12 cr from the above list **PLUS** two semester-length courses in a single non-English or Alaska Native language at the university level **OR** three semester-length courses (9 cr) in American Sign Language.

MATHEMATICS (3–4)
Complete 3-4 credits from the following:
MATH 107X ..... (3) _____
OR MATH 131X (except for BBA) ..... (3) _____
OR MATH 161X ..... (3) _____
MATH 200X ..... (4) _____
MATH 201X ..... (4) _____
MATH 202X ..... (4) _____
MATH 262X ..... (4) _____
MATH 272X ..... (3) _____
NOTE: Additional 3 cr of math needed for degree requirements.

NATURAL SCIENCES (8)
Complete 8 credits from the following:
ATM 101X ..... (4) _____
BIOL 103X **OR** 104X ..... (4) _____
BIOL 105X–106X ..... (8) _____
BIOL 111X–112X ..... (8) _____
CHEM 100X ..... (4) _____
CHEM 103X–104X ..... (8) _____
CHEM 105X–106X ..... (8) _____
GEOG 205X ..... (4) _____
GEOS 100X **OR** 120X **OR** 125X ..... (4) _____
GEOS 101X–112X ..... (8) _____
MSL 111X ..... (4) _____
PHYS 102X **OR** 175X ..... (4) _____
PHYS 103X–104X ..... (8) _____
PHYS 211X–212X ..... (8) _____
PHYS 211X–213X ..... (8) _____
PHYS 212X–213X ..... (8) _____

UNIVERSITY OF ALASKA FAIRBANKS
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