Electrical Engineering

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

B.S. Degree

Minimum Requirements for Degree: 135 credits

The mission of the UAF Electrical and Computer Engineering Department 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.

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 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 electrical engineering program educational objectives are:

1. Breadth: To provide students with a broad education emphasizing electrical engineering that will serve as the foundation for productive careers in the public or private sectors, graduate education and lifelong learning.
2. Depth: To provide students with understanding of the fundamental knowledge prerequisite for practice and/or advanced study in electrical engineering, including its scientific principles, rigorous analysis and creative design. Depth focus areas at UAF include communications, power and control and computer engineering.
3. Practical Experience: To provide students with hands-on experience in the design, implementation and validation of electrical systems in an environment that fosters and encourages innovation and creativity.
4. Professional Skills: To develop skills for clear communication and responsible teamwork and instill professional attitudes and ethics, so that students are prepared for the complex modern work environment and lifelong learning.
5. Learning Environment: To provide an environment that enables students to pursue their goals in an innovative program that is rigorous and challenging, open and supportive.

These objectives serve the department, college and university missions by insuring that all graduates of the BSEE program have received a high quality, contemporary education that prepares them for rewarding careers in electrical engineering.

For more information about the Electrical Engineering Program mission, goals and educational objectives, visit www.uaf.edu/ece/.

Major—B.S. Degree

Concentrations: Communications, Computer Engineering, Power and Control

1. Complete the general university requirements. (See page 112. 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. (See page 117. 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 3
   - 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 one 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 135

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 135

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 135

** 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 or 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 2006-2007 academic catalog, which can be viewed online at www.uaf.edu/catalog/.

Baccalaureate Core Requirements

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

COMMUNICATION (9)

Complete the following:
ENGL 111X ..... (3) _____
ENGL 190H may be substituted.

Complete one of the following:
ENGL 211X **OR** ENGL 213X ..... (3) _____

Complete one of the following:
COMM 131X **OR** COMM 141X ..... (3) _____

PERSPECTIVES ON THE HUMAN CONDITION (18)

Complete all of the following four courses:
ANTH 100X/SOC 100X ..... (3) _____
ECON 100X **OR** PS 100X ..... (3) _____
HIST 100X ..... (3) _____
ENGL/FL 200X ..... (3) _____

Complete one of the following three courses:
ART/MUS/THR 200X, HUM 201X **OR** ANS 202X ..... (3) _____

Complete one of the following six courses:
BA 323X, COMM 300X, JUST 300X, NRM 303X,
PS 300X **OR** PHIL 322X ..... (3) _____

OR complete 12 credits from the above courses **PLUS**
- two semester-length courses in a single Alaska Native language or other non-English language **OR**
- three semester-length courses (9 credits) in American Sign Language taken at the university level.

MATHEMATICS (3)

Complete one of the following:
MATH 107X, MATH 161X **OR** MATH 103X ..... (3-4) _____
** No credit may be earned for more than one of MATH 107X or 161X.*

OR complete one of the following:*
MATH 200X, MATH 201X, MATH 202X,
MATH 262X **OR** MATH 272X ..... (4) _____
**Or any math course having one of these as a prerequisite*

NATURAL SCIENCES (8)

Complete any two (4-credit) courses:
ATM 101X ..... (4) _____
BIOL 100X ..... (4) _____
BIOL 103X ..... (4) _____
BIOL 104X ..... (4) _____
BIOL 105X ..... (4) _____
BIOL 106X ..... (4) _____
BIOL 111X ..... (4) _____
BIOL 112X ..... (4) _____
CHEM 100X ..... (4) _____
CHEM 103X ..... (4) _____
CHEM 104X ..... (4) _____
CHEM 105X ..... (4) _____
CHEM 106X ..... (4) _____
GEOG 205X ..... (4) _____
GEOS 100X ..... (4) _____
GEOS 101X ..... (4) _____
GEOS 112X ..... (4) _____
GEOS 120X ..... (4) _____
GEOS 125X ..... (4) _____
MSL 111X ..... (4) _____
PHYS 102X ..... (4) _____
PHYS 103X ..... (4) _____
PHYS 104X ..... (4) _____
PHYS 115X ..... (4) _____
PHYS 116X ..... (4) _____
PHYS 175X ..... (4) _____
PHYS 211X ..... (4) _____
PHYS 212X ..... (4) _____
PHYS 213X ..... (4) _____

LIBRARY AND INFORMATION RESEARCH (0–1)
Successful completion of library skills competency test **OR**
LS 100X or 101X prior to junior standing ..... (0–1) _____

UPPER-DIVISION WRITING AND ORAL COMMUNICATION (0)

Complete the following:
Two writing intensive courses designated (W) ..... (0) _____
One oral communication intensive course designated (O) ..... (0) _____
OR two oral communication intensive courses designated (O/2), at the upper-division level (see degree and/or major requirements) ..... (0) _____

TOTAL CREDITS REQUIRED 38–39

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