ELECTRICAL ENGINEERING

College of Engineering and Mines
Department of Electrical and Computer Engineering
907-474-7137
www.uaf.edu/cem/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 faculty of the Electrical and Computer Engineering Department at UAF seek to provide a positive learning environment that enables students to pursue their goals in an innovative program that is rigorous and challenging, open and supportive. The BSEE program develops practical skills by emphasizing hands-on experience in the design, implementation, and validation of electrical systems in an environment that fosters and encourages innovation and creativity. This approach builds the foundation for the following program educational objectives:

1. Breadth: Graduates will utilize their broad education emphasizing electrical engineering to serve as the foundation for productive careers in the public or private sectors, graduate education, and lifelong learning.
2. Depth: Graduates will apply their understanding of the fundamental knowledge prerequisite for the practice of and/or advanced study in electrical engineering, including its scientific principles, rigorous analysis, and creative design. The BSEE program offers depth concentration areas in communications, computer engineering, and power and control.
3. Professional Skills: Graduates will apply skills for clear communication, responsible teamwork, professional attitudes and ethics needed to succeed in the complex modern work environment.

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/cem/ece/about/.

Major — B.S. Degree

Concentrations: Communications, Computer Engineering, Power and Control

1. Complete the general university requirements. (See page 132. As part of the core curriculum requirements, complete: MATH F200X, CHEM F105X and CHEM F106X or PHYS F213X.)*
2. Complete the B.S. degree requirements. (See page 137. As part of the B.S. degree requirements, complete: MATH F201X, PHYS F211X and PHYS F212X.)*
3. Complete the following program (major) requirements:*
   - EE F102—Introduction to Electrical Engineering 3
   - EE F203—Electrical Engineering Fundamentals I 4
   - EE F204—Electrical Engineering Fundamentals II 4
   - EE F303—Electrical Machinery 4
   - EE F311—Applied Engineering Electromagnetics 3
   - EE F331—High Frequency Lab 1
   - EE F333W—Physical Electronics 4
   - EE F334—Electronic Circuit Design 4
   - EE F343—Digital Systems Analysis and Design 4
   - EE F353—Circuit Theory 3
   - EE F354—Engineering Signal Analysis 3
   - EE F471—Fundamentals of Automatic Control 3
   - ES F101—Introduction to Engineering 3
   - ES F201—Computer Techniques 3
   - ES F208—Mechanics 4
   - ESM F450W—Economic Analysis and Operations 3
   - MATH F202X—Calculus 4
   - MATH F302—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

Complete the following:
- EE F412—Electromagnetic Waves and Devices 3
- EE F432—Electromagnetics Laboratory 1
- EE F461—Communication Systems 4
- Approved engineering science elective** 3

Computer Engineering

Complete the following:

EE F443—Computer Engineering Analysis and Design 4
EE F451—Digital Signal Processing 4
EE F461—Communication Systems 4

Power and Control

Complete the following:

EE F404—Electric Power Systems 4
EE F406—Electrical Power Engineering 4
Approved engineering science elective** 3

6. Minimum credits required 135

* *Students must earn a C grade (2.0) or better in each course.*

** *Engineering science elective to be chosen from ES F331, ME F334, ES F341 or ES F346.*

*** *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.

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

Baccalaureate Core Requirements

(Note: all courses for Core must be at C- or higher.)

COMMUNICATION (9)

Complete the following:
ENGL F111X .....(3) _____
ENGL F190H may be substituted.

Complete one of the following:
ENGL F211X **OR** ENGL F213X .....(3) _____

Complete one of the following:
COMM F131X **OR** COMM F141X .....(3) _____

PERSPECTIVES ON THE HUMAN CONDITION (18)

Complete all of the following four courses:
ANTH F100X/SOC F100X .....(3) _____
ECON F100X **OR** PS F100X .....(3) _____
HIST F100X.....(3) _____
ENGL/FL F200X .....(3) _____

Complete one of the following three courses:
ART/MUS/THR F200X, HUM F201X **OR** ANS F202X .... (3) _____

Complete one of the following six courses:
BA F323X, COMM F300X, JUST F300X, NRM F303X,
PS F300X **OR** PHIL F322X .....(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 F103X, MATH F107X, MATH F161X **OR**
STAT F200X .....(3 – 4) _____
** No credit may be earned for more than one of MATH F107X or F161X.*

OR complete one of the following:*
MATH F200X, MATH F201X, MATH F202X,
MATH F262X **OR** MATH F272X.....(4) _____
**Or any math course having one of these as a prerequisite.*

NATURAL SCIENCES (8)

Complete any two (4-credit) courses:
ATM F101X.....(4) _____
BIOL F100X .....(4) _____
BIOL F103X .....(4) _____
BIOL F104X .....(4) _____
BIOL F111X .....(4) _____
BIOL F112X .....(4) _____
BIOL F115X .....(4) _____
BIOL F116X .....(4) _____
CHEM F100X.....(4) _____
CHEM F103X.....(4) _____
CHEM F104X.....(4) _____
CHEM F105X.....(4) _____
CHEM F106X.....(4) _____
GEOG F111X.....(4) _____
GEOS F100X.....(4) _____
GEOS F101X.....(4) _____
GEOS F112X.....(4) _____
GEOS F120X.....(4) _____
GEOS F125X.....(4) _____
MSL F111X.....(4) _____
PHYS F102X.....(4) _____
PHYS F103X.....(4) _____
PHYS F104X.....(4) _____
PHYS F115X.....(4) _____
PHYS F116X.....(4) _____
PHYS F175X.....(4) _____
PHYS F211X.....(4) _____
PHYS F212X.....(4) _____
PHYS F213X.....(4) _____

LIBRARY AND INFORMATION RESEARCH (0 – 1)
Successful completion of library skills competency test **OR**
LS F100X or F101X prior to junior standing.....(0 – 1) _____

UPPER-DIVISION WRITING AND ORAL COMMUNICATION (0)

Complete the following:
Two writing intensive courses designated (W) .....(0) _____
and 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) _____

CORE CREDITS REQUIRED ..... 38 – 39

Minimum credits required for degree 120

UNIVERSITY OF ALASKA FAIRBANKS
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