## 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

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. (See page 107. 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 114. 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  
   - EE 203—Electrical Engineering Fundamentals I  
   - EE 204—Electrical Engineering Fundamentals II  
   - EE 303—Electrical Machinery  
   - EE 311—Applied Electrical Engineering Electromagnetics  
   - EE 331—High Frequency Lab  
   - EE 333W—Physical Electronics  
   - EE 334—Electronic Circuit Design  
   - EE 343—Digital Systems Analysis and Design  
   - EE 353—Circuit Theory  
   - EE 354—Engineering Signal Analysis  
   - EE 471—Fundamentals of Automatic Control  
   - ES 101—Introduction to Engineering  


5. Complete 1 of the following concentrations:*  

**Communications**  
- Complete the following:  
  - EE 312—Electromagnetic Waves and Devices  
  - EE 332—Electromagnetics Laboratory  
  - EE 461—Communication Systems  
  - Approved engineering science elective**  
  
**Computer Engineering**  
- Complete the following:  
  - EE 443—Computer Engineering Analysis and Design  
  - EE 451—Digital Signal Processing  
  - EE 461—Communication Systems  

**Power and Control**  
- Complete the following:  
  - EE 404—Electric Power Systems  
  - EE 406—Electrical Power Engineering  
  - Approved engineering science elective**

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* 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 2005-2006 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/FIL 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)
  * 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.

**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 173X ...............................................................(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