**COMPUTER 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 UA Electrical and Computer Engineering Department is to offer the highest quality, contemporary education in electrical and computer engineering 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.

Computer engineering is a relatively new discipline. It lies somewhere in the middle between computer science, which covers theory, algorithms, software, networking, graphics and computer architecture—and electrical engineering, which covers microelectronics, electrical circuits and devices, networks, communications systems, computer architecture, hardware design and systems analysis. Computer engineers design, analyze, produce, operate, program and maintain computer and digital systems. They apply theories and principles of science and mathematics to the design of hardware, software, networks and processes to solve technical problems.

Over the past decade, computers have evolved into complex systems that may consist of single machines or many interconnected computers linked by a data network. In one form or another, computers now control most telephone and communications systems, process control and manufacturing automation systems, management information systems, house hold appliances, automobiles, transportation systems and medical instrumentation. Computers also form the core of the Internet. To work in the constantly evolving discipline of computer systems engineering, the computer engineer must acquire competence in both digital computer hardware and the fundamentals of software engineering.

Careers in computer engineering are as wide and varied as computer systems themselves. Systems range from embedded computer systems found in consumer products or medical devices; control systems for automobiles, aircraft and trains; to more wide-ranging applications in telecommunications, financial transactions and information systems. The Bureau of Labor Statistics lists computer engineering as the fastest growing occupation in the U.S., with 299,000 jobs in 1998 to a predicted 622,000 jobs in 2008.

The computer engineering program education objectives are:

1. **Breadth:** To provide students with a broad education emphasizing computer 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 computer engineering, including its scientific principles, rigorous analysis and creative design. The BSEE program offers depth concentration in communications, computer engineering, and power and control.
3. **Practical Experience:** To provide students with hands-on experience in the design, implementation and validation of computer 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 ensuring that all graduates of the program have received a high quality, contemporary education that prepares them for a rewarding career in computer engineering.

Candidates for the B.S. degree are required to take the state of Alaska Fundamentals of Engineering Examination in their general field. For more information about the computer engineering program mission, goals and educational objectives, visit www.uaf.edu/ece/.

---

### **Major—B.S. Degree**

1. Complete the general university requirements (page 116). (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 121. As part of the B.S. degree requirements, complete: MATH 201X, PHYS 211X and PHYS 212X.)
3. Complete the following program (major) requirements:*  
   - CS 201—Computer Science I ........... 3  
   - CS 202—Computer Science II ........... 3  
   - CS 301—Assembly Language Programming ....... 3  
   - CS 311—Data Structures and Algorithms ....... 3  
   - CS 321—Operating Systems ........... 3  
   - CS 331—Programming Languages ....... 3  
   - EE 102—Introduction to Electrical Engineering ....... 3  
   - EE 203—Electrical Engineering Fundamentals I ....... 4  
   - EE 204—Electrical Engineering Fundamentals II ....... 4  
   - EE 333W—Physical Electronics ....... 4  
   - EE 334—Electronic Circuit Design ....... 4  
   - EE 311—Applied Engineering Electromagnetics ....... 3  
   - EE 331—High Frequency Lab ....... 3  
   - EE 343—Digital Systems Analysis and Design ....... 4  
   - EE 443—Computer Engineering Analysis and Design ....... 4  
   - EE 444W—Embedded Systems Design ....... 4  
   - EE 463—Communication Networks ....... 3  
   - ES 101—Introduction to Engineering ....... 2  
   - ESM 450W—Economic Analysis and Operations ....... 3  
   - MATH 202X—Calculus ....... 4  
   - MATH 302—Differential Equations ....... 3  
   - MATH 307—Discrete Mathematics ....... 3  
   - Approved electives** ....... 9  
   - Approved engineering science elective*** ....... 3  


5. Minimum credits required .....................................................135

* Student must earn a C grade or better in each course in the major requirements.

**Recommended electives are: EE 353, EE 354, EE 434, EE 451, EE 461, EE 464, CS 302, CS 381, CS 402, CS 411, CS 421, CS 431, CS 441, CS 471, CS 481

***Engineering science elective to be chosen from ES 208, ES 331, ES 334, ES 341, ES 346

---

**UNIVERSITY OF ALASKA FAIRBANKS**

Office of Admissions and the Registrar • P.O. Box 757480 • Fairbanks, AK 99775-7480 • admissions@uaf.edu • www.uaf.edu

UA is an AA/EQ employer and educational institution and prohibits illegal discrimination against any individual: www.alaska.edu/titleIXcompliance/nondiscrimination.
## 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)
- ENGL 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 the following:
- MATH 103X, MATH 107X, MATH 161X OR STAT 200X ....(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 202X 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 113X ..............................................................(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