

# COMPUTER ENGINEERING

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

## B.S. Degree

Minimum Requirements for Degree: 133 credits

The mission of the UAF 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, household 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 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 B.S. 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 program's educational objectives:

1. Breadth: Graduates will utilize their broad education emphasizing computer 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 computer engineering, including its scientific principles, rigorous analysis, and creative design.

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 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/cem/ece/about/](http://www.uaf.edu/cem/ece/about/).

## Major — B.S. Degree

1. Complete the general university requirements. (See page 131. 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 136. As part of the B.S. degree requirements, complete: MATH F201X, PHYS F211X and PHYS F212X.)\*
3. Complete the following program (major) requirements:\*
 

CS F201—Computer Science I.....	3
CS F202—Computer Science II.....	3
CS F301—Assembly Language Programming.....	3
CS F311—Data Structures and Algorithms.....	3
CS F321—Operating Systems.....	3
CS F331—Programming Languages.....	3
EE F102—Introduction to Electrical Engineering.....	3
EE F203—Electrical Engineering Fundamentals I.....	4
EE F204—Electrical Engineering Fundamentals II.....	4
EE F333W—Physical Electronics.....	4
EE F311—Applied Engineering Electromagnetics.....	3
EE F331—High Frequency Lab.....	1
EE F343—Digital Systems Analysis and Design.....	4
EE F353—Circuit Theory.....	3
EE F354—Engineering Signal Analysis.....	3
EE F443—Computer Engineering Analysis and Design.....	4
EE F444W,O—Embedded Systems Design.....	4
EE F463—Communication Networks.....	3
ES F101—Introduction to Engineering.....	2
ESM F450W—Economic Analysis and Operations.....	3
MATH F202X—Calculus III.....	4
MATH F302—Differential Equations.....	3
MATH F307—Discrete Mathematics.....	3
Approved electives**.....	9
Approved engineering science elective***.....	3
4. Complete State of Alaska Fundamentals of Engineering examination
5. Minimum credits required.....133

\* Students must earn a C grade (2.0) or better in each course.  
 \*\* Recommended electives are: EE F334, EE F434, EE F451, EE F461, EE F464, EE F471, CS F361, CS F381, CS F472, CS F411, CS F421, CS F431, CS F471, CS F481  
 \*\*\* Engineering science elective to be chosen from ES F208, ES F331, ME F334, ES F341, ES F346.



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 completed with 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

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