

Electrical Engineering



**College of Science, Engineering and Mathematics
Department of Electrical and Computer Engineering
(907) 474-7137**

www.uaf.edu/engineer/ee.html

Degrees: B.S., M.E.E., M.S.

Minimum Requirements for Degrees: B.S.: 134 credits; M.E.E.: 32 credits; M.S.: 30 credits

Electrical engineering encompasses the areas of computer applications and design, electrical power transmission and distribution, telecommunications and electronics.

Electrical engineers design and oversee the construction, installation and maintenance of electrical systems providing light, heat and power. Engineers design the communication systems of telephone, radio and television as well as the transistors and integrated circuits used in these systems. Computer engineers automate businesses, factories, pipelines and refineries; and design control systems and computers which guide trains, planes and space vehicles. Test devices and tools of investigation—in medicine, physics, geology and other sciences—are largely electronic.

The scope of electrical engineering has expanded tremendously in recent years. Important developments in this expansion include automatic control theory, environmental monitoring, communications theory, new geophysical instrumentation, extra-high voltage power transmission, medical electronics, plasmas, magnetohydrodynamics, integrated circuits, satellites and mini and microcomputers.

The process controls in the extraction, transmission and refining of petroleum products are largely the responsibility of the electrical and computer engineer. Development of techniques for utilizing new energy sources presents a challenge, requiring much imagination and resourcefulness. Advanced training in engineering science and mathematics is required for creative work in these areas.

The curriculum is designed to ensure that basic fundamentals and specialized skills are learned. 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.

Graduate degree programs in electrical engineering are closely connected with research activities of the faculty. Research areas in electrical engineering emphasize high latitude problems and include: data communications, telecommunications, electromagnetic and acoustic wave propagation, satellite communications, digital signal processing, digital and physical electronics, computer applications, remote biomedical and environmental instrumentation, electric energy system analyses, electric power quality improvement, geomagnetic storm interaction with electric energy systems, and system identification and simulation.

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.

The department's goals are: to graduate students who will meet the technological needs of the State of Alaska, and provide leadership in electrical and computer engineering industries, government laboratory and academia; to commit to the highest possible standards of quality in teaching, research, advising and service; to maintain Accreditation Board for Engineering Technology (ABET) accreditation for the electrical and computer engineering program, which facilitates professional licensure for our graduates; to disseminate research information to undergraduate students in the electrical and computer engineering program; and to provide and promote a broadly-based educational experience.

The department's objectives are to have graduates be able to: apply knowledge of mathematics, science and engineering; design and conduct experiments, as well as analyze and interpret data; design a system, component or process to meet desired needs; function on multi-disciplinary teams; understand professional and ethical responsibility; communicate effectively; have the broad education necessary to understand the impact of engineering solutions in a global and societal context; recognize the need for, and be able to engage in, life-long learning; understand contemporary issues; and use techniques, skills and modern engineering tools necessary for engineering practice.

The department insures that each course in the curriculum plays a meaningful role in satisfying one or more of these objectives.



University of Alaska Fairbanks

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

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UNDERGRADUATE PROGRAM

MAJOR

Electrical Engineering—B.S. Degree

Concentrations: Communications, Computer Engineering, Power and Control

1. Complete the general university requirements (page 28). (As part of the core curriculum requirements, complete: MATH 200X, CHEM 105X and CHEM 106X.)
2. Complete the B.S. degree requirements (page 34). (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	2
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 1 of the following concentrations:*

Communications

1. 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
2. Minimum credits required

Computer Engineering

1. Complete the following:

EE 443—Computer Engineering Analysis and Design	4
EE 451—Digital Signal Processing	4
EE 461—Communication Systems	4
2. Minimum credits required

Power and Control

1. Complete the following:

EE 404—Electric Power Systems	4
EE 406—Electrical Power Engineering	4
Approved engineering science elective**	3
2. Minimum credits required

* 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.

GRADUATE PROGRAM

Electrical Engineering—M.E.E. Degree

1. Complete the following admission requirement:
 1. Submit GRE scores.
2. Complete 1 of the following admission requirements:
 1. Complete a bachelor's degree in electrical engineering.
 2. Students with bachelor's degrees in other fields should work out a program to remove background deficiencies with their graduate committee.
3. Complete the general university requirements (page 43).
4. Complete the master's degree requirements (page 46).
5. Complete 32 credits.*
6. Minimum credits required

* At least 26 credits must be at the 600 level. A research project is not required, although up to six credit hours of research may be completed as part of the degree program. If a research project is part of the degree program, an oral project presentation and defense is required.

Electrical Engineering—M.S. Degree

1. Complete the following admission requirement:
 1. Submit GRE scores.
2. Complete 1 of the following admission requirements:
 1. Complete a bachelor's degree in electrical engineering.
 2. Students with bachelor's degrees in other fields should work out a program to remove background deficiencies with their graduate committee.
3. Complete the general university requirements (page 43).
4. Complete the master's degree requirements (page 46).
5. Minimum credits required

See Engineering for Ph.D. program.



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