Submit originals and one copy and electronic copy to Governance/Faculty Senate Office (email electronic copy to fysenat@uaf.edu)

PROGRAM/DEGREE REQUIREMENT CHANGE (MAJOR/MINOR)

SUBMITTED BY:

Department	**Electrical & Computer Engineering**	College/School	**CEM**
Prepared by	**Charlie Mayer**	Phone	**6091**
Email Contact	**cemayer@alaska.edu**	Faculty Contact	**Charlie Mayer**

See http://www.uaf.edu/uafgov/faculty/cd for a complete description of the rules governing curriculum & course changes.

PROGRAM IDENTIFICATION:

DEGREE PROGRAM	**Computer Engineering**
Degree Level: (i.e., Certificate, A.A., A.A.S., B.A., B.S., M.A., M.S.,	**B.S.**

A. CHANGE IN DEGREE REQUIREMENTS: (Brief statement of program/degree changes and objectives)

A few minor changes:
1. Add two courses to address ABET accreditation requirements of probability in the curriculum.
2. Drop two courses so as not to increase the degree requirement credit hours.
3. Minor clean up of language to improve program description.
4. Update elective course options to match what is currently being offered.

B. CURRENT REQUIREMENTS AS IT APPEARS IN THE CATALOG:

Computer 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 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 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 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 following 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: Develop skills for clear communication and responsible teamwork, and cultivate professional attitudes and ethics, so that graduates are prepared for the complex modern work environment and for lifelong learning.

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/.

Major -- B.S. Degree

1. Complete the general university requirements. (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. (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 credits
CS F202--Computer Science II--3 credits
CS F301--Assembly Language Programming--3 credits
CS F311--Data Structures and Algorithms--3 credits

CS F321--Operating Systems--3 credits
CS F331--Programming Languages--3 credits
EE F102--Introduction to Electrical Engineering--3 credits
EE F203--Electrical Engineering Fundamentals I--4 credits
EE F204-- Electrical Engineering Fundamentals II--4 credits
EE F333W--Physical Electronics--4 credits
EE F334--Electronic Circuit Design--4 credits
EE F311--Applied Engineering Electromagnetics--3 credits
EE F331--High Frequency Lab--1 credit
EE F343--Digital Systems Analysis and Design--4 credits
EE F443--Computer Engineering Analysis and Design--4 credits
EE F444W,O--Embedded Systems Design--4 credits
EE F463--Communication Networks--3 credits
ES F101--Introduction to Engineering--2 credits
ESM F450W--Economic Analysis and Operations--3 credits
MATH F202X--Calculus III--4 credits
MATH F302--Differential Equations--3 credits
MATH F307--Discrete Mathematics--3 credits
Approved electives**--9 credits
Approved engineering science elective***--3 credits

4. Complete State of Alaska Fundamentals of Engineering examination

5. Minimum credits required--135 credits

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

** Recommended electives are: EE F353, EE F354, EE F434, EE F451, EE F461, EE F464, CS F361, CS F381, CS F472, CS F411, CS F421, CS F431, CS F441, CS F471, CS F481

*** Engineering science elective to be chosen from ES F208, ES F331, ME F334, ES F341, ES F346.

C. PROPOSED REQUIREMENTS AS IT WILL APPEAR IN THE CATALOG WITH THESE CHANGES:
   (Underline new wording strike through old wording *and use complete catalog format)*

Computer 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: 133 ~~135~~ 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 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 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 following 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: Develop skills for clear communication and responsible teamwork, and cultivate professional attitudes and ethics, so that graduates are prepared for the complex modern work environment and for lifelong learning.

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/.

Major -- B.S. Degree

1. Complete the general university requirements. (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. (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 credits
   CS F202--Computer Science II--3 credits
   CS F301--Assembly Language Programming--3 credits
   CS F311--Data Structures and Algorithms--3 credits
   CS F321--Operating Systems--3 credits
   CS F331--Programming Languages--3 credits
   EE F102--Introduction to Electrical Engineering--3 credits
   EE F203--Electrical Engineering Fundamentals I--4 credits
   EE F204-- Electrical Engineering Fundamentals II--4 credits
   EE F333W--Physical Electronics--4 credits
   ~~EE F334--Electronic Circuit Design--4 credits~~
   EE F311--Applied Engineering Electromagnetics--3 credits
   EE F331--High Frequency Lab--1 credit
   EE F343--Digital Systems Analysis and Design--4 credits
   <u>EE F353-- Circuit Theory--3 credits</u>
   <u>EE F354—Engineering Signal Analysis--3 credits</u>
   EE F443--Computer Engineering Analysis and Design--4 credits
   EE F444W,O--Embedded Systems Design--4 credits
   EE F463--Communication Networks--3 credits
   ES F101--Introduction to Engineering— <u>3</u> ~~2~~ credits
   ESM F450W--Economic Analysis and Operations--3 credits
   MATH F202X--Calculus III--4 credits
   MATH F302--Differential Equations--3 credits
   MATH F307--Discrete Mathematics--3 credits
   Approved electives**-- ~~9~~ <u>6</u> credits
   Approved engineering science elective***--3 credits

4. Complete State of Alaska Fundamentals of Engineering examination

5. Minimum credits required—<u>133</u> ~~135~~ credits

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

** Recommended electives are: <u>EE 334,</u> ~~EE F353, EE F354,~~ EE F434, EE F451, EE F461, EE F464, <u>EE 471,</u> CS F361, CS F381, CS F411, CS F421, CS F431, ~~CS F441,~~ CS F471, CS F472, CS F481

*** Engineering science elective to be chosen from ES F208, ES F331, ME F334, ES F341, ES F346.

D. ESTIMATED IMPACT

WHAT IMPACT, IF ANY, WILL THIS HAVE ON BUDGET, FACILITIES/SPACE, FACULTY, ETC.

None, EE 353 and EE 354 have sufficient capacity to handle more students.

E. IMPACTS ON PROGRAMS/DEPTS:

What programs/departments will be affected by this proposed action?
Include information on the Programs/Departments contacted (e.g., email, memo)

Possible minor impact on CS as one EE/CS elective is dropped. Discussed with CS Chair Kara Nance in late August. She understands and supports the ABET requirements, since CS is also accredited by ABET.

F. IF MAJOR CHANGE - ASSESSMENT OF THE PROGRAM:

Description of the student learning outcomes assessment process.)

With only the swapping of two courses, the program outcomes assessment plans are not changed.

JUSTIFICATION FOR ACTION REQUESTED

The purpose of the department and campus-wide curriculum committees is to scrutinize program/degree change applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. If you drop a course, is it because the material is covered elsewhere? Use as much space as needed to fully justify the proposed change and explain what has been done to ensure that the quality of the program is not compromised as a result.

While dropping one EE/CS elective may be viewed as removing some flexibility from the CpE program, there are still two EE/CS electives allowable and the addition of EE 353 and EE 354 gives some very fundamental material, including probability, which is required by our accreditation agency, ABET. We chose to drop EE 334, a course on feedback amplifiers, because that material is not strongly pertinent to computer engineering.

APPROVALS:

	Date	
Signature, Chair, Program/Department of:		

	Date	
Signature, Chair, College/School Curriculum Council for:		

	Date	
Signature, Dean, College/School of:		

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

	Date	
Signature, Chair, UAF Faculty Senate Curriculum Review Committee		