PROGRAM/DEGREE REQUIREMENT CHANGE (MAJOR/MINOR)

SUBMITTED BY:

<table>
<thead>
<tr>
<th>Department</th>
<th>College/School</th>
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<tr>
<td>Electrical and Computer Engineering</td>
<td>CEM</td>
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<tr>
<th>Prepared by</th>
<th>Phone</th>
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<tbody>
<tr>
<td>Charlie Mayer</td>
<td>6091</td>
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</table>

Email Contact: fcem@uaf.edu

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

PROGRAM IDENTIFICATION:

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<tr>
<th>DEGREE PROGRAM</th>
<th>Electrical Engineering</th>
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Degree Level: (i.e., Certificate, A.A., A.A.S., B.A., B.S., M.A., M.S., Ph.D.) B.S.

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

Change the grade requirements from “Student must earn a C grade or better in each electrical engineering course” to “Student must earn a C grade or better in each course”. The objective is to circumvent the confusion arising from which courses are satisfied with a grade of C- and which courses require a C or better. A second objective is to highlight the importance of doing well in all courses in the degree program.

The second change is to remove the CS 201 option in the course requirement of “ES 201 or CS 201.” Since ES 201 now includes both C/C++ and Matlab programming, that course better fits the students’ programming needs, rather than CS 201, which is C/C++ programming only.

B. CURRENT REQUIREMENTS AS IT APPEARS IN THE CATALOG:

Electrical Engineering

College of Engineering and Mines
Department of Electrical and Computer Engineering
907-474-7137
www.uaf.edu/cem/ece/

B.S., M.E.E., M.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 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.

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 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 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 BSEE 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 educational objectives:

1. Breadth: Graduates will utilize their broad education emphasizing electrical 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 electrical engineering, including its scientific principles, rigorous analysis, and creative design. The BSEE program offers depth concentration areas in communications, computer engineering, and power and control.

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 BSEE program have received a high quality, contemporary education that prepares them for rewarding careers in electrical engineering.

For more information about the Electrical 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**

**Concentrations: Communications, Computer Engineering, Power and Control**

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:*
   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 F303—Electrical Machinery—4 credits
EE F311—Applied Engineering Electromagnetics—3 credits
EE F331—High Frequency Lab—1 credit
EE F333W—Physical Electronics—4 credits
EE F334—Electronic Circuit Design—4 credits
EE F343—Digital Systems Analysis and Design—4 credits
EE F353—Circuit Theory—3 credits
EE F354—Engineering Signal Analysis—3 credits
EE F471—Fundamentals of Automatic Control—3 credits
ES F101—Introduction to Engineering—3 credits
ES F201—Computer Techniques (3)
  or CS F201—Computer Science I (3)—3 credits
ES F208—Mechanics—4 credits
ESM F450W—Economic Analysis and Operations—3 credits
MATH F202X—Calculus—4 credits
MATH F302—Differential Equations—3 credits
Approved EE elective—3 – 4 credits
Approved EE design elective—3 – 4 credits
Approved engineering science elective**—3 credits
Approved mathematics elective***—3 credits


5. Complete one of the following concentrations:*  

   **Communications**
   a. Complete the following:
      EE F412—Electromagnetic Waves and Devices—3 credits
      EE F432—Electromagnetics Laboratory—1 credit
      EE F461—Communication Systems—4 credits
      Approved engineering science elective**—3 credits
   
   b. Minimum credits required—135 credits

   **Computer Engineering**
   c. Complete the following:
      EE F443—Computer Engineering Analysis and Design—4 credits
      EE F451—Digital Signal Processing—4 credits
      EE F461—Communication Systems—4 credits
   
   d. Minimum credits required—135 credits

   **Power and Control**
   e. Complete the following:
      EE F404—Electric Power Systems—4 credits
      EE F406—Electrical Power Engineering—4 credits
      Approved engineering science elective**—3 credits
   
   f. Minimum credits required—135 credits

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

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

*** 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.
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)

Electrical Engineering

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5. Complete one of the following concentrations:* Communications
a. Complete the following:
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   EE F432—Electromagnetics Laboratory—1 credit
   EE F461—Communication Systems—4 credits
   Approved engineering science elective**—3 credits

b. Minimum credits required—135 credits

**Computer Engineering**

c. Complete the following:
   EE F443—Computer Engineering Analysis and Design—4 credits
   EE F451—Digital Signal Processing—4 credits
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d. Minimum credits required—135 credits

**Power and Control**

e. Complete the following:
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   EE F406—Electrical Power Engineering—4 credits
   Approved engineering science elective**—3 credits

f. Minimum credits required—135 credits

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

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

***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.

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**D. ESTIMATED IMPACT**

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

*none*

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**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)*

None, only a few EE students took the CS 201 option. CS still has large classes of students in CS 201, and Computer Engineering students still take CS 201.
F. IF MAJOR CHANGE - ASSESSMENT OF THE PROGRAM:

Description of the student learning outcomes assessment process.

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.

The quality of UAF education will be increased by emphasizing the need to earn good grades in all courses.

EE students will be benefited by learning the Matlab programming environment early in the academic career.

APPROVALS:

| Signature, Chair, Program/Department of: Electrical and Computer Engineering | Date 10/7/09 |
| Adam M. Misra | Date 10/6/09 |

Signature, Dean, College/School of: EEM

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

Signature, Chair, UAF Faculty Senate Curriculum Review Committee