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Dear Electrical and Computer Engineering Student,

Welcome to the Electrical and Computer Engineering (ECE) Department. It is the mission of the University of Maine ECE Department to educate you for the professional practice of electrical and computer engineering by offering an undergraduate program that encourages lifelong learning, fosters teamwork and leadership, and promotes creative discovery. This is accomplished by a commitment to the highest possible standards of quality in the areas of teaching, research, advising, and service. The electrical and computer engineering academic program is a demanding one, but one we feel you will find rewarding.

This is your copy of the Electrical and Computer Engineering Undergraduate Student Guide. Please take some time to read through it. While we have tried to incorporate as much information as possible, students should refer to the Electrical and Computer Engineering website at: \url{http://www.eece.maine.edu/} for updated information. The guide should be used in conjunction with the University of Maine Undergraduate Catalog and the Directory of Classes. If you have any questions, please feel free to contact your advisor or me.

Sincerely,

Mohamad Musavi, Professor and Chair  
Department of Electrical and Computer Engineering
# ELECTRICAL AND COMPUTER ENGINEERING FACULTY AND STAFF

## Faculty

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<tr>
<th>Name</th>
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<th>Email address</th>
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<tbody>
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## Staff

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<tbody>
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## Computer and Network Support

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<tr>
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<th>Office</th>
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</tr>
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<tbody>
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<tr>
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<td>Systems Administrator</td>
<td>581-2234</td>
<td><a href="mailto:andy@eece.maine.edu">andy@eece.maine.edu</a></td>
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</tbody>
</table>
1. **OBJECTIVES AND OUTCOMES**

The Electrical and Computer Department offers two separate Bachelor of Science (BS) degrees in Electrical Engineering and Computer Engineering. These programs are accredited by the Engineering Accreditation Commission of ABET, Suite 1050, Baltimore, MD 21202-4012.

**Educational Objectives**

The primary objective of the Electrical Engineering or Computer Engineering program is to ensure that the students obtain a solid educational background in the program so that they are nationally competitive and successful in their chosen profession and are prepared for future graduate training. To achieve this, the program educational objectives are to:

1. Provide students with a solid foundation in Electrical or Computer Engineering.
2. Guide students in their preparation for a broad range of career opportunities.
3. Train students to develop the ability to function in the workplace through teamwork and effective communication.
4. Educate students become aware of their moral, ethical, legal and professional obligations to hold paramount the safety, health and welfare of the public.
5. Help students develop an appreciation for the necessity of lifelong learning.

These objectives are consistent with the mission of the University of Maine and the College of Engineering.

**Program Outcome**

The outcome of the Electrical Engineering and Computer Engineering programs is listed under (a) through (k) below.

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Engineering programs must demonstrate that their students attain these outcomes after going through their programs. Successful completion of the curriculum given below for the Electrical Engineering or Computer Engineering will guarantee attainment of the above outcomes.
2. CURRICULA

Computer Engineering

Computer Engineering involves the design and development of systems based on computers and complex digital logic devices. These systems find use in such diverse tasks as computation, communication, entertainment, information processing, artificial intelligence, and control.

A computer engineer must know how to select and interconnect the electronic and mechanical devices that make up a computer-based system, activities usually associated with electrical engineering. However, the computer engineer must also be capable of developing the software that makes a computer system perform its task. They might need to know, for example, which programming language is best for a particular need or the most efficient way to store or process data.

A computer engineer, equipped with a broad background in hardware and software, will be entering an exciting and rapidly growing profession with unlimited opportunities in industry, government, and education. While still in school, many students participate in the profession by electing an optional co-operative work program. Our co-op work program allows students to gain valuable experience, earn money to help offset college expenses and receive college credit. Recent examples of companies offering co-op and job opportunities to our students include Bangor Hydro Electric Company, General Electric Company, National Semiconductor, Fairchild Semiconductor, IBM, Analog Devices Tundra Semiconductor, Kepware Technologies, Procter and Gamble, Georgia Pacific, Bath Iron Works, Portsmouth Naval Shipyard, and many other companies.

A list of curriculum requirements for Computer Engineering is listed below. A sample curriculum and the graduation check-off sheet are given in the appendix at the end of this guide.

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of courses</th>
<th>Credit hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>Sciences</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Computer Engineering (required)</td>
<td>18</td>
<td>53</td>
</tr>
<tr>
<td>Technical Elective (CEN &amp; others)</td>
<td>7</td>
<td>21</td>
</tr>
<tr>
<td>Human Values and Social Context (HV&amp;SC)</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>and Ethics (elective)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>129</strong></td>
<td></td>
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</tbody>
</table>

Electrical Engineering

Electrical Engineers use their understanding of electrical phenomena to solve problems related to microelectronics, sensors, communications, energy, the environment, transportation, and a host of other areas that have an important impact upon society. These problems may be very specific, such as working closely with a medical professional to develop a new surgical tool or an artificial organ. On the other hand, they may be very broad, such as leading a team to
establish the goals of a more environmentally friendly, efficient and economical energy generation and distribution system.

Equipped with a broad background of theoretical and practical knowledge, the Electrical Engineering graduate has a wide range of careers from which to choose—research, product development, design, teaching, sales and management. Few professions offer the opportunity for diversity that is provided in electrical engineering.

The Electrical Engineering curriculum also is an excellent choice for those students uncertain about a specific career. The knowledge gained through a study of the physical sciences, mathematics, engineering, written and oral communications, humanities, and social sciences provides an excellent background for many career choices (e.g., medicine, business and law).

While still in school, many students participate in the profession by working with faculty on their research projects or by electing an optional co-operative work program. Our co-op work program allows students to gain valuable experience, earn money to help offset college expenses and receive college credit. Recent examples of companies offering co-op and job opportunities to our students include Bangor Hydro Electric Company, General Electric Company, National Semiconductor, Fairchild Semiconductor, IBM, Analog Devices Tundra Semiconductor, Kepware Technologies, Procter and Gamble, Georgia Pacific, Bath Iron Works, Portsmouth Naval Shipyard, and many other companies.

A list of curriculum requirements for Electrical Engineering is listed below. A sample curriculum and the graduation check-off sheet are given in the appendix at the end of this guide.

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of Courses</th>
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<tbody>
<tr>
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<td>18</td>
</tr>
<tr>
<td>English</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>130</strong></td>
<td></td>
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</table>

**Double Major and Double Degree**

By a judicious selection of technical electives and additional courses, students can satisfy the requirements for both Electrical Engineering and Computer Engineering degrees and receive a double major BS degree. By satisfying the requirement for a second degree and obtaining 30 credit hours beyond their first degree, students can receive double degrees.

**Minors**

With suitable selection of their elective courses and taking extra courses, students can also receive minors in robotics, mathematics, business, innovation engineering and others. Consult with your advisor and the appropriate departments on the courses required for the minors.
**Five-Year BS/MBA degree**

The ECE students can combine their Electrical and Computer Engineering education with Master of Business Administration and receive their BS degree after 4 years and their MBA at the end of the fifth year. Those intending to take advantage of this program should take additional economics and business related courses as prerequisites for their MBA education. A sample curriculum for the 5-year BS/MBA program is available in the appendix.

**3. HONORS COLLEGE**

Electrical and computer engineering students can receive a degree with Honors by satisfying the requirements of the Honors College. For more information visit: [www.honors.umaine.edu](http://www.honors.umaine.edu). The curriculum for these degrees is the same as our regular degrees except for the HV&SC required courses and ENG 101 that have been replaced with the Honors courses. Also, ECE 402 and 403 (capstone experience) have been replaced with honors courses, although the content is the same and students attend ECE 402 and 403 classes.

**4. ADVISING AND GENERAL INFORMATION**

Upon entering the electrical and computer engineering programs, all students will be assigned a faculty member as their academic advisor. Students should make every effort to seek out and get acquainted with their advisors. If you do not have any advisor, please seek assistance in the ECE office (101 Barrows).

For registration, students should get approval of their advisors on their plan of study. Using the curriculum as a guide, the student and advisor plan the next semester’s program. Students are responsible for their registration using MaineStreet after receiving their PINs from their advisors. If there are any difficulties, please see Susan Niles in the ECE office. Ultimately students are responsible to ensure that they have satisfied all requirements for graduation.

**5. GRADING POLICIES**

**Grading System**

The University of Maine uses a letter-grade system ranging from A to F. Faculty members have the option of adding + (no A+) and - grades.

The qualitative value of the five basic letter grades is defined as follows:

- **A** - Superior work
- **B** - Good work
- **C** - Satisfactory but undistinguished work
- **D** - Poor work that does not adequately prepare students for more advanced work in the discipline. While some courses completed with D grades may contribute towards the
total credits needed for graduation, others may be unacceptable for certain specific requirements within the major.
F – Failure – no credit earned for a failed course

The grades A-F have the following numerical values used in calculating a student’s Grade Point Average (GPA):

\[
\begin{align*}
A &= 4.00 & A- &= 3.67 \\
B+ &= 3.33 & B &= 3.00 & B- &= 2.67 \\
C+ &= 2.33 & C &= 2.00 & C- &= 1.67 \\
D+ &= 1.33 & D &= 1.00 & D- &= 0.67 & F &= 0.00 \\
\end{align*}
\]

**AU**, assigned only for courses taken under the audit option

**L**, Failure for lack of attendance. This grade indicates that a student stopped attending class, but did not formally withdraw from the course. This grade counts the same as an F.

**W**, indicates that the student formally withdrew from the course during the second third of the semester.

A student may receive one of the following grades upon completion of a course taken pass/fail:

- **LP** = Low Pass (earned D+, D or D-)
- **P** = Pass (earned a C- or above)

**Grading Requirements for ECE 314, ECE 342, and ECE 473**

(a) ECE 314 and ECE 342 require C- or better in ECE 211 as prerequisite.

(b) ECE 473 requires C- or better in ECE 271 as prerequisite.

**Course Repeat Policy**

Repeating any ECE course for which a grade of F, L, or WF has been recorded requires a grade of C- or better in prerequisites for the course. Any required course in the ECE curricula cannot be taken more than twice. If any required course in the program is taken twice without achieving a passing grade then dismissal from the program will be recommended. This includes courses where a grade of AU, L, W, or WF is received.

**Pass/Fail**

Except for ECE100 and ECE194, students enrolled in Electrical and Computer Engineering may not take a course on a Pass/Fail basis, if the course is to be used to fulfill degree requirements.

6. **TRANSFER OF COURSES**

Normally all credit earned with C- grades or higher at any University of Maine System institution, including through distance education, is accepted by the University of Maine. A few
exceptions do exist, usually because a particular course is not applicable to any UMaine program of study. Grades and grade point averages do not transfer. Semester and cumulative grade point averages reflect only those courses taken at the home institution. Credit earned with lower than “C” grades may need to be repeated (as with ENG 101) or counted as elective courses.

Credit from regionally accredited institutions with a letter grade of C- or above is usually accepted by the department. A few exceptions do exist, usually because a particular course is not applicable to the program of study. Correspondence and distance education courses are treated equally with traditional classroom courses. Credit earned with a C- grade (as with ENG 101) may need to be repeated or used as an elective. Grades and grade point averages do not transfer. Official transcripts are required from every institution.

The University of Maine accepts credit from international institutions, both for international students and for domestic students participating in study abroad programs. The University of Maine awards credit to students who have earned the International Baccalaureate diploma and scored 5, 6, or 7 on the higher level examinations. Credit is granted through each dean’s office. Grades and GPA do not transfer. Official transcripts and World Education Services (WES) translations of non-English originals are required.

The Office of Student Records (Wingate Hall) maintains a transfer equivalency database of courses that are offered at other institutions that are transferable to the University of Maine.

**Advanced Placement Credits**

Matriculated University of Maine Electrical and Computer Engineering students may be awarded credit for advanced placement (AP) tests that are comparable or equivalent to UMaine courses. Students wishing to request credit for prior learning should consult the College of Engineering Dean's office located in room 210 in the AMC Building.

7. **GENERAL EDUCATION REQUIREMENTS**

All University of Maine students are required to meet general education requirements in addition to their program requirements. These include:

1. **Science** - Two courses with laboratories in basic or applied science. This is met by the PHY and/or CHY courses.

2. **Human Values and Social Context (HV&SC) and Ethics** – Students must take 18 credits of HV&SC and ethics with at least 3 credits from each of the five HV&SC sub-categories listed below. Note that CMJ 103, which is included in the 18 credit hours, is a required course and satisfies the Social Context and Institutions requirement.
   
   a. Western Cultural Tradition
   b. Social Context and Institutions
   c. Cultural Diversity and International Perspectives
   d. Population and the Environment
e. Artistic and Creative Expression

3. Mathematics - At least six credits in mathematics. This is met by the MAT courses.

4. Demonstrated Writing Competency - Must complete College Composition (ENG 101) with a grade of C or better and at least two writing intensive courses, one of which must be within the academic major. This is met by ECE 403 and ECP 214, 342, and 403 sequence.

5. Senior Project - All students are required to complete a capstone experience within their major during their senior year. This involves the design, implementation and reporting of an engineering device, system or software package by an individual student or a team. This is met by the ECE senior design project.

To get a list of University courses that satisfy General Education requirements visit:
http://studentrecords.umaine.edu/academics/

8. GRADUATION REQUIREMENT

Electrical Engineering and Computer Engineering students must maintain a 2.0 GPA overall, a 2.0 GPA in their major, and satisfy all the requirements set in the graduation check-off sheets as given below:

   Double Major:          http://www.eece.maine.edu/programs/undergrad/double/

Courses numbered 500-599 are graduate level courses and may only be taken by undergraduates who have a cumulative GPA of 3.0 or higher and with permission from their advisor.

In order to be considered for graduation, electrical and computer engineering students must complete an Application for Degree form during their final semester. These forms are usually sent to students in their senior year but are also available in the Office of Student Records in Wingate Hall. Failure to file an application for degree may result in no degree being awarded. Students are responsible for meeting all graduation requirements and should check with their advisors to make sure they are on track for graduation.

9. SERVICES AVAILABLE TO STUDENTS

Math Courses and Tutoring

All engineering students are required to take a math placement examination (http://www.umaine.edu/it/etc/mathplacementtest.php) prior to their first math course (MAT 126). If a placement score indicates that the student scored either “marginally ready” or “not
ready” for MAT 126, the student is encouraged to take a lower level math course to begin their math sequence. If a student still wishes to take the course despite the low test score, the student is required to obtain their advisor’s approval before registering for that course. However, if a student chooses to do this, they will not be eligible for tutoring services through the Onward Program.

If you are having difficulty while enrolled in a math or science course, your instructor is a primary source for help. The Math Department at the University of Maine operates a Math Lab (http://www.math.umaine.edu/) and students are encouraged to take full advantage of this facility. Seeking help early in the semester can make a big difference later. For information on office hours, please contact: Math Department, 116 Neville Hall, 581-3901

The Onward Tutoring Program has group tutoring sessions. Students are generally grouped with students from the same course and section. Students should sign up within the first few weeks of each semester as the tutoring program often has a waiting list and is closed to new student after eight weeks. Onward Program, East Annex, 581-2319

The University of Maine Tutor Program provides small group tutoring for students who need academic assistance in 100 & 200 level courses. Refer the Tutor Program webpage at http://www.umaine.edu/tutorprogram/ to sign up for a tutor. 104 Dunn Hall, 581-2351.

Finally, electrical and computer engineering students who are members of the Institute for Electrical and Electronic Engineers (IEEE) organization and Eta Kappa Nu honor society will provide tutoring. Please contact the ECE office if you need tutoring.

**English Department Writing Center**

The University of Maine Writing Center is available to all students. They offer feedback on written work whether it is for an English course or preparing a paper in any course. They will not proofread your paper, but they will help you think critically about your own writing and give suggestions on how to make it stronger. You can also drop by and use their handbooks or look something up on their computers. For information on office hours, please contact: Writing Center, 402 Neville Hall, 581-382.

**Disability Support Service**

The primary goal of the University of Maine Disability Support Services (DSS) is to create educational access for students with disabilities at UMaine by providing a point of coordination, information and education for those students and the campus community. Some of the services provided or coordinated for students with disabilities include advising, special orientation to campus, readers, tape recorders, note takers, ordering taped texts, classroom relocation, priority registration, mediation and advisement on disability issues, classroom accommodations, as well as personal, educational, and vocational counseling. The staff of DSS promotes self-determination and personal responsibility for students with disabilities by educating them about their rights and responsibilities so that they can make informed choices in order to meet or exceed the standards expected of all students at The University of Maine.
Students believed to be learning disabled without documentation can be screened through this office and referred for assessment. It is the policy of The University of Maine to provide reasonable accommodations for all qualified individuals with disabilities. Federal law, the Rehabilitation Act of 1993, the Americans with Disabilities Act of 1990, and the Maine Human Rights Act established the rights of individuals with disabilities. These laws provide that the recipients of federal funds, employers and places of public access, shall make reasonable accommodation to the known physical and mental limitations of an otherwise qualified person with a disability.

The Counselor/Coordinator of Services for Students with Disabilities is located in East Annex, and their phone number is 581-2319.

**First Class**

All students will automatically be issued an email account to use the First Class Computer Conferencing and Bulletin Board system. This gives you access to email and a wide variety of “conferences.” These conferences are used for courses, campus organizations and departments. For example, ECE 209 has a conference folder allowing accessibility for all students registered for that class. The Electrical and Computer Engineering Department has a folder for announcing different activities, job opportunities, scholarships, and others. Students are encouraged to routinely visit the ECE folder.

**Computer Clusters**

There is a computer cluster available in 228 Barrows Hall that is open to all engineering students when not being used for courses. There are also public computer clusters in Fogler Library and the Memorial Union.

**Student Jobs and Co-ops**

Students should go to the Career Center’s web page (http://www.umaine.edu/career/) under eRecruiting for jobs and co-op opportunities. Call 581-1359 for assistance. Students should also check the ECE First Class folder for employment opportunities and scholarships. Up to 6 credit hours of ECE 394 can be awarded for co-op with the approval of the co-op coordinator.

10. **STUDENT CONDUCT CODE**

The University of Maine System Student Conduct Code seeks to promote the pursuit of activities that contribute to the intellectual, ethical, and physical development of the individual under the auspices of the University of Maine System. It is expected that students will conduct their affairs with proper regard for the rights of others and of the University and be honest and forthright in their academic endeavors. Students in violation of activities under the Student Conduct Code will be subject to disciplinary action under this code. For more information about the Student Conduct Code please refer to: http://www.main.edu/pdf/conductcode.pdf.
11. NON-DISCRIMINATION NOTICE

In complying with the letter and spirit of applicable laws and pursuing its own goals of diversity, the University of Maine System shall not discriminate on the grounds of race, color, religion, sex, sexual orientation, including transgender status or gender expression, national origin, citizenship status, age, disability, or veterans status in employment, education, and all other areas of the University System. The University provides reasonable accommodations to qualified individuals with disabilities upon request.

Questions, concerns and complaints about discrimination or harassment in any area of the University or about the application of laws and regulations related to equal opportunity and affirmative action should be directed to: Office of Equal Opportunity, The University of Maine, Room 101, 5754 North Stevens Hall, Orono, ME 04469-5754; (207) 581-1226 (voice and TDD).

12. FUNDAMENTALS OF ENGINEERING (FE) EXAMINATION

Engineering students are typically allowed to take this exam in late October or mid-April of their senior year in college. You should apply for the examination in September or January of your senior year. The exam is entirely open-book and multiple choice. It consists of about 140 questions in a four-hour morning session and 50 mandatory questions plus 20 questions in two chosen categories in the afternoon session.

Students should think seriously about taking this exam as it is a must for a professional career. If a student passes the exam, it will be stated on the transcript.

An application for applying for the examination may be obtained from the Dean’s Office (210 AMC Building) or the licensing board in any state. The address to write to in Maine is as follows:

State Board of Registration for Engineers
State House Station #92
Augusta, ME 04333
Phone: 207-287-3236
http://www.maine.gov/professionalengineers/

A booklet explaining the engineer in training examination procedure and containing typical questions may be obtained from:

Executive Director of National Council of Engineering Examiners (NCEE)
P.O. Box 1686
Clemson, SC 29633-1686
Phone: 803-654-6824
http://www.ncees.org/introduction/about_ncees/other_organizations_polc.php

Refresher texts are widely available for taking any of the professional licensing exams. We recommend you review one or more such manuals before taking a licensing exam. The College of Engineering also operates a review course in the spring for the engineer in training.
examinations. However, the best source of review information is the wide range of material covered throughout your degree program in college.

After passing the FE examination and gaining five years of professional level experience, you qualify to take the second portion of the professional examination. (Exact requirements may vary from state to state.) Information on this second exam may be acquired from the same sources noted above. For more information on the FE examination log on to http://www.ncees.org/exams/fundamentals/.

13. SCHOLARSHIPS

The Department of Electrical and Computer Engineering offers a variety of scholarships to qualified applicants from the first year to the senior year. These scholarships are: 1) Microelectronics Scholarships, 2) Kepware Scholarships and 3) a number of ECE Scholarships as described below. In addition, there are a number of University, College of Engineering, and private organization scholarships, such as the Paper Foundation and Dearborn Foundation scholarships, available to the Electrical and Computer Engineering students. For more details on these scholarships visit our web site at: http://www.eece.maine.edu/prospective/scholarship.php.

Microelectronics Scholarship Consortium

Fairchild Semiconductor, National Semiconductor, Tundra Semiconductor, Analog Devices, and Texas Instruments Corporation participate in the UMaine Microelectronics Scholarship Consortium. The purpose of this consortium is to increase the number of students at UMaine interested in preparing for jobs in the semiconductor industry. In the Spring of 2008, ten $7,500 scholarships were awarded to upper class students and seven $1,500 scholarships were awarded to high school seniors who are attending UMaine.

<table>
<thead>
<tr>
<th>ECE Level</th>
<th>Annual Awards</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Year Students</td>
<td>5@ $1,500.00</td>
</tr>
<tr>
<td>Upperclassmen</td>
<td>7@ $7,500.00</td>
</tr>
</tbody>
</table>

Kepware Scholarship

Kepware Technologies is a Portland, Maine company specializing in open process control (OPC) and device communication technologies for the industrial automation market. Kepware Technologies is proud to support engineering education in Maine by annually offering three scholarships in the amount of $7,500 each awarded to students maintaining a 3.0 or better GPA.

ECE Scholarships and Awards

The Electrical and Computer Engineering Department annually gives about 25 scholarships and awards to incoming and current students obtaining either an electrical or computer engineering degree. The table below lists departmental funds from which scholarships are currently awarded.
<table>
<thead>
<tr>
<th>ECE Fund Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE Gift Fund</td>
</tr>
<tr>
<td>Edmund M. Sheppard Fund</td>
</tr>
<tr>
<td>David Dunlap Holmes</td>
</tr>
<tr>
<td>Walter W. Turner Fund</td>
</tr>
<tr>
<td>Waldo M. Libbey Fund</td>
</tr>
<tr>
<td>Carleton M. Brown Fund</td>
</tr>
<tr>
<td>Fred H. Irons</td>
</tr>
<tr>
<td>Rajendra &amp; Neera Singh Scholarship</td>
</tr>
<tr>
<td>Walter J. Creamer</td>
</tr>
<tr>
<td>RCA Harold Beverage</td>
</tr>
<tr>
<td>Harold H. Beverage Award</td>
</tr>
<tr>
<td>William Lambert Family Scholarship</td>
</tr>
<tr>
<td>Carrol R. Lee Scholarship</td>
</tr>
<tr>
<td>Louis H. Morrison</td>
</tr>
<tr>
<td>Howard Crosby &amp; Kenneth Parsons</td>
</tr>
<tr>
<td>Robert N. Haskell</td>
</tr>
<tr>
<td>John A. “Gus” O’Brien</td>
</tr>
<tr>
<td>William G. Stoy, Jr. and Judith Kenoyer Stoy</td>
</tr>
<tr>
<td>Haskell Power Eng. Professorship</td>
</tr>
<tr>
<td>Elec. &amp; Comp. Eng. Alumni</td>
</tr>
<tr>
<td>IEEE Scholarship</td>
</tr>
<tr>
<td>1st, 2nd, 3rd Place Senior Projects</td>
</tr>
<tr>
<td>Francis J. Hovey Award-Outstanding Senior</td>
</tr>
<tr>
<td>Haskell Power Engineering Scholarship</td>
</tr>
<tr>
<td>Castle Professorship</td>
</tr>
<tr>
<td>Butler Professorship</td>
</tr>
</tbody>
</table>

**Other Scholarships**

In addition to ECE scholarships, there are other scholarships offered by the University of Maine, College of Engineering, and private organizations. Students interested in College of Engineering scholarships should contact the Dean of the College of Engineering, 200 AMC Building, 207-581-2217. For information on University of Maine scholarships, contact the Office of Student Financial Aid, 5781 Wingate Hall, 207-581-1324. In addition, each year the Pulp and Paper Foundation and Dearborn Foundation have supported several electrical and computer engineering students. Please visit our site at [http://www.eece.maine.edu/prospective/scholarship.php](http://www.eece.maine.edu/prospective/scholarship.php) for more information on how to apply for these scholarships.
14. STUDENT ORGANIZATIONS

**Eta Kappa Nu (Electrical Engineering Honor Society)**
Eta Kappa Nu is a unique membership organization dedicated to encouraging and recognizing excellence in the electrical and computer engineering field. Members consist of students, alumni, and other professionals who have demonstrated exceptional academic and professional accomplishments. [http://www.hkn.org/admin/chapters/delta_kappa.html](http://www.hkn.org/admin/chapters/delta_kappa.html)

**Tau Beta Pi (Engineering Honor Society)**
Tau Beta Pi is the only engineering honor society representing the entire engineering profession. It is the nation's second-oldest honor society, founded at Lehigh University in 1885 to recognize students of distinguished scholarship and exemplary character. There are now collegiate chapters at 230 US colleges and universities, active alumnus chapters in 16 districts across the country, and a total initiated membership of 485,351. [http://www.tbp.org/](http://www.tbp.org/)

**IEEE (Institute of Electrical and Electronics Engineers)**
The University of Maine’s student branch of the IEEE is a student run organization dedicated to serving the electrical and electronics engineering community at the University of Maine. Working with the Department of Electrical and Computer Engineering and the School of Engineering Technology, we support monthly meetings and activities which contribute to the development of electrical and computer engineering and technology. Visit the above website for a list of the offices and membership information. [http://www2.umaine.edu/ieee/](http://www2.umaine.edu/ieee/)

**Association for Computing Machinery (ACM)**
Founded in 1947, ACM currently is the world’s largest educational and scientific computing society. It delivers resources that advance computing as a science and a profession. ACM provides serves its members and the computing profession with leading-edge publications, conferences, and career resources. Its membership is more than 92,000 as of 2009. ACM student chapter at UMaine provides members ACM Distinguished Speakers Program, one of the premier technology outreach programs in the computing industry. The chapter recognizes outstanding ACM student chapters in several key areas via ACM Student Chapter Excellence Program.

**SWE (Society of Women Engineers)**
The Society of Women Engineers (SWE), founded in 1950, is a not-for-profit educational and service organization. SWE is the driving force that establishes engineering as a highly desirable career aspiration for women. SWE empowers women to succeed and advance in those aspirations and be recognized for their life-changing contributions and achievements as engineers and leaders. For more information about Maine SWE, please contact karen.horton@umit.maine.edu. [http://www.swe.org/RegionF/RegionF-Sections.shtml](http://www.swe.org/RegionF/RegionF-Sections.shtml)

**USENIX/Sage**
Since 1975, the USENIX Association has brought together the community of engineers, system administrators, scientists, and technicians working on the cutting edge of the computing world. The USENIX conferences have become the essential meeting grounds for the presentation and discussion of the most advanced information on the developments of all aspects of computing systems. USENIX supports its members' professional and technical development through a variety of on-going activities. [http://www.usenix.org/about/](http://www.usenix.org/about/)
15. BUILDING ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviations for Classroom Buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
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<tr>
<td><strong>AA</strong></td>
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<tr>
<td><strong>ARC</strong></td>
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<td><strong>ARM</strong></td>
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<td><strong>ASC</strong></td>
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<tr>
<td><strong>B</strong></td>
</tr>
<tr>
<td><strong>BAL</strong></td>
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<tr>
<td><strong>BD</strong></td>
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<tr>
<td><strong>BGSC</strong></td>
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<tr>
<td><strong>BLE</strong></td>
</tr>
<tr>
<td><strong>BW</strong></td>
</tr>
<tr>
<td><strong>CA</strong></td>
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<tr>
<td><strong>CHD</strong></td>
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<tr>
<td><strong>CO</strong></td>
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<tr>
<td><strong>COL</strong></td>
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<td><strong>CR</strong></td>
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<td><strong>CSHC</strong></td>
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<td><strong>CY</strong></td>
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<td><strong>D</strong></td>
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<td><strong>DC</strong></td>
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<tr>
<td><strong>DPC</strong></td>
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<tr>
<td><strong>DU</strong></td>
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<tr>
<td><strong>EMMC</strong></td>
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<td><strong>F</strong></td>
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<td><strong>FH</strong></td>
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<tr>
<td><strong>FHC</strong></td>
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<td><strong>FSTA</strong></td>
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<td><strong>FC</strong></td>
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<td><strong>G</strong></td>
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<td><strong>HAU</strong></td>
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<td><strong>HH</strong></td>
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<td><strong>HO</strong></td>
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</tbody>
</table>
16. HELPFUL WEBSITES

Electrical and Computer Engineering - http://www.eece.maine.edu/


Office of Student Records - http://studentrecords.umaine.edu/

Undergraduate Catalog - http://catalog.umaine.edu/

General Ed. Requirements - http://studentrecords.umaine.edu/academics


Student Resources - http://www.umaine.edu/current/default.htm

Bursar’s Office - http://www.umaine.edu/bursar/

Career Center - http://www.umaine.edu/career/

FAQ - http://www.eece.maine.edu/programs/undergrad/ece_faq/ece_faq_qa.html

APPENDIX

Sample Curricula and flowcharts for Electrical Engineering and Computer Engineering programs are presented in the following pages.
### B.S. Electrical Engineering

#### Sample Curriculum - Class of 2014

<table>
<thead>
<tr>
<th>Fall</th>
<th>1st YEAR</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 100 ECE 1st Year Seminar</td>
<td>1</td>
<td>ECE 177 Intro to Prog for Engineers</td>
</tr>
<tr>
<td>ECE 101 Intro to ELE &amp; CEN Eng</td>
<td>3</td>
<td>MAT 127 Calculus II</td>
</tr>
<tr>
<td>MAT 126 Calculus I</td>
<td>4</td>
<td>PHY 121 Physics for Engineers I</td>
</tr>
<tr>
<td>CHY 121 Intro to Chemistry</td>
<td>3</td>
<td>ENG 101 College Composition</td>
</tr>
<tr>
<td>CHY 123 Intro to Chemistry Lab</td>
<td>1</td>
<td>Elective HV &amp; SC (1)</td>
</tr>
<tr>
<td>CMJ 103 Fund of Public Communication</td>
<td>3</td>
<td></td>
</tr>
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<td></td>
<td>15</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>2nd YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 210 Electrical Networks I 3</td>
</tr>
<tr>
<td>ECE 275 Sequential Logic Systems 3</td>
</tr>
<tr>
<td>MAT 228 Calculus III 4</td>
</tr>
<tr>
<td>PHY 122 Physics for Engineers II 4</td>
</tr>
<tr>
<td>Elective2 Basic Science 4</td>
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<tr>
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</table>

<table>
<thead>
<tr>
<th>3rd YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 314 Signals &amp; Systems 3</td>
</tr>
<tr>
<td>ECE 342 Electronics I 4</td>
</tr>
<tr>
<td>ECP 342 Engineering Writing II 1</td>
</tr>
<tr>
<td>ECE 351 Fields and Waves 3</td>
</tr>
<tr>
<td>Elective ECE Technical Elective (1) 3</td>
</tr>
<tr>
<td>Elective HV &amp; SC (2) 3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4th YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 402 Design Project II 4</td>
</tr>
<tr>
<td>Elective Generic Technical Elective (1) 3</td>
</tr>
<tr>
<td>Elective EE Focus (2) 3</td>
</tr>
<tr>
<td>Elective EE Focus (3) 3</td>
</tr>
<tr>
<td>Elective HV &amp; SC (3) 3</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

### MINIMUM CREDIT HOURS TO GRADUATE: 130

1. This is only a sample curriculum. Adjustments, such as interchanging HV & SC and technical electives, and switching ECE 351, ECE 486 and ECE 414 between junior and senior years, can be made to suit individual preferences. Check with your academic advisor for assistance. Be sure all degree requirements listed on the check-off sheet are met.

2. **BIO 222/223 or ERS 102** can be used to satisfy the Basic Science Elective and the HV&SC Elective under the Population and Environment categories. If either of these courses is taken, the three credit hours that is freed up can be replaced with a technical elective.

3. ECE 316 can be replaced with either CHB 350 or MAT 332.
STUDENT ___________________________  ADVISOR ___________________________

1. Total hours (at least 130) ___________________________
2. Passing grade in all required courses ________________
3. Overall GPA 2.0 _________________________
4. Department GPA 2.0 _______________________

Required Courses:

- PHY 121
- MAT 126
- ECE 100
- ECE 314
- PHY 122
- MAT 127
- ECE 101
- ECE 316
- MAT 228
- ECE 177
- ECE 342
- CHY 121
- MAT 258
- ECE 210
- ECE 343
- CHY 123
- ENG 101
- ECE 211
- ECE 351
- ECP 214
- ECP 342
- ECE 343
- ECE 271
- ECE 401
- ECE 275
- ECE 402
- ECE 403
- ECE 414
- ECE 486

HV&SC + Ethics General Education Requirements (minimum of 18 hours in the first 5 of the 6 areas)

Each of the 6 areas below must be represented. A course may represent multiple areas.

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
<th>Grade</th>
<th>18 Credit Hours Required</th>
<th>Ethics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>West</td>
<td>Soc</td>
</tr>
<tr>
<td>CMJ 103</td>
<td>3</td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

West - Western cultural tradition; Soc - Social context and institutions; Cult - Cultural diversity and international perspectives; Pop - Population and the environment; Art - Artistic and creative expression.

Grade

Basic Science Electives (4 hours) ______________________________________

ECE and Technical Electives (21 hours minimum)

Grade

EE Focus #1: ___________________________   Generic Tech Elective #1: ___________________________   __________
EE Focus #2: ___________________________   Generic Tech Elective #2: ___________________________   __________
EE Focus #3: ___________________________   __________
ECE Tech Elective #1: ___________________________   __________
ECE Tech Elective #2: ___________________________   __________

Advisor Reviews

Date | Initials | Comments
<table>
<thead>
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</tbody>
</table>
Graduation Requirements - Electrical Engineering

1. To obtain a BS in Electrical Engineering, a student must:
   a. meet all University academic requirements;
   b. meet all Electrical Engineering curriculum requirements;
   c. have a GPA of 2.0 or better in all ECE courses.

2. Any exceptions to the program specifics listed above require approval of the ECE faculty.

3. Repeating any ECE course for which a grade of F, L, or WF has been recorded requires a grade of C- or better in prerequisites for the course.

4. Any required course in the ECE curricula cannot be taken more than twice. If any required course in the program is taken twice without achieving a passing grade then dismissal from the program will be recommended. This includes courses where a grade of AU, L, or WF is received.

Information about Elective Courses

Technical Electives: The curriculum requires seven technical elective courses used to broaden a student's knowledge. Of these seven elective courses, at least three electives must be Electrical Engineering (EE) focus courses chosen from the list below; two must be 300-level or higher ECE courses excluding ECE 394, and two must be Generic Technical Elective courses described below.

1. Courses that satisfy the Electrical Engineering Focus requirement are:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 323</td>
<td>Electric Power Conversion</td>
</tr>
<tr>
<td>ECE 383</td>
<td>Communications Engineering</td>
</tr>
<tr>
<td>ECE 427</td>
<td>Electric Power Systems</td>
</tr>
<tr>
<td>ECE 444</td>
<td>Analog Integrated Circuit Design</td>
</tr>
<tr>
<td>ECE 453</td>
<td>Microwave Engineering</td>
</tr>
</tbody>
</table>

2. Generic technical electives include 300–level or higher ECE courses including ECE 394, or with approval of the student’s advisor, selected from various advanced Math, Physics, Biology, Chemistry, Engineering or Computer Science courses. For a minor in Business Administration or 5-year BS/MBA program, up to two technical electives can be satisfied by taking BUA 325 or BUA 350 with the provision that upon graduation, the student also satisfied all requirements for the Business minor or BS/MBA program. The following 100- and 200-level courses have been approved to satisfy the Generic Technical Elective requirement. Other courses may be permitted but require written approval from the ECE Department Chair.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHB 200</td>
<td>Fundamentals of Process Engineering</td>
</tr>
<tr>
<td>CIE 231</td>
<td>Fundamentals of Environmental Eng.</td>
</tr>
<tr>
<td>COS 221</td>
<td>Introduction to Computer Science II</td>
</tr>
<tr>
<td>MEE 150</td>
<td>Applied Mechanics: Statics</td>
</tr>
<tr>
<td>MEE 230</td>
<td>Thermodynamics I</td>
</tr>
<tr>
<td>MEE 252</td>
<td>Statics and Strength of Materials</td>
</tr>
<tr>
<td>MEE 270</td>
<td>Applied Mechanics: Dynamics</td>
</tr>
</tbody>
</table>

Areas of Concentration: Students may choose to concentrate electives in various sub-disciplines of Electrical Engineering. The recommended electives for the various specialties are listed below:

Communications and Wireless

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 383</td>
<td>Communications Engineering I</td>
</tr>
<tr>
<td>ECE 484</td>
<td>Communications Engineering II</td>
</tr>
<tr>
<td>ECE 453</td>
<td>Microwave Engineering</td>
</tr>
</tbody>
</table>

Power and Alternative Energy

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 323</td>
<td>Electric Power Conversion</td>
</tr>
<tr>
<td>ECE 427</td>
<td>Electric Power Systems</td>
</tr>
</tbody>
</table>

Microelectronics and Circuits

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 444</td>
<td>Analog Integrated Circuit Design</td>
</tr>
<tr>
<td>ECE 445</td>
<td>Digital Integrated Circuit Design</td>
</tr>
<tr>
<td>ECE 462</td>
<td>Intro. to Basic Semiconductor Devices</td>
</tr>
<tr>
<td>ECE 464</td>
<td>Microelectronics Science and Engineering</td>
</tr>
<tr>
<td>PHY 236</td>
<td>Introduction to Quantum Physics</td>
</tr>
</tbody>
</table>

Solid-State and Sensors

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 465</td>
<td>Introduction to Sensors</td>
</tr>
<tr>
<td>ECE 466</td>
<td>Sensor Technology and Instrumentation</td>
</tr>
<tr>
<td>ECE 453</td>
<td>Microwave Engineering</td>
</tr>
<tr>
<td>ECE 462</td>
<td>Introduction to Basic Semiconductor Devices</td>
</tr>
<tr>
<td>ECE 464</td>
<td>Microelectronics Science and Engineering</td>
</tr>
<tr>
<td>PHY 236</td>
<td>Introduction to Quantum Physics</td>
</tr>
</tbody>
</table>
**Basic Science Elective:** In addition to CHY 121/123, PHY 121 and PHY 122, the Curriculum requires at least 4-credit hours in physical or biological sciences to broaden a student’s knowledge base in science. Courses satisfying the Basic Science Elective include:

<table>
<thead>
<tr>
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**Human Values and Social Context and Ethics:** In addition to CMJ 103, the curriculum requires five courses to complete the General Education Requirements in Ethics and Human Values and Social Context (HV&SC). In addition to the Ethics requirement, the five areas under HV&SC are: Western Cultural Tradition, Social Contexts and Institutions, Cultural Diversity and International Perspective, Population and the Environment, and Artistic and Creative Expression. Note that CMJ 103 satisfies the Social Contexts and Institutions requirement. A list of HV&SC courses with the categories that they satisfy are available on the Office of Student Records web page ([http://studentrecords.umaine.edu/academics/genedreq.htm](http://studentrecords.umaine.edu/academics/genedreq.htm)). The structure of the ECE curriculum guarantees that all other General Education Requirements are met. You may elect to take ERS 102 or BIO 222/223 to satisfy your Basic Science requirement and the “Population and the Environment” area of the 18 credit hour HV&SC requirement. This option frees up 3 credit hours which can be used to take an additional Technical Elective.

**Additional Information**

Check the web page of Frequently Asked Questions (FAQ) for additional information about the ECE program: [http://www.eece.maine.edu/programs/undergrad/ece_faq](http://www.eece.maine.edu/programs/undergrad/ece_faq). Contact your academic advisor for assistance.
# B.S. Computer Engineering

## Sample Curriculum - Class of 2014

<table>
<thead>
<tr>
<th>Fall</th>
<th>1st YEAR</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 100 ELE &amp; CEN Eng Seminar</td>
<td>1</td>
<td>ECE 177 Intro to Prog for Engineers</td>
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<tr>
<td>ECE 101 Intro to ELE &amp; CEN Eng</td>
<td>3</td>
<td>MAT 127 Calculus II</td>
</tr>
<tr>
<td>MAT 126 Calculus I</td>
<td>4</td>
<td>PHY 122 Physics for Engineers II</td>
</tr>
<tr>
<td>PHY 121 Physics for Engineers I</td>
<td>4</td>
<td>ENG 101 College Composition</td>
</tr>
<tr>
<td>CMJ 103 Fund of Public Communication</td>
<td>3</td>
<td>Elective HV &amp; SC (1)</td>
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<tr>
<td></td>
<td><strong>15</strong></td>
<td><strong>18</strong></td>
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<table>
<thead>
<tr>
<th>2nd YEAR</th>
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<tbody>
<tr>
<td>ECE 210 Electrical Networks I</td>
</tr>
<tr>
<td>ECE 275 Sequential Logic Systems</td>
</tr>
<tr>
<td>MAT 228 Calculus III</td>
</tr>
<tr>
<td>COS 221 Intro to Computer Science II</td>
</tr>
<tr>
<td>Elective or Basic Science</td>
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<table>
<thead>
<tr>
<th>3rd YEAR</th>
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</thead>
<tbody>
<tr>
<td>ECE 342 Electronics I</td>
</tr>
<tr>
<td>ECP 342 Engineering Writing II</td>
</tr>
<tr>
<td>ECE 471Embedded Systems or Elective Computer Focus (1)</td>
</tr>
<tr>
<td>ECE 473 Computer Architecture &amp; Org</td>
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<tr>
<td>Elective Computer Focus (2)</td>
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<table>
<thead>
<tr>
<th>4th YEAR</th>
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<tbody>
<tr>
<td>ECE 402 Design Project II</td>
</tr>
<tr>
<td>MAT 481Discrete Mathematics</td>
</tr>
<tr>
<td>Elective ECE Technical Elective (1)</td>
</tr>
<tr>
<td>Elective HV &amp; SC (3)</td>
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<tr>
<td>Elective HV &amp; SC (4)</td>
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</table>

### MINIMUM CREDIT HOURS TO GRADUATE: 129

1. This is only a sample curriculum. Adjustments, such as interchanging HV & SC and technical electives, and switching ECE 471, ECE 477, ECE 473, and ECE 351 between junior and senior years, can be made to suit individual preferences. Check with your academic advisor for assistance. Be sure all degree requirements listed on the check-off sheet are met.

2. **BIO 222/223 or ERS 102** can be used to satisfy the Basic Science and HV&SC Elective under the Population and Environment categories. If either of them is taken, you need to take one less HV&SC course. However, you still need 129 credit hours to graduate.

3. One of the following three courses is required: ECE 316, CHB 350 and MAT 332. If CHB 350 or MAT 332 has been taken, ECE 316 can be taken as ECE technical elective. Otherwise, ECE 316 cannot be counted as technical elective.

4. ECE 331 can be replaced by COS 431 Operating Systems.

5. Either ECE 471 (Fall) or ECE 477 (Spring) is required. One can take both courses and use the other as computer focus ECE elective.

6. MAT 481 can be replaced with COS 250 Discrete Structures.
Check List
Graduation Requirements
COMPUTER ENGINEERING – Class of 2014

STUDENT ______________________________
ADVISOR ______________________________

1. Total hours (at least 129) __________________
2. Passing grade in all required courses ________________
3. Overall GPA 2.0 _______________________
4. Department GPA 2.0 _______________________
5. Computer courses 2.0 _______________________

Required Course Grades

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Course</th>
<th>Hours</th>
<th>Grade</th>
<th>Grade</th>
<th>Grade</th>
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<tr>
<td>PHY 121</td>
<td>MAT 126</td>
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<td>ECE 100</td>
<td>ECE 316</td>
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<td>MAT 127</td>
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<td>COS 221</td>
<td>MAT 228</td>
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<td>ECE 177</td>
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<td>COS 221</td>
<td>MAT 258</td>
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<td>ECE 210</td>
<td>ECE 401</td>
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<tr>
<td>COS 221</td>
<td>MAT 481</td>
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<td>ECE 211</td>
<td>ECE 402</td>
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<td>ECP 214</td>
<td>ENG 101</td>
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<td>ECE 214</td>
<td>ECE 403</td>
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<tr>
<td>ECP 342</td>
<td>ECE 275</td>
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<td>ECE 271</td>
<td>ECE 473</td>
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<tr>
<td>ECP 403</td>
<td>ECP 403</td>
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<td>ECE 471 or ECE 477</td>
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</table>

HV&SC + Ethics Course Requirements (minimum of 18 hrs in the first 5 of the 6 areas)
Each of the 6 areas below must be represented. A course may represent multiple areas.

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
<th>Grade</th>
<th>West</th>
<th>Soc</th>
<th>Cult</th>
<th>Pop</th>
<th>Art</th>
<th>Ethics</th>
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<tr>
<td>CMJ 103</td>
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</table>

West - Western cultural tradition; Soc - Social context and institutions; Cult - Cultural diversity and international perspectives; Pop - Population and the environment; Art - Artistic and creative expression.

Basic Science Course/Grade (4 hrs) _______________________________________

Technical Electives/Grades (at least 21 hrs)

<table>
<thead>
<tr>
<th>Requirement</th>
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<th>Hours</th>
<th>Grade</th>
<th>Grade</th>
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<tbody>
<tr>
<td>Computer Focus #1:</td>
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<td>Computer Focus #2:</td>
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<tr>
<td>Computer Focus #3:</td>
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<td>ECE Tech Elective #1:</td>
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Advisor Reviews

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<tr>
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Graduation Requirements - Computer Engineering

1. To obtain a BS in Computer Engineering, a student must:
   a. meet all University academic requirements;
   b. meet all Computer Engineering curriculum requirements;
   c. have a GPA of 2.0 or better in all ECE courses; and
   d. have a GPA of 2.0 or better in all computer courses.

2. Any exceptions to the program specifics listed above require approval of the ECE faculty.

3. Repeating any ECE course for which a grade of F, L, or WF has been recorded requires a grade of C- or better in prerequisites for the course.

4. Dismissal from the program will be recommended if any required course in the program is taken twice without achieving a passing grade. This includes courses where a grade of AU, L, or WF is received.

Information about Elective Courses

Technical Electives: The curriculum requires seven technical elective courses used to broaden a student's knowledge. Of these seven elective courses, at least three must be Computer focus courses chosen from the list below; two must be 300-level or higher ECE courses excluding ECE 394, and two must be Generic Technical Elective courses described below.

1. Courses that satisfy the Computer Focus requirement are:

   ECE 417 Introduction to Robotics  
   ECE 435 Network Engineering  
   ECE 477 Hardware Applications Using C  
   COS 3xx Computer Science 300 level courses  
   ECE 478 Industrial Computer Control  
   ECE 479 Hardware Applications Using C  
   ECE 498 Select topics (Computer focus)

2. Generic technical electives include 300–level or higher ECE courses including ECE 394, or with approval of the student’s advisor, selected from various advanced Math, Physics, Biology, Chemistry, Engineering, or Computer Science courses. For a minor in Business Administration or 5-year BS/MBA program, up to two technical electives can be satisfied by taking BUA 325 or BUA 350 with the provision that upon graduation, the student also satisfied all requirements for the Business minor or BS/MBA program. The following 100- and 200-level courses have been approved to satisfy the Generic Technical Elective requirement. Other courses may be permitted but require written approval from the ECE Department Chair.

   CHB 200 Fundamentals of Process Engineering  
   CIE 231 Fundamentals of Environmental Engineering  
   MEE 150 Applied Mechanics: Statics  
   GEE 298 Intro to Nanoscale Science and Technology  
   MEE 230 Thermodynamics I  
   MEE 252 Statics and Strength of Materials  
   MEE 270 Applied Mechanics: Dynamics

Areas of Concentration: Student may choose to concentrate electives in various sub-disciplines of Computer Engineering. The recommended electives for various specialties are listed below.

**Embedded Control**

   ECE 478 Industrial Computer Control  
   ECE 477 Hardware Applications Using C  
   ECE 471 Microprocessor App. Engineering  
   ECE 414 Feedback Control Systems

**Robotics**

   ECE 417 Introduction to Robotics  
   ECE 477 Hardware Applications Using C  
   ECE 471 Microprocessor App. Engineering  
   ECE 487 Digital Image Processing

**High-performance Computing**

   ECE 331 Operating System Engineering  
   ECE 477 Hardware Applications Using C  
   ECE 435 Network Engineering
**Basic Science Elective:** Courses satisfying the Basic Science Elective include:

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