DEPARTMENT OF
ELECTRICAL AND COMPUTER ENGINEERING
STUDENT HANDBOOK

Covering the Majors of:

Electrical Engineering
and
Electrical Engineering with a Computer Engineering Specialization

Nineteenth Edition
2017

Prepared by the Faculty of
The Department of Electrical and Computer Engineering
Seattle University
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1. INTRODUCTION

The Department of Electrical and Computer Engineering Student Handbook was written to assist current and prospective students in planning their program of study leading to the degree of Bachelor of Science in Electrical Engineering (BSEE) at Seattle University. The handbook is updated periodically to include the latest information on degree requirements and university procedures that are of particular interest to students in the program. The Handbook was originally written and distributed in hard copy form. Now it is made available on the Department’s web page.

The department offers two related curricula, one in electrical engineering and the other in electrical engineering with a computer engineering specialization. The electrical engineering major offers a broad curriculum that covers most of the various subfields of the profession. As its name implies, the specialization in computer engineering major focuses more specifically on software and hardware topics related to computer and other digital system design. Both curricula lead to the same degree of Bachelor of Science in Electrical Engineering. For simplicity, when both curricula are referred to, the phrases ‘BSEE program’ or ‘electrical engineering program’ will sometimes be used.

Official academic policies at Seattle University are established by the Deans Council and the Academic Assembly. Policies are enacted primarily through the Registrar's Office. The academic policies are published in the Redhawk Axis homepage. This homepage serves as a place to also access the academic calendar, catalog, financial services and other information.

The Department of Electrical and Computer Engineering Student Handbook is, in part, an informal guide and supplement to those official statements of policy and procedure. Whenever questions arise, those documents at the Redhawk Axis homepage should be considered to be the ultimate authoritative sources concerning university policy.
2. THE MISSION OF SEATTLE UNIVERSITY

Seattle University adopted the following mission statement in 2003:

Seattle University is dedicated to educating the whole person, to professional formation, and to empowering leaders for a just and humane world.

As embodied in this mission, Seattle University strives to help its students develop their talents as well-rounded human beings, prepared to meet life’s challenges both for their own benefit and that of society as a whole. This goal is accomplished within the nearly 500-year-old Jesuit tradition of education. This tradition at Seattle University is embodied in the Core Curriculum, a course of study shared by all Seattle University students regardless of major. It includes philosophy, religious studies, social sciences, humanities, and fine arts. The Department of Electrical and Computer Engineering believes that this Core, along with a strong engineering education, provides an excellent basis for a rewarding professional life.

3. THE ELECTRICAL ENGINEERING PROFESSION

Electrical engineering is one of the broadest disciplines of engineering and touches almost every aspect of modern life and society. Electrical engineering is a very broad field. It encompasses computer engineering, communication engineering, power engineering, electronic engineering, etc. Electrical and computer engineers harness energy from renewable resources, design the hardware, software and communication systems for computers and mobile devices, deploy sensor networks and analyze and manipulate the “big data” they provide, develop new medical devices and autonomous vehicles and much more. Electrical engineers also play an important role in interdisciplinary fields such as robotics and biomedical engineering. Electrical engineering is a career that is in high demand, and is highly rewarding—not just in terms of compensation, but also in impact on society.

As students, electrical engineers first learn the mathematical and physics-based foundations of the discipline, progressing toward field-specific applications and design before graduation. Because of the profession’s focus on modern technology, an electrical engineer’s skillset is constantly growing and evolving. Successful electrical engineers are both creative—they have ability to dream up new ideas—and innovative—they have the technical ability to make those dreams a reality.

If you are interested in technology, have a strong foundation in math and science, and a desire to change the world around you, then a career in electrical engineering might be a good choice for you.
4. ELECTRICAL AND COMPUTER ENGINEERING AT SEATTLE UNIVERSITY

The Department of Electrical and Computer Engineering at Seattle University offers two curricula: electrical engineering and electrical engineering with a computer engineering specialization. Both curricula lead to the BSEE degree. All courses offered in the department use the Registrar’s designation of ECEGR.

Computer engineering can be thought of as an intersection between electrical engineering and computer science. It is hard to define precisely where one discipline leaves off and the other begins. Perhaps the simplest way to try to make a distinction between computer engineering and computer science is to say that computer engineers are more concerned with designing hardware (the computer itself) while computer scientists are more interested in developing methods for processing information (the software that runs on the computer). It is not that simple, however. Computer engineers are involved with both hardware and software design along with computer networks, robotics, telecommunications, and any technology that includes the digital processing of information.

Although housed within the Department of Electrical and Computer Engineering, the computer engineering specialization would not be possible without the support and participation of Seattle University’s Department of Computer Science and Software Engineering. As described in greater detail in later sections, the computer engineering curriculum consists of a mix of electrical and computer engineering and computer science courses along with courses in mathematics and physics. Any faculty advisor in the Department of Electrical and Computer Engineering should be able to help you with your questions regarding the computer engineering curriculum. If you are thinking of pursuing this specialization, however, you should talk to the Director of Computer Engineering, Professor Alvin Moser.

4.1 Program accreditation

Standards for undergraduate engineering education in the United States are governed by the Engineering Accreditation Commission of ABET. ABET is a voluntary federation of 31 professional engineering and technical societies and is recognized by the Council for Higher Education Accreditation. In all, ABET accredits more than 2400 engineering, engineering technology, computing, and applied science programs at over 500 colleges and universities nationally. Of these, there are approximately 280 accredited programs in electrical engineering (Seattle University’s program being one) and 118 in computer engineering.

ABET has two main functions. The first is to determine and publish standards for engineering education. This is not done arbitrarily. Published criteria are the result of lengthy and thorough discussions among ABET’s members and others having an interest in maintaining and improving the quality of the engineering profession. General criteria apply to all engineering programs. In addition, separate specific criteria are given for each branch of engineering. ABET recognizes
the Institute of Electrical and Electronics Engineers (IEEE) as having the primary responsibility for establishing criteria specific to electrical engineering and computer engineering programs. Both the general criteria and those specific to electrical, computer and similarly named engineering programs can be found on the ABET webpage. One general criteria is that all programs must determine a set of objectives appropriate to both the ABET criteria and the mission of their institution, and that these goals must be published and made known to the public. Our program objectives are given both in this handbook and on the department’s web page.

ABET’s second and more visible function is to grant accreditation to programs that meet its standards. This is done on a six-year cycle. Accreditation is a voluntary process. Engineering programs must ask to be accredited. The program then prepares a thorough self-study report that both describes and analyzes its degree programs. A visiting team is formed with members from both academia and industry. The team reads the self-study report and then visits the school for an on-site investigation. Visitors examine course materials and student work; talk to faculty, students, and administrators; tour facilities such as laboratories and libraries; and determine whether registrar’s offices, information technology divisions, and other services on campus adequately support the program. Both variations of the electrical engineering program in the Department of Electrical and Computer Engineering are ABET accredited.

Why should a student be concerned about accreditation? Well, studying in an accredited program gives you the assurance that you are receiving an education that meets the profession’s accepted standards. More importantly, many prospective employers will hire you as an engineer only if you have graduated from an ABET-accredited program. To that extent, accreditation assures you that your efforts will be recognized and rewarded.

4.2 Program mission

The Department of Electrical and Computer Engineering at Seattle University, in keeping with the university’s mission, seeks to prepare graduates for productive and fulfilling lifelong careers in the engineering profession. There are almost 300 departments of electrical or electrical and computer engineering in the United States. While they share many similarities, each has developed its own distinctive approach and philosophy. The Department of Electrical Engineering at Seattle University was founded in 1950 and has evolved along with the emerging world-class engineering and technical community of the Puget Sound area. Being a neighbor to many technology-based companies helps us in several ways. Local companies employ many of our graduates. They provide a window into the rapidly changing world of electrical engineering. The program is also strongly influenced by the nearly 500-year-old tradition of Jesuit education. The website www.jcunet.edu provides information about the 28 Jesuit colleges in the United States. Jesuit colleges are characterized by professionally-oriented studies (engineering, business, nursing, law, etc.) within the context of a liberal arts education emphasizing
humanities, philosophy, theology, and ethics. To express these dual influences, we have adopted the following mission statement:

Within the rich tradition of Jesuit education, it is the mission of the Department of Electrical and Computer Engineering to teach and prepare broadly-educated, socially-responsible, articulate, and skilled engineers for leadership in electrical engineering and related fields.

We are proud of the accomplishments of our alumni. Many remain in the Seattle area. Others work throughout the Northwest, the country, and around the world. They work in design, research and development, customer support, management, and sales. They are employed by companies both large and small, representing all of the major industries in which modern electrical engineering plays a role. They work as consultants, some have started their own companies, and some teach engineering at universities across the country. Still others work for local and national governmental agencies. Our alumni are proof of our success in living up to the ideals of our mission.

4.3 Program objectives

In addition to its mission statement, the electrical engineering program has adopted a set of objectives which more specifically describe our goals. These goals reflect the expectations we have for our students in the early years of their careers.

It is expected that a graduate of the Electrical and Computer Engineering Department will:

- Make professional contributions through the attainment of a position in electrical engineering or related field (Professional formation).
- Engage in personal and professional growth through the completion of advanced degrees or other forms of continuing education (Educating the whole person).
- Contribute to society or the profession through the involvement in professional organizations or other service activity (Empowering leaders for a just and humane world).

The above three objectives parenthetically refer to the University’s Mission of Professional Formation, Educating the Whole Person, and Empowering Leaders for a Just and Humane World. Our program objectives are seen to be entirely consistent with the Mission of Seattle University. Although the objectives specifically refer to electrical engineering, we also feel that we have succeeded when our graduates pursue career paths in other areas such as law, business, medicine, and education.
4.4 Learning outcomes

Our Program Mission is a statement of our philosophy and vision. More specific goals are embodied in the Objectives. In order to measure our success, we need to look at our graduates’ abilities in more detail. This is the purpose of our Learning Outcomes which state that at the time of graduation our students will have:

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 multi-disciplinary 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.

Graduates who reflect all of these facets of engineering practice are well on their way to developing successful and rewarding careers.

4.5 Engineering education at Seattle University

The school that eventually became Seattle University was founded by members of the Society of Jesus in 1891. It was not until 1941, however, that the School of Engineering was organized under the leadership of Fr. Edmund McNulty, S.J. Electrical engineering began as a separate department in 1950. The first baccalaureate degrees in engineering were awarded in 1948; degrees specific to electrical engineering followed in 1952. The BSEE degree program at Seattle University first achieved national accreditation from the predecessor organization to ABET in 1962. The program has been continuously accredited since that time. In 2000 the department developed a variation of the BSEE curriculum that allows electrical engineering students to specialize in computer engineering. To reflect this, the department name was changed to Electrical and Computer Engineering in 2001.

In 1972, the school was reorganized and joined the natural sciences and mathematics to become the School of Science and Engineering. The school was re-designated as a college in 2003. The college is administered by its dean along with two associate deans. The associate deans attend
primarily to student affairs and in interfacing with the Registrar and Admissions offices and the other schools and colleges of the University. In addition to undergraduate programs in electrical, mechanical, and civil engineering, and computer science, the college houses programs in natural sciences, health sciences, and mathematics. There are nine undergraduate departments in all, along with masters programs in software engineering and computer science, and structural engineering.

The College of Science and Engineering also contains within it the Science and Engineering Project Center. Through the Project Center, all senior students in engineering and computer science are formed into teams that are given real-world design problems to work on during their last year in school. In most cases, the projects are provided and sponsored by companies from local industry. Each company also provides a liaison engineer to act as a technical advisor to the student team. A faculty advisor acts to facilitate the process and to evaluate the students' efforts. We feel that this experience gives our students a strong bridge between the academic world and the workforce, and that it goes a long way toward fulfilling the mission of the university.

5. BSEE Degree Program

The Department of Electrical and Computer Engineering at Seattle University offers two curricula: electrical engineering and electrical engineering with a computer engineering specialization. Both curricula lead to the BSEE degree. All courses offered in the department use the Registrar’s designation of ECEGR.

In order to graduate with a BSEE degree, students must complete all required courses as shown on the Academic Evaluation report for their chosen curriculum of study. This is accessible anytime through SU Online. Students must have GPA’s of 2.5 or better based both on their science, engineering, and mathematics courses alone and also on all courses taken at Seattle University.

5.1 Structure of the curriculum for both majors

Courses taken to fulfill the requirements toward the BSEE degree are grouped together into four interrelated curricular blocks. These are the University Core Curriculum, the Electrical Engineering Foundations Block, the Electrical Engineering Fundamentals Block, and the Advanced Electrical Engineering Block.

1. The University Core Curriculum (48 credits) introduces students to the humanities, social sciences, philosophy, theology, ethics and fine arts.

2. The Foundations Block includes courses in physics and mathematics.
3. The Electrical Engineering Fundamentals Block covers the areas of circuits, electronics, linear systems, digital and computer systems, and basic laboratory practice. This block forms the foundation upon which all advanced electrical engineering courses are built.

4. The Advanced Electrical Engineering Block includes electives and ten credits of senior design. The elective courses give students the opportunity to explore their individual interests. Specific elective offerings are chosen based on student interest and availability of faculty resources; topics without formally-assigned course numbers may be offered as special topics courses. Senior design gives students exposure to engineering practice through a yearlong team-based design project.

The four year plan for both majors are shown next.
### 5.2 Electrical Engineering Program of Study

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<td>ECEGR 3500 Electrical Energy Syst.</td>
<td>ECEGR 2010 Computer Tools</td>
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### 5.3 Specialization in Computer Engineering Program of Study

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**SENIOR**

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**Total Credits: 180**
5.4 University Core Curriculum

The University Core Curriculum introduces all Seattle University students to the tradition of Jesuit education. The university core is divided into four modules. Electrical engineering students are required to take 48 credits of core classes as follows:

Module I: UCOR 1100, UCOR 1300, UCOR 14XX and UCOR 16XX (20 credits)
Module II: UCOR 2100, UCOR 2500 and UCOR 29XX (15 credits)
Module III: UCOR 3100, UCOR 34XX and CEEGR 3020 (13 credits)
Module IV: Senior design courses (ECEGR 4870, 4880 and 4890) satisfy this requirement

Transfer students may have some of their University Core requirements modified or waived. These situations are discussed in section 12.

5.5 Foundations Block

The Foundations Block (45 credits) includes mathematics (30 credits) and physics (15 credits). This block is shown in flowchart form.

The Electrical Engineering Foundations Block includes 30 credits of mathematics that, if taken at Seattle University, automatically qualify students for minors in mathematics.

The flowchart of Prerequisites in the Foundations Block for both curricula is shown below.
5.6 Fundamentals Block in the Electrical Engineering curriculum

The electrical engineering curriculum requires 48 ECE credits and 5 Computer Science credits as shown in the flowchart below.
5.7 **Fundamentals Block in the Computer Engineering specialization**

The computer engineering specialization requires 45 ECE credits and 20 Computer Science credits as shown in the flowchart below.
5.8 **Advanced Electrical Engineering Block**

The Advanced Electrical Engineering Block consists of two groups of courses: electives and senior design.

The Curriculum for Electrical Engineering requires 20 credits of ECE electives: 4 ECE elective classes (16 credits total) and 2 elective lab classes (4 credits total). The flowchart is shown below.

There is also a four-credit elective that can be taken in any area of the natural sciences, mathematics, engineering or computer science that may interest you. This elective can also be taken in the ECE department. A list of Seattle University courses that will satisfy this elective requirement can be found in the appendix.

The Curriculum for the Computer Engineering specialization requires 12 credits of ECE and/or Computer Science electives. The ECE electives are 4 credits each while the Computer Science elective are 5 credits each; therefore, a student may end up between 12 to 15 credits of electives accordingly. The flowchart is shown below.
The Department of Electrical and Computer Engineering offers a selection of elective courses consistent with the interests of the students and the resources of the department. Students are polled from time-to-time to determine what subjects are desired. The department also keeps abreast of trends in local industry. This helps to determine the course offerings. A projected pattern of elective course offerings for the next several years can be found on the department’s web page. All elective courses have the EE Fundamentals Block as a prerequisite.

5.8.1 Elective Laboratories for the Electrical Engineering major

The general electrical engineering major requires four advance elective courses (16 credits total) and two elective laboratories (4 credits total). There are several ways to fulfill the elective laboratory requirement: by taking elective lab classes, by taking elective lecture courses with significant lab content, or using a combination of the above.

A student can fulfill the elective laboratory requirement by taking two elective laboratory classes such as:

- ECEGR 4111 Advanced Electronics Laboratory
- ECEGR 4331 Antennas Laboratory
- ECEGR 4511 Electromechanical Energy Conversion Laboratory
- ECEGR 4611 Communications Laboratory
- ECEGR 4901 Data Acquisition Laboratory
- ECEGR 4711 Digital Signal Processing Laboratory

Some of the available elective lecture courses have significant laboratory content. With approval, such courses may be used to fulfill elective laboratory requirements. A four credit elective class with significant lab content can be used as follows:

- two of the credits can be used to fulfill one elective lab requirement and
- the other two credits can used to fulfill half of an elective lecture course requirement

It is important to end up with the necessary number of elective credits. Thus an electrical engineering major student can fulfill the advanced elective requirements (16 lecture credits and 4 lab credits) in either one of the following ways:

1. Four elective lecture courses with or without lab content (16 credits) and two elective lab courses (4 credits)
2. Four elective lecture courses (16 credits), one elective lecture course with lab content (2 credit lecture, 2 credit lab), and one elective lab class (2 credits lab). With this option a student will have 2 excess credits.
3. Three elective lecture courses (12 credits lecture) and two elective lecture courses with lab content (4 credits lecture, 4 credits lab).
The elective lecture courses with recognized laboratory content for the Electrical Engineering major include:

- ECEGR 3210 Embedded Systems
- ECEGR 4110 Analog Electronic Circuits
- ECEGR 4140 Introduction to VLSI Circuit Design
- ECEGR 4160 Active Networks and Filters
- ECEGR 4210 VHDL for Digital Design
- ECEGR 4220 Advanced Digital Design
- ECEGR 4420 Robotic Manipulators
- ECEGR 4620 Data Communication
- ECEGR 4720 Introduction to Digital Image Processing
- ECEGR 4730 Introduction to Data Compression
- ECEGR 4910 Internet of Things

A student must discuss this option with the advisor for approval. The advisor will then inform the office of the registrar so the program evaluation reflects the choices made. If you have any questions, talk to your advisor or the department chair.

### 5.8.2 Senior Engineering Design

One of the hallmarks of engineering education at Seattle University is the yearlong senior design experience. Students from Electrical and Computer Engineering, Civil and Environmental Engineering, Mechanical Engineering, and Computer Science are formed into teams and given industry-sponsored projects to work on under the direction of a faculty advisor and a liaison engineer from the sponsoring company. Senior design is a capstone experience bringing together all aspects of the student’s education within the context of an interdisciplinary effort to solve a real world problem. The College of Science and Engineering Project Center handles many of the organizational and administrative aspects of the senior design programs in the four departments. Each department assigns a design coordinator to act as the focal point for senior design and to be the instructor of record for senior design courses. The senior design courses in electrical engineering are numbered ECEGR 4870/4880/4890. The senior design experience is one of the distinctive features of engineering education at Seattle University and is an embodiment of the Jesuit concept of “education for the world” as reflected in Seattle University’s mission statement.

Because senior design projects require an advanced understanding of engineering principles, electrical engineering students must complete the EE Fundamentals Block before enrolling in ECEGR 4870. Senior design is not just a technical experience, however, to be successful, student teams must address issues related to team dynamics, scheduling of work, budgeting, interpersonal and technical communications, independent learning, and collaborative effort. In other words, senior design is a big step toward developing the skills necessary for a successful career in engineering or any other field.
The culmination of the senior design experience is **Engineering Projects Day**. Usually held on the last Friday of Spring Quarter, Projects Day consists of student teams making formal presentations of their year’s work to an audience of project sponsors, faculty, and fellow students. In addition to the talks, students prepare demonstrations and have a poster session to further describe the projects. It is an exciting end to the year, and a fitting culmination to an engineering student’s undergraduate career.

### 5.9 ECE Course Numbering System

The numbers chosen for electrical and computer engineering (ECEGR) courses are assigned to reflect the nature and content of the courses. All courses are designated by four digits. Courses at the 1000, 2000, 3000, and 4000 levels are generally intended to be taken in the freshman, sophomore, junior, and senior years, respectively. The second of the four digits indicates the technical topic area of the course:

<table>
<thead>
<tr>
<th>Digit</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Programming/Software</td>
</tr>
<tr>
<td>1</td>
<td>Analog (Circuits, Electronics)</td>
</tr>
<tr>
<td>2</td>
<td>Digital</td>
</tr>
<tr>
<td>3</td>
<td>Electromagnetic Fields</td>
</tr>
<tr>
<td>4</td>
<td>Controls</td>
</tr>
<tr>
<td>5</td>
<td>Power/Energy</td>
</tr>
<tr>
<td>6</td>
<td>Communications</td>
</tr>
<tr>
<td>7</td>
<td>Signals and Systems</td>
</tr>
<tr>
<td>8</td>
<td>Design</td>
</tr>
<tr>
<td>9</td>
<td>Independent Study/Special Topics</td>
</tr>
</tbody>
</table>

The third digit is used to differentiate courses within a topic area. The fourth digit indicates whether the course is of lecture format (0) or laboratory (1). For example, ECEGR 3120 is a lecture course in the analog area, normally taken in the junior year.

The complete programs of study in electrical engineering and computer engineering are shown in the Appendix. These show the suggested quarter-by-quarter sequencing of courses that will satisfy all prerequisites and degree requirements. Part-time students or students who have gotten out of sequence for some reason will have to choose their courses carefully. There may be times when the next logical courses for them to take are not being offered. The curriculum is cumulative in nature. Prerequisite courses cover specific topics that will be assumed or built upon in later courses. In a more general way, upper division courses often require a higher level of sophistication than lower division courses. It is usually not advisable to take courses out of their recommended order even when prerequisites are not violated.

### 5.10 Course Offerings

All of the required ECE courses are offered once a year, except for the MATLAB and Computer Tools classes (ECEGR 1000, ECEGR 2010, ECEGR 3000), which are offered twice a year. Elective courses are offered at most once per year.
Prospective transfer students should note the advantage of taking first-quarter circuit analysis (our ECEGR 2100) before coming to Seattle University. This course is offered as ENGR 215 at many local community colleges. Having completed this course will allow you to enroll in ECEGR 3110 – Circuits II in fall quarter. This arrangement may make it possible to complete the requirements for the BSEE degree within two additional years of study.

The department determines a schedule of projected elective offerings one or two years in advance in order to aid students in planning their curricula. The senior design sequence is offered only once per year beginning in fall quarter. Students should complete either the electrical or computer engineering fundamentals blocks before taking senior design.

Full-time students can progress through the curriculum as shown in the appendix and can be certain that courses will be offered and space in those courses will be available for them to complete their studies. Part-time students or others who have not followed the suggested sequence of courses typically experience some scheduling problems. Such students should pay special attention to the prerequisites for courses they expect to take in a given quarter to be sure that they meet the course entrance requirements. Part-time students should also be especially careful in scheduling when they take the senior design sequence since it is offered only once per year.

5.11 Curriculum Changes

The curricula of the Department of Electrical and Computer Engineering are under constant review by the faculty in order to enhance and improve our course offerings. From time to time, changes are made in the degree requirements. Such changes are intended to reflect the current knowledge base expected of entry-level engineers and are developed in consultation with the department’s advisory board and other industry colleagues. Students entering the BSEE program after such a change will be subject to the new degree. Students already enrolled will be allowed to complete the degree program under the requirements that existed when they entered, provided they are full-time students following the suggested sequence of courses and maintaining satisfactory progress. Continuing students may also elect to graduate under the rules of the curriculum in effect at the time of their graduation. Part-time students or others who have not followed the suggested sequence of courses will have individual assessments of the courses needed for graduation. Such students will be provided an accredited program of study which may include courses from both the old and new curricula.

The most recent general modification to the curriculum, for both majors, went into effect for students beginning in Fall 2014. This is curriculum that is described in this handbook.
5.12 Laboratory Program

The Department of Electrical and Computer Engineering has a major commitment to the important "hands-on" experience provided by laboratory courses. The electrical engineering fundamentals block of courses required of all students includes three laboratory courses. These are ECEGR 3111, ECEGR 3121, and ECEGR 3711.

Electrical engineering students must take two elective laboratories. The elective laboratory requirement can be fulfilled by taking some advanced lecture courses with significant laboratory content. Students specializing in computer engineering take computer science courses that have significant hands-on programming experiences.

5.13 Minors and double majors

Some students in the BSEE program are interested in obtaining minors or even a second major or degree. The Seattle University’s policy regarding undergraduate minors and the specific requirements for each discipline are described in the Undergraduate Catalog. All students in the Department of Electrical and Computer Engineering take 30 credits of mathematics. This number qualifies students for minors in mathematics (subject to certain restrictions as outlined in the Catalog), but the minor must be applied for. Over the years, electrical engineering students have obtained minors in a wide variety of fields. The most common of these are physics, mathematics, and computer science because of the close connection of those fields to electrical engineering. Minors in business or a foreign language might also be attractive options. If you wish to obtain a minor in a particular discipline, print out the form to Request to Add a Minor, and talk to the chair of that department.

The policies on double majors and second baccalaureate degrees at Seattle University are detailed in Policy #76-2 (revised 5/20/16).

5.14 Student perception of teaching and course assessment

The department and the university strive to provide students with an educational experience of high quality. Several components go into making up this experience; the most obvious to you will be the courses that you take. As an aid in improving the quality of the teaching in its courses, the department asks students to fill out feedback questionnaires for some of the courses that they take. These will generally be done online sometime during the last week of every quarter.

This information helps us in two ways. First, it acts as feedback to your instructors so that they can identify and respond to areas that students feel are in need of attention. Secondly, the information is used as one of several measures of the work performance of the faculty. Teaching is only one of several dimensions to a faculty member’s job, but at Seattle University it is the most important.
Student feedback is one method that the university has for evaluating the effectiveness of its faculty with regard to teaching; the university places great importance on this input.

The university is quite serious about the evaluation process; we ask you to be equally sincere. Feel free to state any negative impressions that you have. It is through these that improvements can be made. Feel free also to express positive observations. Like students, we are pleased to know when our efforts are well received. We do ask you to avoid personal or humorous remarks because these can be easily misinterpreted when read by anyone other than the instructor.

6. ADMISSIONS

All students at Seattle University must have a major field of study into which they have been admitted. In the College of Science and Engineering students apply for entry into a particular department and are admitted according to their qualifications and the availability of openings. This section describes the various paths for admission into the Department of Electrical and Computer Engineering. The same procedures apply both to students who wish to study under the general electrical engineering curriculum and those interested in the specialization in computer engineering.

Students may apply to be admitted to the department at any time during the year. Usually the application will be acted upon immediately. Sometimes, though, consideration of an application will be delayed until after a student has completed additional preparation courses. The success of any application depends on several factors. The applicant must meet all of the published minimum criteria for admission to the department (see below). Meeting the minimum criteria does not, however, guarantee admission. In practice, admissions are based on the relative academic qualifications of those applying and on the space that the department has to accommodate new students. Questions concerning your likelihood of admission may be directed to the department although we cannot state specific guidelines that will guarantee admission in any given quarter.

Prospective students should understand that because of the department's size, most required courses are offered once each year. Elective courses are offered at most once per year; most are offered only every other year. Transfer students should apply several terms prior to the desired entry quarter so that adequate planning time is available in order to ensure a smooth transition.

6.1 Financial aid

Financial aid is an important consideration for many of our students. Consult the Financial Aid page. You may also wish to contact the Financial Aid Office directly for specific information regarding application procedures. Many of our students have financial aid packages including scholarships, loans, and work-study opportunities.
Since 1996, the College of Science and Engineering has been proud to be able to recognize a number of talented upper division students (juniors and seniors) with scholarship awards made possible with endowed funds from the estates of Thomas and Arline Bannan, long-time friends and supporters of Jesuit education, Seattle University, and the College of Science and Engineering. Bannan Scholars are chosen from among both continuing Seattle University students and students transferring from other institutions. Information concerning qualifications and application procedures can be obtained either through the Financial Aid Office or the Office of the Dean of Science and Engineering.

Freshmen may qualify for a Sperry Goodman Scholarship. Mr. Goodman was a 1969 graduate of the then Department of Electrical Engineering’s master’s program. Mr. Goodman recognized the value of combining studies in technical fields with a deep appreciation of the humanities. His estate endowed a fund that the university uses to support up over a dozen scholarships per year.

Lower division students within the College of Science and Engineering with low and middle income may also qualify for the Washington State Opportunity Scholarship.

The scholarships managed by the College of Science and Engineering are offered in addition to the financial aid you receive through Seattle University. The criteria and application deadlines can be found at https://www.seattleu.edu/scieng/scholarships/.

### 6.2 New Freshmen

If you have no previous college experience you should submit your application directly to the university's Admissions Office. Be sure to specify either electrical engineering or electrical engineering with a computer engineering specialization as the intended field of study.

Recognizing that engineering is a demanding course of study, minimum admissions standards for Seattle University's engineering programs are somewhat different than for other programs. Students must have completed four years of high school mathematics, including the equivalent of pre-calculus. Students entering the engineering programs are also expected to have taken at least two years of laboratory science. Refer to Policies #2004-02 and #81-4 for details (the links 3 and 4 are also listed in section 6.8). All decisions on the admission of freshmen are made by the Dean of Admissions.

### 6.3 Off-Campus Transfers

If you have had previous college experience and are not currently enrolled in Seattle University, you may directly enter the Department of Electrical and Computer Engineering by submitting an application to the Admissions Office. Be sure to specify electrical engineering or electrical engineering with a computer engineering specialization as the intended field of study.
Minimum qualifications for admission to the department are an overall grade point average (GPA) of 2.5 or better on a scale of 4.0 and a composite average of 2.5 in all of your technical courses. These include all mathematics, science, and engineering courses that you have taken. In both cases, the GPA calculation is based on all courses that are transferable to Seattle University regardless of whether or not they apply to the BSEE degree. Note, however, that grades earned in engineering technology programs are not included in GPA calculations because engineering technology courses are not transferable to Seattle University.

The decision to admit off-campus transfers directly into any program within the College of Science and Engineering is made by the associate dean of the college in consultation with the department chair. If you are denied direct admission to the department, you may still wish to enroll in the College of Science and Engineering as a general science major or in the College of Arts and Sciences as a premajor. If either of these possibilities is of interest to you, then you should make that clear at the time of application. After improving your record, you can seek a transfer to the department according to the criteria given in the following section.

If you are considering transferring to the electrical engineering program from another school, it will be to your advantage to make an appointment to talk to the department chair several quarters in advance of the time when you plan to first enroll. This will give you a good idea about what work you will be credited with and how you will fit into the curriculum at Seattle University. In particular, most transfer students are well advised to have taken first quarter circuit analysis (ECEGR 2100) before coming to Seattle University. This course is offered as ENGR 204 by nearly all pre-engineering programs in the area. Those interested in the specialization in computer engineering should pay special attention to any computer science or programming courses they have taken. If these are not in C++, the courses may still be transferable but you will have to learn C++ when you take computer science courses at Seattle University.

6.4 On-Campus Transfers

Seattle University students majoring in other programs may apply for a change of major into the department at any time. The requirements for such a transfer vary somewhat depending upon whether you are already an engineering student or not.

If you are currently a student outside of the ECE department and wish to change your major to electrical engineering or electrical engineering with a computer engineering specialization, you should make an appointment with the Chair of the Department of Electrical and Computer Engineering through the department’s administrative assistant (Bannan 209) in order to discuss your individual situation. Do so well in advance of registration for the quarter in which you want to transfer. Be sure to bring your advising folder/file to the appointment so that all relevant information will be available.
The decision to admit you will be made by the Chair of the Department of Electrical and Computer Engineering, but a signature will also be needed from the chairperson of your previous department in order to release your advising file.

### 6.4.1 Non-Engineering Students

Students with non-engineering majors must have completed a minimum of 25 credit hours at Seattle University. Of these, 15 credit hours must have been earned in the College of Science and Engineering. Both your overall and your science/engineering GPA's at Seattle University must be at least 2.5. This information can be found in Policy #81-4 (link 4 in section 6.8). The form to petition a Change of Major is found at link 5 in section 6.8.

### 6.4.2 Engineering Students outside the Department

Students in good standing as computer science, or civil and environmental, mechanical, or undecided engineering majors may petition to transfer either to electrical engineering or the specialization in computer engineering after having completed at least one quarter at Seattle University. The petition will be considered by the chair of the ECE department. The form to petition a Change of Major is found at link 5 in section 6.8.

### 6.4.3 Students within the Department

If you are already in the department and follow either the electrical engineering curriculum or the specialization in computer engineering curriculum, you can change to the other any time you want. You do have to fill out a change of major form, however, so that the Registrar’s Office will know to change your computerized student records to reflect the new major. The form to petition a Change of Major is found at link 5 in section 6.8.

### 6.5 Second Degree Students

Students who have completed baccalaureate degrees in fields other than electrical or computer engineering sometimes apply for admission to the department. The admissions procedures and requirements are the same as for other prospective students. Such students should contact the University Admissions Office, making sure to specify electrical engineering or electrical engineering with a computer engineering specialization as their intended field of study. University Core requirements are significantly altered for second degree students, but all other degree requirements must be met. Students staying on at Seattle University for a second degree should consult the Registrar’s Office for rules specific to this situation.
6.6 Returning Students and Leaves of Absence

Anyone who has previously been a student in the department and who wishes to be readmitted will be considered on his or her merits as they compare with the other current applicants.

If you leave the university or any reason other than graduation or formal withdrawal, you will continue to receive registration information for three quarters. During that period you can return to the university by simply enrolling in courses.

If you fail to register for four consecutive quarters, however, the university will assume that you have left school. Your priority for enrolling in ECEGR classes will be lost and you will have to apply for readmission to the university. Readmission to the same program may be automatic if a student has a cumulative GPA of at least 2.75 and last attended Seattle University within two years of the application for readmission. Otherwise, the application is subject to review by the dean.

Students who withdraw from the university for one calendar year or more are subject to the degree requirements in effect at the time of their readmission. Readmission decisions are made by the Associate Dean of the College of Science and Engineering. Refer to Policy #81-4 for details.

International students may be subject to some different rules for readmission due to U.S. immigration regulations. Please consult with the International Student Center for details.

6.7 Non-Matriculated Students

Occasionally a working professional or a student not in the Department of Electrical and Computer Engineering will want to take some ECEGR courses without the intention of obtaining a degree. The department is happy to accommodate these individuals as non-matriculated students on a space available basis. The student must, of course, have the proper background for the desired courses. Such arrangements are at the discretion of the Chair of the Department of Electrical and Computer Engineering. In addition to talking to the department chair, those not already enrolled at Seattle University must contact the Admissions Office.

If a non-matriculated student decides to apply for admission to the BSEE program, a maximum of 30 credits taken at Seattle University in non-matriculated status may be applied toward the degree.

6.8 Links of interest

1. Visit the Undergraduate Admission webpage to apply to Seattle University. (https://www.seattleu.edu/undergraduate-admissions/apply/applications/ )
2. Consult the Admissions Policy section for general admissions rules for the University. 
   (https://www.seattleu.edu/undergraduate-admissions/apply/admission-policies/)

3. The office of the Registrar page contains a longer list of policies, such as policy #2004-02 

4. Specific admissions criteria for Electrical Engineering are contained in Seattle University 
   Policy #81-4 which details admission, progression and graduation policies within the 

5. The form to petition a Change of Major is found at: 
   https://www.seattleu.edu/media/redhawk-axis/registrar/Change-Major.pdf

7. TRANSFER CREDITS

If you have attended schools other than Seattle University, you will naturally want previous 
pertinent work to apply toward your SU degree. Being properly credited for such work is usually 
straightforward. **It is your responsibility to have complete, official, transcripts sent to the 
Admissions Office (if you are a new transfer student) or the Evaluations Unit of the 
Registrar's Office (if you are already enrolled).** If you are enrolled in another school at the time 
you apply for admission to Seattle University, be sure to have updated, complete transcripts sent 
when you finish your last term’s work. Specialists will evaluate the transcript(s) and indicate which 
course requirements for your Seattle University degree have been satisfied. Failure to submit all 
previous transcripts at the time of application for admission (if you are a new transfer student) or in 
the allowed period of time (if you are already enrolled) may mean that courses will not be 
transferred. This process seems simple, but probably no other interaction with the university causes 
as much distress and misunderstanding among our students as does the issue of transfer credits.

Deadlines are established for submitting transcripts for courses taken at other institutions. These 
deadlines can be found in policy #76-7:

- If admitted for Winter quarter, transcript must be received by January 31.
- If admitted for Spring quarter, transcript must be received by April 15.
- If admitted for Fall quarter, transcript must be received by October 15.

New students frequently neglect to send a final transcript from the last school attended. If you 
believe that your degree check sheet is incomplete, go to the Admissions Office to be sure that all 
transcripts have been received and evaluated. Work reflected on transcripts received after the above 
deadlines will not be transferred without a Petition for Exception to Policy initiated by your advisor.
Upon admission, a computer-generated form known as a Program Evaluation will be prepared for you. It lists the requirements of your chosen major and indicates which ones have been fulfilled. The database from which this form is generated is updated whenever you submit additional transcripts or complete courses at Seattle University. You are able to view and print out your Program Evaluation report through the student menu of SU Online. You should check it from time to time. If you think there are any discrepancies, discuss them with your faculty advisor and the transfer evaluators in the Registrar’s Office. When you are admitted to Seattle University, you should begin working with the department chair and your assigned faculty advisor to make sure that you understand exactly how much of your previous work has been credited and what degree requirements remain to be completed. It is best to be cautious on this point. **Do not assume that you will receive transfer credit until it has officially been granted.**

New transfer students are sometimes surprised to learn that not all of their course work from other schools can be applied to their degree at Seattle University in the way they expect. Particular courses that sometimes cause difficulties in terms of transfer are in the areas of mathematics, physics, and computer science.

**Mathematics:** The BSEE curriculum requires three quarters (15 credits) of basic calculus, 3 credits of multivariable (advanced) calculus, 3 credits of linear algebra, 4 credits of differential equations and 5 credits of probability and statistics. In recent years, some local community colleges have packaged the topics of basic calculus in ways other than that followed at Seattle University. Transferring students who are uncertain about how their mathematics courses have been credited should discuss the situation with the Chair of the Mathematics Department. The Appendix includes a guide showing how local community college mathematics courses correspond to those at Seattle University.

**Physics:** Each of the required engineering-oriented physics courses (PHYS 1210, 1220, 1230) contains a laboratory component. On rare occasions, transfer students will have taken physics courses without laboratories. They will be required to take separate one-credit laboratories - PHYS 2960 at Seattle University. These are taken pass/fail (credit/no credit).

**Computer Science:** Both of our majors, electrical engineering and electrical engineering with a computer specialization, require two freshmen-level computer programming courses. The first programming course, ECEGR 1000, a 5 credit course, is taught using MATLAB as the programming language.

The second programming course, CPSC 1230- Programming and Data Types uses C++ as its computer language of instruction. The prerequisite for this course is a first programming course, such as ECEGR 1000.

Students transferring with a programming course that uses a different language, but is comparable in content to ECEGR 1000, can very likely use that course to fulfill the
requirement for ECEGR 1000 and thus meet the prerequisite for CPSC 1230. However, the curriculum still requires knowledge of MATLAB, so students have to take a 1 credit MATLAB course (ECEGR 3000).

The electrical engineering with a computer specialization major further requires additional computer science courses. Students transferring with programming courses should consult the Department of Computer Science and Software Engineering to determine a proper placement in their CS classes. If a student transfers with two programming courses in a language other than C++, most likely those classes substitute ECEGR 1000 and CPSC 1230 thus the student won’t be required to take those courses. The student is then registered to a special section of CPSC 2430-Data Structures that familiarized them with C++.

Anyone who feels that their computer science experience has not been properly recognized should contact their advisor and/or the CPSC Department.

7.1 University policies on credit transfer

Seattle University has dozens of academic policies. Seattle University has established these and other rules regarding transfer credits in order to maintain consistency in its degree programs. All colleges, both public and private, have similar sets of rules. Each institution has its own philosophy of education and Seattle University is no exception. The only way that we can be sure that our students are exposed to the Jesuit tradition of a liberal arts education and service to society is to make sure that the courses that they take reflect this viewpoint.

On a more practical level, the electrical engineering program is accredited by a national organization (ABET) that sets the standards for engineering education in the United States. Our accreditation would be seriously jeopardized if our students were allowed to freely substitute courses from other schools in place of our own offerings.

Specific rules governing the transfer of credit to Seattle University from other institutions can be found in the following policies:

Transfer credit policy #77-1
https://www.seattleu.edu/media/redhawk-axis/registrar/registrar-policies/Transfer-Policy-77-1.pdf

University Core Curriculum policy # 2012-1
https://www.seattleu.edu/media/redhawk-axis/registrar/registrar-policies/University-Core-Curriculum-2012-1.pdf

Second Degree and Dual Degree policy #76-2
Following is a summary of some of the transfer rules taken from the policies.

### 7.2 Transferable credits

Credit can be transferred only for courses whose content is substantially equivalent to corresponding courses at Seattle University. You must have earned at least a grade of C or better (2.0 on a scale of 4.0) for each course to be transferred.

No course work from technology programs can be transferred. No work-related experience can be counted toward your degree requirements. (A later section in this handbook describes rules governing credit by examination.)

If a course is transferred and it is of fewer credits than the equivalent course at Seattle University, the shortfall in credits must be made up with courses in the same general area so that you graduate with the proper number of total credits (presently 180). Note: To be considered equivalent, the transfer course must be within one credit of the corresponding course at Seattle University.

### 7.3 Maximum number of transferable credits

A maximum of 90 quarter credit hours can be transferred from community colleges. A maximum of 135 credit hours, comprising 90 lower division and 45 upper division credits, can be transferred when work from four-year colleges or universities is included. (Two semester hours are equivalent to three quarter hours.)

### 7.4 Recognition of course content without transferring credit

Once you have attained upper division standing (90 or more total Seattle University and transfer credit hours) you may not transfer additional credit hours from any two-year schools. In some
instances, however, a course taken beyond the 90 credit limit may be recognized for its content in such a way that you will not be required to take the equivalent course at Seattle University. In such cases you will be required to make up the credits so that you graduate with the correct total (180).

7.5 How are courses selected for transfer

The evaluation specialists of the Registrar’s Office look at transcripts for transfer students chronologically. That is, courses taken at other schools are considered in the order in which they were taken. Once these total 90 credit hours, no further course work from two-year institutions can be transferred for credit. This is regardless of whether or not all of the first 90 could be counted toward your BSEE degree. For example, assume that you have 97 college-transferrable credits from XYZ Community College. Of the first 90 credits taken, 53 related to your chosen degree program in electrical engineering but 37 did not. Despite the fact that only 53 credits helped you toward your degree requirements, none of the last 7 credit hours (those beyond the 90-credit limit) will be transferred for credit regardless of what they were. They may, however, be recognized for content as described. If, however, the last 7 credits were from ABC University they would be transferred if they are applicable toward your degree.

7.6 Dual enrollment

Once you are a student at Seattle University, do not take courses at other schools and expect them to count toward your SU degree without having previously cleared it with the Evaluations Unit of the Registrar’s Office.

Start by discussing the situation with your advisor or the department chair. The Registrar has a Transfer Verification Form that will help to avoid any misunderstandings. Fill it out well in advance of the quarter for which the simultaneous enrollment is planned. This form can be found online. Your advisor must sign the form.

Except during summer quarter, permission for dual enrollment is normally granted only to relieve scheduling conflicts which would impede your progress in your degree program and delay your graduation. Final approval is determined by the Associate Dean of the College of Science and Engineering.

Seattle University has a senior residency policy that states that the last 45 credits toward the undergraduate degree must be spent in residence at Seattle University; therefore, approval for simultaneous enrollment at two institutions may be granted only if the student pursuing a 180 credit degree will have fewer than 135 total undergraduate credits once the new credits are posted. Course content can be recognized if cumulative credits are beyond the maximum, though no credit is granted. A community college may be attended only if the student has not already earned 90
credits, or if transfer credit will not be requested and course content only is to be recognized. Refer to policy #75-6 in section 7.1

7.7 Minimum credits to take at SU

A minimum of 45 quarter credits must be completed at Seattle University to meet the Residency Requirement for the bachelor's degree. In some circumstances recognition of content can be granted for courses taken at other institutions after the junior year, but no additional credits will be granted. There are four exceptions to this rule, but in no case will more than 135 total credits be allowed in transfer from all institutions. See policy #77-1 in section 7.1 for these exceptions.

7.8 University Core transfer guidelines

7.8.1 University Core for ECE students

The ECE curriculum includes University Core classes. These classes are classified into four modules. Module IV classes are specific to each department. There are 48 credits in the first three modules. The specific classes required by the university, for the ECE curricula, are as follows:

Module I: Engaging Academic Inquiry (20 credits, 5 credits per class)
  o UCOR 1100 Academic Writing Seminar
  o UCOR 1300 Creative Expression and Interpretation
  o UCOR 14xx Inquiry Seminar in the Humanities (UCOR 1410, 1420, 1430, or 1440)
  o UCOR 16xx Inquiry Seminar in the Social Sciences (UCOR 1610, 1620, 1630, or 1640)

Module II: Engaging Jesuit Traditions (15 credits, 5 credits per class)
  o UCOR 2100 Theological Explorations
  o UCOR 2500 Philosophy of the Human Person
  o UCOR 29xx Ethical Reasoning (UCOR 2900, 2910, or 2920)

Module III: Engaging the World (13 credits, 5 credits per class unless indicated)
  o UCOR 3100 Religion in a Global Context
  o UCOR 34xx Humanities and Global Challenges (UCOR 3410, 3420, 3430, or 3440)
  o CEEGR 3020 Engineering Economy (3 credits)

Module IV: Reflection (departmental capstone courses)
  o Senior design courses: ECEGR 4870, ECEGR 4880 and ECEGR 4890
7.8.2 Transferring Core classes

Core requirements for transfer students are based on the number of credits and type of degrees earned at students’ previous institutions. Courses are satisfied either through direct equivalences or categorical substitutions. To understand the differences between direct equivalence and categorical substitution, please refer to pages 4 and 5 of policy #2012-1 in section 7.1. Here is a summary as it pertains to the ECE curriculum:

7.8.2.1 Students transferring with fewer than 36 credits prior to first enrollment at SU:
The following courses are satisfied through direct equivalences:
UCOR 1100, UCOR 1200, UCOR 1300 and UCOR 3100

7.8.2.2 Students transferring with 36-84 credits prior to first enrollment at SU:
The following courses are satisfied through direct equivalencies:
UCOR 1100, UCOR 1200, UCOR 1300 and UCOR 3100
The following courses are satisfied through categorical substitution:
UCOR 14xx, UCOR 16xx

7.8.2.3 Students transferring with 85 or more credits prior to first enrollment at SU, but without a transferrable degree:
Module I:
The following courses are satisfied through direct equivalencies:
UCOR 1100, UCOR 1200, UCOR 1300
The following Core courses are satisfied through categorical substitution:
UCOR 14xx, UCOR 16xx
Module II:
Must be completed at Seattle University
Module III:
UCOR 3100 is waived.
Either UCOR 34xx is satisfied through categorical substitution.
CEEGR 3020 is required

7.8.2.4 Students transferring with 90 credits prior to first enrollment at SU, with a transferable degree
Students can transfer from a community college with an Associate degree as listed in appendix 16.4. The advantage of having such degree is that many core classes are satisfied or waived as described below.
Transferring with an Associate in Science – Transfer Degree (AS-T) from Washington Community Colleges (or equivalent as defined in Transfer Policy #77-1 in section 7.1).

**Module I:**
- The following courses are satisfied through direct equivalencies:
  - UCOR 1100, UCOR 1200, UCOR 1300
- The following Core courses are satisfied through categorical substitution:
  - UCOR 14xx, UCOR 16xx

**Module II:**
- Must be completed at Seattle University

**Module III:**
- UCOR 3100 is waived.
- UCOR 34xx is waived; it is satisfied via application of AS-T credits.
- CEEGR 3020 is required

Transferring a Direct Transfer Associate Degree (DTA) from Washington Community Colleges (or equivalent as defined in Transfer Policy #77-1 in section 7.1)

**Module I:**
- Satisfied by DTA degree curriculum

**Module II:**
- Must be completed at Seattle University

**Module III:**
- UCOR 3100 is waived.
- UCOR 34xx is waived; it is satisfied via application of DTA credits.
- CEEGR 3020 is required

7.8.2.5 *Students entering SU with a first undergraduate degree from an accredited US institution*

Most of the Core is waived. The following courses must be completed at Seattle University:
- UCOR 2100 and UCOR 29xx

7.8.2.6 *Students entering SU with a first undergraduate degree from a non-US institution*

**Module I:**
- The following courses are satisfied through direct equivalencies:
  - UCOR 1100, UCOR 1200, UCOR 1300
- The following courses are waived:
  - UCOR 14xx, UCOR 16xx

**Module II:**
- UCOR 2500 is waived.
- UCOR 2100 must be completed at Seattle University
UCOR 29xx must be completed at Seattle University

Module III:
UCOR 3100 is waived.
UCOR 34xx and CEEGR 3020 may be satisfied through categorical substitution

Waived courses are indicated as transferred (TE) with zero credits on your Academic Evaluation form. This is a waiving of the content of the course. As described above, the credits for a waived course must be made up in some way by a course of similar type. All students must have received at least 48 college level credits in university core to fulfill the Core requirement. If a specific course in the Core is waived, the 48 credits must be reached by additional courses in one of the Core areas. It is also possible to simply take the waived course itself in order to fulfill the credit requirement.

Once admitted to the Department of Electrical and Computer Engineering, students may not normally transfer ECEGR courses from other institutions. Occasionally, students will transfer from other schools after having already taken a number of ECEGR courses. These will be evaluated by the department on a case-by-case basis.

Deadlines are established for submitting transcripts for courses taken at other institutions. According to policy #75-6 (section 7.1), “the student is required to present an official transcript from the second institution to the Seattle University Registrar within 30 days of the completion of the other institution’s term.”

New students frequently neglect to send a final transcript from the last school attended. If you believe that your degree check sheet is incomplete, go to the Admissions Office to be sure that all transcripts have been received and evaluated. Work reflected on transcripts received after the above deadlines will not be transferred without a Petition for Exception to Policy initiated by your advisor.

8. MATHEMATICS PLACEMENT

It is important that new freshmen and transfer students with no previous college-level mathematics be placed in mathematics courses appropriate to their mathematics background and level of accomplishment. Seattle University’s Mathematics Department makes this determination based on the student’s SAT mathematics or ACT score.

Appendix 16.3 includes a guide describing how this placement is determined. If you feel that you should be placed at a higher level than that determined by your SAT or ACT scores, you may choose to take a diagnostic test offered by the Mathematics Department. Note that an SAT score of over 640 or Mathematics Department placement exam scores of 25-30 (algebra) and 6 or better (trigonometry) are needed for placement in MATH 1334 – Calculus I. Your placement will be based on the better of your two scores. While many engineering students will be placed in MATH 1334, some will be placed in MATH 1021 - Pre-calculus: Algebra, MATH 1022 - Pre-calculus: Trigonometry, or earlier mathematics classes. These courses are not part of the 180-credit BSEE
curriculum, but they will provide the background that the Mathematics Department feels the student needs for success in later courses.

Both BSEE curricula assume that students have had sufficient mathematical preparation for immediate entry into freshman calculus. If this is not the case, and additional courses must be taken, the time required to get your degree may be extended. However, mathematical reasoning and abstract thinking are key skills to develop if you hope to be successful in an engineering career. The extra time spent will be well worth it.

Placement in mathematics can also be affected by having taken the AP examination following high school. Freshmen who have taken calculus in high school but who have not taken the AP examination may take a special examination from the Mathematics Department to see if they can skip MATH 1334 and start with MATH 1335. If this is done and MATH 1335 is successfully completed with a grade of C or better, the student will be granted credit for MATH 1334. In other words, the skipped course will not have to be made up in any way. Students interested in this possibility should discuss it with the Chair of the Mathematics Department.

The flowchart shows the sequence of courses offered to get the necessary background to take Calculus I and proceed to Calculus II. If you need Trigonometry and place into Calculus I then you can either take MATH 1334 with MATH 1022 in the same quarter or you take the two quarter sequence of MATH 1331 and 1332.
9. ADVISING AND REGISTRATION

9.1 New student advising and registration

9.1.1 New freshmen

New freshmen admitted for fall quarter register for classes during the summer. You will be contacted with information about when and where you can get advice and register. The university also has a division of Student Academic Services with several offices that can assist with your transition from high school to college. These include the Bellarmine Advising Center, Disabilities Services and the Learning Center. You are also encouraged to contact the Department of Electrical and Computer Engineering directly. We are happy to answer your questions and assist you in any way possible. Additional information can be found at https://www.seattleu.edu/newregistration/freshmen/.

9.1.2 New transfer students

All new off-campus transfer students should meet initially with the Chair of the Department of Electrical and Computer Engineering to review their transfer credits and plan a program of study. As soon as you are admitted as a transfer student, you may call the department office to set up an advising appointment with the department chair. After your initial advising appointment, the Dean’s Office will assist you in actually registering for classes. Once you have enrolled, you will be assigned a permanent advisor from among the department’s faculty.

Another useful resource for new transfer students is the College of Science and Engineering Advising Center. One of the professional advisors there specializes in engineering student issues, is very knowledgeable about our engineering programs and curricula, and works closely with the department chairs. Further useful information can be found at https://www.seattleu.edu/newregistration/transfer/.

9.2 Continuing student advising and registration

Continuing students normally sign-up for classes during early registration. This is a period of time (usually about the sixth week of every quarter) during which you may start to register for the following quarter.

Once each quarter you will need to choose and/or confirm your courses for the following term. You should do this in consultation with your advisor. Faculty advisors in the department will post sign-up time slots using the software tool provided by the university. Select a time and make an
appointment online. Class schedules for an entire academic year are available on the SU Online webpage in the previous spring quarter. Each spring quarter you can make a complete academic plan for the next academic year. Check the web and begin planning your selection of courses.

Actual course registration is also done online. You will not be able to access the registration site, however, until your advising hold is lifted. This will be done after you meet with your advisor.

9.3 Faculty advisor

When you are first admitted to the department, one of the department's faculty members will be selected to act as your academic advisor. Your advisor will assist you prior to registration each quarter, and can discuss academic and career paths with you. You may also talk with your advisor about any problems you might have that affect your work at the university.

A list of all students and their advisors is maintained by the department’s administrative assistant. Your program evaluation, which you can access from Canvas, lists the name of your faculty advisor. If, for any reason, you are not happy with the advisor to whom you have been assigned or wish to have another particular advisor, simply tell the administrative assistant and a change will be made.

You should also become familiar with the resources available to you in the Student Center Pavilion. There you can find, among other services, counselors who are trained to help you with personal problems should the need arise.

9.4 Advising

Just prior to early registration is the advising period which normally lasts for three weeks. It is the policy of the Department of Electrical and Computer Engineering that all students must make an appointment to see their faculty advisors during the advising period. In fact, the department places registration holds on all its students. The computer system will not allow you to register unless you have talked to your advisor and had the advising hold released. It is advisable you check your SUOnline account for other registration holds you may have, such as financial holds.

Faculty advisors in the department will post sign-up time slots using the software tool provided by the university. It is each student's responsibility to make an appointment and meet with his or her advisor each quarter during the advising period. In order to make the most effective use of your advising appointment, please come to it with the courses you wish to take in mind. Your advisor will discuss your progress with you, and discuss your selection of classes.

The department keeps an Excel advising file for each student showing the curriculum, the progress towards completing the degree requirements, and advising notes for each quarter. You can request your advisor to email you your Excel advising file. It is the only record of which classes you and
your advisor agreed you should be taking. After this meeting, your advisor will arrange to have the advising hold on your registration lifted. Some advisors lift the advising hold immediately while others prefer to lift the hold at the end of the advising period.

9.5 Registration and other issues

During the advising period you should check your registration time and registration restrictions on SU Online. Your registration appointment time is the time you are able to start registering for classes. **It is advisable that you register at your appointed registration time in order to increase your chances of getting into the classes you want to take.**

You may register and change your schedule (add/drop classes) up to one week after classes start. Beyond this period, you may not add classes, but you may withdraw from classes according to the rules of the university. Withdrawal from a class requires both your advisor's and the instructor's signatures. If you change your schedule, please inform your advisor so that a note of the changes may be made in your advising file. Important dates, such as the last day to add/drop classes and to withdraw from classes, can be found in the Academic Calendar. The academic calendar and the Final Exam schedule can be found at: [https://www.seattleu.edu/redhawk-axis/academic-calendar/](https://www.seattleu.edu/redhawk-axis/academic-calendar/).

9.5.1 Closed classes

When you register you may find some classes are already closed. To request registration for lower division math and physics courses, fill out a Closed Class Request Form. The form lists the classes you can request. ([https://www.seattleu.edu/scieng/advising/closed-class-registration-procedure/](https://www.seattleu.edu/scieng/advising/closed-class-registration-procedure/)).

For classes, within Science and Engineering, not listed in the form, go directly to the department offering the course. For UCOR classes, go to the Science and Engineering Advising Center (ENGR 300) or the Core Solution Center (Student Services Building).

In the Department of Electrical and Computer Engineering, it is our policy to set section sizes at their projected enrollments. This sometimes means that classes are closed when several students still need to enroll. If you have the necessary prerequisites, you will be permitted to take required classes. However, we cannot guarantee enrollment in a specific laboratory section if another section is not yet closed. You may request to enter a closed class by contacting the department’s administrative assistant.

9.5.2 Exceptions to policy

It is sometimes reasonable to give students credit toward the degree for work that, strictly speaking, is not strictly in keeping with the BSEE curricular requirements. For instance, a transfer student
may have taken a MATLAB programming course with an emphasis on numerical analysis methods, but with sufficient programming content. Although not exactly equivalent to Seattle University’s ECEGR 1000, such a course might be used to offset the ECEGR 1000 requirement under some circumstances. These and other exceptions to policy require permission from course instructors, department chairs, and/or deans. If you think you have a situation that might justify an exception to policy, talk to your faculty advisor or the department chair. With their approval, a Petition for Exception to Policy can be submitted for approval by the Registrar’s Office.

9.5.3 Credit by examination

If you feel that you have mastered a subject through personal study or work experience you may receive credit for the course(s) by examination. The rules for credit by examination are outlined in the Seattle University policy #2004-06 (https://www.seattleu.edu/media/redhawk-axis/registrar/registrar-policies/Credit-by-exam-2004-06.pdf). As in many other situations, it is required that a form (Petition for Credit by Examination) be filled out and submitted (https://www.seattleu.edu/media/redhawk-axis/registrar/Credit-by-Examination.pdf).

The Department of Electrical and Computer Engineering normally administers such examinations by having students take the final examination for the class when normally offered.

9.5.4 Grading options

The following system of grading is used to indicate the level of individual student achievement. Each letter grade has a quality point value assigned to the grade achieved as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Quality Point Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4.00</td>
<td>Superior performance</td>
</tr>
<tr>
<td>A-</td>
<td>3.70</td>
<td></td>
</tr>
<tr>
<td>B+</td>
<td>3.30</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>3.00</td>
<td>Good performance</td>
</tr>
<tr>
<td>B-</td>
<td>2.70</td>
<td></td>
</tr>
<tr>
<td>C+</td>
<td>2.30</td>
<td>Adequate performance</td>
</tr>
<tr>
<td>C</td>
<td>2.00</td>
<td></td>
</tr>
<tr>
<td>C-</td>
<td>1.70</td>
<td></td>
</tr>
<tr>
<td>D+</td>
<td>1.30</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>1.00</td>
<td>Poor performance</td>
</tr>
<tr>
<td>D-</td>
<td>0.70</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>0.00</td>
<td>Failing</td>
</tr>
</tbody>
</table>

The grades of CR, HW, I, IP, M, N, NC, P, W, Y or YW have no quality point value.
All courses to be counted toward the BSEE degree must be taken for a letter grade with a quality point value. They may not be taken on a pass/fail (P/F) basis. Neither may they be audited. The one unique exception to this rule is for transfer students who are required to take PHYS 2960, a physics course in order to make up for a lack of physics laboratories. This course is offered only under the pass/fail option.

Officially withdrawing from a course is an action initiated by the student. This will result in a grade of ‘W’ which will not affect your GPA. If the course is required for graduation you will have to enroll in it again and complete it. Refer to policy #97-22.

A student can request a Hardship Withdrawal (HW) to withdraw from several courses. Hardship withdrawals may be granted for the death of a family member, catastrophic illness in the family, or an illness or an incapacitating injury to the student. Refer to policy #2012-01.

Students who, for reasons beyond their control, are unable to complete their coursework during the quarter may receive a grade of Incomplete (I). Incompletes are intended for students experiencing illness or a family emergency. You must have a passing grade at the time you are given the Incomplete. You must complete the work during the following quarter in order to have the Incomplete changed over to a letter grade. Otherwise, the grade will convert to the default grade that the faculty noted. Talk to your individual course instructors if you feel that you are in this situation. Refer to policy #97-3.

University academic policies can be found at: https://www.seattleu.edu/redhawk-axis/academic-policies/.

9.5.5 Repeating courses

The university's policy on repeated courses is explained in policy #77-2. Under the limitations described in that policy, you may repeat a course in which you received a grade of C- or lower. Both grades will appear on your SU transcript, but only the grade from the repeated course will be used in computing your GPA. It is not necessary to repeat courses in which you received lower than a C unless a higher grade is prerequisite for subsequent courses. For instance, you must have a grade of C- or better in Math 1334 before taking MATH 1335. Otherwise, repeating courses is an option that may help to satisfy the requirement of maintaining a GPA of at least 2.5. Of course, failed courses (grade F) must be repeated if they are to count toward your graduation requirements.

Once a course has been taken and a grade received at Seattle University, it may not be taken at another institution for purposes of transferring the credit. A student who receives permission to repeat a course at another institution will have no adjustment made to the Seattle University grade point average. The new course may count for content only
A course may be repeated at Seattle University only three times including withdrawals. If you register for a course and then drop it before the end of the add/drop period, this will not count toward the total. Registrations resulting in grades of CR, I, N, P, W, HW, LW, Y or Z are included in the three maximum attempts allowable. A student who has not satisfactorily completed a departmental requirement after three attempts will be asked to withdraw from the school or major.

9.5.6 Satisfactory progress, academic probation, and dismissal

Once admitted to the Department of Electrical and Computer Engineering, a full-time student is guaranteed entry into department courses in the normal sequence in order to complete the degree program. The student must, however, maintain satisfactory progress as described in Seattle University Policy #81-4.

Primarily, you are required to maintain both your overall and your science/mathematics/engineering GPA’s at 2.5 or better. Students who fail to maintain satisfactory progress may lose priority for entrance into electrical and computer engineering courses. Scholastic difficulties can lead to probation and ultimately dismissal from the department, school, and university.

Students in danger of probation or dismissal will receive ample notification from the Associate Dean of Science and Engineering so that they might have the opportunity to correct the problem.

10. INFORMATION FOR JUNIORS AND SENIORS

As a junior student you need to start collecting course material that showcases your academic work to use in your portfolio, as described below. It is also a good time to look for internships and start planning your future. Things to consider include taking the FE (Fundamentals of Engineering) exam (refer to Section 10.5), and applying for graduate school. You also need to apply for graduation.

10.1 Student portfolios and comprehensive files

Students entering the engineering design sequence (ECEGR 4870/4880/4890) are asked to prepare portfolios of representative examples of their work as undergraduates. Portfolios serve several intended purposes. For the student, the portfolio is a developmental tool for assessing strengths and weaknesses and a preparation for the transition into a career, especially as a tool in a job interview. For the department, portfolios act as an assessment of the effectiveness of the electrical engineering program. Portfolios also help the faculty guide students through the excitement and challenges of their senior year. Policies relating to student portfolios are described in detail in several handouts included in Section 16.6.
The process of completing your college education is long and gradual. Knowledge and skills accumulate slowly as you move through the series of courses that make up the curriculum. In some cases, the connections between courses are obvious. For instance, Circuits I is clearly a prerequisite for Circuits II. In other cases it may be less clear to you how one class relates to another. Students are not necessarily aware that a communications engineer may need to draw upon knowledge in the areas of linear systems, electromagnetics, and electronics. Engineering education can be very demanding. When caught up in the pressures and challenges of a quarter’s work, students have a tendency to treat their courses in isolation and not relate them to what they have previously learned. Therefore, we think that saving the work from all of your courses, and not just for your portfolio, will help you to better understand the inter-related knowledge that you have acquired. It will also allow for easy access to material as the need arises. For instance, you may want to refer back to some of your course materials when preparing for the Graduate Record Examination (GRE) or the Fundamentals of Engineering Exam (FE). And, it is increasingly common for job applicants to be asked to come to an interview prepared with tangible evidence of their educational accomplishments.

We strongly suggest that students maintain files of all of their college work. Instructors in some courses may specifically ask that you keep all work for the class in a folder and turn it in at the end of the quarter. Even when it is not required, it is a very good idea to maintain such folders. What should a student’s file consist of? Most basically, it should have a folder for each course you have taken in your college career. These will include not only Seattle University course work, but also your work completed at other colleges and universities. If you have attended other institutions, you may not have consistently collected materials from your courses. This may make it difficult to assemble a portfolio from your files. If this is the case, consult with your advisor. We won’t ask you to present examples of work that you may not have saved before coming to Seattle University. Your advisor may be able to suggest appropriate substitutions. Note that both technical and non-technical courses should be included in your file. It should be as easy to locate a paper written for a philosophy course as it is to find a homework assignment from a particular engineering course.

What should an individual course folder contain? The folder for a course might include a syllabus and other handouts, your course notes, homework assignments, computer work, examinations, laboratory reports, papers, and materials related to projects. In other words, the folder should contain any and all evidence of your work and accomplishments in the course. Use your own judgment, keeping in mind that once you’ve thrown something away it usually cannot be retrieved.

While not required by the department, your file might also contain evidence of work experience, especially professionally related internships, student records and transcripts, evidence of outside experiences and accomplishments, financial aid information, honors and awards, and an up-to-date resume. In short, your file should be a collection of all those materials that you might wish to access when applying for a job or graduate program or preparing for a new job assignment or professional licensing examination.
Your file will grow in size as you progress through your education. It will obviously be too large for the department to review in its entirety. This is the reason that we will ask you to select materials for presentation in a smaller portfolio. The process is a great help to the department in assuring that students have attained appropriate mastery of topics in the curriculum. Students also benefit in maintaining a record of the beginnings of their professional careers.

10.2 Applying for graduation

You should apply for graduation at the beginning of the academic year in which you intend to finish your studies. This is done via SUOnline. The process and due dates are listed here. The Registrar’s Office will determine the remaining course requirements you have and place its assessment online to be verified by the department chair or your academic advisor. You will then receive a notice from the Registrar of your remaining course requirements.

It is to your advantage to submit an application well in advance of your intended graduation date because the response you get back from the Registrar's Office represents an agreement between you and the university as to exactly what remains to be done. Once this process has been completed there can be no misunderstanding about remaining requirements. The deadline for submitting applications is November 1 for graduation in June of the current academic year. If you do not apply for graduation by the deadline, conferral of your BSEE degree may be delayed until the following quarter.

If you plan to finish your degree requirements in fall quarter, then you may apply for graduation during the previous academic year but you must apply no later than October 1 during your last quarter at SU. Students who will have 18 or fewer credits remaining to complete their degree requirements at the end of spring quarter may participate in the university’s commencement exercises in June in accordance with the university’s policy on Commencement with Deficiencies. If you plan to participate in Commencement with deficiencies, you must file your application for graduation by the November 1 deadline.

10.3 Career development center

The goal of almost all engineering students is to work as a practicing engineer. Seeking your first job is a process that should begin up to a year prior to graduation. To aid in this process, the university has a Career Services department. This office is located in the Student Services Pavilion on campus. Professionals there can help you to develop an effective resume and give you tips on how best to present yourself in interviews. The center is the focal point on campus for recruiters from companies.

The department tries to help in this process also. Talk to faculty members who are most familiar with your background. Sometimes they might have contacts in local industry or know of companies
that are hiring. Consult the bulletin board outside the department office. Job notices are sometimes
posted there. In times when jobs are scarce, much time may be needed in order to secure a position.
Even when jobs are more plentiful, give yourself sufficient time to find the best possible situation.

Even before your senior year you should try to become familiar with employment opportunities that
may be open to you. A relatively easy way to do this is by attending events such as the annual
Business and Engineering Career Fair organized by the Career Services. Many local companies
have displays at the Fair. Often, company representatives are Seattle University alumni who are
familiar with our programs and motivated to help our graduates. You should also consider
attending off-campus career fairs. Although these are usually oriented toward working engineers,
they are often open to the general public. In attending these events you can learn about what is
going on in the local engineering and high tech communities. At the same time, you can practice
your interviewing skills. Career fairs are publicized in the local news media and through the IEEE
and other professional organizations.

The department can be thought to be a success only when its graduates are successful in
establishing professional careers. Good luck in this process!

10.4 Graduate school

Undergraduate programs in engineering provide a broad-based general education to those wishing
to enter the engineering profession. Elective courses allow for a certain amount of specialization,
but for the most part depth is sacrificed in favor of breadth. It is expected that practicing engineers
will be life-long self learners in order to keep abreast of new developments and to gain skills
required for particular job assignments. Graduate school provides a formal way of obtaining expert
status in subfields of electrical engineering. Some students enter graduate school directly upon
finishing their undergraduate studies. Others may wait until they have gained a few years’
experience in the work place.

We encourage you to consider graduate or professional school as a way of furthering your career. If
you think you may be interested in continuing your studies at the graduate level, talk to your advisor
and other faculty members. All have attended graduate school themselves and can talk to you about
what to expect and help you with strategies for selecting and applying to graduate schools that
would be appropriate for your goals. Most graduate programs in engineering require those applying
to take the Graduate Record Exam (GRE). This is similar to the Scholastic Aptitude Test (SAT)
that you probably took before entering college. If interested, you should look into the GRE about
one year before you plan apply to graduate school.

Some engineering graduates go on to studies in other professional areas such as business, law, or
medicine. If interested in these fields, you can find resources at Seattle University to help guide you
through the application process.
10.5 The Fundamentals of Engineering (FE) examination

Engineering is not merely a job, it is a profession. Like medicine or law, the practice of engineering is subject to state regulation. As you approach graduation you will be eligible to take the Fundamentals of Engineering (FE) Examination (still known in Washington State under its traditional name of the Engineer in Training or EIT Examination). Regardless of the name, the test consists of 110 multiple choice questions. The exam is six hours long and covers a variety of topics related to electrical and computer engineering, mathematics (including probability and statistics), ethics, engineering economics, and physics. The exam is computer based and can be taken throughout the year. Details of the exam, including how to register and the associated fees are found on the Washington State Department of Licensing website and the NCEES (National Council of Examiners for Engineering and Surveying) website.

The FE Exam is a step beyond obtaining an engineering degree in establishing credentials as a professional engineer. When the FE Exam has been successfully passed and the individual has gained sufficient work experience, the Professional Engineering (PE) Examination may be taken. Although a professional license is not required for many electrical engineering careers, it is essential if you wish to do consulting or work for governmental agencies. Licensing is more important for some specialties (such as power engineering) than it is for others. Even if your career does not require it, being a licensed professional engineer is a mark of distinction that indicates a superior level of accomplishment in your chosen profession.

The department strongly encourages students to take the FE Examination. There is no better time to take it than when you are near graduation. You may take the test in your senior year when you are still a student and the information covered is still fresh in your mind. Because it is a national exam, it is transferable throughout the United States.

11. ENGINEERING STUDENT ORGANIZATIONS

Seattle University has several student engineering clubs. These clubs are student branches of national organizations. Student clubs of particular interest to electrical and computer engineering students are:

- The Institute of Electrical and Electronics Engineers (IEEE)
- The Society of Women Engineers (SWE)
- The National Society of Black Engineers (NSBE)
- The Society of Hispanic Professional Engineers (SHPE)
- Engineers for a Sustainable World (ESW)
- Tau Beta Pi (TBP)
- IEEE-Eta Kappa Nu (IEEE-HKN)
The **Institute of Electrical and Electronics Engineers (IEEE)** is the world's largest technical society. The IEEE sponsors conferences and publications as well as many professional subgroups that cover the broad range of the electrical engineering profession. It also sponsors student branches at colleges and universities as a way of developing professional awareness among those planning to make electrical engineering their career.

For a modest annual fee, you can become a student member of the IEEE. Applications are available from the branch's faculty advisor. All students are encouraged to become members of the IEEE. To facilitate student membership, the department will pay the first year of IEEE membership dues for students when they join.

As a member of IEEE you will receive several publications including *SPECTRUM*, a broad interest professional-level magazine covering electrical engineering topics and *POTENTIALS*, a student-oriented publication. You may also become a member of one of IEEE’s many technical societies. These are representative of the sub-disciplines of the electrical engineering profession. For students specializing in computer engineering, the IEEE Computer Society is one of the largest and most active societies within IEEE. You will also be eligible to attend student branch sponsored activities of both a social and professional nature.

Students in mechanical engineering and civil and environmental engineering have organizations similar to IEEE. There are also student clubs in the science departments. Depending on your interests, you might wish to join some of these groups also.

Seattle University has a chapter of **Tau Beta Pi**, the national engineering honor society. Tau Beta Pi was established to recognize engineering students with outstanding academic records. Membership is by invitation. If you are eligible, you will be contacted by student officers of the society.

An honor society focused on electrical engineering students is **IEEE-Eta Kappa Nu (IEEE-HKN)**. Membership is by invitation. If you are eligible, you will be contacted by student officers of the society.

The **Society of Women Engineers (SWE)** also has a student chapter at Seattle University. Membership is open to all engineering students. Similarly, you might be interested in the **National Society of Black Engineers (NSBE)**, the **Society of Hispanic Professional Engineers (SHPE)** or **Engineers for a Sustainable World**.

Your education extends beyond the walls of the classroom and the pages of textbooks. Participation in student organizations provides you with opportunities to develop your social and leadership skills. We encourage you to actively participate.
12. COLLEGIUM

As mentioned in the previous section, a student’s education is not restricted simply to what goes on in the classroom. Less formal settings can be invaluable in developing an individual’s interpersonal and leadership skills and to place one’s knowledge into different, broader, contexts. Student organizations offer one avenue for such extracurricular learning. Campus collegia offer another.

The university has several collegia around campus. A collegium is a place where students from a college or school can gather for informal conversation and relaxation. The atmosphere is designed to be welcoming, with comfortable furniture and coffee and light snacks provided. The collegia are particularly appealing to commuters, but students who live on campus also find them to offer a nice counterpoint to hectic college life. Stop by. You may make a new friend or have a conversation with one of your teachers.

The Reidy Collegium welcomes juniors and seniors (transfers and 4-year students). It is located on the third floor of the Student Center (Room 310). It is a quiet location, but close to several food service venues. For more details visit the collegia page.

13. PART-TIME EMPLOYMENT

With the high costs associated with going to school, many students find it necessary to work part time. This can be a valuable experience, particularly if you can find employment in a technical area. Many companies in the Puget Sound region have employment opportunities available for students while they are attending school. These can be thought of as an extension of your engineering education. Positions such as these are often the first step toward securing permanent employment upon graduation.

Although part-time employment while attending school has some obvious benefits, it can also detract from a student’s education. Engineering is a demanding course of study that requires a considerable degree of attention. A traditional rule of thumb in engineering education is that students should spend at least two hours studying for each hour spent in class. Time spent on the job is time not devoted to studies. Most students can handle ten hours of work per week without it affecting their performance in school. Strong students might work up to twenty hours per week and still perform well in their studies. Beyond that, however, compromises must be made. If your personal financial situation requires you to work a significant number of hours per week or if you find a particularly attractive job opportunity that you want to take advantage of, we urge you to attend school on a part-time basis. Otherwise, your grades are likely to suffer. Much more serious than poor grades, however, is potentially compromising the quality of your education. Learning takes place throughout your career and throughout life. Your time as an undergraduate, however, provides you with a nearly unique opportunity to study and master topics comprehensively and from basic principles. If your ability to focus on your education is
jeopardized through too many hours devoted to work, it will be very difficult to make up for in later years.

Department faculty members sometimes become aware of job openings for engineering students. These are usually announced through the ecestudents e-mail alias that all electrical engineering students join. In addition to talking to department faculty, check for job postings at the Career Center in the Student Center Pavilion and on their website, accessible through Seattle University’s homepage.

The department and university offer some part-time student employment opportunities. Students grade papers for classes, assist in equipment rooms, and work in computer laboratories. Inquire with faculty and in departmental offices to learn about these jobs.

14. COMPUTER ACCESS AND EMAIL

The ECE department has computers in our laboratories with specialized applications programs used in our courses. All ECE students have access to those computers. To access the labs you will need your own personal combination code, which you can request from our lab manager (see section 16.1 for contact information). Your one personal code will allow access to all the ECE labs. You should not share that code with others.

You will also have access to the general-use computer laboratories open to all university students. These labs are located in the third floor of the Engineering Building and also in the Pigott Building.

The Department of Electrical and Computer Engineering makes extensive use of e-mail for communication among students and faculty. The e-mail addresses of departmental faculty and staff are listed in section 16.2 of this handbook along with their office locations and phone numbers. We have an e-mail list for all students in the department, and all ECE students are expected to join it. The e-mail address for this list is ecestudents@seattleu.edu. Announcements of events and notices of interest to students are posted to ecestudents. We try to add all new students to the list as they enter the department and delete them after they have graduated. If you find that your name is not on the list for some reason, see the ECE administrative assistant. Only Seattle University e-mail accounts are included in the ecestudents alias. Accounts you may have with an outside provider will not be added to the list. However, you may want to consult with Information Technology (IT) to learn how best to forward your Seattle University e-mail to an outside account. Regardless of how you are able to access it, you should check your SU e-mail daily. Some messages from the department will need to be responded to in a timely manner. Also, the storage space in your SU e-mail account is limited. We often get messages back that e-mail is undeliverable to a student because the account has exceeded its allotted space. If this happens, you may miss some important information.
In addition to the use of e-mail, the Seattle University computer system provides useful information to students through its website. SU Online, in particular, gives you access to your GPA, class schedule, etc. You should familiarize yourself with this resource, as it can be very useful to you in managing your academic career at the university. Many instructors make use of online course sites through a utility program named Canvas. This is a very useful way for an instructor to make information available to students in his/her classes.

15. IEEE CODE OF ETHICS

Engineering is a profession, not unlike medicine or law. The work of engineers often affects the health and safety of the general public. Thus, engineers have a responsibility to society and should strive to maintain high levels of ethical professional conduct. This sense of ethical behavior should definitely be a part of your conduct as a student. For your reference the IEEE Code of Ethics is included below.

IEEE Code of Ethics

We, the members of the IEEE, in recognition of the importance of our technologies in affecting the quality of life throughout the world and in accepting a personal obligation to our profession, its members and the communities we serve, do hereby commit ourselves to the highest ethical and professional conduct and agree:

1. to accept responsibility in making decisions consistent with the safety, health and welfare of the public, and to disclose promptly factors that might endanger the public or the environment;

2. to avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist;

3. to be honest and realistic in stating claims or estimates based on available data;

4. to reject bribery in all forms;

5. to improve the understanding of technology, its appropriate application, and potential consequences;

6. to maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, or after full disclosure of pertinent limitations;

7. to seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others;
8. to treat fairly all persons and to not engage in acts of discrimination based on race, religion, gender, disability, age, national origin, sexual orientation, gender identity, or gender expression;

9. to avoid injuring others, their property, reputation, or employment by false or malicious action;

10. to assist colleagues and co-workers in their professional development and to support them in following this code of ethics.

Approved by the IEEE Board of Directors
16. APPENDIX

16.1 Science or Engineering Elective

The Electrical Engineering major requires a 4 credit Science or Engineering Elective, listed in the fall quarter of the junior year. The courses that can satisfy that elective are listed below. Some of the courses are 5 credits.

Any ECE elective course and/or ECE elective labs

BIOL 1610 - Biology I: Molecular and Cellular Biology
and BIOL 1611 - Biology Lab I (they have to be taken together)

CHEM 1500 - General Chemistry I
and CHEM 1501 - General Chemistry Laboratory I (they have to be taken together)

MATH 3000 - Introduction to Advanced Mathematics
MATH 3420 - Advanced Linear Algebra
MATH 3430 - Introduction to Complex Variables
MATH 3440 - Nonlinear Systems and Modeling
MATH 3450 - Introduction to Numerical Methods

Mechanical engineering classes:
MEGR 2100 - Statics

The 2000 level classes in CEEGR require MEGR 2100. The only class you can take without a prerequisite is:
CEEGR 3510 - Engineering Geology
### 16.2 Faculty and Staff

The current faculty and staff members of the Department of Electrical and Computer Engineering are listed below.

<table>
<thead>
<tr>
<th>Faculty/Staff</th>
<th>Office</th>
<th>Phone**</th>
<th>E-mail</th>
<th>Areas of Technical Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teresa Beery</td>
<td>BA 209</td>
<td>296-5970</td>
<td>beeryt</td>
<td>Administrative Assistant</td>
</tr>
<tr>
<td>Gary Fernandes</td>
<td>BA 218</td>
<td>296-5971</td>
<td>fernandg</td>
<td>Laboratory Manager</td>
</tr>
<tr>
<td>Shiny Abraham</td>
<td>BA 212</td>
<td>296-5967</td>
<td>Abrahash</td>
<td>Communications, Internet of Things</td>
</tr>
<tr>
<td>Henry Louie</td>
<td>BA 219</td>
<td>398-4619</td>
<td>louieh</td>
<td>Power Systems, Renewable Energy, Rural Electrification</td>
</tr>
<tr>
<td>Agnieszka Miguel</td>
<td>BA 222</td>
<td>296-5965</td>
<td>amiguel</td>
<td>Digital image processing and compression</td>
</tr>
<tr>
<td></td>
<td>Department Chair</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Margarita Takach</td>
<td>BA 221</td>
<td>296-6196</td>
<td>takach</td>
<td>Analog and Digital Electronics, Controls, Signal Processing</td>
</tr>
<tr>
<td>Mehmet Vurkaç</td>
<td>BA 220</td>
<td>296-5983</td>
<td>vurkacm</td>
<td>Machine learning, Signal Processing and Machine Listening, Problem-Solving in the Arts and Engineering, Mathematical Music Theory</td>
</tr>
</tbody>
</table>

* All e-mail addresses at Seattle University are of the form xxxxx@seattleu.edu.
** All the phone numbers use the 206 area code
16.3 Placement in Mathematics Courses, 2015-2016

16.3.1 Mathematic placement for freshmen

The following information comes from: https://www.seattleu.edu/scieng/math/math-placement/

First year ECE students without AP calculus credit or previous college mathematics credits place into one or more of the following mathematics courses:

- MATH 1000  Functions and Algebraic Methods (Fall, Winter, Spring)
- MATH 1021  Precalculus: Algebra (Fall, Winter, Spring)
- MATH 1022  Precalculus: Trigonometry (Fall, Winter, Spring)
- MATH 1334  Calculus I (Fall, Winter, Spring)

The mathematics course in which a student enrolls depends upon the student’s SAT or ACT Mathematics score, or Mathematics Placement Exam score. To determine which courses a student is eligible to take, go down the SAT or ACT column until you find the range of your score. From there, go across the row to the first column, which gives the eligible mathematics courses.

<table>
<thead>
<tr>
<th>Math Courses</th>
<th>SAT score</th>
<th>ACT score</th>
<th>S.U. Math Placement Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1000</td>
<td>SAT: 450 - 530</td>
<td>ACT: 18 - 22</td>
<td>algebra score: 4 - 14</td>
</tr>
<tr>
<td>MATH 1021</td>
<td>SAT: 540 - 630</td>
<td>ACT: 23 - 27</td>
<td>algebra score: 15 - 24</td>
</tr>
<tr>
<td>MATH 1022</td>
<td>SAT: 620 - 800</td>
<td>ACT: 27 - 36</td>
<td>algebra score: 23 - 30</td>
</tr>
<tr>
<td>MATH 1334</td>
<td>SAT: 640 – 800, and trig place. score ≥ 6*</td>
<td>ACT: 28 – 36, and trig place. score ≥ 6*</td>
<td>algebra score: 25 - 30, and trig score ≥ 6 or MATH 1022</td>
</tr>
</tbody>
</table>

(*Corequisite for MATH 1334 is MATH 1022 or indicated score on trig. placement exam)

A student who places into a mathematics course may opt to take a course with a lower number, but will not be allowed to take a course higher than placed. However, students who do not feel that their SAT or ACT score accurately represents their mathematical knowledge may request to take the Seattle University Mathematics Placement Exam to demonstrate this knowledge. To take the Placement Exam, the student should call the Mathematics Department at 206-296-5930.
to request an online appointment. You may take the placement anywhere using a computer with a reliable connection to the internet. Both exams have a time limitation, but are not proctored.

The Mathematics Department Placement Exam has two parts, you may take one or both parts, depending upon your situation. 30 points on algebra (60 minutes) and 9 points on trigonometry (30 minutes). The two parts of the exam are scored separately, so that a perfect score would be 30 T 9, or on Datatel, the score would appear as 3009, the last digit being the trigonometry score. No calculators are allowed during the multiple choice exam. You can find out more about the Mathematics Department Placement Exam in our Frequently Asked Questions document.

MATH 1022 (Precalculus: Trigonometry) is a co-requisite for both MATH 1334 and 1230, if a student has not been exempted by the departmental Placement Exam. Because the SAT and ACT exams do not cover trigonometry topics, students scheduled to take MATH 1334 (Calculus I) or MATH 1230 (Calculus for the Life Sciences) will be required to take a trigonometry exam on the first day of class if they have not already taken the Mathematics Department Placement Exam. If a student does not receive a sufficiently high score on the exam, he or she will be required to enroll concurrently in MATH 1022 (Precalculus: trigonometry), which is a 2 credit course. Therefore, if a student is going to be enrolled in MATH 1334 or 1230 and does not wish to take this additional course, he or she should review trigonometry before the beginning of the quarter. A student may also call the Mathematics Department (296-5930) to take the trigonometry placement exam during pre-registration, to determine whether or not enrollment in MATH 1022 is required.

A student who has taken the AP Calculus Exam (AB or BC), and has a score of 3 or better may receive credit for one or more calculus courses. Contact the Office of the Registrar or the Mathematics Department for more information.

AP CALCULUS SUMMARY

There are two Advanced Placement mathematics exams, the AB and BC exams. The BC exam covers the same material as the AB exam plus additional topics.


Topics for BC exam: Topics for the AB exam, Parametric, polar and vector functions, Concept of series, Series of constants (including tests for convergence), Taylor series
The credit granted for scores on each exam is summarized in the table below:

<table>
<thead>
<tr>
<th>Score of 3</th>
<th>AB Exam</th>
<th>BC Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Credit for MATH 1130 (Calculus for Business) or MATH 1230 (Calculus for Life Sciences).</td>
<td>Credit for MATH 1334</td>
</tr>
<tr>
<td>Score of 4</td>
<td>Credit for MATH 1334</td>
<td>Credit for MATH 1334, and MATH 1335</td>
</tr>
<tr>
<td>Score of 5</td>
<td>Credit for MATH 1334, and MATH 1335</td>
<td>Credit for MATH 1334, MATH 1335, and possibly MATH 1336 *</td>
</tr>
</tbody>
</table>

* Credit for MATH 1336 may be granted after consultation with the Mathematics Department Chair.
### 16.3.2 Mathematics placement for Transfer students

Below is a transfer Guide for Courses from UW and some Local Community Colleges. All numbers refer to Mathematics courses at the various institutions. The first row refers to the math courses at Seattle University.

#### Table of Equivalencies

<table>
<thead>
<tr>
<th>Seattle U</th>
<th>1021</th>
<th>1022</th>
<th>1334</th>
<th>1335</th>
<th>1336</th>
<th>2330</th>
<th>2320</th>
<th>2340</th>
</tr>
</thead>
<tbody>
<tr>
<td>UW</td>
<td>120</td>
<td>---</td>
<td>124</td>
<td>125</td>
<td>---</td>
<td>324</td>
<td>308/318</td>
<td>307&amp;309</td>
</tr>
<tr>
<td>SCCC</td>
<td>141</td>
<td>142</td>
<td>151</td>
<td>152</td>
<td>---</td>
<td>153&amp;224</td>
<td>220 x*</td>
<td>238 x**</td>
</tr>
<tr>
<td>NSCC</td>
<td>141</td>
<td>142</td>
<td>151</td>
<td>152</td>
<td>---</td>
<td>153&amp;224</td>
<td>220</td>
<td>238 x**</td>
</tr>
<tr>
<td>SCCC</td>
<td>141</td>
<td>142</td>
<td>151</td>
<td>152</td>
<td>153</td>
<td>224</td>
<td>220</td>
<td>238 x**</td>
</tr>
<tr>
<td>Bellevue Col</td>
<td>141</td>
<td>142</td>
<td>151</td>
<td>152</td>
<td>153</td>
<td>---</td>
<td>208</td>
<td>238 x**</td>
</tr>
<tr>
<td>Edmonds CC</td>
<td>141</td>
<td>142</td>
<td>151</td>
<td>152</td>
<td>---</td>
<td>254</td>
<td>272</td>
<td>271 x**</td>
</tr>
<tr>
<td>Shoreline CC</td>
<td>141</td>
<td>142</td>
<td>151</td>
<td>152</td>
<td>---</td>
<td>153&amp;264</td>
<td>208</td>
<td>---</td>
</tr>
<tr>
<td>Gr River CC</td>
<td>141</td>
<td>142</td>
<td>151</td>
<td>152</td>
<td>153</td>
<td>254</td>
<td>240</td>
<td>238</td>
</tr>
<tr>
<td>Highine CC</td>
<td>141</td>
<td>142</td>
<td>151</td>
<td>152</td>
<td>153</td>
<td>254</td>
<td>220</td>
<td>230 x**</td>
</tr>
</tbody>
</table>

Courses marked with an x will not transfer directly and/or completely

*Linear Algebra course without abstract vector space coverage

**Differential Equation course with no linear systems coverage

- MATH 1021 – Precalculus: Algebra
- MATH 1022 – Precalculus: Trigonometry
- MATH 1334 – Calculus I
- MATH 1335 – Calculus II
- MATH 1336 – Calculus III
- MATH 2330 – Multivariable Calculus
- MATH 2320 – Linear Algebra
- MATH 2340 – Differential Equations

If you have questions about the transfer of mathematics course taken at other schools, you should talk to both your academic advisor and the chair of the Mathematics Department.

Course equivalences for these and other courses can be found at: [https://www2.seattleu.edu/registrar/course-equivalencies.aspx](https://www2.seattleu.edu/registrar/course-equivalencies.aspx)
16.4 Direct Transfer Associates Degrees from Washington State Colleges

Many students are able to earn an associate degree after two years of study at a community college. The 27 community colleges and in Washington State and the Northwest Indian College each offer associate degrees which is recognized as being equivalent to the first two years of study at a four-year school. These so-called direct transfer degrees provide the transferring student with some advantages when moving to the four-year school. Degrees that are so recognized are listed below:

Bellevue College……………………………… Associate in Arts and Sciences
Big Bend CC……………………………….. Associate in Arts and Sciences
Centralia College…………………………… Associate in Arts, Associate in Liberal Arts
Clark College………………………………… Associate in Arts
Columbia Basin CC………………………… Associate in Arts and Sciences
Edmonds CC……………………………….. Associate in Arts and Sciences, Option I
Everett CC…………………………………… Associate in Arts and Sciences, Option II
Grays Harbor College……………………… Associate in Arts
Green River CC…………………………….. Associate in Arts
Highline CC………………………………… Associate in Arts, Option A
Lower Columbia College…………………… Associate in Arts and Sciences, Plan B
North Seattle CC…………………………… Associate in Arts, Associate of Science
Northwest Indian College…………………… Associate in Arts and Sciences – Option I
Olympic College……………………………. Associate in Arts and Sciences, Option A
Peninsula College…………………………… Associate in Arts, Associate in Arts – Honors
Pierce College……………………………… Associate in Arts and Sciences
Seattle Central CC…………………………… Associate in Arts, Associate in Science
Shoreline CC………………………………… Associate in Arts and Sciences, Option A
Skagit Valley College………………………. Associate in Arts, Univ, and College Transfer
South Puget Sound CC…………………….. Associate in Arts
South Seattle CC…………………………….. Associate in Arts, Associate in Science
Spokane CC………………………………….. Associate in Arts
Spokane Falls CC…………………………… Associate in Arts
Tacoma CC………………………………….. Associate in Arts and Sciences, Option A
Walla Walla CC……………………………… Associate in Arts
Wenatchee Valley CC………………………. Associate in Arts and Sciences
Whatcom CC……………………………….. Associate in Arts and Sciences
Yakima Valley College…………………….. Associate in Arts and Sciences
16.5 **Descriptions of fundamental ECE courses**

**ECEGR 1000 – Computing for Engineers (5)**
Engineers write computer programs for either of two reasons. Programs (or code) can be the end product of an engineer’s work. Code written for a microprocessor used to control the operation of an automobile engine is an example of this. More often, engineers write programs in order to get results that help in designing something else. MATLAB is a programming package used by many engineers and scientists. It is one of the tools of the trade. This course introduces students to MATLAB; it does not require previous programming experience, but students should have a reasonable level of mathematical ability.

**ECEGR 1200 – Digital Operations and Computation (4)**
Digital processing of information and data, number-systems, Boolean algebra; design of hardware for registers, counting, and arithmetic operations; organization of computers, storage, and input/output. Introduction to simple logic circuits. Elementary concepts of programming, assembly language, and computer simulation. Open to all university students.

**ECEGR 2010 – Computer Tools (1)**
An introduction to various Computer Aided Design (CAD) tools used in electrical and computer engineering.

**ECEGR 2200 – Microprocessor Design (4)**
Design of digital components and subsystems of a typical microprocessor. Assembly language programming, memory access, Instruction processing, peripherals. Three lectures and one four-hour laboratory per week.

**ECEGR 2210 – Programmable Devices (2)**
Designing a number of digital functions with programmable devices, e.g. communications protocols, state machines, peripherals; VHDL; debug tools and techniques; introduction to systems orientation.

**ECEGR 2100 – Electrical Circuits I (5)**
This course is an introduction to how engineers analyze the behavior of systems made of electrical components. Students learn how to calculate the response behavior of simple circuits consisting of resistors, capacitors, inductors, and sources.

**ECEGR 3000 – Introduction to MATLAB (1)**
Laboratory oriented course designed to introduce students who already have taken a programming course to programming in MATLAB. Topics include introduction to the MATLAB environment, matrix manipulation and computation, MATLAB programming language, writing functions and scripts, and production of 2D graphical output.

**ECEGR 3110 – Electrical Circuits II (4)**
A continuation of ECEGR 2100. Additional and more powerful approaches to the analysis of electrical circuits are mastered.

ECEGR 3111 – Laboratory I: Circuits (2)
This laboratory introduces a series of experiences to develop skills in the use of test and measurement equipment as well as circuit simulation, building, debugging and testing. Some of the circuits are part of a large project that gradually gets completed in the three quarter junior lab sequence.

ECEGR 3120 – Semiconductor Devices and Circuits (5)
Radios, computers, cell phones, and many other modern devices are based upon electronic components and circuits. Modern electronics began with the introduction of the bipolar junction transistor in 1947. This course introduces students to methods used in analyzing simple diodes and transistor circuits.

ECEGR 3121 – Laboratory II: Electronics (2)
A series of laboratory experiences to incorporate electronics into various sections of the year-long design project. The emphasis is to strengthen skills in the use of test and measurement equipment and in the simulation, building, and debugging of a variety of electronic circuits. Some programming will be used according to the project needs.

ECEGR 3210 – Embedded Systems (5)
System architectures; data acquisition tradeoffs; introduction to digital controls; Software architectures for real time operating systems; design of device drivers and board support packages; software engineering; capstone project involving a prototype embedded system. This course is required only for the Computer Engineering specialization major.

ECEGR 3300 – Fields and Waves (4)
Transmission lines are studied as a bridge from circuit analysis to understanding electromagnetic fields. Then, electric and magnetic fields are studied using vector algebra, culminating in Maxwell’s equations which are used in the analysis of plane waves and the introductory study of guided waves, electromagnetic (EM) interference, and antennas. This course is required only for the Electrical Engineering major.

ECEGR 3500 – Electrical Energy Systems (4)
An introduction to electric energy systems. Topics include an overview of electric power systems and power factor; three phase circuits; magnetic circuits; transformers and an introduction to electro-mechanical energy conversion. This course is required only for the Electrical Engineering major.

ECEGR 3710 – Signals and Systems (4)
The modern practice of electrical engineering draws heavily upon both physics and mathematics. Of all the courses in the Electrical Engineering Fundamentals Block, ECEGR 3710 is the most
purely mathematical. Systems are treated as ‘black boxes’ with inputs and outputs. Signals are studied in the time and frequency domains using Fourier analysis.

**ECEGR 3711 – Laboratory III: Signals and Systems (2)**
A series of laboratory experiences, many of which draw on signals and systems concepts. The experiments directly related to the year-long design project will aid in its successful completion.

Descriptions of all our courses, required and electives, can be found in the Undergraduate Catalog online.
For Electrical Engineering:
For Electrical Engineering with a Computer Engineering specialization:
MEMORANDUM

TO: Students Entering Senior Design

FROM: Electrical and Computer Engineering Faculty

SUBJECT: Student Portfolios

All students entering Senior Design are asked to put together portfolios of work that will display their accomplishments and talents. The portfolios will assist the design coordinator in forming student teams that possess a balance of complementary interests and talents that will lead to a successful project outcome. Most of the work of putting your portfolio together will be done during the first several weeks of ECEGR 4870. We are alerting you now so that you will have the summer to start thinking about your portfolio’s contents and locate materials that you might want to include.

We have two main reasons for asking you to create a portfolio. The first is that we think the portfolio process will be a useful first step for you as you move from college to the working world. We think that in assembling your portfolio, you will be able to better see where your strengths, weaknesses, and interests are. As a result, you will perhaps have a better understanding of what types of employment would be best for you to seek out. It is becoming increasingly common for company interviewers to ask prospective employees to bring evidence of work they have done. Your portfolio may be a useful document for you to take along when you interview for a job. The second primary reason we have for asking students to do portfolios is that the department can use them to assess its program. The department has both a mission statement and a list of specific program objectives. Student portfolios are one way we have to determine our level of success in living up to our mission and meeting our objectives.

Although we will use the portfolios to assess the electrical engineering program, individual students will not be evaluated on the content of their portfolios. You have presumably received grades on many of the individual items that will be included in your portfolio. You will not be graded on them again. An A paper will be considered to be no better than a B- paper. Obviously, though, you will want to present your most accomplished work. Although you will not be graded on the quality of the individual items in your portfolio, you will be graded on how well you put your portfolio together and how enthusiastically you take part in the process. Portfolios will be completed during the first few weeks of ECEGR 4870. At that time you will work with a faculty mentor who will assist you in the final stages of assembling your portfolio.
Electrical engineering students entering into Senior Design are asked to prepare portfolios of their academic and professionally-related work. The purposes for doing so and the make-up of the portfolios are described elsewhere. This document outlines the timeline that students preparing portfolios should keep in mind. In order to give students sufficient time to put together the best possible portfolios, the process should begin at the end of the Spring Quarter prior to enrollment in ECEGR 4870 – Engineering Design I.

- Toward the end of spring quarter, the electrical engineering design coordinator will visit classes of those students who will be entering Senior Design in the fall. The portfolio process will be explained and memos outlining faculty expectations will be distributed.

- During the summer, individual students should gather appropriate materials for their portfolios. Specific requirements are listed in the document ‘Guidelines for Student Portfolio Content’. Don’t despair if you can’t find examples in all the categories listed. Transfer students, especially, may not have saved all their course materials. You will be able to work with the faculty to identify suitable substitutions. Also during the summer you may wish to begin writing the personal statement and resume to be included in your portfolio. At the very least, you should write a first draft of your resume and give serious thought to what you want to include in your statement.

- In the first week of Fall Quarter, the portfolio process will again be discussed and the department will provide you with a three-ring binder to put your portfolio in.

- Portfolios will be due on the beginning of the second week of the quarter.

- During October the faculty will review the portfolios. The purpose of this is not to evaluate individual students. Instead, reviewing the portfolios allows the faculty to see the strengths and weaknesses of the program as a whole, and to make improvements where necessary.

- Portfolios will be returned to students within a few weeks after submission.
Electrical engineering students are asked to assemble portfolios of their work as they enter into the Senior Design Program (ECEGR 4870). The purpose of the portfolios and the procedures and timelines for putting them together are described in accompanying documents and the Electrical Engineering Student Handbook. In brief, the portfolios are an opportunity for individual students to showcase their talents, accomplishments, and experiences as they relate to their chosen profession of engineering. Outlined below is a list of items that should be included in each student’s portfolio. You are not limited to the contents of the list. Feel free to include other items of interest if you choose.

Items to be included in the portfolio:

**Letter of Transmittal.** A brief letter (a short paragraph should be sufficient) stating what the portfolio is and why you have assembled it. The letter should be addressed to ‘The Faculty of the Department of Electrical and Computer Engineering, Seattle University’. It should be dated and signed.

**Table of Contents.** Help the reader to understand what you have included in your portfolio.

**Personal Statement.** A 3-5 page (or longer) statement that describes your background and future plans. In other words, how did you get to this point in your education, and what are your goals for the future? We are particularly interested in hearing about how the electrical engineering program is helping you to achieve your goals. We have attached copies of the department’s mission statement and objectives. Read them carefully, and then include in your personal statement a discussion of how the program has succeeded or failed in meeting its objectives. At a minimum, we would like you to write about one thing that you feel the department does particularly well and one thing that you feel is in need of improvement. It won’t help us much if you just name these things. Instead, give reasons and suggestions that we can use as the basis for improvement.

**Personal Resume.** A one-page standard resume, appropriate for presentation to a prospective employer.

**Writing Sample.** Include an example of a significant piece of writing that you are particularly proud of. This may be a paper from a humanities class, something you’ve written at work, or any other piece of prose writing that you have done in the last year or two.
**Laboratory Report.** One laboratory report, preferably from an electrical engineering course, that includes a significant tabular or graphical data presentation.

**Engineering Analysis.** An example of a detailed mathematical analysis of an electrical engineering problem. This may be taken from a homework assignment.

**Computer Use.** An example of applying the use of computers to engineering problems. This may be in the form of code you’ve written in C++ or another programming language. Or, if you prefer, you can present the results of using high level software such as MATLAB, or a circuit simulation application. Include enough information to show how you used the computer software to solve a problem.

**Design.** An example of an engineering design problem you have worked on. This may be a homework problem, or an investigation from any of the required laboratory courses.

**Personal Interest.** Your profession is a major part of your life, but don’t mistake it for life itself. Please include an item that relates to a personal interest in your life. This could be something from sports, music or other artistic pursuits, participation in youth activities, volunteer work with community or religious groups, or hobbies. It is preferable to include something related to an ongoing interest rather than a single event from your past, because this better reflects who you are now. So, it would be better to describe how you play guitar for enjoyment whenever you can, as opposed to saying that you played tuba in your high school band.

Your portfolio should be in notebook form. Use the three ring binder provided by the department to assemble the portfolio materials into an organized presentation. Don’t feel that you are limited in either content or style. If you have ideas other than those suggested here, feel free to include them. Remember, your portfolio is intended to reflect your talents and your personality. Your portfolio will become part of the course requirements for the first course in Senior Design, ECEGR 4870. In the first several weeks of Senior Design you will work with a faculty mentor who will give you advice as you put the finishing touches on your portfolio.