The University of Connecticut

School of Engineering

COMPUTER ENGINEERING

GUIDE TO COURSE SELECTION

AY 2017-2018
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for

Computer Engineering (CMPE) Majors

in

The School of Engineering

Prepared by the
Electrical & Computer Engineering Curricula & Courses Committee
School of Engineering, University of Connecticut.

http://www.ee.uconn.edu/csecourseguide.php

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1. INTRODUCTION

The objective of this Guide is to outline courses offered by the Computer Science and Engineering (CSE) and Electrical & Computer Engineering (ECE) Departments leading toward a degree in **Computer Engineering** (CMPE) which will prepare the student for a career in the chosen field, meet the curricular requirements of the Department, the School and the University, and meet nationally recognized standards for Computer Engineering as established by the Accreditation Board for Engineering and Technology (ABET). This Guide is intended to be used in conjunction with the University of Connecticut General Catalog as a source of information regarding degree requirements in Computer Engineering.

1.1 Preparation of Plans of Study

Prior to registration during the first semester of the Junior year [typically when a student is taking ECE 3101 and/or ECE 3201], or for transfer students in the second semester at UConn, whichever is later, each student must complete a Plan of Study form documenting the program he/she intends to follow to satisfy the degree requirements of the chosen major in engineering. In order to help students in developing a suitable Plan of Study form which meets graduation requirements, the CSE and ECE departments usually hold Plan of Study meetings, normally scheduled sometime during the first five weeks of each semester. All students intending to file a Plan of Study form in CMPE should attend one of these meetings. Details about the process of filling out a Plan of Study form are provided later in Section 6.

2. COMPUTER ENGINEERING PROGRAM

The Computer Engineering Program at the University of Connecticut is continuously evolving and improving in response to feedback from our constituents and program assessment results.

We have developed a set of Program Educational Objectives which are periodically reviewed by all constituents (including our alumni and employers of our graduates). PEOs refer to the abilities and accomplishments of CMPE graduates several years after graduation. The feedback provided by our constituents is used to refine and improve the Program Educational Objectives.

We have determined a set of Program Outcomes which are necessary for the achievement of the Program Educational Objectives. They describe the abilities that our students will have at the time of graduation from the CMPE program. We use several assessment tools (including senior design project evaluation, alumni surveys, exit interviews, senior surveys, and course-level assessment) to measure our success with respect to the Program Outcomes. The assessment results are reviewed periodically and used for the continuous improvement of the program and our courses.

The two-loop process involving the definition of the Program Educational Objectives (loop one) and the assessment / program improvement (loop two) is shown below.
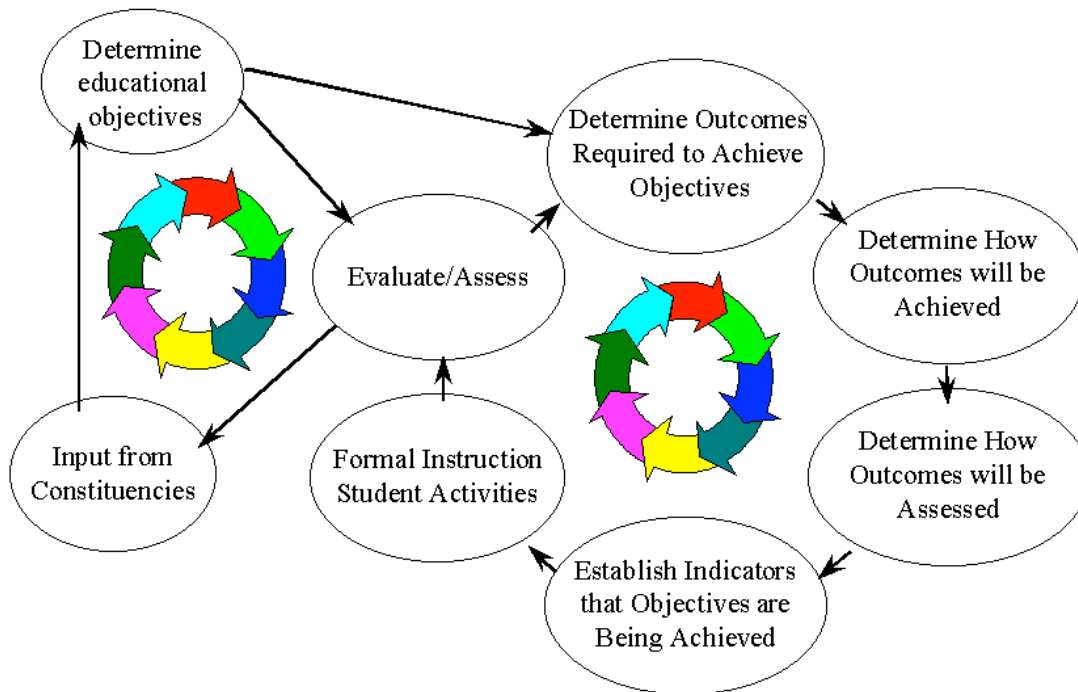
The Two Loops of EC2000

Figure 2.1. The two-loop process of Engineering Criteria 2000, as defined by Accreditation Board for Engineering and Technology (ABET).

2.1 Computer Engineering Program Educational Objectives (PEO)

The Computer Engineering program combines coursework in computer science and electrical engineering providing a program that focuses on the design of computer hardware and digital systems.

The Computer Engineering undergraduate program educational objectives are that our alumni/ae:
- make technical contributions to design, development, and manufacturing in their practice of computer engineering (corresponding to the description of the Computer Engineering program given above).
- advance in their professional career.
- engage in professional development or post-graduate education to pursue flexible career paths amid future technological changes.

The Computer Engineering Curriculum described in Section 3 has been designed to achieve these three Program Educational Objectives.

2.2 Computer Engineering Outcomes and Assessment

Based on the Program Educational Objectives, we have defined Program Outcomes necessary for their fulfillment. Program assessment is used to insure that these outcomes are achieved. The **CMPE Student Outcomes** are identical to the EAC Outcomes (a)-(k). They require that our graduates will demonstrate:.

(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

3. COMPUTER ENGINEERING CURRICULUM

The basic level curriculum has been designed to achieve the Program Educational Objectives and to meet the University General Education Requirements. Section 3.1 describes the University General Education Requirements. Section 3.2 describes the basic-level CMPE Curriculum with the courses and options offered in the lower and upper divisions provided in Sections 3.3 and 3.4.

3.1 General Education Requirements (University Core Curriculum)

As part of all baccalaureate degree programs at the University, students are required to satisfy a common core of coursework known as the General Education Requirements. These are described in what follows.

Foreign Languages
The minimum requirement is met if the student is admitted to the University with three years of a single foreign language in high school, or the equivalent. If the student has not met the minimum requirement through high school coursework, he or she must pass the second semester course of the introductory year-long course sequence in a language at the University.

Expository Writing

All students must take ENGL 1010 Seminar in Academic Writing or ENGL 1011 Seminar in Writing through Literature. In addition to these courses, all students must complete two Writing (W) courses. As shown in the following pages, two Writing courses are specified in the required coursework in Computer Engineering.

Arts and Humanities (Content Area One)

All students must take two Arts and Humanities courses. These courses must be from two different departments. All students in the School of Engineering are required to take PHIL 1104, which satisfies one of these requirements.

Social Sciences (Content Area Two)

All students must take two Social Sciences courses. These courses must be from two different departments.

Science and Technology (Content Area Three)

All students must take two Science and Technology courses. These courses must be from two different departments. All engineering students satisfy this requirement automatically with required courses.

Diversity and Multiculturalism (Content Area Four)

All students must take two Diversity and Multiculturalism courses. One of these courses may also count toward the Content Area One or Content Area Two. One of these courses must be an international course.

The list of approved courses has been furnished by the General Education Oversight Committee. It is available at http://geoc.uconn.edu/Approved%20Courses.htm.

3.2 Computer Engineering Basic-Level Curriculum

The basic-level curriculum is given in Table 3.1. This basic-level curriculum typically includes 33 credit hours of Math and Basic Science, 63 credit hours of Engineering Topics, 22 credit hours of General Education, and 8 credit hours of Other topics (including 3 credits of a free elective), as defined by the Accreditation Board for Engineering and Technology.

**Table 3.1. Basic-Level Curriculum**
Computer Engineering

Year; Semester or Quarter	Course (Department, Number, Title)	Category (Credit Hours)			
		Math & Basic Sciences	Engineering Topics Check if Contains Design (✔)	General Education.	Other
Freshman Fall	CHEM 1127Q General Chemistry	4	( )		
	MATH 1131Q Calculus I	4	( )		
	ENGL 1010 or 1011 Writing Seminar		( )	4	
	CSE 1010 Intro. to Computing for Engr.		( )		3
	ENGR 1000 Orientation to Engineering		( )		1
Freshman Spring	PHYS 1501Q Physics for Engineers I	4	( )		
	MATH 1132Q Calculus II	4	( )		
	CSE 1729 Intro. Principles of Programming		3 (✔)		
	Arts & Humanities Course		( )	3	
	Social Sciences Course			3	
Sophomore Fall	PHYS 1502Q Physics for Engineers II	4	( )		
	MATH 2110Q Multivariable Calculus	4	( )		
	CSE 2050 Data Structures & OO Design		3 ( )		
	CSE 2300W Logic Design		4 (✔)		
			( )		
Sophomore Spring	MATH 2410Q Elementary Differential Equations	3	( )		
	ECE 2001 Electrical Circuits		4 (✔)		
	CSE 2500 Intro. to Discrete Systems		3 ( )		
	PHIL 1104 Phil. & Social Ethics		( )	3	
	Social Sciences Course		( )	3	
Junior Fall	ECE 3101 Signals and Systems		3 ( )		
	ECE 3201 Electronic Circuit Design and Analysis		4 (✔)		
	CSE 3666 Intro. to Computer Architecture		3 (✔)		
	CSE 3100 Systems Programming		3 (✔)		
	MATH 2210Q Applied Linear Algebra	3	( )		

Table 3.1. Basic-Level Curriculum (continued)
Computer Engineering

Year; Semester or Quarter	Course (Department, Number, Title)	Category (Credit Hours)			
		Math & Basic Science	Engineering Topics Check if Contains Design (✓)	General Education	Other
Junior Spring	ECE 3411/ CSE 4903 Microprocessor Lab		3 (✓)		
	ECE 3401 Digital Systems Design		3 (✓)		
	CSE 4302 Advanced Computer Architecture		3 (✓)		
	STAT 3345Q Probability Models for Engineers or MATH 3160 Probability	3	( )		
	Diversity & Multiculturalism Course		( )	3	
Senior Fall	ECE 4901 Electrical and Computer Engineering Design I		2 (✓)		
	ECE 4099W Independent Study		( )		1
	CSE 4300 Operating Systems		3 (✓)		
	Professional Requirement		3 (✓)		
	Design Laboratory		3 (✓)		
	Elective		( )		3
Senior Spring	ECE 4902 Electrical and Computer Engineering Design II		3 (✓)		
	ECE 3421 VLSI Design and Simulation		4 (✓)		
	Professional Requirement		3 ( )		
	Professional Requirement		3 ( )		
	Diversity & Multiculturalism Course		( )	3	
TOTALS-ABET BASIC-LEVEL REQUIREMENTS		33	63 (✓)	22	8
OVERALL TOTAL FOR DEGREE		126			
PERCENT OF TOTAL		26%	50% (✓)	17%	6%
Totals must satisfy one set	Minimum semester credit hours	32 hrs	48 hrs		
	Minimum percentage	25%	37.5 %		

Computer Engineering Prerequisite Flow:
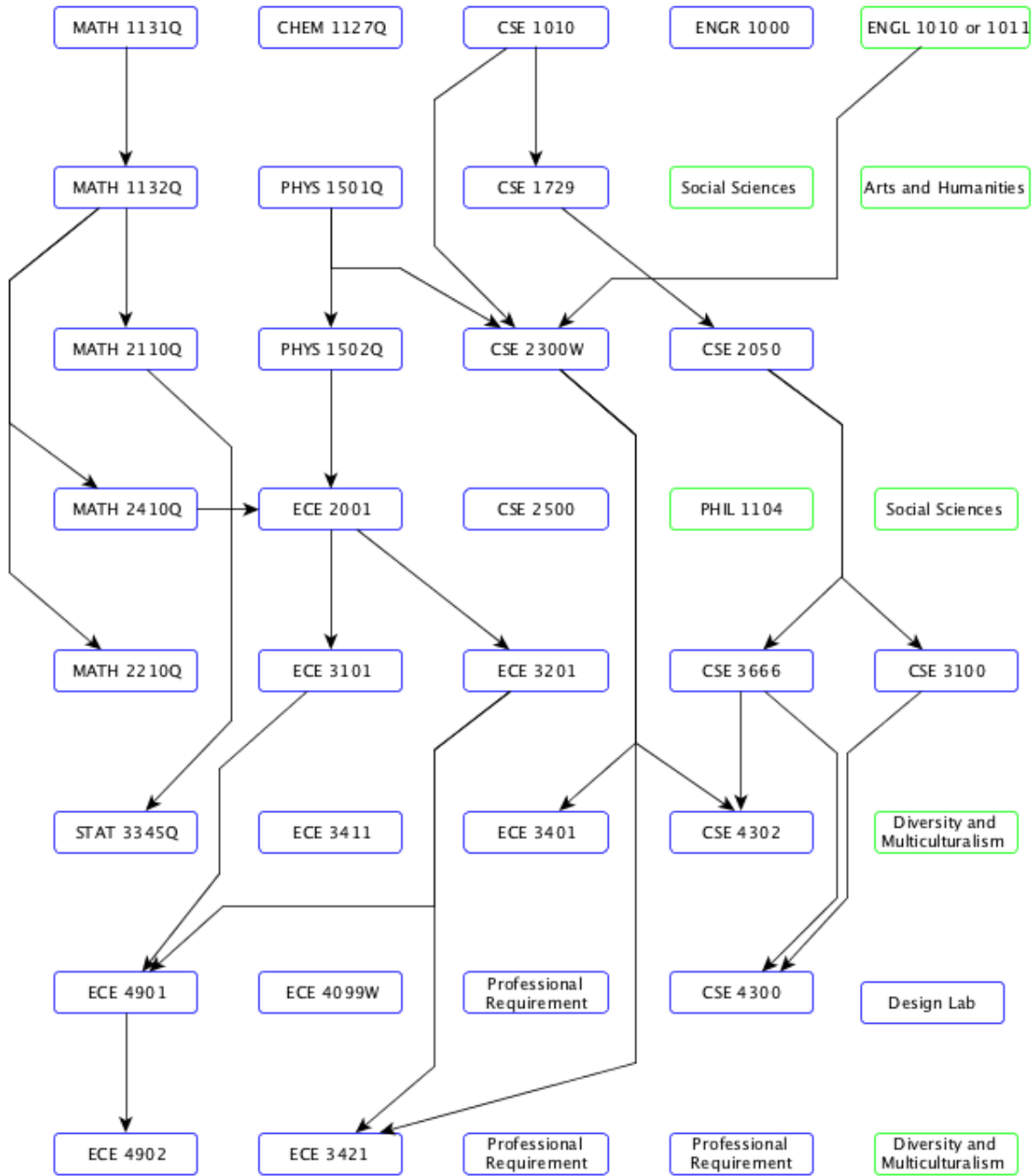
3.3 Overview of the Freshman and Sophomore Years

The lower division, or freshman and sophomore years, of the Computer Engineering curriculum are similar to the other engineering curricula. The recommended sequence of courses is as follows.

FRESHMAN YEAR

First Semester	Credits	Second Semester	Credits
MATH 1131Q - Calculus I	4	MATH 1132Q - Calculus II	4
CHEM 1127Q - Gen. Chem. I	4	PHYS 1501Q - Engineering Phys. I	4
CSE 1010 - Intro. to Computing for Engr.	3	CSE 1729 – Intro. Principles Programming	3
ENGL 1010 or ENGL 1011 - Acad. Writing	4	Arts and Humanities course	3
ENGR 1000 - Orientation to Engr.	1	Social Sciences course	3
	16		17

SOPHOMORE YEAR

First Semester	Credits	Second Semester	Credits
MATH 2110Q - Multivariable Calculus	4	MATH 2410Q - Differential Equations	3
PHYS 1502Q - Engineering Phys II	4	ECE 2001 - Electric Circuits	4
CSE 2050 - Data Structures & OO Design	3	CSE 2500 - Intro to Discrete Systems	3
CSE 2300W - Logic Design	4	PHIL 1104 - Phil. and Social Ethics	3
	15	Social Sciences course	3
			16

The three-semester sequence of PHYS 1201Q-1202Q followed by PHYS 1230 or 1530 may be taken instead to satisfy this requirement. However, only eight credits of PHYS 1201-1202-1230/1530 can be used toward the required 126 credits for the Engineering degree.

The courses from content areas one (Arts and Humanities) and two (Social Sciences) must be from four different departments. One course from either content area one (Arts and Humanities) or content area two (Social Sciences) may also be used to fulfill one of the requirements from content area four (Diversity and Multiculturalism). One course from content area four must be an international course.

3.4 Overview of the Junior and Senior years

The Computer Engineering upper division curriculum, as described below, includes required courses and a number of professional requirements. The professional requirements are used to allow the student to specialize in a particular area within Electrical Engineering or to broaden his or her knowledge.

JUNIOR YEAR

First Semester	Credits	Second Semester	Credits
ECE 3201 - Electronic Circuit Design and Analysis	4	ECE 3401 - Digital Systems Design	3
ECE 3101 - Signals and Systems	3	ECE 3411 - Microprocessor Applications Lab or CSE 4903 - Microprocessor Laboratory	3
CSE 3666 - Intro. to Comp. Arch.	3	CSE 4302 – Advanced Computer Architecture	3
CSE 3100 – Systems Programming	3	STAT 3345Q - Prob. Models for Engineers or MATH 3160 - Probability	3
MATH 2210Q - Linear Algebra	3	Diversity and Multiculturalism course	3
	16		15

SENIOR YEAR

First Semester	Credits	Second Semester	Credits
ECE 4901 - Elec. & Comp. Engr. Design I	2	ECE 4902 - Elec. & Comp. Engr. Design II	3
ECE 4099W – Indep. Study w/writing	1	ECE 3421 - VLSI Design & Simulation	4
CSE 4300 - Operating Systems	3	Professional Requirement	3
Design Laboratory	3	Professional Requirement	3
Professional Requirement	3	Diversity and Multiculturalism course	3
Elective	3		16
	15		

CMPE Students have a choice of STAT 3345Q or MATH 3160 in the sixth semester.

Design Laboratories
Courses which may be used to fulfill the 3 credits Design Laboratory requirement include 3350/ECE 4401, CSE 4901/ECE 4402, and ECE 4132.

Professional Requirements
Courses which may be used to fulfill the 3 Professional Requirements include ECE 3111, ECE 3431/CSE 3802, ECE 4112, ECE 4121, ECE 4131, ECE 4451, CSE2102, CSE3100, CSE 3300, CSE 3500, CSE 3504, CSE 4707, and CSE 4709. At least one of the three must be ECE 4112 or CSE 3504.

The entire program of professional requirements is selected by the student, subject to approval by his/her advisor, the Department Head, and final approval by the Dean of Engineering.

4. UPPER DIVISION CMPE HONORS PROGRAM

Rising Juniors

Students with a grade point average of at least a 3.4 (with at least 54 credits completed) who wish to do Honors work in their junior/senior years may apply for admission in the second semester of – or immediately following – the sophomore year. In addition to completing the application for admission, students applying for admission for junior/senior-level study must obtain departmental consent from the ECE department's Honors advisor (Prof. Krishna Pattipati). In granting departmental consent, an Honors advisor is making a favorable judgment as to the student's qualifications for Honors work in the major. For information about the Honors Program, visit the website at http://www.honors.uconn.edu.

CMPE Honors Program

The Computer Engineering program participates in the Honors Program at UConn. The ECE Department will offer honors sections of the following courses so that the Honors Program requirements (minimum 12 credits) can be satisfied within the CMPE Program. CMPE Honors students **must** take the following four courses for 12/13 credits.

ECE 3101: **Signals and Systems** (3 credits; Fall, Junior Year)
ECE 3221: **Digital Integrated Circuits** or ECE 3111: **Systems Analysis** (3 or 4 credits; Fall, Senior Year)
ECE 4901 or CSE 4950: **Electrical and Computer Engineering Design I** (2 credits; Fall, Senior Year) **and** ECE 4099W: **Independent Study in Electrical and Computer Engineering** (1 credit)
ECE 4902 or CSE 4951: **Electrical and Computer Engineering Design II** (2 credits; Fall, Senior Year)

Electrical and Computer Engineering Design (ECE 4901 & 4902 / CSE 4950 & 4951) can be used for the Honors Thesis.

IMPORTANT: Honors students must complete 15 honors credits of which 3 must be outside the major.

Notes

- ECE *graduate* courses may be taken to fulfill (automatically) honors course requirements.
- The honors thesis can be satisfied with Electrical and Computer Engineering Design I and II. **No other honors thesis is required for the Honors Program if you successfully complete the Senior Design coursework.**

5. DOUBLE MAJORS, MINORS, AND ADDITIONAL DEGREES

Opportunities exist to pursue a double major program in Computer Engineering and one of the other undergraduate engineering curricula, to pursue a minor degree program in conjunction with the CMPE degree, or to pursue an additional degree within the University. Any student pursuing a second baccalaureate degree must i) submit an Additional Degree Petition (which requires the consent signature from the Dean of the School of Engineering) and ii) meet the course requirements of both degrees; and iii) earn at least 30 credits more than the requirements of the degree with the higher credit minimum.

Double Major with another Engineering program
Opportunities exist to pursue a double major program in Computer Engineering and one of the other undergraduate engineering curricula. Of the other curricula, the Electrical Engineering (EE) and the Computer Science and Engineering (CSE) majors have the most overlap with the CMPE curriculum and are the most popular double majors for CMPE students. If a student wishes to be a double major within Engineering, he or she should notify the Dean. Careful planning of course selection should be done each semester in consultation with the student's advisor. A separate Plan of Study form for each major must be prepared and submitted for approval.

Minors
Several minors are available within the University that may be attractive to students pursuing the Computer Engineering degree. Examples include minors in Mathematics and Statistics, within the College of Liberal Arts & Sciences, as well as the Biomedical Engineering and Nanotechnology minors within the School of Engineering.

Additional Degree with another major outside of Engineering
From time to time students wish to obtain an additional degree in a field outside of the School of Engineering. One example of an additional degree would be that found in the EUROTECH program in which the completion of a degree in German Studies within the College of Liberal Arts & Sciences is achieved at the same time the student completes the primary degree in a major within the School of Engineering. Students who have such an interest should discuss the procedure for pursuing the additional degree with the Director of Undergraduate Advising, (486-5462).

6. SUBMITTING THE PLAN OF STUDY

All students in the first semester of their Junior year in the Engineering curriculum must prepare a preliminary Plan of Study (POS) through StudentAdmin. These students should work with their advisors to determine a POS that meets the degree requirements of the School of Engineering and the University. The preliminary POS allows students to map out the entirety of their degree coursework to assist them in conversations with their advisor about meeting all degree

requirements prior to graduation. A preliminary POS is filed after a student has reached junior credit standing (54 credits or more) and outlines the student's plan for the remainder of their coursework until graduation. Submitting an approved preliminary POS is required in the School of Engineering.

A final POS is filed after you have registered for your final semester of coursework. The final POS must demonstrate that the student meets all requirements to graduate. The final POS is a UConn graduation requirement.

It is the student's responsibility to fill out and file both the preliminary and final POS. However, students should do so with the guidance of their Academic Advisor. It is ideal to start this process at least one semester ahead of time, that is, in the spring of your sophomore year.

How do I submit a preliminary POS?
First, you must access you academic planner in Student Administration.

SA Self Service > Student Center > Academic Planner

Then you can select "Plan by Requirements" to review your remaining unsatisfied requirements for your degree. You may also add courses to your planner using the "Browse Course Catalog" component.

Once you understand which courses you still need to take, review what semester those courses are offered and enter them into your Academic Planner accordingly. When you have completed this, you can select "Submit Plan of Study" and the document will be sent electronically to your faculty advisor for their review.

Ultimately, if the preliminary POS is **denied**, you must fix whatever errors are indicated and submit a new, correct POS that satisfies all degree requirements. If the POS is **approved**, you now have a complete and accurate plan to reach graduation. If you decide to deviate from this plan, it is your responsibility to discuss the changes with your academic advisor and ensure that you are still completing all degree requirements.

If you need further assistance, please access this video tutorial or contact your Academic Advisor: https://www.youtube.com/watch?v=bXChknVu1yM

How do I submit a final POS?
First, you must apply for graduation via Student Administration here:

SA Self Service > Learner Services > Academics > Apply for Graduation

Next, submit your final POS. You can do this by navigating the following path:

SA Self Service > Student Center > Academic Requirements (under the drop down menu at the left) > *"Submit Final Plan of Study"* button

All of your requirements must show as satisfied in StudentAdmin to have your final POS approved.

The final POS must be submitted as soon as possible after registering for your final semester of coursework. The latest a final POS can be submitted is by the end of the fourth week of the semester in which a student plans to graduate.

When preparing the POS, the following guidelines should be adhered to:

Double Major: If you plan to follow a double major, you will need to submit two plans of study.

Catalog year and date of graduation: It is extremely important that you accurately note what catalog year you are filing under and your intended date of graduation. The catalog year determines the set of requirements under which you will be graduating. If you need to change the catalog year, contact the Registrar. You can use any catalog year from the year you entered UConn to the year of your graduation.

Courses taken: The POS must show exactly the courses being used to satisfy degree requirements. Exemption from specific School of Engineering course requirements or substitution of alternative courses require approval (see "Exemption and Substitution" below).

Foreign Language Requirement: The Foreign Language requirement calls for three years of a single foreign language in High School or passing the second semester course of the introductory year-long course sequence in a language at the University.

Expository Writing Requirement: The General Education Requirement for Expository Writing is met through ENGL 1010 or ENGL 1011 and two "W" (writing) courses which are part of the engineering curriculum for each department (for CMPE majors, CSE 2300W and ECE 4099W are required). Thus, the POS (and the student transcript) must show these courses. If, for some reason beyond the student's control, the major "W" courses are not taken, the student will have to take the required "W" courses outside the department curriculum.

Arts and Humanities (Content Area One): All students must take two Arts and Humanities courses. These courses must be from two different departments. All students in the School of Engineering are required to take PHIL 1104, which satisfies one of these requirements.

Social Sciences (Content Area Two): All students must take two Social Sciences courses. These courses must be from two different departments.

Science and Technology (Content Area Three): All students must take two Science and Technology courses. These courses must be from two different departments. All engineering students satisfy this requirement with required courses.

Diversity and Multiculturalism (Content Area Four): All students must take two Diversity and Multiculturalism courses. One of these courses may also count toward the Content Area One or Content Area Two. One of these courses must be an international course.

Required courses: Required courses are shown on the form. If there are alternatives listed, the course(s) that the student has taken or intends to take should be circled (e.g., ENGL 1010 or ENGL 1011, circle 1010 or 1011 depending on which one was taken).

Professional Requirements: The Professional Requirements which are not specified on the Plan of Study form are chosen in consultation with the student's advisor.

Restrictions: The following courses may not be counted for credit toward graduation: MATH 1120Q and 1110Q along with other mathematics courses numbered below 1120Q; PHYS 1010Q; PHYS 1030Q; CSE 1000C; STAT 1000QC; and courses labeled "independent study" or "variable topics" taken in departments outside of the School of Engineering. No course taken on a Pass/Fail basis may be counted for credit toward graduation or used to meet any course requirement of the School of Engineering.   Many general University restrictions are shown in the Academic Regulations and Procedures section of the University Catalog.

Exemption and Substitution: Students who desire to be excused from any of the requirements, or to substitute other courses for those prescribed, must do so by getting approval from the department head and SoE Director of Undergraduate Advising.. Some examples of this type of departure from a published regulation are as follows: exemption from MATH 1131Q for a student who had Calculus in high school and started in MATH 1132Q or substitution of transfer courses for UConn equivalents. Exceptions can be approved by submitting an exceptions form, which requires approval from your advisor, the department head (or associate department head), and the SoE Director of Undergraduate Advising.

Changes: Changes to a previously submitted preliminary POS should be made in consultation with the advisor. A new preliminary POS submission is not necessary, but the changes should be reflected in the student's last semester on the final POS submission which will accurately list all the courses that were taken to satisfy degree requirements.