The University of Connecticut

School of Engineering

COMPUTER SCIENCE AND ENGINEERING

GUIDE TO COURSE SELECTION

AY 2015-2016

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for

Computer Science and Engineering (CSE) Majors

in the School of Engineering

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Introduction

The School of Engineering

The Bachelor of Science in Engineering (BSE) curriculum is designed to give sound knowledge of basic principles in mathematics, physics, and chemistry; to provide education in the theory, principles, and practices of engineering; and to present the opportunity to obtain additional instruction and experience in one of the major engineering disciplines. Students gain hands-on experience in the laboratory courses that accompany classroom work, and develop design skills in course work beginning in the first two years. Design experience continues in junior and senior years in the areas of software engineering, computer hardware and architecture, and in applications areas of the student's choosing, culminating in the two semester Senior Design Project.

The Computer Science and Engineering Degree

The Computer Science and Engineering program produces graduates with a broad perspective in both software and hardware topics pertinent to computing systems. It provides the foundation and specialized knowledge necessary to analyze, design and evaluate system software, utility programs and software-hardware architectures. All students take courses on digital logic design, computer architecture, software engineering, compiler design, operating systems, algorithms and analysis.

Students also take three professional requirement courses, generally at least one of which will be selected from courses offered by the Computer Science and Engineering department. Professional requirement courses offered recently by the Department include artificial intelligence, bioinformatics, databases, distributed objects, data security, ethics and professionalism, graphical user interfaces, graphics, networks, numerical analysis, and programming languages.

Punctuating the senior year are two design laboratory courses that, in combination, allow the students to work on a team project over two semesters.

This degree program is accredited by both the Engineering Accreditation Commission (EAC) and Computing Accreditation Commission (CAC) of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 - telephone: (410) 347-7700. It was first accredited by EAC/ABET in 1972. In 1993 it became accredited by the Computer Science Accreditation Commission (CSAC) as well. Accreditation activities previously conducted by CSAC are now conducted by the Computing Accreditation Commission (CAC) of ABET.

Using this Guide

This Course Selection Guide will assist you in completing your educational goals at the University in the Computer Science and Engineering Program, in conjunction with your faculty advisor and the University of Connecticut General Catalog. The Plan of Study current at the time of the student's admission or readmission to the School, whichever is later, lists the requirements for that student’s graduation. Thus, this guide provides details on student degree requirements that may not be reflected in the University of Connecticut Catalog.

Accreditation of the Computer Science & Engineering Program

The Computer Science and Engineering program is accredited by the Engineering Accreditation Commission (EAC) and Computing Accreditation Commission (CAC) of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 - telephone: (410) 347-7700. Accreditation is a peer review process which insures that educational programs meet established standards of quality and graduate students who are prepared for the requirements of their profession. As part of the accreditation process the Computer Science and Engineering department has developed the following Program Educational Objectives of the Computer Science and Engineering program. These objectives describe the abilities of our graduates about five years after graduation.

The Computer Science and Engineering undergraduate program educational objectives are that our alumni/ae: practice as computing professionals in various areas of computer science or computer engineering, advance in their professional practice; and enhance their skills and embrace new computing technologies through self-directed professional development or post-graduate education.

ABET's EAC requires that each student of the Computer Science and Engineering program follow a curriculum that has the following minimum content:

- one year of a combination of college level mathematics and basic sciences (some with experimental experience) appropriate to the discipline. Basic sciences are defined as biological, chemical, and physical sciences.
- one and one-half years of engineering topics, consisting of engineering sciences and engineering design appropriate to the student's field of study.
- a general education component that complements the technical content of the curriculum and is consistent with the program and institution objectives.

In addition ABET's CAC requires that each student of the Computer Science program follow a curriculum that has the following minimum content:

- one and a third years (40 credits) of computer science coursework.
- one-half year of mathematics that includes discrete mathematics. The additional mathematics might consist of courses in areas such as statistics, calculus, linear algebra, numerical methods, number theory, geometry, or symbolic logic.
- one year of combined mathematics and science that includes a science component that develops an understanding of the scientific method and provides students with an opportunity to experience this mode of inquiry in courses for science or engineering majors that provide some exposure to laboratory work.

The Computer Science and Engineering program detailed in the Plan of Study meets these requirements. Detailed syllabi for the required Computer Science and Engineering coursework is available on the Computer Science and Engineering website

Degree Requirements

University General Education Requirements

The University requires all baccalaureate degree students to satisfy a common core of course work known as the General Education Requirements. Course work in the Arts, Humanities and Social Sciences is also an integral part of the engineering program. Courses must be taken and distributed to cover the Four Content Areas and the Five Competencies listed below. Please see the University of Connecticut General Catalog for more detailed information.

Note that students must earn at least a 2.0 grade point average for all calculable course work to receive a degree.

The Four Content Areas

The courses taken to satisfy the General Education Content Areas One, Two, and Three must be selected from six different departments.

1. **Arts and Humanities**
   Two courses from two different departments in this content area are required. These courses emphasize artistic, cultural, and historical topics. (PHIL 1104, required of all engineering students, meets a Content Area One course requirement.)

2. **Social Sciences**
   Two courses from two different departments in this content area are required. These courses emphasize the ways in which people and institutions interact.

3. **Science and Technology**
   Two courses from two different departments in this content area are required. These courses provide background in the sciences, including laboratory work. (CHEM 1127Q and PHYS 1501Q, required of all engineering students, meet the Content Area Three requirement.)

4. **Diversity and Multiculturalism**
   Two courses in this content area are required. These courses provide background on the global community and other cultures with which engineers will interact over the course of their careers. At least one of these courses must be classified as international. One course (only) may be used to meet both this requirement and a course requirement in Content Areas One or Two.

The Five Competencies

1. **Second Language Competency**
   The minimum requirement is met by three years of a single foreign language in high school or equivalent, or completion of a two-semester course sequence in any foreign language at the University.

2. **Writing (W) Competency**
   All students must take either ENGL 1010 Seminar in Academic Writing or ENGL 1011 Seminar in Writing through Literature. Students taking ENGL 3800 in the Honors Program and transfer students with both ENGL 1010 English Composition and ENGL 1011 Literature and Composition have met the requirement. In addition to these courses, Computer Science and Engineering students must complete the two required writing (W) courses, CSE 2300W and CSE 4939W.

3. **Quantitative (Q) Competency**
   All students must take two Quantitative (Q) courses. The mathematics course requirements for the Computer Science and Engineering major meet this requirement.

4. **Computer Technology Competency**
   By graduation, CSE students are expected to understand computer logic and basic structure and to have the ability to develop algorithms. These competencies are achieved by the courses in the major.

5. **Information Literacy Competency**
   In addition to the basic competency achieved in ENGL 1010 or 1011 or equivalent, all Engineering students will receive instructions in ENGR 1000 or equivalent on how to conduct effective information searches, both in the library and on the web. As the student progresses, successive courses will require an increased level of Information Literacy competency. An advanced level of Information Literacy will be achieved at the completion of the program's major design experience course.

School of Engineering Requirements

All Computer Science and Engineering students are required to complete the following School of Engineering Requirements:

Course	Title	Credits
CHEM 1127Q or 1147Q	Chemistry I Honors Chemistry I	4
CSE 1010 or CSE 1729	Introduction to Computing for Engineers or Introduction to Principles of Programming	3
ENGR 1000	Orientation to Engineering I	1
MATH 1131Q/1151Q or (MATH 1125Q and MATH 1126Q) or MATH 2141Q	Calculus I or Calculus Ia and Ib or Advanced Calculus I	4
MATH 1132Q11/52Q or MATH 2141Q	Calculus II Advanced Calculus II	4
PHIL 1104	Ethics	3
PHYS 1501Q	Physics for Engineers I	4
PHYS 1502Q	Physics for Engineers II	4

Computer Science and Engineering Requirements

Computer Science and Engineering majors are required to complete the following:

Course	Title	Credits
CSE 1102	Object Oriented Design and Programming	3
CSE 2100	Data Structures and Introduction to Algorithms	3
CSE 2102	Introduction to Software Engineering	3
CSE 2300W	Digital Logic Design	4
CSE 2500	Introduction to Discrete Systems	3
CSE 3000 or CSE 3002	Contemporary Issues in Computer Science and Engineering or Ethics and Professionalism in Computer Science and Engineering	1 3
CSE 3500	Algorithms and Complexity	3
CSE 3502	Theory of Computation	3
CSE 3504	Probabilistic Performance Analysis of Computer Systems	3
CSE 3666	Introduction to Computer Architecture	3
CSE 4100	Programming Language Translation	3.
CSE 4300	Operating Systems	3
CSE 4302	Computer Organization and Architecture	3.
CSE 4939W	Computer Science and Engineering Design Project I	3
CSE 4940	Computer Science and Engineering Design Project II	3
MATH 2110Q or MATH 2130Q	Multivariable Calculus or Honors Multivariable Calculus	4
MATH 2410Q or MATH 2420Q	Elementary Differential Equations or Honors Differential Equations	3.
MATH 2210Q	Applied Linear Algebra	3
ECE 2001W	Electrical Circuits	3

In addition a course in probability/statistics, three Professional Requirements courses, and sufficient additional elective course work to bring the total number of credits for the degree to a minimum of 126 credits.

It is recommended that students think about their choices as a whole, and consider using them deliberately to either gain breadth in their educational program or to focus on an area of particular interest. Students should consult their faculty advisor to plan a course of study which will best meet their individual educational goals.

Probability/Statistics Course

Every Computer Science and Engineering major must take one of the following courses. This course work may also be applied towards a minor.

Course	Title	Credits
MATH 3160	Probability	3 cr.
STAT 3025Q	Statistical Methods (Calculus Level)	3 cr.
STAT 3345Q	Probability Models for Engineers	3 cr.
STAT 3375Q	Introduction to Mathematical Statistics	3 cr.

Professional Requirements

Every Computer Science and Engineering major must take at least 9 credits from the following courses. At least one of the Professional Requirement courses must be from one of the School of Engineering departments. This course work may also be applied towards a minor.

Course	**Title**	**Credits**
CSE 3xxx/4xxx	Any CSE 3000 or 4000 level course not used to satisfy another degree requirement	1-4
CSE 5xxx/6xxx	Any CSE graduate course, 3 credits or more	3
ECE 3111	Systems Analysis	3
ECE 3221	Digital Integrated Circuits	3
ECE 3431	Numerical Methods in Scientific Computation	3
ECE 4111	Communications Systems	3
ECE 4112	Digital Communications and Networks	3
ECE 4121	Digital Control Theory	3
ECE 4131	Introduction to Digital Signal Processing	3
ECE 4211	Micro/Opto-electronic Devices	3
MATH 3260	Introduction to Mathematical Logic	3
MATH 3410	Differential Equations for Applications	3
STAT 3965	Elementary Stochastic Processes	3

Free Electives

The student must complete 126 credits subject to the credit restrictions below, which will allow the student to take a number of free electives. Elective course work may also be applied toward a minor.

Credit Restrictions

The following courses may not be counted for credit toward graduation in the School of Engineering: MATH courses numbered 1120Q and below; MATH 1110; PHYS 1010 and 1030Q; CSE 1000. MATH 1125, only 1 credit can be used toward the required credits for the degree. No course taken on a Pass/Fail basis may be counted for credit toward graduation or may be used to meet any course requirements of the School of Engineering. Only eight credits for courses numbered CHEM 1124Q, 1125Q, 1126Q, 1127Q, 1128Q, 1147Q, and 1148Q and only eight credits for courses numbered PHYS 1201Q through 1602Q may be applied toward the degree.

COMPUTER SCIENCE & ENGINEERING CURRICULUM

Catalog Year 2015-2016

FRESHMAN YEAR

First Semester	Credits	Second Semester	Credits
CHEM 1127Q/1147Q- Chemistry I	4	PHYS 1501Q-Physics for Engineers I	4
MATH 1131Q- Calculus I	4	MATH 11132Q-Calculus II	4
ENGL 1010 or ENGL 1011-Acad. Writing	4	CSE 1102-Object Oriented Design	3
CSE 1010 or CSE 1729-Computing for Engineers	3	Area 2 (Social Science)	3
ENGR 1000-Orientation to Engineering	1	Area 1 (Arts and Humanities)	3
	16		17

SOPHOMORE YEAR

First Semester	Credits	Second Semester	Credits
PHYS 1502Q- Physics for Engineers II	4	MATH 2410Q-Differential Equations	3
MATH 2110Q-Multivariable Calculus	4	CSE 2500 -Intro to Discrete Systems	3
CSE 2100 – Data Structures & Intro to Algorithms	3	ECE 2001W – Electric Circuits	4
CSE 2300W – Logic Design	4	PHIL 1104 (Area 1) - Phil. and Social Ethics	3
		Area 2 (Social Science)	3
	15		16

JUNIOR YEAR

First Semester	Credits	Second Semester	Credits
CSE 2102-Intro. to Software Engr.	3	CSE 4302 - Advanced Computer Architecture	3
CSE 3666- Intro. to Comp. Arch.	3	CSE 3504- Prob. Perf. Analysis. of Computer Systems.	3
CSE 3500- Algorithms and Complexity	3	CSE 3000-Contemporary Issues in CSE or CSE 3002-Social, Ethical and Prof. Issues in CSE	1 or 3
Prob. and Stat.Course[1]	3	Prof Req. (PR)	3
Area 4 (Diversity and Multiculturalism)	3	MATH 2210Q-Linear Algebra	3
		Elective	3
	15		16 or 18

[1] This should be one of the following: MATH 3160Q- Probability, STAT 3025Q Statistical Methods I, STAT 3345Q- Probability Models for Engineers or STAT 3375Q Introduction to Mathematical Statistics.

SENIOR YEAR

First Semester	Credits	Second Semester	Credits
CSE 4939W-CS & E Design Project I	3	CSE 4940-CS & E Design Project II	3
CSE 3502-Theory of Computation	3	CSE 4100-Prog. Language Translation or CSE 4102-Programming Languages	3
CSE 4300-Operating Systems	3	Prof. Req. (PR)	3
Prof. Req. (PR)	3	Area 4 (Diversity and Multiculturalism	3
Elective	3	Elective[2]	2 or 4
	15		14 or 16

Plan of Study

Timing

Prior to registration in the first semester of the Junior year[3], or for transfer students in their second semester at the University of Connecticut, whichever is later, each student must complete a Plan of Study documenting the program the student intends to follow to satisfy degree requirements for Computer Science. A final revised Plan of Study form must be completed before the end of the fourth week of a student's last semester.

Preparation

Plans of Study are prepared within the Student Admin (Peoplesoft) System at https://student.studentadmin.uconn.edu/. Using information from the catalog and this document, students will plan out the courses that they plan on taking by semester in their academic planner. When this is complete, they can submit it for approval by hitting the appropriate button. The student will be notified when the plan is approved or disapproved.

Exemptions and Substitutions

Students who desire to be excused from any of the requirements or to substitute other courses for those prescribed must do so by submitting a petition to the Assistant Dean for Undergraduate Affairs. For example, a student who had calculus in high school and started in MATH 1132Q might request exemption from MATH 1131Q, or approval of the substitution of PHYS 1201Q, 1202Q, 1230 for PHYS 1501Q, 1502Q. Exemption from course requirements or substitution of alternative courses must be clearly indicated on the Plan of Study form and explained in the “Comments” section or an attachment. Note: Exemptions mean that the requirement is satisfied but no credits are given in the process of satisfying the requirement. This process should be initiated between the student and his or her advisor, and should be completed before the final plan of study is submitted.

Double Major

Students may pursue a double major in Computer Science and another major in a different department in the School of Engineering undergraduate curriculum. They should submit the request form available in the UG programs office, E-II 304; requests are generally

[2] The minimum number of credits for this degree is 126. Your choice between CSE 3000 or 3002 will determine the amount of elective credit needed.

[3] In practice, this is the first semester after the student has completed 54 credits.

considered in January and June.

Additional Degree

Students may earn two separate bachelor degrees from two different schools or colleges of the University. Students must meet the requirements of both schools or colleges, and a Plan of Study form must be submitted to each department for each degree. An example of this would be the Eurotech program (with the College of Liberal Arts and Sciences): a student pursuing this program would submit a form for both the Computer Science & Engineering and the Modern & Classical Languages departments.

The student must complete an Additional Degree Petition, which requires the consent signature of the dean of each school or college in which the student will be enrolled. Students may get Additional Degree Petitions from the Registrar forms page, http://registrar.uconn.edu/forms/ A student pursuing two or more degrees concurrently must designate one degree the primary degree.

The student must meet all requirements for each degree. The two degrees require at least 30 degree credits more than the degree with the higher minimum-credit requirement. For example, the Computer Science degree requires at least 126 credits, while Arts and Sciences degrees require at least 120 credits, so the total required for CSE and an Arts and Science degree would be 126+30, or 156.. (If the student pursues a third degree, the two additional degrees require at least 60 degree credits more than the degree with the highest minimum-credit requirement.) **At least 30 of the additional credits must be 2000-level courses, or above, in the additional degree major or closely related fields and must be completed with a grade point average of at least 2.0.**