The University of Connecticut

School of Engineering

COMPUTER SCIENCE AND ENGINEERING

GUIDE TO COURSE SELECTION

AY 2013-2014

Revised May 23, 2013

for

Computer Science and Engineering (CSE) Majors

in the School of Engineering

Table of Contents

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	Introduction to Computing for Engineers	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 3101	Signals and Systems	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 three of 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
BME 2101	Introduction to Biomedical Engineering	3
CE 3110	Mechanics of Materials	3
CSE 3002	Ethics and Professionalism in Computer Science and Engineering	3
CSE 3300	Computer Networks and Data Communication	3
CSE 3800	Bioinformatics	3
CSE 3802	Numerical Methods in Scientific Computation	3
CSE 4095	Special topics in CSE (with permission)	3
CSE 4102	Programming Languages	3
CSE 4500	Parallel Systems	3
CSE 4701	Principles of Data Bases	3
CSE 4703	Computer Graphics	3
CSE 4705	Artificial Intelligence	3
CSE 4707	Data Security	3
CSE 4709	Networked Embedded Systems	3
CSE 5xxx/6xxx	Any CSE graduate course, 3 credits or more	3
ECE 3111	Systems Analysis	3
ECE 3221	Digital Integrated Circuits	3
ECE 3311	Electrical Instrumentation	3
ECE 3431	Numerical Methods in Scientific Computation	3
ECE 3608	Electronic Devices and Circuits	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 2360Q	Geometry	3
MATH 3146	Introduction to Complex Variables	3
MATH 3150	Analysis I	3
MATH 3260	Introduction to Mathematical Logic	3
MATH 3410	Differential Equations for Applications	3
ME 3225	Computer-Aided Design, Modeling, and Graphics	3
STAT 3075Q	Statistical Methods II	3
STAT 3965	Elementary Stochastic Processes	3

Free Electives

Nine credits of any University courses, not on the credit restriction list, must be completed. If the General Education requirements are met by seven courses, an additional 3 credits of an elective course (12 credits total) are required. Elective course work may also be applied toward a minor.

Credit Restrictions

Many general University restrictions are shown in the University Catalog. Courses which may not be counted for credit toward graduation include:

- MATH courses numbered 1120Q and below
- PHYS 1010Q and PHYS 1030Q
- CSE 1000
- STAT 1000
- Any course outside of the School of Engineering which is labeled "independent study" or "variable topics"
- Any courses taken on Pass/Fail basis (also may not be counted for any course requirement of the School of Engineering.)
- Any course prerequisite to a second in the same department, if the student has passed the second course.
- Only eight credits of chemistry courses numbered CHEM 1124Q, 1125Q, 1126Q, 1127Q, 1128Q, 1147Q, or 1148Q and only eight credits of physics courses numbered PHYS 1201Q through PHYS1602Q may be applied toward the degree.

COMPUTER SCIENCE & ENGINEERING CURRICULUM
Catalog Year 2013-2014

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[1]-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

[1] This course has been approved but is not yet in the catalog.

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. Analy. of Computer Sys.	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[2]	3	ECE 3101- Signals and Systems	3
Area 4 (Diversity and Multiculturalism)	3	MATH 2210Q-Linear Algebra	3
		Elective	3
	15		16 or 18

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	3
CSE 4300-Operating Systems	3	Prof. Req. (PR)	3
Prof. Req. (PR)	3	Area 4 (Diversity and Multiculturalism	3
Prof Req. (PR)	3	Elective[3]	2 or 4
	15		14 or 16

Plan of Study

NOTE: Preparation and submission of Plans of Study are being moved to the Peoplesoft system, so electronic forms and signatures will replace the hard-copy forms described below. At time of writing this document, not all of the infrastructure was in place, but it is expected to be fully operational by Fall 2013. When that is completed the preparation and approvals will be electronic.

Timing

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

Preparation

Forms are available at the School of Engineering Undergraduate website (www.engr.uconn.edu/soe_ugrad.htm). To successfully prepare a plan of study, students must:

- carefully read both the *University of Connecticut Catalog* and the *Course Selection Guide*
- work with the faculty advisor to determine a Plan of Study that meets all degree requirements and student needs.

[2] 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.

[3] 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.

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.

Approval Process

After an initial consultation with the faculty advisor, the student should prepare two original copies of the Plan of Study form, in ink. The student's transcript should be reviewed to insure that completed courses are appropriately listed. After the student and advisor agree on the plan, each will sign the two original copies and submit them to the Coordinator of Undergraduate Studies in Computer Science and Engineering for review and approval. The student should check back with the advisor to see if any corrections must be made after review by the Coordinator. Upon completion of this stage of approval, the Plan of Study forms are forwarded to the Office of the Assistant Dean for Undergraduate Affairs in Engineering. If the Assistant Dean's approval is not given, the Plan will be returned to the department and then to the advisor for resolution. If approval is given, the Office of the Assistant Dean will return two approved tentative Plan of Study forms to the advisor. One original will be kept in the student's folder, and a photocopy will be returned to the student.

Changes

Each subsequent registration period, students must bring their approved Plan of Study to their advisor when they select courses for the next semester. An approved Plan of Study form can be modified and submitted at any time, in consultation with the student's advisor. Problems can be best avoided if changes are reviewed early. No modifications that jeopardize the meeting of requirements will be approved. A revised Plan of Study form may be created either by forming two new originals or by marking the changes on the formerly approved original, with each change initialed and dated by the advisor. If extensive changes are to be made, or if a second revision is necessary, a new Plan of Study form should be submitted following the same process. In the student's last semester, the student must file a "final" Plan of Study form. This form must accurately list all of the courses that were taken to satisfy degree requirements.

Filling out the Plan of Study Form

The Plan of Study form should be filled out neatly and in ink. All approval signatures and initials should be in ink and dated. Some guidelines follow to assist you in completing the form.

Expected date of graduation and catalog year

It is important that the intended date of graduation (month and year) be accurately listed, and that the form correctly reflect the catalog year in which the student is filing. The Registrar needs both items to certify the completed degree requirements by the student's graduation date. If the student is using a catalog year other than the one in which they were most recently admitted to the School of Engineering, a form to change the catalog year must also be completed. The change of catalog year form can be found at (http://www.registrar.uconn.edu/change.doc).

Courses taken

The Plan of Study form must show exactly the courses used to satisfy degree requirements.

General Education Requirements

For the second language competency line, the words "High School" should be circled if the student has met this requirement in high school. If not, the appropriate courses should be listed with the credits earned.

Required courses

Required courses are printed on the form. If there are alternatives listed, the course that the student intends to take should be circled (e.g., where it says MSE 201/2101 or 243/2001, one course should be circled).

Transfer Courses

Transfer courses should be listed on the Plan of Study form, and indicated with a superscript "T". Courses which are the result of Advanced Placement work done in High School, whether through AP Tests results or formal arrangement with UConn (UConn Early College Experience Program formerly UConn High School Coop Program) do not need to be marked with a T and are counted as UConn coursework. Columns for sub-totaling "UConn Credits" and "Transfer Credits" are listed to the right of the form. Students with transfer credits should separate all credits earned at the University of Connecticut from those completed elsewhere, fill in the columns, and sum them across each row.

Credit Summary

The Transfer Credit line in the bottom section of the form should be the sum of all transfer credits that are applied toward graduation. The UConn Credits line should show the total of all credits taken at the University of Connecticut that are applied toward graduation. Do not include credits for classes which cannot be counted toward graduation credit in either total. See Credit Restrictions above. The sum of the two totals should be listed on the Total Credits line. The total credits must equal or exceed 126.

Professional Requirements

Write in the 2000-or-higher-level courses you will use to fulfill the Computer Science and Engineering Professional Requirements.

Double Major

Students may pursue a double major in Computer Science Engineering and another major in a different department in the School of Engineering undergraduate curriculum. A separate Plan of Study form must be prepared and submitted for approval to each department. The double major must be indicated at the bottom of the Plan of Study form; i.e. "Double major: Department."

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 offices of deans or from the Registrar. 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, Computer Science and Engineering degrees require at least 126 credits while Arts and Sciences degrees require at least 120 credits. The Computer Science and Engineering degree has the higher minimum-credit requirement, so the total is 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.**