Computer Science/Software Engineering
Everald E. Mills, PhD, Chair

Objectives
The computer science program seeks to prepare students for careers that require sophisticated programming and computer applications in industrial, scientific, technical or educational settings, and to incorporate into the program the principles and techniques of software engineering. The program provides solid foundations for understanding the changing roles of computers in society and encourages students to apply their knowledge to solving a variety of problems through laboratory and project activities.

Recognizing that different people study computer science for different reasons, the department offers both bachelor of science and bachelor of arts degrees. The bachelor of science in computer science (BSCS) degree program provides a rigorous professional, technical educational background, appropriate for a career in software development or for entry into graduate study in computer science. A general option is available, as well as two specializations, the bachelor of science in computer science with a specialization in mathematics, and the bachelor of science in computer science with specialization in business. These specialized options within the BSCS degree program enable students to develop greater interdisciplinary expertise which will better equip them for jobs demanding these skills in the workplace.

The bachelor of arts (BA) degree program offers a sound foundation in computer science courses, while allowing greater flexibility in determining an area of application of the acquired computing skills. It is an excellent preparation for students interested in professional careers involving computer applications in less technical areas such as business or education.

Both the BSCS and BA degree programs require that all students complete a capstone experience, the year-long senior software engineering project which requires students to work in small groups to complete a substantial software system project, working with a faculty adviser and a sponsoring organization from business or industry.

In addition to the bachelor’s degree programs, the department offers a computer science minor, as well as computer literacy courses.

Degrees Offered
- Bachelor of Arts
- Bachelor of Science in Computer Science
- Master of Software Engineering - See the Graduate Bulletin of Information

Majors Offered
- Computer Science
- Computer Science with Specialization in Mathematics
- Computer Science with Specialization in Business

Minor Offered
- Computer Science
Departmental Requirements

In addition to the stated course prerequisites, departmental candidacy is required for entry into all 300- and 400-level courses. Candidacy is achieved by completing all required 100- and 200-level computer science requirements, other program requirements (math and science), and ENGL 110 with a combined grade point average of at least 2.5. Only courses graded C (2.0) or higher may be transferred to satisfy degree requirements. Both the cumulative grade point average and grade point average for major/department courses completed at Seattle University must be at least 2.5 for graduation.

Bachelor of Arts
Major in Computer Science

The bachelor of arts degree with a major in computer science requires students to complete a minimum of 180 quarter credits with both a cumulative grade point average and a major/department grade point average of 2.5 or better (II and III below). Students must also achieve a minimum grade of 2.0 in all courses in the major requirements list (see II below).

I. Core Curriculum Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 110</td>
<td>Freshman English</td>
<td>5</td>
</tr>
<tr>
<td>PHIL 110</td>
<td>Introduction to Philosophy and Critical Thinking</td>
<td>5</td>
</tr>
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</table>

Choose one of the following two courses: ............................................................................. 5

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST 120</td>
<td>Origins of Western Civilization</td>
<td>5</td>
</tr>
<tr>
<td>HIST 121</td>
<td>Studies in Modern Civilization</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
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<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 120</td>
<td>Masterpieces of Literature</td>
<td>5</td>
</tr>
<tr>
<td>Lab Science</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>FINR 120</td>
<td>or approved fine arts alternate</td>
<td>5</td>
</tr>
<tr>
<td>PHIL 220</td>
<td>Philosophy of the Human Person</td>
<td>5</td>
</tr>
<tr>
<td>Social Science I</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Social Science II (different discipline from Social Science I)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Theology and Religious Studies Phase II(200-299)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Ethics (upper division)</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Theology and Religious Studies Phase III (300-399)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Interdisciplinary</td>
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<td>3</td>
</tr>
<tr>
<td>Senior Synthesis filled by CSSE 487, 488, and 489.</td>
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</tbody>
</table>

See detailed core curriculum information in this bulletin.

II. Major Requirements

Fifty-four credits in computer science, including:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSSE 151</td>
<td>Fundamentals of Computer Science I</td>
<td>5</td>
</tr>
<tr>
<td>CSSE 152</td>
<td>Fundamentals of Computer Science II</td>
<td>5</td>
</tr>
<tr>
<td>CSSE 250</td>
<td>Data Structures</td>
<td>5</td>
</tr>
<tr>
<td>CSSE 251</td>
<td>Introduction to Computer Organization</td>
<td>5</td>
</tr>
<tr>
<td>CSSE 308</td>
<td>Technical Communication</td>
<td>3</td>
</tr>
<tr>
<td>CSSE 310</td>
<td>Design and Analysis of Algorithms</td>
<td>5</td>
</tr>
<tr>
<td>CSSE 380</td>
<td>Organization of Programming Languages</td>
<td>5</td>
</tr>
<tr>
<td>CSSE 487</td>
<td>Software Engineering &amp; Project Development I</td>
<td>5</td>
</tr>
<tr>
<td>CSSE 488</td>
<td>Software Engineering &amp; Project Development II</td>
<td>3</td>
</tr>
<tr>
<td>CSSE 489</td>
<td>Software Engineering &amp; Project Development III</td>
<td>3</td>
</tr>
<tr>
<td>CSSE Electives</td>
<td>(CSSE 320, 400-level)</td>
<td>10</td>
</tr>
</tbody>
</table>
III. Other Major Department Requirements

MATH 134 Calculus and Analytic Geometry I ............................................................ 5
MATH 135 Calculus and Analytic Geometry II .......................................................... 5

Choose one of the following two courses: ................................................................. 5
  MATH 222 Discrete Structures
  MATH 310 Introduction to Advanced Mathematics

Choose one of the following two courses: ................................................................. 5
  MATH 244 Fundamentals of Probability and Statistics.
  MATH 351 Probability

*Area of Application ........................................................................................................ 30
*Bachelor of arts degree students must complete a coordinated group of application area courses. These courses must include at least 30 credits of courses in an area of proposed application of computer science. These 30 credits may be those prescribed for a minor in another department, but may not include any credits already required by the Computer Science Department for the bachelor of arts degree. In areas of application where a minor is not prescribed, the Computer Science Department will define the acceptable application area courses, with the assistance of the appropriate departments.

Please Note: 1. A minimum grade of C (2.0) is required in all courses which are direct prerequisites to required CSSE courses. 2. Transfer credits require departmental approval.

Bachelor of Science in Computer Science
Major in Computer Science - General Option

The bachelor of science in computer science degree (BSCS) requires students to complete at least 180 quarter credits with both a cumulative grade point average and a major/department grade point average of 2.5 or better (see II and III below). Students must also achieve a minimum grade of 2.0 in all courses in the major requirements list (see II below).

I. Core Curriculum Requirements

ENGL 110 Freshman English ...................................................................................... 5
PHIL 110 Introduction to Philosophy and Critical Thinking ................................ 5

Choose one of the following two courses: ................................................................. 5
  HIST 120 Origins of Western Civilization.
  HIST 121 Studies in Modern Civilization

ENGL 120 Masterpieces of Literature ...................................................................... 5
FINR 120 or approved fine arts alternate ................................................................. 5
PHIL 220 Philosophy of the Human Person ......................................................... 5
Social Science I ........................................................................................................... 5
Social Science II (different discipline from Social Science I) ....................................... 5
Theology and Religious Studies Phase II (200-299) ............................................... 5
Ethics (upper division) ............................................................................................. 5
Theology and Religious Studies Phase III (300-399) ............................................. 5
Interdisciplinary ......................................................................................................... 3

Senior Synthesis filled by CSSE 487, 488, 489

See detailed core curriculum information in this bulletin.
II. Major Requirements
Seventy-four credits in computer science, including:

- CSSE 151 Fundamentals of Computer Science I ..................................................... 5
- CSSE 152 Fundamentals of Computer Science II .................................................... 5
- CSSE 250 Data Structures ...................................................................................... 5
- CSSE 251 Introduction to Computer Organization ................................................. 5
- CSSE 252 Computer Systems and Assembler Language ........................................ 5
- CSSE 308 Technical Communication ....................................................................... 3
- CSSE 310 Design and Analysis of Algorithms ...................................................... 5
- CSSE 320 Object-oriented Development ............................................................... 5
- CSSE 380 Organization of Programming Languages ......... 5
- CSSE 440 Operating Systems .................................................................................. 5
- CSSE 487 Software Engineering & Project Development I .................................... 5
- CSSE 488 Software Engineering & Project Development II ................................... 3
- CSSE 489 Software Engineering & Project Development III .................................. 3
- CSSE Electives (400-level) ........................................................................... 15

III. Other Major Department Requirements
Forty-eight credits in mathematics, physics, and science including:

- MATH 134 Calculus and Analytic Geometry I ............................................................ 5
- MATH 135 Calculus and Analytic Geometry II ......................................................... 5
- MATH 136 Calculus and Analytic Geometry III ....................................................... 5
- MATH 233 Linear Algebra ...................................................................................... 3
- PHYS 200 Mechanics ........................................................................................... 5
- PHYS 201 Electricity and Magnetism ....................................................................... 5
- PHYS 202 Waves, Optics and Thermodynamics .................................................... 5
- Science ................................................................................................................... 5

Choose one of the following two courses: ............................................................... 5

- MATH 222 Discrete Structures
- MATH 310 Introduction to Advanced Mathematics

Choose one of the following two courses: ............................................................... 5

- MATH 244 Fundamentals of Probability and Statistics
- MATH 351 Probability

Please Note: 1. A minimum grade of C (2.0) is required in all courses which are direct prerequisites to required CSSE courses. 2. Transfer credits require departmental approval. 3. The MATH 134, 135, 136 sequence can be fulfilled by any three quarter or two semester calculus sequence from which Seattle University accepts the first course or courses as substitutes for MATH 134 and 135. 4. The science course may be any physics, chemistry, or biology course which is acceptable toward the physics, chemistry, or biology majors.
Bachelor of Science in Computer Science
Major in Computer Science with a Specialization in Business

The specialization in business will prepare students for information management or information technology positions, which are increasingly critical in most companies. In addition to computer science requirements (54 credits), the student will take at least 45 credits of business foundation courses through the Albers School of Business and Economics.

This bachelor of science in computer science degree requires students to complete at least 180 quarter credits with both a cumulative grade point average and a major/specialization/department grade point average of 2.5 or better (see II, III, and IV below). Students must also achieve a minimum grade of C(2.0) in all courses in the major and specialization requirements list (see II and III below).

I. Core Curriculum Requirements

ENGL 110 Freshman English ................................................................. 5
PHIL 110 Introduction to Philosophy and Critical Thinking ................... 5

Choose one of the following two courses: ............................................. 5
HIST 120 Origins of Western Civilization
HIST 121 Studies in Modern Civilization

ENGL 120 Masterpieces of Literature ...................................................... 5
Lab Science ................................................................................................ 5
FINR 120 or approved fine arts alternate ................................................. 5
PHIL 220 Philosophy of the Human Person ........................................... 5
Social Science I (not economics) ........................................................... 5
Social Science II filled by ECON 271
Theology and Religious Studies Phase II(200-299) ............................... 5
Ethics (upper division) ........................................................................... 5
Theology and Religious Studies Phase III (300-399) ............................. 5
Interdisciplinary ....................................................................................... 3

Senior Synthesis filled by CSSE 487, 488, 489
See detailed core curriculum information in this bulletin.

II. Major Requirements

Fifty-four credits in computer science, including:

CSSE 151 Fundamentals of Computer Science I ....................................... 5
CSSE 152 Fundamentals of Computer Science II .................................... 5
CSSE 250 Data Structures ...................................................................... 5
CSSE 251 Introduction to Computer Organization ................................... 5
CSSE 308 Technical Communication .................................................... 3
CSSE 310 Design and Analysis of Algorithms ....................................... 5
CSSE 380 Organization of Programming Languages ................................ 5
CSSE 487 Software Engineering & Project Development I ....................... 5
CSSE 488 Software Engineering & Project Development II ..................... 3
CSSE 489 Software Engineering & Project Development III .................... 3
CSSE Elective (CSSE 320, 400-level) ...................................................... 10
III. Business Specialization Requirements

Forty-five credits in business courses, including:

(No course substitution/waiver is allowed within these requirements.)

ACCT 230 Principles of Accounting I (Financial) ................................................... 5
ACCT 231 Principles of Accounting II (Managerial) .............................................. 5
ECON 271 Principles of Economics_Macro ............................................................. 5
ECON 272 Principles of Economics_Micro ............................................................ 5

Choose five of the following courses: ................................................................................... 25

- ECON 310 Quantitative Methods and Applications
- ECON 330 International Economic Events & Business Decisions
  or
- MGMT 320 Global Environment of Business
- BUEN 370 Business and International Law
- FINC 340 Business Finance
- MGMT 380 Principles of Management
- MKTG 350 Introduction to Marketing
- OPER 360 Manufacturing and Service Operations
  elective from ASBE (one 400-level course)

IV. Other Major Department Requirements

MATH 134 Calculus and Analytic Geometry I ............................................................ 5
MATH 135 Calculus and Analytic Geometry II .......................................................... 5

Choose one of the following two courses: ................................................................. 5

- MATH 222 Discrete Structures
- MATH 310 Introduction to Advanced Mathematics

Choose one of the following three courses: ............................................................. 5

- MATH 244 Fundamentals of Probability and Statistics.
- MATH 351 Probability
- ECON 260 Business Statistics

Please Note: 1. A minimum C(2.0) grade is required in prerequisites to all CSSE required courses. 2. Transfer credits require departmental approval. 3. CSSE business specialization students must meet all prerequisites for courses taken and must be at least at junior standing when enrolled in 300/400 level courses from Albers School of Business and Economics. One 300/400 level business course may be taken beyond the business core. These students must take the above specified business specialization requirements; no course may be waived by petition.

Bachelor of Science in Computer Science
Major in Computer Science with a Specialization in Mathematics

This specialization requires students to take 64 credits in computer science and 50 credits in mathematics. The combination of mature skills in applied mathematics and strong computer applications skills is a rare and valuable combination.
This bachelor of science in computer science degree requires students to complete at least 180 quarter credits with both a cumulative grade point average and a major/specialization grade point average of 2.5 or better (see II and III below). Students must also achieve a minimum grade of C(2.0) in all courses in the major and specialization requirements (see II and III below).

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<td></td>
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<td>ENGL 120</td>
<td>Masterpieces of Literature</td>
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<td>FINR 120</td>
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<td>PHIL 220</td>
<td>Philosophy of the Human Person</td>
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<tr>
<td>Lab Science</td>
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<td>5</td>
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<td>Social Science II</td>
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<td>5</td>
</tr>
<tr>
<td>Theology and Religious Studies Phase II (200-299)</td>
<td>5</td>
<td></td>
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<td>Ethics (upper division)</td>
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<tr>
<td>Theology and Religious Studies Phase III (300-399)</td>
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II. Major Requirements

Sixty-four credits in computer science courses, including:

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<tbody>
<tr>
<td>CSSE 151</td>
<td>Fundamentals of Computer Science I</td>
<td>5</td>
</tr>
<tr>
<td>CSSE 152</td>
<td>Fundamentals of Computer Science II</td>
<td>5</td>
</tr>
<tr>
<td>CSSE 250</td>
<td>Data Structures</td>
<td>5</td>
</tr>
<tr>
<td>CSSE 251</td>
<td>Introduction to Computer Organization</td>
<td>5</td>
</tr>
<tr>
<td>CSSE 308</td>
<td>Technical Communication</td>
<td>3</td>
</tr>
<tr>
<td>CSSE 310</td>
<td>Design and Analysis of Algorithms</td>
<td>5</td>
</tr>
<tr>
<td>CSSE 320</td>
<td>Object-oriented Development</td>
<td>5</td>
</tr>
<tr>
<td>CSSE 380</td>
<td>Organization of Programming Languages</td>
<td>5</td>
</tr>
<tr>
<td>CSSE 487</td>
<td>Software Engineering &amp; Project Development I</td>
<td>5</td>
</tr>
<tr>
<td>CSSE 488</td>
<td>Software Engineering &amp; Project Development II</td>
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</tr>
<tr>
<td>CSSE 489</td>
<td>Software Engineering &amp; Project Development III</td>
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<tr>
<td>CSSE Electives</td>
<td>(400 level)</td>
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III. Mathematics Specialization Requirements

Fifty credits in mathematics courses, including:

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>MATH 134</td>
<td>Calculus and Analytic Geometry I</td>
<td>5</td>
</tr>
<tr>
<td>MATH 135</td>
<td>Calculus and Analytic Geometry II</td>
<td>5</td>
</tr>
<tr>
<td>MATH 136</td>
<td>Calculus and Analytic Geometry III</td>
<td>5</td>
</tr>
<tr>
<td>MATH 232</td>
<td>Multivariable Calculus</td>
<td>3</td>
</tr>
<tr>
<td>MATH 233</td>
<td>Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 234</td>
<td>Differential Equations</td>
<td>4</td>
</tr>
</tbody>
</table>
Choose one of the following two courses: ................................................................. 5
  MATH 222  Discrete Structures
  MATH 310  Introduction to Advanced Mathematics

Choose one of the following two courses: ................................................................. 5
  MATH 244  Fundamentals of Probability and Statistics.
  MATH 351  Probability

Choose three of the following four courses: ......................................................... 15
  MATH 361  Applied Mathematics I
  MATH 331  Introduction to Complex Variables
  MATH 371  Introduction to Numerical Methods
  MATH 461  Applied Mathematics II

Please Note: 1. A minimum C (2.0) grade is required in prerequisites to all CSSE required courses. 2. Transfer credits require departmental approval.

**Minor in Computer Science**

In order to earn a minor in computer science, students must complete 30 quarter credits in computer science, selected from:

  CSSE 151  Fundamentals of Computer Science I ..................................................... 5
  CSSE 152  Fundamentals of Computer Science II .................................................. 5
  CSSE 250  Data Structures ..................................................................................... 5
  CSSE 251  Introduction to Computer Organization ............................................... 5
  CSSE 310  Design and Analysis of Algorithms ..................................................... 5
  CSSE 320  Object-oriented Development ............................................................... 5
  CSSE 380  Organization of Programming Languages ........................................... 5

See policy for minors on p. 46.

**Advanced Placement Credit**

Students who have taken the College Board advance placement test in computer science may petition the department for advanced placement credit on the basis of test results scored three or higher.

**Teacher Education**

The teacher preparation program is a graduate-level program only. Students interested in teaching should contact the Master in Teaching program at (206) 296-5759 to be assigned an adviser to ensure that they meet state requirements for an academic program as well as the specific requirements for MIT admission.

**Computer Science Courses**

**CSSE 103  Introduction to Computers and Applications**  5

An introduction to computer applications and concepts. Applications include word processing, spreadsheets, databases, electronic mail, and other Internet tools. Also covers historical development of computers. A brief introduction to hardware and software, and other concepts of modern computing. Computer-related social and ethical issues. No prior experience with computers required. Credit not granted for both CSSE 103 and CSSE 104. Prerequisites: none. (fall, winter, spring)
CSSE 151  **Fundamentals of Computer Science I**  5
Introduction to the fundamentals of computer science, including programming in a modern high-level language with emphasis on programming design and style. Algorithm development, stepwise refinement, control structures, functions, elementary search algorithms, primitive and aggregate data types. Prerequisite: C (2.0) or better in MATH 134 *Calculus and Analytic Geometry I* (fall, winter)

CSSE 152  **Fundamentals of Computer Science II**  5
Continuation of the introduction to the fundamentals of computer science, including string processing, recursion, internal searching and sorting, abstract data types (ADTs), such as stacks, queues, linked lists and binary trees. Prerequisite: C (2.0) or better in CSSE 151 *Fundamentals of Computer Science I* (winter, spring)

CSSE 191  **Special Topics**  1 to 5
CSSE 192  **Special Topics**  1 to 5
CSSE 193  **Special Topics**  1 to 5

CSSE 230  **FORTAN for Science and Engineering**  3
Introduction to FORTAN programming for science and engineering computing. Emphasis on algorithm development and stepwise refinement for solving science and engineering problems. Introduction to numerical techniques. Laboratory programming assignments will be taken primarily from the fields of engineering and science. Credit not granted for both CSSE 230 and CSSE 231. Prerequisites: MMEGR 215 or 230; plus MATH 232 and 233

CSSE 231  **C Programming for Science and Engineering**  3
Introduction to C programming, in a UNIX environment, for science and engineering computing. Emphasis on algorithm development, stepwise refinement for solving science and engineering problems. Programming assignments will be drawn from the fields of engineering and science. Credit not granted for both CSSE 230 and CSSE 231. Prerequisites: MMEGR 215 or 230; plus MATH 232 and 233

CSSE 250  **Data Structures**  5
Abstract data types. Big-Oh notation. Binary search trees, tree balancing techniques, and hash tables. Additional topics may include heaps, priority queues, hash functions, external searching and sorting, and graph algorithms. Prerequisite: C (2.0) or better in CSSE 152 *Fundamentals of Computer Science II* (fall, spring)

CSSE 251  **Introduction to Computer Organization**  5
Basic concepts of computer architecture and digital logic design. Coding of information, number representations, and computer arithmetic. Computer architecture concepts, including CPU, memory and I/O organization. Control unit implementation and microprogramming. Prerequisites: a C (2.0) grade or better in the following: CSSE 152. Pre- or corequisite MATH 222 or MATH 310. (fall, spring)

CSSE 252  **Computer Systems and Assembler Language**  5
Elementary computer structure, machine languages, assembly language programming. Programming will be done in assembly language. Addressing techniques, macros, linkers, loaders, and assemblers. Prerequisite: a C (2.0) grade or better in CSSE 251 or EEGR 201. (winter)

CSSE 291  **Special Topics**  1 to 5
CSSE 292  Special Topics  1 to 5
CSSE 293  Special Topics  1 to 5
CSSE 296  Directed Study  1 to 5

CSSE 308  Technical Communications  3
Communication skills for computer professionals. Writing, speaking, electronic communication. Structure and content of software documentation. This course should be taken concurrently with CSSE 487, the first quarter of the capstone software project course. Prerequisite: C (2.0) or better in CSSE 250 Data Structures and ENGL 110 Freshman English (fall)

CSSE 310  Design and Analysis of Algorithms  5
Advanced data structures (e.g. sets, graphs, priority queues) and their application; algorithm analysis and design techniques, such as divide and conquer, greedy methods, branch and bound, etc. Asymptotic analysis of algorithms and introduction to computability theory. Prerequisite: C (2.0) or better in CSSE 250 Data Structures and either MATH 222 Discrete Structures or MATH 310 Introduction to Advanced Mathematics (fall, winter)

CSSE 320  Object-Oriented Development  5
Fundamentals and principles of object-oriented development, including classes, containment, inheritance, overloading and polymorphism. Object-oriented analysis, design and programming. Prerequisite: C (2.0) or better in CSSE 250 Data Structures (winter, spring)

CSSE 380  Organization of Programming Languages  5
Introduction to the structure and organization of programming languages; semantics; control structures; implementation considerations; garbage collection; parameter passing techniques. Imperative, functional and object-oriented programming paradigms. Prerequisite: C (2.0) or better in CSSE 250 Data Structures (fall, spring)

CSSE 391  Special Topics  1 to 5
CSSE 392  Special Topics  1 to 5
CSSE 393  Special Topics  1 to 5
CSSE 396  Directed Study  1 to 5
CSSE 420  Introduction to Database Systems  5
Introduction to database concepts, the need for database management systems and their
use, including relational databases. Elementary concepts of DBMS architecture and design
including database security, transaction management, concurrency control and recovery
control. Prerequisite: C (2.0) or better in the following: CSSE 250  Data Structures, and
MATH 222  Discrete Structures or MATH 310  Introduction to Advanced Mathematics

CSSE 440  Operating Systems  5
Basic concepts of operating systems, including machine structures, dynamic processes,
structure, memory management, I/O control, process management, file systems,
security issues and recovery techniques. Prerequisite: C (2.0) or better in the following:
CSSE 251  Introduction to Computer Organization; and CSSE 250  Data Structures; and
either MATH 244  Probability and Statistics for the Sciences and Engineering or MATH
351  Probability. (winter)

CSSE 444  Concurrent Systems  5
Fundamentals of concurrent programming including: identification of race conditions and
standard methods of prevention; correctness of concurrent programs; mutual exclusion;
concurrent constructs such as threads, semaphores, monitors, rendezvous and remote
procedural calls; and classic concurrent problems such as the reader-writer problem, the
producer-consumer problem. Prerequisite: C (2.0) or better in CSSE 252  Computer
Systems and Assembly Language and CSSE 440  Operating Systems

CSSE 450  Automata, Computability and Formal Languages  5
Formal mathematical basis of computer science. Topics include set theory, recursive
functions, automata, regular sets, formal languages, Turing machines, concepts of comput-
ability and computational complexity. Prerequisites: a C (2.0) grade or better in CSSE 310.

CSSE 465  Computer Graphics  5
Fundamentals of computer graphics. Techniques of computer image synthesis. Line-
drawing and color raster graphics. Homogeneous coordinates, hidden line and surface,
and smooth shading algorithms. Prerequisite: C (2.0) or better in CSSE 250  Data
Structures and either MATH 222  Discrete Structures or MATH 310  Introduction to
Advanced Mathematics

CSSE 470  Artificial Intelligence  5
Principal ideas and developments in artificial intelligence, including knowledge represen-
tation, goal-directed problem solving, optimal and sub-optimal search, theorem proving,
pattern matching. Additional topics may include expert systems, neural nets, simulated
annealing, genetic algorithms. Prerequisite: C (2.0) or better in: CSSE 310  Design and
Analysis of Algorithms and CSSE 380  Organization of Programming Languages

CSSE 485  Translation of Programming Languages  5
Formal language definitions and descriptions. Syntax, semantics, parsing and translating
techniques. Prerequisite: C (2.0) or better in: CSSE 252  Computer Systems and Assembly
Language; and CSSE 380  Organization of Programming Languages.
CSSE 487 Software Engineering and Project Development I
Meets regularly in the fall quarter, to cover the principles of software engineering, and to initiate software project activities. Prerequisite for 487: C (2.0) or better in CSSE 310 Design and Analysis of Algorithms and in CSSE 380 Organization of Programming Languages; pre or co-requisite, CSSE 308 Technical Communications; and a major GPA of 2.5 or higher. It is recommended that students enroll in CSSE 308 concurrently with CSSE 487. (fall)

CSSE 488 Software Engineering and Project Development II
Meets as required to continue software project work initiated in the fall quarter. Prerequisite for 488: C (2.0) or better in: CSSE 487 Software Engineering and Project Development (winter)

CSSE 489 Software Engineering and Project Development III
Meets as required to complete software projects by end of spring quarter. Prerequisite for 489: C (2.0) or better in: CSSE 488 Software Engineering and Project Development II (spring)

Principles of software engineering and their application in the planning and execution of a three-quarter-long software development project. Students work in teams to define and carry out software projects from initial requirements statements to final implementation. Activities include project planning and management, as well as analysis, design and implementation of the software project. In CSSE 487, projects are defined and requirements specifications developed by the project teams. The required software products are then designed and implemented in CSSE 488 and 489, culminating in a formal presentation of results at the end of the spring quarter. The three courses, CSSE 487, 488, and 489, must be taken as a continuous sequence and together, they fulfill the senior synthesis core requirement.

CSSE 491 Special Topics 1 to 5
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CSSE 496 Independent Study 1 to 5
CSSE 497 Directed Reading 1 to 5
CSSE 498 Directed Research 1 to 5