Department of Computer Science and Engineering

Department Head: Dr. Shahram Rahimi
Assistant Department Head and Undergraduate Coordinator: Dr. Sarah Lee
Graduate Coordinator: Dr. T. J. Jankun-Kelly
Office: 300 Butler Hall

The Department of Computer Science and Engineering is dedicated to maintaining quality programs in undergraduate teaching, graduate teaching, and research, and to the fruitful interaction between teaching and research. In research, we wish to maintain our present emphasis on applications (often pursued with colleagues from other disciplines), and upon the synergistic relationships between theory and applications in which the most meaningful advances often result. The department has identified six core competency areas in which we shall seek national prominence: artificial intelligence, computational science, human centered computing, graphics, systems, and software engineering. These core competencies support research applications in areas such as bio-informatics, high performance computing, computer security, computer forensics, computer science education, human-robotic interaction, and visualization. The Department of Computer Science and Engineering offers degree programs leading to the Bachelor of Science degree in Computer Science, Software Engineering, and (jointly with the Department of Electrical and Computer Engineering) Computer Engineering and the Master of Science in Cybersecurity and Operations. The department also offers study leading to the Master of Science and the Doctor of Philosophy degrees in Computer Science. An accelerated BS/MS program is also available.

Computer Science Major (CS)

Computer Science is the study of the principles, applications, and technologies of computing and computers. It involves the study of data and data structures and the algorithms to process these structures; principles of computer architecture—both hardware and software; problem solving and design methodologies; and language design, structure and translation techniques. Computer Science provides a foundation of knowledge for students with career objectives in a wide range of computing and computer-related professions.

The objectives for the department with respect to the Bachelor of Science Degree in Computer Science are as follows:

1. The graduate will demonstrate an understanding of computer science principles and an ability to solve unstructured computer science problems through the successful entrance into and advancement in the computer science profession.
2. The graduate will demonstrate an appreciation for lifelong learning and for the value of continuing professional development through participation in graduate education, professional education or continuing education opportunities, attainment of professional licensure, or membership in professional societies.
3. The graduate will demonstrate an understanding of professional and ethical responsibilities to the profession, society and the environment incumbent on a computer science professional.
4. The graduate will successfully interact with others of different backgrounds, educations, and cultures.
5. The graduate will demonstrate effective communication skills in their profession.

Computer Science graduates begin careers as computer programmers, system analysts, programmer/analysts, software engineers, systems programmers, computer system engineers and in a number of other computer-related jobs. A minor in computer science is available to students with major programs of study in other fields at the University.

The Bachelor of Science degree requires the completion of a total of 128 credit hours of general studies, computer science, mathematics and science, and supporting technical courses. To graduate, a student must have a “C” average in all MSU computer science and engineering courses attempted.

The computer science program is accredited by the Computing Accreditation Commission of ABET, http://www.abet.org.

Software Engineering Major (SE)

Software Engineering is the application of engineering practices to the design and maintenance of software. The Software Engineering degree program prepares students for careers in the engineering of large complex software systems and products. These systems often involve millions of lines of code and frequently operate in safety-critical environments. The Software Engineering major contains courses related to the study of software engineering in practice necessary to manage these development processes. The faculty for the Software Engineering program is drawn from the Department of Computer Science and Engineering and the Department of Industrial Engineering.

The objectives for the department with respect to the Bachelor of Science Degree in Software Engineering are as follows:

1. The graduate will demonstrate an understanding of engineering principles and an ability to solve unstructured engineering problems through the successful entrance into and advancement in the engineering profession.
2. The graduate will demonstrate an appreciation for lifelong learning and for the value of continuing professional development through participation in graduate education, professional education or continuing education opportunities, attainment of professional licensure, or membership in professional societies.
3. The graduate will demonstrate an understanding of professional and ethical responsibilities to the profession, society and the environment incumbent on an engineering professional.
4. The graduate will successfully interact with others of different backgrounds, educations, and cultures.
5. The graduate will demonstrate effective communication skills in their profession.

A minor in software engineering is available to students with major programs of study in other fields at the University.

The Bachelor of Science degree in Software Engineering requires the completion of a total of 128 credit hours of general studies, computer science, industrial engineering, mathematics and science, supporting technical courses, and free electives. To graduate, a student must have a “C” average in all MSU computer science and engineering courses attempted.

The software engineering program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

### Computer Science Major (CS)

#### English Composition
- EN 1103 English Composition I 3
- or EN 1163 Accelerated Composition I
- EN 1113 English Composition II 3
- or EN 1173 Accelerated Composition II

#### Mathematics
- See Major Core

#### Science
- See Major Core

#### Humanities
- See General Education courses 6

#### Fine Arts
- See General Education courses 3

#### Social/Behavioral Sciences
- See General Education courses 6

#### Major Core

##### Math and Basic Science
- MA 1713 Calculus I 3
- MA 1723 Calculus II 3
- MA 3113 Introduction to Linear Algebra 3
- Math elective 3
  - MA 2733 Calculus III 3
  - or MA 3053 Foundations of Mathematics
  - or MA 4143 Graph Theory
  - or MA 4173 Number Theory
- IE 4613 Engineering Statistics I 3
- BIO 1134 Biology I 4
- CH 1213 Chemistry I 3
- CH 1211 Investigations in Chemistry I 1
- PH 2213 Physics I 3
- Science elective 3
  - PH 2223 Physics II 3
  - or CH 1223 Chemistry II
  - & CH 1221 and Investigations in Chemistry II
  - or BIO 1144 Biology II

#### Engineering and Computer Science Topics
- CSE 1002
- CSE 1284 Introduction to Computer Programming 4
- CSE 1384 Intermediate Computer Programming 4
CSE 2383  Data Structures and Analysis of Algorithms  3
CSE 2813  Discrete Structures  3
CSE 3324  Distributed Client/Server Programming  4
CSE 3813  Introduction to Formal Languages and Automata  3
CSE 4503  Database Management Systems  3
CSE 4713  
CSE 4733  Operating Systems I  3
CSE 4763  Ethical and Legal Issues in Computing  3
CSE 4833  Introduction to Analysis of Algorithms  3
ECE 3714  Digital Devices and Logic Design  4
ECE 3724  Microprocessors  4
ECE 4713  Computer Architecture  3

Computer Science Electives: select two of the following:  

CSE 4153  Data Communications and Computer Networks  
CSE 4163  Designing Parallel Algorithms  
CSE 4214  Introduction to Software Engineering  
CSE 4413  Principles of Computer Graphics  
CSE 4453  Game Design  
CSE 4633  Artificial Intelligence  
CSE 4743  Operating Systems II  

Computer Science electives (upper level) - see advisor  6
Technical Electives - see advisor  6
Free elective  8

Oral Communication Requirement  
CO 1003  Fundamentals of Public Speaking  3
or CO 1013  Introduction to Communication

Writing Requirement  
GE 3513  Technical Writing  3

Computer Literacy  
Fulfilled in Engineering & Computer Science Topics courses

Total Hours  128

Software Engineering Major (SE)

English Composition  
EN 1103  English Composition I  3
or EN 1163  Accelerated Composition I
EN 1113  English Composition II  3
or EN 1173  Accelerated Composition II

Mathematics  
See Major Core

Science  
See Major Core

Humanities  
See General Education courses  6

Fine Arts  
See General Education courses  3

Social/Behavioral Sciences  
See General Education courses  6

Major Core  
Math and Basic Science  
MA 1713  Calculus I  3
MA 1723  Calculus II  3
MA 3113 | Introduction to Linear Algebra | 3
Math elective | 3
MA 2733 | Calculus III | 3
or MA 3053 | Foundations of Mathematics
or MA 4143 | Graph Theory
or MA 4173 | Number Theory
IE 4613 | Engineering Statistics I | 3
BIO 1134 | Biology I | 4
CH 1213 | Chemistry I | 3
CH 1211 | Investigations in Chemistry I | 1
PH 2213 | Physics I | 3
Science elective | 3
PH 2223 | Physics II | 4
or CH 1223 | Chemistry II
& CH 1221 | and Investigations in Chemistry II
or BIO 1144 | Biology II

**Engineering Topics**

CSE 1002 | 2
CSE 1284 | Introduction to Computer Programming | 4
CSE 1384 | Intermediate Computer Programming | 4
CSE 2383 | Data Structures and Analysis of Algorithms | 3
CSE 2813 | Discrete Structures | 3
CSE 3324 | Distributed Client/Server Programming | 4
CSE 4214 | Introduction to Software Engineering | 4
CSE 4503 | Database Management Systems | 3
CSE 4733 | Operating Systems I | 3
CSE 4763 | Ethical and Legal Issues in Computing | 3
CSE 4833 | Introduction to Analysis of Algorithms | 3
CSE 4233 | Software Architecture and Design Paradigms | 3
CSE 4153 | Data Communications and Computer Networks | 3
CSE 3213 | Software Engineering Senior Project I | 3
CSE 4283 | Software Testing and Quality Assurance | 3
CSE 3223 | Software Engineering Senior Project II | 3
ECE 3714 | Digital Devices and Logic Design | 4
ECE 3724 | Microprocessors | 4
IE 4533 | Project Management | 3
CSE Security Elective | 3
Technical elective - see advisor | 3
Free electives | 4

**Oral Communication Requirement**

CO 1003 | Fundamentals of Public Speaking | 3
or CO 1013 | Introduction to Communication

**Writing Requirement**

GE 3513 | Technical Writing | 3

**Computer Literacy**

Fulfilled in Engineering Topics courses

**Total Hours** | 128

**Computer Science Minor**

Computer science has application in a broad range of disciplines, and students with majors in other fields of study may wish to complement their studies with a minor in computer science. Completion of the minor requirements should prepare the student to pursue a career as a computer applications specialist within his/her field of study or as an entry-level computer programmer in the general computing environment. The minor in computer science
is not available to students majoring in computer engineering or software engineering since significant parts of these majors consist of computer science courses.

A minor in computer science consists of:

<table>
<thead>
<tr>
<th>Course</th>
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<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
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<td>3</td>
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<td>CSE 2813</td>
<td>Discrete Structures</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Nine hours of approved upper-division courses</td>
<td>9</td>
</tr>
</tbody>
</table>

A list of approved courses is available from the Department of Computer Science and Engineering.

**Software Engineering Minor**

Software Engineering practices and skills are valuable in a wide range of disciplines, and students with majors in other fields of study may wish to complement their studies with a minor in software engineering. Completion of the minor requirements should prepare the student to pursue careers that involve the application and development of software systems in their field of study.

A minor in software engineering consists of

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<td>CSE 4214</td>
<td>Introduction to Software Engineering</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Approved upper-division software engineering courses</td>
<td>9</td>
</tr>
</tbody>
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A list of approved courses is available from the Department of Computer Science and Engineering.