Department of Computer Science and Engineering

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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.

Cyber Security Major

The Bachelor of Science in Cyber Security and Operations is designed for students who wish to help meet the challenges posed by increasing cyber-threats. Using a multidisciplinary approach, the program is designed to provide students with a focused education for evaluating, understanding, and solving cyber security problems.

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.

Computer Science Major (CS)

English Composition

EN 1103	English Composition I	3
EN 1113	English Composition II	3
Fine Arts		
See General Education courses		3
Humanities		
See General Education courses		6
Social/Behavioral Sciences		
See General Education courses		6
Writing Requirement		
GE 3513	Technical Writing	3
Departmental Requirements		
MA 1713	Calculus I	3
MA 1723	Calculus II	3
MA 3113	Introduction to Linear Algebra	3
Math elective		3
MA 2733	Calculus III	
or MA 3053	Foundations of Mathematics	
or MA 4143	Graph Theory	
or MA 4173	Number Theory	
Statistics Requirement		3
IE 4613	Engineering Statistics I	
or MA 4523	Introduction to Probability	
or MA 4543	Introduction to Mathematical Statistics I	
or BQA 2113	Business Statistical Methods I	
CH 1213	Chemistry I	3
CH 1211	Investigations in Chemistry I	1
Science electives		6
Lab Science - Choose from:		3-4
BIO 1134	Biology I	
BIO 1144	Biology II	

CH 1223 & CH 1221	Chemistry II and Investigations in Chemistry II	
PH 2223	Physics II	
Natural Science - Choose from:		3-4
BIO 1134	Biology I	
BIO 1144	Biology II	
PH 2213	Physics I	
PH 2223	Physics II	
CH 1223	Chemistry II	
CSE 1011	Introduction to CSE	1
CSE 1284	Introduction to Computer Programming	4
CSE 1384	Intermediate Computer Programming	4
CSE 2213	Methods and Tools in Software Development	3
CSE 2383	Data Structures and Analysis of Algorithms	3
CSE 2813	Discrete Structures	3
CSE 3183	Systems Programming	3
CSE 3723	Computer Organization	3
CSE 3763	Ethical and Legal Issues in Computing	3
CSE 4714	Theory & Implementation of Programming Languages	4
CSE 4733	Operating Systems I	3
CSE 4833	Introduction to Analysis of Algorithms	3
Technical Electives - Choose from:		27
IE 3913	Engineering Economy I	
IE 4113	Human Factors Engineering	
IE 4123	Psychology of Human-Computer Interaction	
IE 4333	Production Control Systems I	
IE 4513	Engineering Administration	
IE 4533	Project Management	
IE 4573	Process Improvement Engineering	
IE 4623	Engineering Statistics II	
IE 4653	Industrial Quality Control	
IE 4713	Operations Research I	
IE 4733	Linear Programming	
IE 4773	Systems Simulation I	
BIS 4523	Business Programming with COBOL	
BIS 4533	Decision Support Systems	
Any upper-level CSE, ECE, or MA course		
Free elective		15
Total Hours		**128**

Software Engineering Major (SE)

English Composition

EN 1103	English Composition I	3
EN 1113	English Composition II	3
Fine Arts		
See General Education courses		3
Humanities		
See General Education courses		6
Social/Behavioral Sciences		
See General Education courses		6
Writing Requirement		
GE 3513	Technical Writing	3

Departmental Requirements		
MA 1713	Calculus I	3
MA 1723	Calculus II	3
MA 3113	Introduction to Linear Algebra	3
Math elective		3
MA 2733	Calculus III	
or MA 3053	Foundations of Mathematics	
or MA 4143	Graph Theory	
or MA 4173	Number Theory	
Statistics Requirement		3
IE 4613	Engineering Statistics I	
CH 1213	Chemistry I	3
CH 1211	Investigations in Chemistry I	1
Science electives		8
Choose from:		
BIO 1134	Biology I	
BIO 1144	Biology II	
CH 1223 & CH 1221	Chemistry II and Investigations in Chemistry II	
PH 2213	Physics I	
PH 2223	Physics II	
CSE 1011	Introduction to CSE	1
CSE 1284	Introduction to Computer Programming	4
CSE 1384	Intermediate Computer Programming	4
CSE 2213	Methods and Tools in Software Development	3
CSE 2383	Data Structures and Analysis of Algorithms	3
CSE 2813	Discrete Structures	3
CSE 3183	Systems Programming	3
CSE 3213	Software Engineering Senior Project I	3
CSE 3223	Software Engineering Senior Project II	3
CSE 3723	Computer Organization	3
CSE 3763	Ethical and Legal Issues in Computing	3
CSE 4214	Introduction to Software Engineering	4
CSE 4223	Managing Software Projects	3
or IE 4533	Project Management	
CSE 4233	Software Architecture and Design Paradigms	3
CSE 4283	Software Testing and Quality Assurance	3
CSE 4733	Operating Systems I	3
CSE 4833	Introduction to Analysis of Algorithms	3
Technical Electives - Choose from:		15
IE 3913	Engineering Economy I	
IE 4113	Human Factors Engineering	
IE 4123	Psychology of Human-Computer Interaction	
IE 4333	Production Control Systems I	
IE 4513	Engineering Administration	
IE 4533	Project Management	
IE 4573	Process Improvement Engineering	
IE 4623	Engineering Statistics II	
IE 4653	Industrial Quality Control	
IE 4713	Operations Research I	
IE 4733	Linear Programming	
IE 4773	Systems Simulation I	

BIS 4523	Business Programming with COBOL	
BIS 4533	Decision Support Systems	
Any upper-level CSE, ECE, or MA course		
Free elective		10
Total Hours		**128**

Cyber Security Major

English Composition		
EN 1103	English Composition I	3
EN 1113	English Composition II	3
Fine Arts		
See General Education courses		3
Humanities		
See General Education courses		6
Social/Behavioral Sciences		
See General Education courses		6
Writing Requirement		
GE 3513	Technical Writing	3
Communication Requirement		
CO 1003	Fundamentals of Public Speaking	3
or CO 1013	Introduction to Communication	
Departmental Requirements		
MA 1713	Calculus I	3
MA 1723	Calculus II	3
MA 3113	Introduction to Linear Algebra	3
Math elective		3
MA 2733	Calculus III	
or MA 3053	Foundations of Mathematics	
or MA 4143	Graph Theory	
or MA 4173	Number Theory	
Statistics Requirement		3
IE 4613	Engineering Statistics I	
or MA 4523	Introduction to Probability	
or MA 4543	Introduction to Mathematical Statistics I	
or BQA 2113	Business Statistical Methods I	
CSE 2813	Discrete Structures	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	
or BIO 1144	Biology II	
or CH 1223	Chemistry II	
& CH 1221	and Investigations in Chemistry II	
Engineering Core		
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 4153	Data Communications and Computer Networks	3
CSE 4173	Cryptography	3

CSE 4243	Information and Computer Security	3
CSE 4733	Operating Systems I	3
CSE 4763	Ethical and Legal Issues in Computing	3
ECE 3714	Digital Devices and Logic Design	4
ECE 3724	Microprocessors	4
ECE 4713	Computer Architecture	3
Cyber Security Electives		
Choose five of the following:		
BIS 4113	Business Information Systems Security Management	
CSE 4253	Secure Software Engineering	
CSE 4273	Introduction to Computer Forensics	
CSE 4363	Software Reverse Engineering	
CSE 4383	Network Security	
CSE 4743	Operating Systems II	
CSE 4773	Introduction to Cyber Operations	
Technical Electives		
Any upper-level course in the following areas that is not already required in the Cyber Security curriculum: CS, ECE, MA		
Free electives		**6**
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:

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
Nine hours of approved upper-division courses		9

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

CSE 1284	Introduction to Computer Programming	4
CSE 1384	Intermediate Computer Programming	4
CSE 2383	Data Structures and Analysis of Algorithms	3
CSE 4214	Introduction to Software Engineering	4
Approved upper-division software engineering courses		9

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