Department of Computer Science and Engineering

Interim Department Head: Professor Donna Reese 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 five 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. The department also offers study leading to the Master of Science and the Doctor of Philosophy degrees in Computer Science.

Computer Science Major (CS)

Major Advisor: Dr. Sarah Lee 300 Butler Hall

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:

- 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.
- 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.

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)

Major Advisor: Dr. Sarah Lee 300 Butler Hall

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:

- 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.
- 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.
- 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.

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) General Education Requirements

EN 1103 English Composition I or EN 1163 Accelerated Composition I EN 1113 English Composition II Or EN 1173 Accelerated Composition II Mathematics See Major Core Science See Major Core Humanities See General Education courses Fine Arts See General Education courses See General Education courses See General Education courses See General Education courses Major Core Math and Basic Science Math 1713 Calculus I MA 1713 Calculus II MA 2733 Calculus III MA 3113 Introduction to Linear Algebra 3 CH 1213 Chemistry I 3 CH 1211 Investigations in Chemistry I 1 PH 2213 Physics I 3 PH 2223 Physics II 3 BIO 1134 Biology I 4 Engineering and Computer Science Topics CSE 1002 Introduction to CSE 2 CSE 1284 Introduction to Computer Programming 4 CSE 2383 Data Structures and Analysis of Algorithms 3 CSE 2813 Discrete Structures 3 CSE 283 Data Structures and Analysis of Algorithms 3 CSE 2813 Discrete Structures 7 CSE 4833 Introduction to Formal Languages and Automata 3 CSE 3394 Distributed Client/Server Programming 4 CSE 3381 Introduction to Formal Languages and Automata 3 CSE 3391 Social and Ethical Issues in Computing 1 CSE 4833 Introduction to Formal Languages and Automata 3 CSE 4813 Programming Languages 3 CSE 4713 Programming Languages 3 CSE 4714 Digital Devices and Logic Design 4 CSE 3724 Microprocessors 4 CSE 4153 Data Communications and Computer Networks CSE 4413 Principles of Computer Graphics CSE 4453 Data Sprinciples of Computer Graphics CSE 4453 Data Design Parallel Algorithms CSE 4453 Data Communications and Computer Networks CSE 4453 Data Design Parallel Algorithms CSE 4453 Data Communications and Computer Networks CSE 4453 Data Design Parallel Algorithms CSE 4453 Data Communications and Computer Networks CSE 4453 Data Design Parallel Algorithms CSE 4453 Data Design Parallel Algorithms CSE 4453 Data Design Parallel Algorithms CSE 4453 Data Communications and Computer Networks CSE 4453 Data Communications and Computer Networks CSE 4453 Data Design Parallel Algorithms CSE 4453 Data Design Parallel Algorithms CSE 4453	English Compo	sition	
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CSE 2383 Data Structures and Analysis of Algorithms CSE 2813 Discrete Structures 3 CSE 3324 Distributed Client/Server Programming 4 CSE 3813 Introduction to Formal Languages and Automata 3 CSE 3981 Social and Ethical Issues in Computing 1 CSE 4733 Operating Systems I 3 CSE 4833 Introduction to Analysis of Algorithms 3 CSE 4713 Programming Languages 3 ECE 3714 Digital Devices and Logic Design 4 ECE 3724 Microprocessors 4 ECE 4713 Computer Architecture 3 IE 4613 Engineering Statistics I 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 1284	Introduction to Computer Programming	4
CSE 2813 Discrete Structures CSE 3324 Distributed Client/Server Programming 4 CSE 3813 Introduction to Formal Languages and Automata 3 CSE 3981 Social and Ethical Issues in Computing 1 CSE 4733 Operating Systems I CSE 4833 Introduction to Analysis of Algorithms 3 CSE 4813 Programming Languages 3 ECE 3714 Digital Devices and Logic Design 4 ECE 3724 Microprocessors 4 ECE 4713 Computer Architecture 3 IE 4613 Engineering Statistics I 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 1384	Intermediate Computer Programming	4
CSE 3324 Distributed Client/Server Programming 4 CSE 3813 Introduction to Formal Languages and Automata 3 CSE 3981 Social and Ethical Issues in Computing 1 CSE 4733 Operating Systems I 3 CSE 4833 Introduction to Analysis of Algorithms 3 CSE 4713 Programming Languages 3 ECE 3714 Digital Devices and Logic Design 4 ECE 3724 Microprocessors 4 ECE 4713 Computer Architecture 3 IE 4613 Engineering Statistics I 3 Computer Science Electives: select two of the following: 6-7 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 2383	Data Structures and Analysis of Algorithms	3
CSE 3813 Introduction to Formal Languages and Automata 3 CSE 3981 Social and Ethical Issues in Computing 1 CSE 4733 Operating Systems I 3 CSE 4833 Introduction to Analysis of Algorithms 3 CSE 4713 Programming Languages 3 ECE 3714 Digital Devices and Logic Design 4 ECE 3724 Microprocessors 4 ECE 4713 Computer Architecture 3 IE 4613 Engineering Statistics I 3 Computer Science Electives: select two of the following: 6-7 CSE 4153 Data Communications and Computer Networks CSE 4163 Designing Parallel Algorithms CSE 4214 Introduction to Software Engineering CSE 4413 Game Design	CSE 2813	Discrete Structures	3
CSE 3981 Social and Ethical Issues in Computing CSE 4733 Operating Systems I CSE 4833 Introduction to Analysis of Algorithms CSE 4713 Programming Languages 3 ECE 3714 Digital Devices and Logic Design 4 ECE 3724 Microprocessors 4 ECE 4713 Computer Architecture 3 IE 4613 Engineering Statistics I 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 3324	Distributed Client/Server Programming	4
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CSE 4713 Programming Languages 3 ECE 3714 Digital Devices and Logic Design 4 ECE 3724 Microprocessors 4 ECE 4713 Computer Architecture 3 IE 4613 Engineering Statistics I 3 Computer Science Electives: select two of the following: 6-7 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 4733	Operating Systems I	3
ECE 3714 Digital Devices and Logic Design 4 ECE 3724 Microprocessors 4 ECE 4713 Computer Architecture 3 IE 4613 Engineering Statistics I 3 Computer Science Electives: select two of the following: 6-7 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 4833	Introduction to Analysis of Algorithms	3
ECE 3724 Microprocessors 4 ECE 4713 Computer Architecture 3 IE 4613 Engineering Statistics I 3 Computer Science Electives: select two of the following: 6-7 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 4713	Programming Languages	3
ECE 4713 Computer Architecture 3 IE 4613 Engineering Statistics I 3 Computer Science Electives: select two of the following: 6-7 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	ECE 3714	Digital Devices and Logic Design	4
IE 4613 Engineering Statistics I 3 Computer Science Electives: select two of the following: 6-7 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	ECE 3724	Microprocessors	4
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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	IE 4613	Engineering Statistics I	3
CSE 4163 Designing Parallel Algorithms CSE 4214 Introduction to Software Engineering CSE 4413 Principles of Computer Graphics CSE 4453 Game Design	Computer Scien	nce Electives: select two of the following:	6-7
CSE 4214 Introduction to Software Engineering CSE 4413 Principles of Computer Graphics CSE 4453 Game Design	CSE 4153	Data Communications and Computer Networks	
CSE 4413 Principles of Computer Graphics CSE 4453 Game Design	CSE 4163	Designing Parallel Algorithms	
CSE 4453 Game Design	CSE 4214	Introduction to Software Engineering	
-	CSE 4413	Principles of Computer Graphics	
CSE 4503 Database Management Systems	CSE 4453	Game Design	
	CSE 4503	Database Management Systems	

CSE 4633	Artificial Intelligence		
CSE 4743	Operating Systems II		
Computer Scien	6		
Technical Electi	ves - see advisor	3	
International/Intercultural Studies - see advisor			
Free elective		7	
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	

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		

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

Software Engineering Major (SE) General Education Requirements

English Composition

See General Education courses

Major Core

•			
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 Co	ore		
Science			
See Major Core			
Humanities			
See General Education courses			6
Fine Arts			
See General Education courses			3
Social/Behavio	Social/Behavioral Sciences		

6

Math and Basic Science Calculus I MA 1713 3 MA 1723 Calculus II 3 3 MA 2733 Calculus III MA 2743 Calculus IV 3 MA 3053 Foundations of Mathematics 3 or MA 3253 Differential Equations I or MA 3113 Introduction to Linear Algebra 3 CH 1213 Chemistry I CH 1211 Investigations in Chemistry I PH 2213 Physics I 3 PH 2223 Physics II 3 Biology I **BIO 1134** 4 **Engineering Topics** CSE 1002 Introduction to CSE 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 **CSE 4214** Introduction to Software Engineering 4 CSE 3981 Social and Ethical Issues in Computing CSE 4733 Operating Systems I 3 3 CSE 4503 **Database Management Systems** 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 3 **CSE 3223** Software Engineering Senior Project II ECE 3714 Digital Devices and Logic Design 4 **ECE 3724** 4 Microprocessors IE 4533 **Project Management** 3 IE 4613 **Engineering Statistics I** 3 **CSE Security Elective** 3 Technical elective - see advisor 6 Free electives - see advisor 3 **Oral Communication Requirement** CO 1003 Fundamentals of Public Speaking 3 **Writing Requirement** GE 3513 **Technical Writing** 3 **Computer Literacy** Fulfilled in Engineering Topics courses **Total Hours** 128

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.