Summary of changes for MS in Software Engineering (with concentration in Software Testing)

1. Create new course SENG 6255, Requirements Analysis and Management. Methods and processes for managing, analyzing and specifying requirements; Use-Case modeling; Systems for requirements analysis and management. The course introduces students to the fundamental concepts and methods in requirements engineering and management

2. Create new course SENG 6265. Foundations of Software Testing; Fundamentals of software testing, test management, testing tools, test planning approaches, and basic static and dynamic testing methods.

3. Create new course SENG 6275. Dependable Systems and Software Reliability. Analysis, modelling, and development of dependable systems. Foundations of software reliability.

4. Modify the degree requirements for the M.S. in Software Engineering by introducing third concentration

5. Remove CSCI 6130 and add SENG 6250 to Software design and construction concentration.

6. Remove CSCI 6710 and SENG 6250 and add SENG 6255 and SENG 6265 to Software project management and quality assurance

- Software design and construction

- Software project management and quality assurance

- Software Testing

The modification moves required credit from the core into concentration areas, and encourages students to focus in an area that is suitable to their needs.

Redundant terms from Core and elective sections of the SENG program have been removed.

Department of Computer Science

John Placer Karl Abrahamson, Interim Chairperson, Suite 124-C C-113, Science and Technology Building

MS IN COMPUTER SCIENCE

Applicants to the master of science degree in computer science must meet the admission requirements of the Graduate School, have an undergraduate degree in computer science or a related field, be able to demonstrate significant study in computer science, including a study of

computer architecture and software design, be proficient programmers in at least one high-level programming language, submit three letters of recommendation, and have satisfactory scores on the general portion of the Graduate Record Examinations. Applicants whose native language is not English must additionally submit a satisfactory score on the Test of English as a Second Language (TOEFL).

Each applicant's credentials will be reviewed by the director of graduate studies, who will determine if undergraduate deficiencies are present and, if so, will prescribe a method for their removal and determine a precondition for admission.

Minimum degree requirement is 30 s.h. of credit as follows:

1. Core courses (12 s.h.): CSCI 6120, 6230, 6420, and one of 5210 or 5220; an additional 18 s.h. selected from CSCI courses numbered 5000 or above, including 3-6 s.h. of thesis or research project. At least 15 s.h. must be in courses numbered 6000 or above. Up to 6 s.h. of the following courses can count toward the 18 hours of CSCI elective courses:

    SENG 6240. Software Architecture and Design (3) (P/C: SENG 6230 or consent of instructor)
    SENG 6250. Software Systems Modeling and Analysis (3) (P/C: SENG 6230 or consent of instructor)
    SENG 6270. Software Verification and Validation (3) (P/C: SENG 6230 or consent of instructor)

2. A minimum cumulative GPA of 3.0 must be submitted for all graduate courses. No more than 6 s.h. of course work evaluated as C may be counted toward the degree.
3. Satisfactory score on a comprehensive examination covering 12 s.h. of course work.
4. Following successful completion of the comprehensive examination, the student must design and complete CSCI 6995 or 7000 under the direction of an advisor. The project or thesis must be successfully defended before the student's examination committee.
5. Students must attend at least five research seminars and present at least one research seminar during the course of study.
6. A minimum cumulative GPA of 3.0 must be submitted for all graduate courses. No more than 6 s.h. of course work evaluated as C may be counted toward the degree.

Minimum degree requirement is **30 s.h.** of credit as follows:

1. Core courses (12 s.h.): CSCI 6120, 6230, 6420, and one of 5210 or 5220; an additional 18 s.h. selected from CSCI courses numbered 5000 or above, including 3-6 s.h. of thesis or research project. At least 15 s.h. must be in courses numbered 6000 or above. Up to 6 s.h. of the following courses can count toward the 18 hours of CSCI elective courses:
    SENG 6240. Software Architecture and Design (3) (P/C: SENG 6230)
    SENG 6250. Software Systems Modeling and Analysis (3) (P/C: SENG 6230)
    SENG 6270. Software Verification and Validation (3) (P/C: SENG 6230)
2. A minimum cumulative GPA of 3.0 must be submitted for all graduate courses. No more than 6 s.h. of course work evaluated as C may be counted toward the degree.

3. Satisfactory score on a comprehensive examination covering 12 s.h. of course work.
4. Following successful completion of the comprehensive examination, the student must design and complete CSCI 6995 or 7000 under the direction of an advisor. The project or thesis must be successfully defended before the student's examination committee.
5. Students must attend at least five research seminars and present at least one research seminar during the course of study.
6. A minimum cumulative GPA of 3.0 must be submitted for all graduate courses. No more than 6 s.h. of course work evaluated as C may be counted toward the degree.

CSCI: Computer Science

5002. Logic for Mathematics and Computer Science (3) Same as MATH 5002 P: CSCI 3310 or CSCI 3510 or MATE 3223 or 2775 or MATH 2427 or 2775 or 3256 or PHIL 3580 or equivalent. Methods of mathematical logic important in mathematics and computer science applications.

5210. Operating Systems II (3) P: CSCI 4630 or consent of instructor. Theory and practice of concurrent processes in computer operating systems. Process scheduling. Memory and auxiliary storage management.

5220. Program Translation (3) P: CSCI 4627 or consent of instructor. Formal language specification for programming languages. Advanced parsing techniques. Code generation and optimization.

5501, 5502, 5503. Independent Study (1,2,3) Minimum of 3-6 hours per week depending on nature of work assigned. P: CSCI 3601 or equivalent or consent of instructor. Advanced computer science students study topics that supplement regular curriculum.

5774. Programming for Research (3) Same as MATH 5774 For graduate student who wishes to use computer science to meet required research skills in his or her dept. May not count toward MATH major or minor. P: General statistics course or consent of instructor. Emphasis on minimum-level programming skill and use of statistical packages.

5800. Artificial Intelligence (3) P: CSCI 3310 or CSCI 3510 or consent of instructor. Fundamental problems and techniques of artificial intelligence. Heuristic search. Concepts of expert systems.

6100. Cryptography and Information Security (3) P: Consent of instructor. Cryptographic techniques to
provide secrecy and authenticity of information communicated over an insecure channel; private-key cryptography, public-key cryptography and deployed cryptography.

6120. Computer Systems Architecture (3) P: CSCI 4520 or consent of instructor. Sequential architectures, instruction sets, addressing modes, and control structures. Introduces parallel architectures.

6130. Networking and Telecommunication (3) P: CSCI 6120 or consent of instructor. Theory and case studies of modern networking protocols and telecommunication methods. Local area and long-haul networks.

6140. Mobile Communications and Wireless Security (3) P: CSCI 6130; or consent of instructor. Signals, access protocols, application requirements, and security issues with a focus on digital data transfer.

6220. Topics in Language Design (3) P: CSCI 3675 or consent of instructor. Semantics and implementation characteristics of languages supporting modern computing paradigms such as functional programming, logic programming, constraint programming, and object-oriented programming.

6230. Software Engineering Foundations (3) Same as SENG 6230 P: Consent of instructor. Software project development using software engineering principles and current software development techniques.

6300. Cryptographic Protocols (3) P: CSCI 6100; or consent of instructor. Design and analysis of cryptographic protocols for various tasks; emphasis on applications beyond providing secrecy and authenticity of messages.

6410. Design and Analysis of Algorithms (3) P: CSCI 3650 or consent of instructor. Methods of designing efficient algorithms, case studies. Analysis of complexity of algorithm.

6420. Computability and Complexity (3) P: CSCI 4602 or consent of instructor. Computability, Church's thesis, formal models of computation. Introduces complexity theory.

6600. Data Base Management Systems (3) P: CSCI 3700 or consent of instructor. Theory and techniques of data base management systems. Examines implementations of DBMS.

6710. Developing e-Commerce Systems (3) P: CSCI 6230; or consent of instructor. Introduces use of concepts, technologies, and building blocks from computer science, practical software engineering, and business development in building e-Commerce systems. Systematic life-cycle approach to developing successful e-Commerce systems essential to wide range of organization and software developers.

6810. Topics in Artificial Intelligence (3) P: CSCI 5800 or consent of instructor. Study of state of the art in selected topic on artificial intelligence.

6820. Computer Graphics (3) P: CSCI 3800 or consent of instructor. Principles and techniques of image rendering. Use of image rendering software.

6840. Data Mining (3) P: Consent of instructor. Data mining concepts and techniques and state of the art in data mining, including association rule mining, classification, clustering, data mining on complex type of data, and other data mining algorithms and applications.

6905. Topics in Computer Science (3) May be repeated once with change of topic. P: Consent of instructor. Current topic in computer science.

6995. Research Project (3) P: Approval of director of graduate studies. Student selects, investigates, and reports to faculty on challenging research project.

7000. Thesis (3) May be repeated. May count maximum of 3 s.h.

7001. Thesis: Summer Research (1) May be repeated. No credit may count toward degree. Students conducting thesis research may only register for this course during the summer.

CSCI Banked Courses

5726. Scientific Programming (1)   **6605. Data Structure and Algorithm Design (3)**

6603. Microcomputer Programming (3)

MS IN SOFTWARE ENGINEERING

The College of Technology and Computer Science offers a master's of science in software engineering that is available online and on campus. The program prepares students to be able to specify, implement, and manage large software system projects from initial concept to the end of product life that are on-time, on-budget, and meet functional requirements.

Admission Requirements

Applicants must meet the admission requirements of the Graduate School. Acceptance to the master of science degree in software engineering is based on satisfactory undergraduate grades, scores on either the Miller Analogies Test or the Graduate Record Examinations, and letters of reference. Applicants whose native language is not English must additionally submit a satisfactory score on the Test of English as a Foreign Language. Completion of an undergraduate degree in computer science, software engineering, computer engineering, electrical engineering, information systems or a related discipline is recommended for admission. Students from other disciplines or applicants with limited technical expertise are evaluated on a case-by-case basis by the program admissions committee. In some cases, remedial undergraduate courses or additional graduate courses are required as a precondition for admission. Students in the program are required to have fully functional computer hardware and full Internet connectivity. Requirements for completing the master of science in software engineering are described below.

Minimum degree requirement is 30 s.h. of credit as follows:

1. Core - 9-12 s.h.

    SENG 6230, 6235 and SENG 6290 (3 s.h.) or 7000 (6 s.h.)

2. Concentration area (choose one) - 12 s.h.

    Software Design and Development
    ~~CSCI 6130. Networking and Telecommunication~~
    SENG 6240. Software Architecture and Design
    SENG 6245. Software Construction
    SENG 6250. Software Systems Modeling and Analysis
    SENG 6270. Software Verification and Validation

    Software Project Management and Quality Assurance
    ~~CSCI 6710. Developing e-Commerce Systems~~
    ~~SENG 6250. Software Systems Modeling and Analysis~~
    SENG 6255. Software Requirement Analysis and Management
    SENG 6260. Software Metrics and Quality Management
    SENG 6265. Foundation of Software Testing
    SENG 6280. Process Management and Life Cycle Modeling

    Software Testing
    SENG 6250. Software Modeling and Analysis
    SENG 6265. Foundation of Software Testing
    SENG 6270. Software Verification and Validation
    SENG 6275. Dependable Systems and Software Reliability

3. Electives (Choose any two) - 6-9 s.h.

    Electives must come from outside concentrations
    CSCI 5220, 6130, 6140, 6600, 6710, SENG 6240, 6245, 6250, 6255, 6260, 6265, 6270, 6275, 6280
    ~~Up to 3~~ Three s.h. from the following list:
    CSCI 5210, 5800, 6100, 6120, 6410, 6420, 6840

A minimum cumulative GPA of 3.0 must be earned for the degree. No more than 6 s.h. of course work evaluated as C may be counted toward the degree.

SENG: SOFTWARE ENGINEERING

6230. Software Engineering Foundations (3) Same as CSCI 6230 P: CSCI 4200 or consent of instructor. Software project development using software engineering principles and current software development techniques.

6235. Software Project Management (3) P/C: SENG 6230 or consent of instructor. Advanced methods and techniques to initiate, plan, and control large and complex software development projects.

6240. Software Architecture and Design (3) P/C: SENG 6230 or consent of instructor. Software development issues related to software architecture and design. Examines software development and implementation.

6245. Software Construction (3) P: Consent of instructor. Software development environments, data structures and algorithms, object-oriented techniques, and object-oriented programming.

6250. Software Systems Modeling and Analysis (3) P/C: SENG 6230 or consent of instructor. Methods for the construction of software including formal notation language and its application to the analysis and specification of software system requirements.

6255. Software Requirements Analysis and Management (3) P: Consent of instructor. Methods and processes for managing, analyzing and specifying requirements; use-case modeling; systems for requirements analysis and management.

6260. Software Metrics and Quality Management (3) P/C: SENG 6230 or consent of instructor. Software quality metrics associated with process and product metrics. Examines development of software using various types of metrics and models employed in the field of software quality engineering.

6265. Foundations of Software Testing (3) P: Consent of instructor. Fundamentals of software testing, test management, testing tools, test planning approaches, and basic static and dynamic testing methods.

6270. Software Verification and Validation (3) P/C: SENG 6230 or consent of instructor. Verification and validation strategies and techniques throughout the software life-cycle, including processes that assure the desired software and documentation are developed and maintained.

6275. Dependable Systems and Software Reliability (3) P: Consent of instructor. Analysis, modeling, and development of dependable systems. Foundations of software reliability.

6280. Process Management and Lifecycle Modeling (3) P/C: SENG 6230 or consent of instructor. Foundations of software management and support over the complete life cycle including maturity models, change management, and optimization.

6290. Software Engineering Project (3) P/C: SENG 6230 or consent of instructor. Practical process-based and industry-oriented view of software engineering practices. Exposure to research, software development, and implementation of professional level software.

7000. Thesis (3) P: SENG 6230 or consent of instructor. May be repeated. May count maximum of 6 s.h.