COURSE OF STUDY
Master of Software Engineering

The Master of Software Engineering (MSE) is a 36-credit program, which is based on a model that emphasizes object-orientation, multi-tier data-driven development, and sound software engineering and design methodologies. The program has been approved by the Higher Education Learning Commission (HLC)/North Central Association. The 36 credits consist of the following 12 three-credit courses:

Computer Science 506, Object Oriented Programming and Data Structures
Computer Science 550, Advanced Web Applications
Computer Science 560, Advanced Web Applications II
Computer Science 580, Information Technology Management in a Net-Centric World
Computer Science 591, Enterprise Data Modeling
CSC591 may be waived and replaced by a second graduate elective
Computer Science 600, Object Oriented Analysis and Design
Computer Science 602, Project Management and Technical Communication
Computer Science 603, Networking: Design and Implementation
Computer Science 640, Software Engineering
Computer Science graduate elective
Computer Science 650, Capstone Research and Design
Computer Science 651, Capstone Implementation

CSC506. Object Oriented Programming and Data Structures 3 credits
This course is an intensive introduction to the fundamentals of object-oriented programming. The features of the object-oriented paradigm (encapsulation, inheritance and polymorphism) will be introduced through use of the language Java. Fundamental data structures such as stacks, queues, lists and trees will be covered along with an analysis of algorithm efficiency. Prerequisite: CSC111or data structures or consent of the instructor. *(Fa)*

CSC550. Advanced Web Applications 3 credits
This course concentrates on the skills necessary for a student to master the multi-tier Web development environment using Microsoft .NET framework (the latest version). Database-driven applications, Web services, and component development are stressed. Other topics covered may include SOA (Service Oriented Architecture), XML document processing, as well as performance and security issues. Web fundamentals are reviewed as deemed necessary. Prerequisite: CSC351 or CSC591 or consent of the instructor. *(WW)*

CSC560. Advanced Web Applications II 3 credits
This course develops the skills necessary for a student to master the world of Java-based server-side processing. This course builds on CSC550 with special emphasis on the Java2 Platform for implementing scalable and reliable enterprise applications from reusable components. Each student will manage a Tomcat-JBoss Web Server running on a dedicated Linux server for the entire semester. Contemporary issues in client server technology will be addressed including Remote Method Invocation (RMI), JavaBeans, Java Servlets, and Java Server Pages (JSP). A 3-tier'd distributed component programming environment is used with an Oracle Database on the 3rd tier. Prerequisites: CSC506 and CSC550. *(Sp)*

CSC580. Information Technology Management in a Net-Centric World 3 credits
This course studies management of information technology and its transitions in a technology based world. The foundational message of the course is that the primary focus of the IT manager must be the business goals of the organization and the application of current and future technology towards a competitive advantage for the organization. Operational, tactical and strategic directions are discussed with the understanding that these are changing and will continue to change with the application of technology both within the organization, within their industry, and with respect to supply chain management. The positioning of the head of information technology within the organization is

researched and discussed. Proven leadership goals and strategies within information technology departments are reviewed and discussed with the focus of reviewing how technology is changing the methods and focus of IT management. *(Sp, WW)*

CSC591. Enterprise Data Modeling 3 credits
The course concentrates on the skills necessary to design effective database models upon which an enterprise database is constructed. These skills include Entity/Relationship (ER) Modeling, normalization, and command of the SQL language. Students will study both the theory and practical aspects of contemporary relational databases. Emphasis will be placed on the three-tiered architecture and its role in ecommerce World Wide Web sites. "Hands-on" experiences will include the use of modern CASE tools for modeling, and practice with enterprise databases such as Oracle or Microsoft SQL Server. This course may be waived for professional worker in the field with appropriate database experience. Prerequisite: CSC506 or consent of the instructor *(Fa)*

CSC600. Object Oriented Analysis and Design 3 credits
This course concentrates on the object-oriented paradigm as it applies to analysis, design and software implementation. Various object-oriented design patterns will be introduced, so will design frameworks as they apply to the latest software development practices. Unified Modeling Language (UML) and CASE tools may be used as appropriate. Prerequisites: CSC506 and CSC591 *(Sp)*

CSC602. Project Management and Technical Communication 3 credits
This course concentrates on the skills necessary to manage a project both from the technical perspective and from the human relations perspective. Key ideas addressed will be change management, deadlines, motivation and other issues that affect productivity within a team. Tools such as Microsoft Project will be used to understand and control massive projects. Various techniques such as Pert charts and Gant charts will be discussed, compared and contrasted. Inter-team and intra-team communication will be covered, as well as communication with non-technical individuals. *(Sp)*

CSC603. Networking: Design and Implementation 3 credits
This course presents a view of the broad field of data communications and networking. Fiber and wireless technologies (Wireless LAN, MMDS, LMDS) will be stressed as they reshape the future of networking. Topics include network classification, protocols, services, hardware components: routers, switches, multiplexors, concentrators, and communications media. Students will concentrate on how technology is changing the nature and uses of networking as bandwidth and services increase under a Moore's Law projection. Quality of service issues will be stressed and uses of this technology are studied as it leads a reshaping of organizations and their activities. Broadband and last mile issues will be studied and forecast as these reshape communication. *(Su, WW)*

CSC605. Mathematical Underpinnings of Information Systems 3 credits
This class will provide the mathematical underpinnings of the MSE curriculum. It will emphasize the mathematical structures used in computer and information sciences. Topics covered will include analysis of algorithms, mathematical logic, sets, graph theory, functions, relations, recursion, computability, proof of correctness, and applications.

CSC610. Operating Systems 3 credits
This class covers the elements and design of operating systems. Traditional operating systems such as Unix and Windows will be compared and contrasted along with more futuristic, experimental operating systems. Problems such as concurrence, memory management, file management, communication, security and other such issues will be addressed. A "hands –on" laboratory component includes experiments with the linux kernel. Prerequisite: CSC506

CSC623. Programming Languages 3 credits
This class covers the elements and design of programming languages. Topics covered include: specification of syntax and semantics, programming language paradigms – with several example languages, and parsing. Prerequisite: CSC506 or consent of the instructor. *(Sp, even years)*

CSC631. Advanced Database Design and Implementation 3 credits
This course builds upon previous database experience. It assumes that the student is proficient with a Database Management System (DBMS) and adds the object model to the database model. Various DBMS systems will be explored, examined and compared. Research into this new model and its future will also be examined.

CSC640. Software Engineering 3 credits
This course presents state-of-the art techniques in software development. Topics will include the software engineering lifecycle and current approaches to software development process, including formal software specification, software teams, Web engineering, and agile development. In addition, the course will cover version control, roll out, software maintenance and quality assurance. Research issues in software engineering will be examined. Prerequisite: CSC600 or consent of the instructor. *(Fa)*

CSC641. Advanced Visual Basic 3 credits
This course is a hands- on examination of further features and techniques of the programming language Microsoft Visual Basic. This course provides further experience in OO programming and demonstrates how to build Windows applications using the features of Visual Basic. *(WW)*

CSC642. Visual C++ 3 credits
This course is a hands-on examination of the features and techniques of the programming language Microsoft Visual C++. This course provides further experience in OO programming and demonstrates how to build Windows applications using the features of Visual C++. *(WW)*

CSC650. Capstone Research and Design 3 credits
This course requires the student to select a real-world project and write up a formal proposal. Upon approval of the proposal, the student will perform the necessary research on the project and present the findings in a formal setting. A formal design will then be undertaken and presented. Prerequisites: CSC640 and CSC600. *(WW)*

CSC651. Capstone Implementation 3 credits
This course is the culmination of the previous classes taken in the graduate program. The student must use all of the skills developed with the other courses, life experiences, and research and design from CSC650 to schedule, implement, and document the systems proposal begun in CSC650. Appropriate scheduling, design, implementation and documentation tools will be used. Prerequisites: CSC560 and CSC650. *(WW)*

CSC660. Component Software and Implementation Issues 3 credits
This course requires the student to bring together the knowledge and skills from the previous object-oriented courses. The class begins with a review of the object-oriented paradigm and continues through the real world issues of software creation for a wide variety of customers with varying needs and issues. Does the OO paradigm lead to the creation of component-based systems as its proponents suggest? And if so, how do implementation, reusability, components, internationalization and other similar topics affect the delivery of software systems? Prerequisite: CSC560

CSC680. Internship in Software Engineering 1-3 credits
This course entails professional work experience in computer science under the supervision of faculty and industry personnel. Written report required. S/U graded. *(WW)*

CSC691. Special Topics in Software Engineering 3 credits
Advanced research designed to permit individual students or groups of students to undertake special projects related to their educational interests and goals.