

SOFTWARE ENGINEERING - MS WITH THESIS PROGRAM

Course Code	Course Name	Cr	Compulsory/ Elective
CMSE500	M.S. Thesis	0	Compulsory
CMSE598	Seminar	0	Compulsory
CMSE511	Software Architecture	3	Compulsory
CMSE512	Database and File Security	3	Compulsory
CMSE513	User Interface Development	3	Compulsory
CMSE514	Web Technologies and Services	3	Compulsory
REQ1	Elective Course	3	Elective
REQ2	Elective Course	3	Elective
REQ3	Elective Course	3	Elective

Elective Course List*

CMSE515 Testing Web Applications and Services

CMSE516 Software Quality Assurance and Reliability

CMSE517 Software System Analysis and Modeling

CMSE518 Big Data Analytics

* Students may also take Computer Engineering MS courses, or other Engineering Faculty MS courses by the approval of their thesis supervisors.

Course Descriptions

Compulsory Courses:

Course Code: CMSE500 **Course Name:** Master Thesis

Course Description: Student must submit a thesis on results of their original investigation of a problem may be one of limited scope. The thesis must show a significant style, organization and depth of understanding of the subject. Thesis Study is conducted with the supervision of an instructor.

Course Code: CMSE598 **Course Name:** Seminar

Course Description: This course includes seminars which will be given by teaching staff to MS students covering the topics related to research methodologies, thesis writing, presentation, ethics, social responsibility, plagiarism, scientific paper writing and publishing.

Course Code: CMSE511 **Course Name:** Software Architecture

Course Description: Architectural abstraction of software systems. Software elements and how the elements relate to each other. Looking at a software system in terms of its elements, how they are arranged, how they interact, how they are composed, what their functional and behavioral properties are. Describing software in a modular/hierarchical manner. Describing interfaces between modules. Techniques for partitioning modules into submodules. Relationship of hardware architecture and software architecture descriptions of a Software system.

Course Code: CMSE512 **Course Name:** Database and File Security

Course Description: Security requirements. Confidentiality, integrity, availability, assurance, authenticity, anonymity. Security threats and attacks on security, Protection, Intruders, Access control models. Discretionary and mandatory access control, Authorization. Multilevel security. Malicious software, Trojan horses. Password protection. Symmetric and public key encryption. DES. RSA. Digital signature. Key distribution and authentication. Secure Sockets Layer protocol. Passport: Single Sign-On. Electronic commerce. Secure Electronic Transaction protocol, Goods atomicity, Certified delivery and escrow. Electronic cash. Blind signature, Security in XML-based Web-services. Kerberos. X.509 authentication

service. Authentication, procedures. One-time password. Hash functions. Statistical database security, Functional dependency attack on databases with multilevel security. Flow control, Covert channel, Auditing. Auditing process, Auditing classifications and types.

Course Code: CMSE513 **Course Name:** User Interface Development

Course Description: This course will provide a general introduction to the theory and practice of computer user interface design. In this respect, principles of human factors in computing, cognitive modeling and usability engineering will be covered in association with practical design issues. User interface design phases task analysis, user-centered design, and prototyping will be covered in detail. Design of windows, menus, and commands will be presented based on the design of 2D graphical user interfaces in three environments: standalone, Web and mobile devices. The study of several important paradigms and principles of design and how these can be applied to the user Interfaces will be explored.

Course Code: CMSE514 **Course Name:** Web Technologies and Services

Course Description: WEB 2.0 technologies. Influence of WEB 2.0 over business and society. Web 3.0 and semantic web concepts and technologies. Web 3.0 applications and management of web data. Web services overview. Service-Oriented Architecture (SOA). Web Services Description Language (WSDL). Universal Description, Discovery & Integration (UDDI). Simple Object Access Protocol (SOAP). Service-Oriented Software Reengineering (SOSR). XML technologies. Web services interaction protocol and description with J2EE technologies. Web service discovery and composition. Future trend in web technologies and services. For the programming part of this course, students will use different tools: Client Side (e.g.

HTML, CSS, JavaScript, Ajax, jQuery and JSON), Server Side (e.g. Servlets, JSP, Java Beans, JAX-RS for RESTful services), Database (e.g. MySQL) and Knowledgebase (e.g. OWL 2.0).

Elective Courses:

Course Code: CMSE515 **Course Name:** Testing Web Applications and Services

Course Description: This course will start with a discussion on how modern web applications work. Secure coding practices to develop better web applications will be introduced. White/grey/black-box testing techniques and tools for assessing web applications will be mentioned. Common pitfalls and security vulnerabilities that affect web applications will be discussed. Mobile application security concerns will be explained.

Course Code: CMSE516 **Course Name:** Software Quality Assurance and Reliability

Course Description: Concepts, metrics, and models in software quality assurance. Components of software quality assurance systems at the beginning, during, and after the software development process. Software quality assurance within the stages of the software development process: planning, configuration management, reviews, testing, and maintenance. In these stages, metrics and models for software quality will be discussed. The course will include practical case studies. Students will develop an understanding of how software quality can be assured.

Course Code: CMSE517 **Course Name:** Software System Analysis and Modeling

Course Description: This course is intended for helping students build up an understanding of how to develop a software system by guiding them through the software system analysis and design process. Software systems analysis and design as a problem-solving activity, key elements of analysis and design, and the place of the analysis and design phases within the system development life cycle will be discussed in detail. Students will be required to apply these techniques in a group design project.

Course Code: CMSE518 **Course Name:** Big Data Analytics

Course Description: This course examines the basic concepts and practices of big data analytics. Learning objectives of this course involve; understanding of the MapReduce paradigm and Hadoop, developing data analysis skills with Hive and Pig, analyzing temporal, geospatial, text, and graph data via Spark, and also performing supervised/unsupervised machine learning algorithms on large datasets using Mahout (Hadoop) or MLlib (Spark). R, Java or Python language examples will be used for illustration.