Description of MSc Courses offered by the Department of

Software Engineering
2019 / 2020

Scientific Research Methodologies ٠٦٠٣٧1٥٠

This course covers the principles of the Scientific Method: Theory and Measurement, Principles of the Scientific Method: Validity and Control, Ethical Issues in a Scientific Research, Non-Experimental Research: Observational, Archival, and Case-Study Research, Non-Experimental Research: Survey Research, Single-Subject Experimental Research, Group Experimental Research: Single-Factor Designs, Group Experimental Research: Factorial Designs, Quasi Experimentation, Reporting Research Results, Conclusions: Bias and Limitations of Experimental Scientifically (Epilogue). This course is planned for writing-intensive, topic courses that introduce students to academic thought, discourse and practices in a specific academic area of interest. Topics may change each semester. Students will improve their writing, reading, research, and basic information and technology skills while learning to work both collaboratively and independently.

Advanced Software Engineering 06037130

The course covers advanced concepts of Software Engineering, Software architecture, and Software models and standards. The course concentrates to develop a broad understanding of the discipline of software engineering, software requirements, project management and Software configuration management, quality insurance, Software architecture, and model-driven engineering.

Advanced Requirements Engineering ٠٦٠٣٧١٣١

Requirements engineering demonstrates an in-depth understanding of the range of problems which arise in requirement engineering, depth understanding of the state-of-the-art practices and leading academic research that are aimed at addressing the range of problems which arise in requirements engineering, a systematic understanding of the differences between alternative requirements modeling techniques, and apply start-of-the-art requirements methods and techniques to acquire, model and analyze requirements for complex systems.

Software Architecture Design and Design Patterns ٠٦٠٣٧١٣٢

This unit covers the fundamental design principles and strategies for software architecture and design. Architectural styles, quality attributes notations and documents, reference architecture, domain-specific architecture in architecture process and pattern-oriented design, component-oriented design, aspect-oriented design, and interface design in detail design process are discussed.

Advanced Software Testing ٠٦٠٣٧٢٣٣

The Advanced Software Testing course will address the understanding of the advanced elements of software testing, in particular, focusing on automated test data generation. Describe, apply and critique several well-known software testing strategies, and describe and apply several well-known software testing techniques. Measuring various characteristics of software and development processes, information can be obtained in order to understand, control and improve our software and development processes.

Advanced IT Project Management 06037251

The aim is to cover the software measurement methodologies and a study of all aspects and tools for software project management. These include:
managing software, people; scheduling and tracking estimation of software cost and project time; Quality management; process improvement; The role of software metrics in software management; Integrating experience factory with software project management; Managing inconsistency in software engineering.
Some project management tools and techniques are used for assessment of software development capabilities. The students decide on a project concept, complete a project-approval process, develop high-level requirements for the project, perform a risk assessment, develop a test plan, and complete a first-iteration prototype. Social, legal, and economic factors are considered.

Service-Oriented Architecture ٠٦٠٣٧2٣٤

This unit learns the standards of service-oriented architecture (SOA) implementation and gain a thorough understanding of the value, benefit, costs, effectiveness, and challenges of moving to an SOA. In this course, you'll master the basics of modeling, designing, and implementing an SOA—and discover the theories and best practices behind interoperability.

Advanced Database Management Systems 06037220

Database management systems are standard tools that enable the storage and retrieval of data within modern information systems. Units introducing database concepts are now an accepted part of most computer science courses. These introductory units tend to concentrate on the use of relational database systems. This advanced module, in contrast, deals with implementation aspects of relational systems and tests the candidates' knowledge of the current enhancements to relational database systems, object oriented database, RDF database and XML database systems.

Component-Based Design 06037335

This course covers a wide range of component-based software development skills, from analyzing and modeling a problem with component-based notations and architectures, to implementing a solution using a particular component technology. The principles and methodologies in component based software development will be

discussed in depth focusing on component-oriented programming and its related technologies. The students are assumed to have data structure as a prerequisite.

Object-Oriented Design (OOD) 0603٧٣٣٦

This course covers the concepts of object-orientation and the application of important design techniques and patterns. The contents include: overview of concepts and motivations; Use cases development; Interaction between objects and state diagrams; verification and validation models; component-based development; semantics for UML and object constraint language.
Some familiarity with basic concepts of object orientation (such as classes, inheritance, and polymorphism), including a little Java, will be assumed.

Software Engineering for Web Applications 06037337

This course is for students who already have some programming and software engineering experience. The goal is to give students some experience in dealing with those challenges that are unique to Internet applications, such as: concurrency; unpredictable load; security risks; opportunity for wide-area distributed computing; extreme requirements and absurd development schedules; User demands for a multi-modal interface.

Cloud Computing 06037310

This unit covers the computing background for large-scale enterprise computing, including the out-sourcing of computing to the cloud. Cloud computing: SaaS, PaaS (e.g. Windows Azure) and IaaS (e.g. Amazon EC2). Web applications in the cloud: ASP.NET and Windows Azure. Enterprise Web services: Windows Communication Foundation (WCF) and the Web Services stack. Interoperability with e.g. Java EE. Large-scale cloud computing using MapReduce. Gathering and processing data using NoSQL data stores, e.g., Cassandra. Virtualization as the basis for scalable enterprise and cloud computing: Xen, KVM, z/VM. Secure virtualization, e.g., Security Enhanced Linux (SELinux). Stream processing: data stream management systems (DSMS) and streaming data warehouses (SDW). CS548 Enterprise Software Architecture and Design is a useful companion course. Programming experience with Java or C# is required.

Formal Methods ٠٦٠٣٧٣٣٨

This course covers a critical appreciation of the problems of incompleteness, inconsistency and ambiguity arising from traditional methods of software specification, and of how formal methods overcome these problems; differentiate between algebraic and operational approaches to formal specification, and be aware of some of the methods used in industry. Nature of formal proof in the prepositional and predicate logics and have a critical appreciation of the need for the 3 valued logic of partial functions, develop software design using VDM;

Data Science and Big Data Engineering 06037321

This course aims at providing students with the theoretical knowledge and practical skills required in the field of data science and big data engineering. It introduces the fundamentals of data science concepts, methods, techniques and challenges and focusses on providing students with a hand-on experience that involves applying data science tools and algorithms to several real-life applications. It also covers the fundamentals big data ecosystem and the various technologies and tools used for scraping, handling, and mining structured, unstructured and semi-structured clusters of data. The course enables students also to gain a hand-on experience regarding big data technology and applications using popular tools such as HDFS, MapReduce, Spark, Hive, Pig, NoSQL and others.

Advanced Software Quality Assurance 06037339

Software quality, SQ factors, components of SQA system. Development and quality plans, quality activities in the project life cycle, reviews, procedures and work instructions. Documentation control, software quality metrics

Artificial Intelligence and Machine Learning 06037352

This course aims at providing students with theoretical knowledge and practical skills concerning Artificial Intelligence (AI) and Machine Learning (ML). Topics covered includingAI fundamentals such as searching, logic, knowledge representation, reasoning, and optimization as well as AI applications such asexpert systems, neural language processing, intelligent agents and robotics. The course also focuses on supervised and no supervised machine learning techniques such as regression, classification decision trees, neural networks and deep learning, genetic algorithms, clustering analysis, dimensionality reduction, features extraction and association rules.

Advanced Selected Topics in Software Engineering 06037340

To be set by the department.