

**Tripoli University**  
**Faculty of Information Technology**  
**Department of Software Engineering**

**Master of Science in Software Development**

**Tripoli, Libya**  
**August 11, 2022**

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## 1. Introduction

The Master of Science in Software Development degree aims to equip the student with the professional and technical skills to specify, design, develop and test modern software systems in a variety of contexts and organisational settings. The degree has been designed for those with some, or good, previous background and experience in their first degree of computer programming languages, software design, computer science, software engineering, secure software, web technologies and for those who would like the opportunity to pursue employment or further research in software systems development. Furthermore, The degree combines theories and practices in the design and development of software systems. It covers a wide range of key topics, including Advanced Software Architecture, Design Solutions, Database Design and Management, Big Data, Software Security and Web Technologies, Cloud Deployment, Distributed Programming, Digital Signal and Image Processing (DSIP), Artificial Intelligence, Machine Learning, Gaming Technologies and Design, Computer Graphics and Software Project Management is also included.

## 2. Program Outcomes

- Student will develop strong theoretical foundations and practical skills to develop a new software as well as to the customize, integrate and further development of existing software.
- Enable the students to use the techniques and tools necessary for the identification of requirements, analysis, software design, programming and testing.
- Improving the ability of students to work systematically with large and complex software systems to control functionality and software qualities important to software development.

## 3. Modules

The following table shows the six compulsory modules that student must be achieved and selected three modules towards the achievement of the master degree. The research methods in information sciences module is an essential.

S. No	Module Code	Course Title	Module Credits	Course Type
1	ITSE511	Advanced Software Architecture	3	Core Modules
2	ITSE513	Software Security and Web Technologies	3	
3	ITSE515	Advanced Programming for Software Development	3	
4	ITSE517	Software Project Management	3	
5	ITSE522	Research Methods in Information Sciences	3	
6	ITSE524	Advanced Database Design	3	
7	ITSE600	M.Sc. Thesis "Dissertation"	6	
8	ITSE501	Digital Signal and Image Processing	3	Elective Modules
9	ITSE502	Gaming Technologies and Design	3	
10	ITSE503	Real-Time Computer Graphics	3	
11	ITSE504	Artificial Intelligence	3	
13	ITSE505	Machine Learning	3	
14	ITSE506	Big Data	3	
15	ITSE507	Software Project Quality Management	3	
16	ITSE508	Software Cost Management	3	
17	ITSE509	Security Management and Governance	3	

### 3.1 The First Semester Structure

S.No	Compulsory modules	Optional modules (choose one)
1	Advanced Software Architecture	Digital Signal and Image Processing
2	Software Security and Web Technologies	Artificial Intelligence
3	Advanced Programming for Software Development	Software Project Quality Management
4	Software Project Management	

### 3.2 The Second Semester Structure

S.No	Compulsory modules	Optional modules (choose two)
5	Research Methods in Information Sciences	Gaming Technologies and Design
6	Advanced Database Design	Real-Time Computer Graphics
7	M.Sc. Thesis "Dissertation"	Machine Learning
		Big Data
		Software Cost Management
		Security Management and Governance

## 4. Core Modules

4.1	Advanced Software Architecture	ITSE511
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The overall aim of this module is to provide the student with the knowledge and skills to develop well-designed and tested software systems. The module will adopt the Object-oriented (OO) approach to software designed and development and apply industry-standard frameworks and practices. The module will also evaluate different software development paradigms and architecture design patterns for modern software systems development. The module focus on the tools and techniques for each of the software processes, from requirements to automated testing.

4.2	Software Security and Web Technologies	ITSE513
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This course will focus on cyber security management in business and within an organization. It will ensure that students will know how to satisfy legislation related to securing personal and sensitive information and how to manage data correctly. To emphasis the importance and wherewithal of information security provision to meet legislation imperatives; To explore the advanced security management issues related to IT usage within and outside the enterprise, the challenges of ensuring information security and the tools available to managers to assure this; Encourage the acquisition of analytical, management and communication skills to identify enterprise assets and threats, argue mitigation actions and communicate such complex concepts to key-decision makers within an enterprise. The module will also deliver significant

practical experience of developing modern full-stack, cross-platform Progressive Web Apps (PWAs) supported by REST Web APIs. The module will cover the entire design, develop and deploy process, focussing on the application of open standards to produce responsive and adaptive designs that will run in the browser but can also be installed as apps on mobile devices. Finally, securing accounts systems will be covered.

4.3	Advanced Programming for Software Development	ITSE515
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The module is intended to extend the student's knowledge to encompass a number of important programming techniques necessary for building a modern computing application. The course content will include techniques in Java to deal with a range of issues drawn from the following: program design using an object-oriented programming model; modelling data using programming language type systems; event and exception programming; advanced features of GUI; thread programming; multithreaded programming; persistence; parallel distributed programming; stream Tokenizer; the Java application of e-business programming "advanced features of client-server", remote control, ; and its advanced database; TCP; TCP/IP, HTTP, DES, RSA programming, will be covered as well. It will also cover the underlying Java run time system and techniques that found in other languages.

4.4	Software Project Management	ITSE517
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This module will provide students with theoretical and practical knowledge of digital products and digital information systems used in project management. It helps in understanding of Information Technology (IT) project management and how it forms an essential backbone for most modern organizations today. The module extends, and enhances student's knowledge in the derivation, from corporate strategy, of business change programs and their comprising projects, and then the chartering, structuring, and governance of those collections of projects and programs within businesses. There is a strong emphasis on understanding the context of the project and program and the extent to which this can be influenced or shaped by the initiation and agreed planning processes and outputs. look at the differences between traditional project management processes, and the more agile options that are developing in most digital industries.

4.5	Research Methods in Information Sciences	ITSE522
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This module aims to enable a student to gain the issues, concepts, methods and techniques associated with science and technology research in general and those most commonly used for research in information technology and management. After the successful completion of this module, student will be able to recognize and explain the main research methodologies used in information technology research, choose the appropriate research methodology, describe the most common data collection and analysis methods used in information systems research, Explain the ethical and professional issues that may arise in research, Communicate both orally and in writing. Finally, Describe the professional environment and different kinds of roles in which information technology research is conducted.

4.6	Advanced Database Design	ITSE524
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The overall aim of this module is to provide the student with theoretical knowledge and practical skills in advanced topics in database systems, big data and modern data-intensive systems. The

specific topics include indexing methods, query processing and optimization strategies for relational database systems. Object relational mapping and object database, distributed database systems, data mining on large databases. Parallel and distributed database (topics such as role of NoSQL, map-reduce, hadoop platform, etc.). contemporary issues and emerging technologies such as On-Line analytical processing (OLAP), data warehouse database-as-a-service (DB clouds).

## 5. Elective Modules

5.1	Digital Signal and Image Processing	ITSE501
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The overall aim of this module is to enable a student to consider the applications of signal and image analysis and computational methods for processing digital signals, including images. The emphasis is on the generation of appropriate "software solution" for digital signal and image processing (DSIP) in the time and frequency domains.

5.2	Gaming Technologies and Design	ITSE502
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This module aims to provide the students thinking about the structure and depth in a game, the principles, practice, and context of interactive 3D modeling, rendering and animation. This module also enable students to understand both technical and aesthetic aspects of 3D animation and performance capture and CGI production and pipelines. The Using of specialist software such as Unity3D and Unreal engines will be covered. This course provides an opportunity to develop your interest in computer games into a set of skills which will help you start a career in this exciting industry.

5.3	Real-Time Computer Graphics	ITSE503
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This module aims to provide the students with graphics programming to include efficient acceleration of rendering of accepted quality images also emphasis the rendering of 3D augmented reality, high-quality graphical applications such as computer games. The students will learn how to research and select appropriate algorithms and techniques to sort out problem and then construct an implementation using Java, C++, a graphics library such as OpenGL or Direct3D, Ray tracing, and shading languages such as GLSL or HLSL.

5.4	Artificial Intelligence	ITSE504
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This module introduces the core concepts of artificial intelligence and machine learning. The principal focus of the module will be on the underlying principles such as knowledge representation, search, decision theory, probability, and statistical learning.

5.5	Machine Learning	ITSE505
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This module aims to provide the students with the knowledge of data-driven process of constructing mathematical models that can make predictions about future situations or take actions in a future situations to optimize some outcome neural networks (one form of ML method), the student will study a range of deep learning tools that allow for the efficient construction of very

complex neural network models, model evaluation, use of several python-based tools, including tensorflow and keras, backpropagation, timeseries processing, transformer networks, generative models, generative adversarial networks, model interpretation.

5.6	Big Data	ITSE506
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This module aims to provide the students with the knowledge of data science, entropy, Regression Models, Various Concepts in Machine Learning Modeling, Classification Models, Classic Classifiers, Model Pathologies and Overfitting, Clustering & Pattern Recognition, Introduction to cloud computing, Natural Language Processing, First neural nets, DL & Big Data Applications, Finally, the module will be also cover Deep learning models.

5.7	Software Project Quality Management	ITSE507
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Quality is a highly competitive market in software projects development. Quality is a key measure of project success. The course essentially to clearly define the quality requirements of a software product. Moreover, it teaches to plan and perform a systematic set of activities in software quality assurance and use ‘quality filters’ such as formal technical reviews for detecting errors. Software quality management module includes: Basic Concepts of software quality, software quality assurance, and formal technical reviews. This course will enable students to explain software quality, the factors that impact quality, and the metrics used to assess product quality.

5.8	Software Cost Management	ITSE508
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This module introduces the student to the applied and advanced concepts and methods of software development and software cost management and cost projects from both a theoretical and a real-world approach. The module content includes measuring the size of a software product that is necessary for estimation and project planning. It is also required for normalizing the data across projects. Approaches used for measuring the size of software products include: Direct measure of the technical size of a product using lines of code, and Indirect measure of the functional size of a product using function points.

5.9	Security Management and Governance	ITSE509
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Effective real-world security is an essential topic in modern technological projects. However, this module addresses cyber security management. This module will give students an understanding and appreciation of the need for effective security management. Students will study different approaches to management in practice, including key standardized approaches and the fundamental importance of a risk-based approach. After completing the module, students will also understand key components of practical cyber security management, including the impact of law and regulation, the importance of auditing, and the key role of people in achieving cyber security.

6.

**M.Sc. Thesis "Dissertation"**

**ITSE600**

The project is intended to provide the student with the opportunity to demonstrate competence in applying the knowledge and skills acquired during the taught modules.