MASTER OF COMPUTER SCIENCE

COURSE SYNOPSIS

CORE COURSES

MECS1013 – Advanced Theory of Computer Science
The course presents the most fundamental theories and concepts that provide a mathematical sense to answer some of the basic question as can the given problems be solved by computation and how efficiently can a given problem be solved by computation. The course provides an in-depth study to the main models and concepts of the mathematical theory of computation, including automata and languages, computability and complexity. The emphasis of the course will be on the ability to move from a concrete problem to a mathematical model, and after proving things about the mathematical model to correctly interpret what we have learned about the concrete problem.

MECS1023 – Advanced Data Structure and Algorithm
This course provides a solid or advanced understanding to theory and practice of data structure and the study of algorithms analysis. Students will learn the most common data structures and the advanced concepts of the data structure such as B-trees, heaps and priority queues. Further, students will be exposed to the techniques used in the development and analysis of data structures and its algorithms. The analytical abilities of the students in this course are to analyze the performance of data structures and algorithms. At the end of the course, students should be able to implement and apply the theory and concepts of the advanced data structure in assignments.

MECS1033 – Advanced Artificial Intelligence
Increasing practical implementation of several Soft Computing approaches in real world problems has grounded this course to explore the intensity of SC techniques. As such, Neural Computing, Nature Inspired Computing and Granular Computing provide foundations for the conception, design and development of the intelligent systems. By hybridizing such paradigms, it has been possible to create a number of successful and sophisticated solutions to complex real-world problems. The aim of this course is to provide the student with knowledge of the principles, mechanisms and theory behind SC and their applications. The theory of each SC techniques is given in a conceptual and in a mathematical way; the practice is discussed with stress on the outcomes of successful applications and on the intricacies of the actual implementations

MECS1043 – Advanced Computer System and Architecture
This course covers the general principles of Research Methodology that are applicable to Computing and Digital Technology discipline. It discusses the fundamental process in conducting an academic research. The theoretical and practical aspects of preparing a research proposal presented. Among topics that will be covered are introduction to research and its philosophy, problem formulation and research objectives, literature review, research methodology and design, data collection procedures, data analysis, research proposal and thesis preparation and research management.

ELECTIVE COURSES

MCSD2213 – Advanced Analytics for Data Science
This course provides a solid or advanced understanding on the use of analytics approach in the examination of data or content to discover deeper insights, make predictions or generate recommendations using sophisticated techniques and tools on real world problems. Students will learn descriptive analytics using advance tools to gain insight into the past. Students will also acquire understanding of predictive analytics using statistical and machine learning techniques to understand future outcome. The prescriptive analytics provides knowledge in simulation and optimization to quantify the effect of future decision to advise possible outcomes before decision is made. The analytical abilities to be acquired by students in this course are to reliably select analytic techniques or method and specify steps involve in the analysis process and to interpret analytically the results obtained from data analytics techniques or tools. At the end of the course, students should be able to implement and apply the knowledge on analytical techniques or tools in real world problems and able to make an informed decisions or recommendation through analytical interpretations of results.

MCSD1233 – Big Data Management
This course provides a basic fundamental of big data architecture and management. Students will learn the big data processes and the current big data technologies that are available. Further, students will be exposed to the big data platform ecosystem for big data manipulation. The big data management will be explored for the best practice in managing and manipulating large amount of data. At the end of the course, students should be able to understand the architecture and management of big data and also can develop simple application of big data handling using particular platform in assignment.

MCSD2123 – Massive Data Mining and Streaming
This course aims to introduce students to basic principles and methods of machine learning algorithms that are typically used for mining large data sets. This course also will provide students with the skill and knowledge to build system and capable of analysing huge amount of data. It explains the principle of distributed file systems and shows Map reduce as a tool for creating parallel algorithms. Typically, it covers the algorithms that used for analysing networks, fundamental principles of techniques such as decision trees and support vector machines and finally neural network architecture. The students will gain practical understanding through a coding exercise where they will implement and apply one machine learning algorithm on a particular large dataset.

MECS1073 – Cryptographic Engineering
This is a survey and seminar course that gives an overview on the concepts of advanced database topics such as databases to handle objects, unstructured data, semi-structured data; distributed databases and data warehouses.   The course opens with a sequence of lectures by the instructor to provide background on post relational database systems. This sets the stage for student review paper on their topic of interest and a practical group project in databases to expose them to issues and research solutions regarding emerging database technologies.

MECS2213 – Cyber Threat Intelligence

With the rapid increase of cyber attacks, accurate security information is becoming more difficult to obtain. This course exposes the students to a complete cycle of CTI which includes hunting, behavioral patterns extraction, clustering and correlation, threat actor attribution until taking it down. Besides, it also explains the Cyber Kill Chain process in launching an attack. Understanding CKC is important in detecting cyberthreat. CTI will be explained in 3 different levels; strategic, tactical and operational.

MECS1023 – Information Security Governance and Risk Management

The subject is aimed at imparting knowledge and skill sets required to assume the overall responsibilities of administration and management of security of an information system. This subject covers issues related to administration, management and governance of security of information systems. Topics include auditing and data management, risk management (risk identification, risk analysis, risk control), contingency planning, incident handling and risk governance. The subject will study in detail principles and tools related to these topics. The subject will also cover security standards, evaluation and certification process, security planning, ethical and legal issues in information and privacy.

MECS2423 – Virtual and Augmented Reality Environment

This course focuses on Virtual and Augmented Reality (AR) systems, algorithms, and applications. With the proliferation of powerful, always-on, Internet-connected mobile devices such as smartphones, tablets and newer head-worn displays, sophisticated applications that combine location-specific content with the current user view are becoming more possible. Application developers for these devices require a broad set of technical and design skills to create effective interactive AR experiences. Topics will include vision-based marker and feature tracking, model-to-view space transformations, mobile application development, and AR interaction techniques

MECS2433 – Advanced Computer Graphics and Image Processing

The aim of the course is to give understanding of sound knowledge and theory of Computer Graphics & Image Processing. First part of the lecture will cover basic and advanced theory of Computer Graphics. Second part of the lecture will deal with Image Processing and Pattern Recognition.

MECS2413 – Advanced Human Computer Interaction

This course provide the students with advanced topics in Human Computer Interaction (HCI). The course give students practice and theoretical knowledge of the use of HCI methodologies for both design and evaluation, different types of HCI experimentation, including both quantitative and qualitative methods. Students are expected to participate in group activities, student-led presentations and discussion of several research papers in HCI.

MECS2323 – Advanced Computer Network and Cloud Computing

This course focuses on advanced topics in the computer network. Topics covered include the technical knowledge of IPv6, concept of SDN, and implementation of wireless, sensored, Adhoc and 5G network. The second part is Students will have an opportunity to perform research in these and other areas of computer network and cloud computing.

MECS2413 – Advanced Computer System & Architecture
This course focuses on advanced topics in the design and analysis of computer architectures. Topics covered include instruction set design, pipelining, instruction-level parallelism, high-speed memory systems, storage systems, interconnection networks, and multiprocessor architectures. Students will have an opportunity to perform research in these and other areas in the field of computer architecture.

MECS2343 – Blockchain Technology
This course focuses on the introduction to blockchain technology and its applications. Block chain is a technology which will lead majority of data storage and information sharing for upcoming many industries. In this course students will understand about fundamentals of blocks, blockchain protocol as well as the fundamental of cryptographic primitives used in the Blockchain and smart contract. The protocol behind the chain formation of blocks with data stored will be understood with practical implementations. Consensus Protocol creation for blockchain formation will be created using python script to understand blockchain from very core. As a hands on, students will be introduced with a development of blockchain application through Solidity Smart Contract platform.

MEEH1293 – Intelligent Engineering Solution
In an increasingly competitive world where more and more data is becoming available from web documents, digital media, financial markets, and wireless sensors, there is a great need for new intelligent systems that can analyse the huge amounts of data and make the right decisions. These intelligent systems can analyse the stock markets and make robust predictions, control and optimize factory productions in an uncertain environment, improve transportation safety, improve the quality of life of the elderly or entertain the children. This course provides students a solid theoretical foundation, a set of practical tools and project that allow the understanding and the design of intelligent systems and services that fulfils the needs for a dynamic and everchanging industry and offer exciting opportunities for research.

MKET1423 – Wireless Communication Systems
This course introduces students to introductory and advanced level of wireless communication technologies. In the beginning students will be presented with the concept of wireless communication systems and mobile radio propagation. Students will then be illuminated on MIMO technology in mobile communication. Next, the course will describe on cellular concepts that will include small cell networks. This is followed by details on the overall evolution of mobile communication system. Finally, this course will cover on different multiple access techniques used in wireless communication systems.

MKET1523 – Internet of Things Technology
The course provides students with a technical background to the Internet of Things (IoT) which includes its concept, architecture and applications. It also gives the underlying communication protocols and technologies. The course has a significant practical element that will be delivered during lab sessions in which students are expected to complete exercises involving system design, device programming and cloud development.

RESEARCH

MECS XX80 – Dissertation II
This is the initial part of a 2-part Master dissertation that every student must fulfil successfully. Students are required to propose a suitable research topic under the supervision of a lecturer as a supervisor. Students must meet regularly with supervisor who will monitor their continuous progress. At the end of this course, students are required to prepare a report and present their proposal.

MECS XX80 – Dissertation III
This is the second part of a 2-part Master dissertation that every student must fulfil successfully. In this installation, students are required to execute the next phases of their development plan from Part 1. Students are now required to code and integrate the different modules that make up the proposed project. Students will test the developed modules and the final fully-integrated project following software development and research testing practices. Students must meet regularly with supervisor(s) who will monitor their continuous progress. Students are required to prepare a report and present their final work.