



## College of Engineering

### Master of Science in Telecommunications and Networks Engineering

Year I - Semester 1		
Course Code	Course Title	CH
EEM 600	Principles of Artificial Intelligence	4
EEM 601	Statistical Data Analysis and Research Methods	4
EEM 602	Internet of Things (IoT)	4

Year I - Semester 2		
TNE 603	Modern Telecommunications Systems	4
TNE 604	Advanced Communication Networks	4
TNE 605	Special Topics in Communications	4

Year II - Semester 3-4		
EEM 699	Thesis	12

Total Credit Hours 36

**Course Descriptions:**

**Year I - Semester 1**

Course Code:	<b>EEM 600</b>	Course Title:	<b>Principles of Artificial Intelligence</b>
Course Description:	<p>Historical background and foundations of artificial intelligence. Major Development of AI; the Philosophical Background. Introduction to concepts of Intelligent agents and their use for Engineering applications. The search algorithms and concepts (A* search and iterative deepening methods). Classes of AI and Concepts of computational AI. Artificial Intelligence versus Machine learning and Deep Learning. AI as Logical formalisms, propositional and first order predicate calculus Planning, from STRIPS to other Partial Order Planning Probability and uncertainty, the Bayesian inference and Bayes computational networks. Machine learning. AI based decision trees. Classes of ANN Neural Nets. The hill climbing, and genetic programming (algorithms). Other classes of Engineering AI, Vision systems, IoT, Bigdata, Robotics, and Computational Systems. AI and Ethics: The Ethical Principles of AI. AI Management, principles and fundamentals.</p>		
Course Code:	<b>EEM 601</b>	Course Title:	<b>Statistical Data Analysis and Research Methods</b>
Course Description:	<p>This applied course is designed for graduate students. The goals of the course are to develop the skills necessary to identify an appropriate statistical technique, estimate models, analyze data, and interpret results for independent research and to critically evaluate contemporary research using advanced quantitative methods. The course will include descriptive and inference statistics, hypothesis testing, confidence intervals, processing and analysis of research data using different parametric and nonparametric statistical methods, regression analysis for linear and nonlinear models, and introduction to the design of experiments. Research methods, research ideas through literature survey, planning and designing specific methods for conducting research, analyzing data using scientific methodology and presenting research results in a systematic and objective way.</p>		
Course Code:	<b>EEM 602</b>	Course Title:	<b>Internet of Things (IoT)</b>
Course Description:	<p>This advanced course delivers an understanding of Embedded Systems and Internet of Things and their enabling smart everywhere applications, like smart grid, smart city, smart home, industrial automation, telemetry, etc. Typical architectures of IoT systems are introduced, including microcontrollers and sensors. It is industrially focused, tailored to the demands of companies that design and manufacture mobile electronic equipment which interfaces with wireless networks and applications. Students will also learn how to use typical IoT enabling communications technologies,</p>		

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## Year I - Semester 2

Course Code:	<b>TNE 603</b>	Course Title:	<b>Modern Telecommunications Systems</b>
Course Description:	The modelling of the corresponding channels as well as their implications on the design and architecture of modern wireless telecommunications systems. The fundamental multiplexing and space time coding concepts as well as the principles and challenges of signal processing for broadband communications are also covered. This course also includes the latest technologies used in next generations of cellular and mobile networks and their applications.		

Course Code:	<b>TNE 604</b>	Course Title:	<b>Advanced Computer Networks</b>
Course Description:	This course covers advanced topics in networking and data communications and develops an in-depth understanding of issues relating to network services provision. It considers the modelling, simulation, planning and optimization of communication networks. It also investigates different forms of networking algorithms and provides students with an insight into cutting-edge and emerging network technology.		

## Year II - Semester 3,4

Course Code:	<b>TNE 605</b>	Course Title:	<b>Special Topics in Communications Systems</b>
Course Description:	<p>Depending on the request of the requirements of majority of the M.Sc. Candidates one of the advanced topics in communications systems will be offered. This course will focus on one or multiple of the following topics that is used in advanced and modern communications systems</p> <p><u>Optical Communications</u>: covering the design and operating characteristics of advanced digital optical fibre communication systems. Students will obtain an understanding of the optical sources; principles of optical modulation; characteristics of optical fibre waveguides, optical amplifiers and optical receivers. The role of these components in determining the performance of practical optical communications systems will be applied.</p>		

	<p><u>Multimedia Systems</u>: This part is dedicated to introducing the fundamentals of data, image, and video coding and compression technologies. Basic tools such as multidimensional transforms will first be addressed, and then practical standards for visual compression will be extensively studied. Also, aims to introduce critical issues of reliable transmission of multimedia contents where data transmission may suffer from packet losses, bit errors, packet delay &amp; jitter and out-of-order packet delivery, and provide an overview of various techniques to counter those effects of networks with focus on robust coding and error concealment.</p> <p><u>Satellite Communications</u>: This part aims to provide students with an understanding of the operation of space technologies that are used to deliver satellite data for various applications. It features an overview of the space environment, spacecraft or satellite design principles, configuration and sub-systems, along with the techniques to undertake a basic space mission analysis and design for satellite applications.</p> <p><u>Cyber and Network Security</u> : This part Imparts the principles and practical knowledge of foundational of computer network security; identify network security threats in a systematic way; exploiting vulnerabilities in common computer system architectures; Impart a deep understanding of common techniques to implement countermeasures, experience with key services and tools used for computer network security purposes; designing, implementing and testing security solutions for computer network applications</p> <p><u>Antenna and propagations</u>: Antennas and the propagation of radio signals on the physical layer are a fundamental aspect of telecommunications systems. It is essential to design devices that radiate electromagnetic waves over an air interface efficiently. Therefore, this course aim design suitable antenna to be used in wireless devices to operate and comply with suitable standards.</p>
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Course Code:	<b>EEM 699</b>	Course Title:	<b>Thesis</b>
Course Description:	The last semester of the Master program provides the student with an opportunity to undertake extensive investigation of an advanced or specialized topic relating to his/her MSc program; to provide the opportunity to plan and execute a significant project of research, investigation or development.		