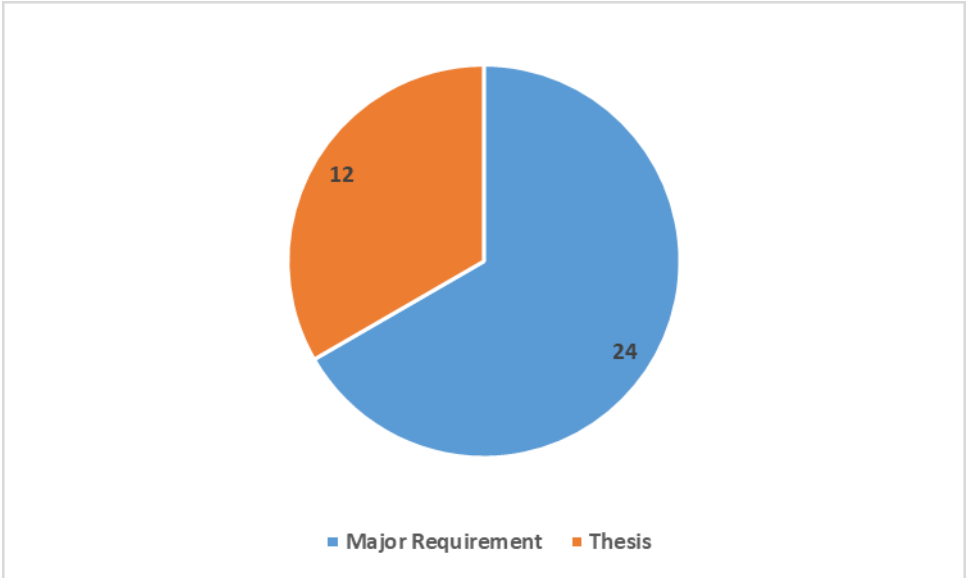


# Master of Science Program in Artificial Intelligence Systems

## Program Components



University Requirement (UR)	--
College Requirement (CR)	--
General Studies Compulsory (GSCC)	--
Major Requirement (MR)	<b>24</b>
Major Elective (ME) <sup>1</sup>	--
General Studies Elective (GSE) <sup>2</sup>	--
Training (Internship)	--
Thesis	<b>12</b>
<b>Total Credit (CRD)</b>	<b>36</b>

<sup>1</sup> Not Applicable.

<sup>2</sup> Not Applicable

## Detailed Study Plan

### Year 1 - Semester 1

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
EEM 600	Principles of Artificial Intelligence	4	0	4	MR	--	YES
EEM 601	Statistical Data Analysis and Research Methods	4	0	4	MR	--	YES
EEM 602	Internet of Things (IoT)	4	0	4	MR	--	YES

### Year 1 - Semester 2

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
AIE 603	Machine Learning	4	0	4	MR	Completion of three core courses	YES
AIE 604	Deep Learning Application	4	0	4	MR	Completion of three core courses --	YES
AIE 605	Special Topics in Artificial Intelligence	4	0	4	MR	Completion of three core courses --	YES

### Year 2 - Semester 3 & 4

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
EEM699	Thesis	0	36	12	MR	Completion of six core courses.	No

## Course Description

### Major Requirement Courses Descriptions (MR):

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. Classes of AI and Concepts of computational AI. Artificial Intelligence verses 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. The hill climbing and genetic programming. Other classes of AI Computational Systems. The Ethical Principles of AI. AI Management, principles, and fundamentals. Data driven AI and Depth of machine learning, self-driving cars, intelligent assistants (e.g., Alexa), chatbots (e.g., ChatGPT). Applying intelligent algorithms to real engineering problems using recent coding platforms.</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 appropriate statistical techniques, 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>		

Course Code:	<b>AIE 603</b>	Course Title:	<b>Machine Learning</b>
Course Description:	<p>The purpose of the Machine Learning ML course is to present and develop practical ML skills using different ML techniques; Supervised learning, like Linear Regression, Least Squares, Statistical Estimation: MLE, MAP, Naïve Bayes Classifier, Linear Classification Models: Logistic Regression, Support Vector Machines (SVMs), Multi-class SVM, Kernels, Support Vector Regression. Unsupervised learning; like: Clustering: K-Means Clustering, Spectral Clustering, Agglomerative Clustering. Reinforcement learning in both classical and deep learning techniques. In addition to dimensionality Reduction for PCA, SVD, ICA, autoencoders, and anomaly detection. Learners will learn how to extract predictions from data using a programming coding environment. All the computational algorithms will be used for advanced engineering aspects of the applications.</p>		

Course Code:	<b>REE604</b>	Course Title:	<b>SOLAR THERMAL ENERGY</b>
Course Description:	Management and storage of heat, mechanical, and electrical energy are treated. The following forms of storage: Thermal energy storage: heat reservoirs, phase transition utilization and chemically bound heat are presented. Mechanical energy storage: Spin Wheels, pumps, turbines and heat recovery and Electrochemical storage of electrical energy		

Course Code:	<b>AIE 604</b>	Course Title:	<b>Deep Learning Applications</b>
Course Description:	This course provides a comprehensive exploration of deep learning applications, covering essential neural network architectures and the three main paradigms of deep learning: supervised, unsupervised, and reinforcement learning. Students will learn to develop and deploy advanced machine learning models with applications in real-world engineering and industry. Key topics include convolutional neural networks (CNNs) for image processing, recurrent neural networks (RNNs) and LSTMs for sequential data, optimization methods like Adam, and regularization techniques such as dropout and batch normalization. The course also introduces students to deep reinforcement learning (DRL) Basics for decision-making and autonomous systems. Applications covered in this course span IT, healthcare, FinTech, computer vision, traffic management, agriculture and others. this course also helps students enhance their innovation and entrepreneurship abilities, preparing them for impactful roles across diverse sectors.		

Course Code:	<b>AIE 604</b>	Course Title:	<b>Special Topics in Artificial Intelligence</b>
Course Description:	AI has several demanding engineering applications. For this course, depending on the request of the requirements of majority of the M.Sc. Candidates, special topics in AI in engineering will be offered. This course will focus on one (or multiple) of the following topics that is used in Artificial Intelligence. Topics include AI ENGINEERING FOR HEALTHCARE, MECHATRONICS AND AI FOR INDUSTRY 4.0 ENGINEERING, EDUCATIONAL AI SYSTEMS, CIVIL ENGINEERING AND TRANSPORTATION AI SYSTEMS, ROBOTICS ENGINEERING APPLICATIONS, NATURAL LANGUAGE PROCESSING SYSTEMS, INTELLIGENT ASSISTANTS.		

Course Code:	<b>AIE 604</b>	Course Title:	<b>Special Topics in Artificial Intelligence</b>
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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.		