Professional Master in Artificial Intelligence

Program General Requirements

To obtain a professional master's degree in artificial intelligence, the student must complete at least (39) accredited credits, including the applied project, distributed as follow :

- (21) accredited units for compulsory courses
- (15) accredited units for elective courses
- (3) accredited units for the applied project

The following are the details of the courses:

(21) credit units for compulsory courses:

Course Code	Course Title	Required or Elective	Pre-Requisite Courses	Credit Hours
EMAI 610	Programming for AI	Required		3
EMAI 620	Foundation of AI	Required		3
EMAI 630	Advance Artificial Intelligence	Required		3
EMAI 640	Machine Learning	Required		3
EMAI 611	Advance Programming for AI	Required	EMAI 610	3
EMAI 631	Natural Language Processing	Required	EMAI 630	3
EMAI 641	Deep Learning	Required	EMAI 640	3
EMAI 698	Applied Project	Required		3

(15) credit units for elective courses:

Course Code	Course Title	Required or Elective	Pre-Requisite Courses	Credit Hours
EMAI 621	Statistical Learning Theory	Elective		3
EMAI 642	Advanced Multimodal Machine Learning	Elective	EMAI 640	3
EMAI 643	Machine Learning for Trading	Elective	EMAI 640	3
EMAI 644	AI for Cybersecurity	Elective	EMAI 640	3
EMAI 651	Computer Vision	Elective	EMAI 640	3
EMAI 652	Medical Image Analysis	Elective		3
EMAI 653	Fundamentals of Bioinformatics	Elective	EMAI 630	3
EMAI 660	Independent Study	Elective		3
EMAI 621	Selected topics	Elective		3

(3) credit units for research project

Course Code	Course Title	Required or Elective	Pre-Requisite Courses	Credit Hours
EMAI 698	Applied Project	Required		3

Courses Description

Course Code	Course Title	Pre-Requisite Courses	Credit Hours
EMAI 610	Programming for AI	-	3
This course gives an introduction to Python programming for AI systems. The course covers data types, control flow, object-oriented programming, programming tools (Python, NumPy, and Pandas), and some mathematical and linear algebra operations.			

Course Code	Course Title	Pre-Requisite Courses	Credit Hours
EMAI 620	Foundation of AI	-	3
This course introduces students to the important mathematical concepts and background required to understand modern machine learning. Topics include linear algebra, Analytic geometry, Vector calculus, Probability and distribution, Continuous optimization**.**			

Course Code	Course Title	Pre-Requisite Courses	Credit Hours
EMAI 630	Advance Artificial Intelligence	-	3
This course provides a board introduction to intelligent agents, knowledge representation, planning, search techniques, and reasoning under uncertainty. The course also covers various issues and concerns related to artificial intelligence, such as ethics and bias.			

Course Code	Course Title	Pre-Requisite Courses	Credit Hours
EMAI 640	Machine Learning	-	3
This course gives a theoretical and practical introduction to various machine learning techniques. Topics including supervised (linear regression, kernel methods, and neural network), unsupervised (clustering and dimensionality reductions), and self-supervised learning models will be covered during this course.			

Course Code	Course Title	Pre-Requisite Courses	Credit Hours
EMAI 611	Advance Programming for AI	EMAI 610	3
This course provides an advanced overview of concepts and methodology required to program for artificial intelligence systems. The course focuses on object-oriented programming, data analysis, and linear algebra and calculus operations that are essential to understanding and developing machine learning and deep learning models.			

Course	Course Title	Pre-Requisite	Credit

Code		Courses	Hours
EMAI 631	Natural Language Processing	EMAI 630	3
This course describes different tasks in natural language processing (NLP), including syntax and semantic analysis, builds NLP models to solve real-world problems. Students will have proficiency in a selected tool/language, like Python, to solve select problems, like sentiment analysis.			

Course Code	Course Title	Pre-Requisite Courses	Credit Hours
EMAI 641	Deep Learning	EMAI 640	3
This course introduces students to deep learning methods and common challenges faced in solving real-world problems. Topics include artificial neural network, convolutional neural network and its applications in computer vision, sequence models and their applications in natural language processing, transfer learning, overfitting, hyperparameter tuning and regularizatio.			

Course Code	Elective Course Title	Pre-Requisite Courses	Credit Hours
EMAI 621	Statistical Learning Theory	-	3
This course gives a broad introduction to various statistical aspects of learning theory, focusing on the interplay between modeling and optimization aspects with an emphasis on least square regression, decision tree, and SVM. The course also provides an introduction to key ideas in analyzing properties of learning algorithms like generalization, convergence, complexities, and stability. An introduction to time series machine learning models will be covered in the course. Other topics like bagging and boosting will also be introduced throughout the course. A number of applications of statistical learning theory will be covered.			

Course Code	Course Title	Pre-Requisite Courses	Credit Hours
EMAI 642	Advanced Multimodal Machine Learning	EMAI 640	3
It is a multidisciplinary course with the focus of integrating and modeling different communicative modalities not limited to visual messages, acoustic and linguistic etc. It will help to develop skills to systematically learn any concept along with introducing advanced topics in machine learning. Furthermore the skills to analyze, understand and pre-processing of data before transforming it to the format which is understandable for machine learning algorithms will be developed. It also aims to enhance one's capabilities to understand which machine learning algorithm is more suitable for a specific problem and how to train, test and deploy the machine learning models in real world.			

Course Code	Course Title	Pre-Requisite Courses	Credit Hours
EMAI 643	Machine Learning for Trading	EMAI 640	3
This course introduces students to the real-world challenges in implementing trading techniques focused on machine learning, including algorithmic steps from data analysis to market orders. Students will understand how different machine learning algorithms are implemented on financial market data, and they will analyze actual data and create trading and financial models. Students will also learn how to design, train, and evaluate machine learning algorithms that underpin automated trading strategies. This course gives them the chance to analyze data using AI skills, whether they choose to pursue a new job in finance, launch their road to a quant trading career, or master the emerging AI applications in quantitative finance. The focus is on how to apply probabilistic machine learning approaches like linear regression, KNN and regression trees etc. in actual stock trading decisions. Several industry case studies will be studied and discussed. Students will work together in teams on selected case studies or hypothetical scenarios to implement trading techniques focused on machine learning. Finally, they will write and present their assessment reports and findings.			

Course Code	Course Title	Pre-Requisite Courses	Credit Hours
EMAI 644	AI for Cybersecurity	EMAI 640	3
In this course, students will learn about preparing the data for machine learning, common machine learning techniques and tools, and their applications in cyber-security such as detecting anomalies, detecting known types of attacks like injections, clustering user activities, adversarial learning, intrusion detection systems …etc.			

Course Code	Course Title	Pre-Requisite Courses	Credit Hours
EMAI 651	Computer Vision	EMAI 640	3

This course covers the latest developments in vision AI, with a sharp focus on advanced deep learning methods, specifically convolutional neural networks, that enable smart vision systems to recognize, reason, interpret and react to images and videos with improved precision. The course enables the student to develop knowledge regarding Computer Vision techniques and best practices with hands-on experience in delivering Computer vision projects. By the end, students will:

- Be familiar with fundamental concepts and applications in computer vision
- Understand low-level image and video processing
- Grasp the principles of state-of-the art Deep Learning Frameworks for Computer Vision
- Gain knowledge of high-level vision detection, recognition and understanding tasks
- Develop practical skills necessary to build highly-accurate, industrial computer vision applications

Course Code	Course Title	Pre-Requisite Courses	Credit Hours
EMAI 652	Medical Image Analysis		3
This course will provide a strong background in biomedical imaging technology and biomedical image analysis. It provides the skills and knowledge to quantify information in medical images such as x-ray, MRI, and other. The course introduces students to learn how to analyses images and how to integrate the analysis with data coming from other sources. The students will be introduced to the automation of personalized diagnosis.			

Course Code	Course Title	Pre-Requisite Courses	Credit Hours
EMAI 653	Fundamentals of Bioinformatics	EMAI 630	3
This course Increases awareness of the utility and need of computational solutions in the biosciences. Students will evaluate the quality of biological data, analyze biological quantitative data using machine learning techniques, identify and critically evaluate approaches for analyzing a given –omics dataset, and provide experience in analyzing -omics big data within the R statistical programming environment.			

Course Code	Course Title	Pre-Requisite Courses	Credit Hours
EMAI 660	Independent Study	-	3
This course is designed to provide the student with an opportunity to gain and enhance Artificial intelligence knowledge and to explore an area of interest related to specific field.			

Course Code	Course Title	Pre-Requisite Courses	Credit Hours
EMAI 621	Selected topics	-	
This course emphasizes on the recent technologies and trends in any field of Artificial Intelligence. The course has to be approved of by the Department before being opened.			

Course Code	Course Title	Pre-Requisite Courses	Credit Hours
EMAI 698	Applied Project		3
This course will integrate the concepts, skills, insights and experience gained throughout the course into a project. In this course, students will conduct research and create an independent, comprehensive practical project related to the field of AI and present their results at the conclusion of the course.			