M.Sc. in Machine Learning and Computational Intelligence

Program Components

Course Type	CRD
University Requirement (UR)	
College Requirement (CR)	
General Studies Compulsory (GSCC)	
Major Requirement (MR)	**33**
Major Elective (ME)[1]	
General Studies Elective (GSE)[2]	
Training (Internship) **Yes**	
Total Credit (CRD)	**33**

Detailed Study Plan

Year 1 - Semester 1

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITML 601	Artificial Intelligence & Natural Language Processing	4	0	4	MR	-	Yes
ITML 602	Machine Learning	4	0	4	MR	-	Yes
ITML 603	Research Methodology	4	0	4	MR	-	Yes

Year 1 - Semester 2

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITML 604	Deep Learning	4	0	4	MR	-	Yes
ITML 605	Robotics and Computer Vision	4	0	4	MR	-	Yes
ITML 608	Advanced Topics in Computational Intelligence	4	0	4	MR	-	Yes

Year 2 - Semester 3

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITML690	MSc Thesis	0	27	9	MR	Pass 20 credits	Yes

Course Description

Course Code: ITML601 **Course Title:** Artificial Intelligence & Natural Language processing (4-0-4)
This course is concerned with the latest advancement in the field of Artificial Intelligence and Natural Language Processing. Topics include knowledge representation, classical logic, fuzzy systems, expert systems, heuristic search, translation, summarization, sentiment analysis, opinion mining, spam filtering, question answering, chatbots, and others.

Course Code: ITML 602 **Course Title** Machine Learning (4-0-4)
This course focuses on machine learning techniques related to supervised learning, unsupervised learning, semi supervised learning and reinforcement learning. Topics include regression such as linear regression and logistic regression, classification such as KNN, SVM, neural networks, decision trees, and Naïve Bayes. Clustering such as K-means and SOM. Reinforcement learning such as Q-learning. Simulation techniques such as genetic algorithms and PSO. Ensemble learning, boosting and bagging with Some hybrid model cases are investigated.

Course Code: ITML 603 **Course Title:** Research Methodology (4-0-4)
The course provides critical understanding of major research paradigms, research methodology and professional issues, research design, research ethics, and research methods and techniques of data collection and analysis appropriate to Artificial Intelligence (AI) and Machine Learning (ML) research. Topics include all aspects related to the process of developing new research questions/solutions through literature survey, planning, proposing scientific methodologies, and collecting experimental results. In addition to, materials related to scientific publishing, legal IT & AI issues and regulations, code of ethics and plagiarism, AI ethics, article critique, writing scientific proposal, writing research papers, writing master level thesis, and presenting research papers to audience.

Course Code: ITML 604 **Course Title:** Deep Learning (4-0-4)
This course demonstrates critical knowledge and recent advancements in Deep Learning. Topics include: Convolution Neural Networks (Different Architectures: AlexNet, ResNet, VGG, LeNet etc..., Convolution, Pooling, Fully connected networks, etc..), Recurrent Neural Networks (Long-Short Term Memory (LSTM), Bidirectional LSTM, Embedded Networks etc ...), Deep Belief Networks, Unsupervised Deep Learning (Restricted Bolzmann Machines. Autoencoder (Encoder and Decoder), Deep Embedded Clustering). Various strong applications, based on Deep Learning Models, would be investigated.

Course Code: ITML 605 **Course Title:** Robotics and Computer Vision (4-0-4)
This course provides an in-depth exploration of the integration between robotics and computer vision, focusing on the principles, techniques, and algorithms that enable autonomous systems to perceive and interact with their environments. Topics include robot kinematics, dynamics, control systems, image processing, feature extraction, and object recognition, all while engaging in hands-on labs and projects.

Course Code: ITML 608 **Course Title:** Advanced Topics in Computational Intelligence (4-0-4)
This course covers advanced topics from various areas of Machine Learning and Computational Intelligence.

Course Code: ITML 690 **Course Title:** MSc Thesis (0-27-9)
This course is a research-focused requirement where it focuses on independent, original research under faculty supervision. It involves identifying a research problem, reviewing literature, designing a methodology, collecting and analyzing data, and presenting findings in a formal thesis.