

Detailed Syllabus

Subject Code	21M71CS112	Semester Even	Semester M.Tech I Session 2022- 2023 Month from July - December
Subject Name	Advances in AI		
Credits	3	Contact Hours	3
Faculty (Names)	Coordinator(s)	Dr. Ankit Vidyarthi	
	Teacher(s) (Alphabetically)	Dr. Ankit Vidyarthi	

S.No.	Description	Cognitive Level (Blooms Taxonomy)
C161.1	Understand the characteristics & significance of AI	Understanding Level (Level III)
C161.2	Analyze several AI/ML techniques to yield and process information from open real-world data sources	Analyzing Level (Level II)
C161.3	Apply the concept of Machine Learning for industrial applications	Applying Level (Level IV)
C161.4	Evaluate the use of the Machine Learning algorithms towards pattern mining	Evaluating Level (Level V)
C161.5	Design algorithmic frameworks for solving time series data patterns	Creating Level (Level VI)

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1	Introduction	Introduction of AI, introduction of Machine Learning, Significance of AI and ML, Application areas, model pipelining	3
2	Mathematical Formulation	Matrices and its operations, Overview of probability theory, Bayes networks, Independence, I-Maps, Undirected graphical models, Bayesian and Markov networks	5
3	Models and Learning	Learning, Types of learning, Local models; Exact inference, Clique trees, Belief propagation, Tree construction, applications solving problems	6

4	Optimization and Inference	Introduction to optimization, Approximate inference: sampling, Markov chains, MAP inference, Inference in temporal models; Learning graphical models	6
5	Estimation	Parameter estimation, Bayesian networks and shared parameters, structure learning, Partially observed data, Dimension reduction: PCA, LDA	8
6	Decision making	Gradient descent, Expected Maximization, Hidden variables, HMM, Undirected models, Undirected structure learning, Causalty, Utility functions, Decision problem, Expected utility	8
7	Classification and Segmentation	KNN, SVM, NN and its types, K-means, FCM, Introduction to Deep learning for classification and segmentation	6
Total number of Lectures			42

Evaluation Criteria	
Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	Attendance (15Marks), Assignment/Quiz/Mini-project (10Marks)
Total	100

Project based learning: Each student in a group of 2-3 will extract data from real-world domains using data from standard repositories that are globally recognized. For conducting application-based research, the students are encouraged to analyze social/political/financial/disease related data and generate underlying networked structure based on the algorithms of AI.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Michael Negnevitsky, <i>Artificial Intelligence</i> , Person Publication, Third Edition, 2011
2.	Toshinori Munakata, <i>Fundamentals of the New Artificial Intelligence</i> , Springer, Second Edition, 2008
3.	Deisenroth, Marc Peter, A. Aldo Faisal, and Cheng Soon Ong. <i>Mathematics for machine learning</i> . Cambridge University Press, 2020
4.	Valliappa Lakshmanan, Martin Görner, Ryan Gillard - <i>Practical Machine Learning for Computer Vision_ End-to-End Machine Learning for Images</i> , O'Reilly Media, Inc., 2021
5.	Laurence Moroney - <i>AI and Machine Learning for On-Device Development_ A Programmer's Guide</i> , O'Reilly Media, Inc., 2021