Semester II

Program Structure for First Year Master of Computer Applications

Scheme for Autonomous Program

(With Effect from 2023-2024)

Semester II

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total
MCA21	Combinatorial Algorithms for Problem Solving	3	--	1	3	--	1	4
MCA22	Artificial Intelligence and Machine Learning	3	--	--	3	--	--	3
MCA23	Cyber Security And Digital Forensics	3	--	1	3	--	1	4
MCA24	IOT and IIOT	3	--	--	3	--	--	3
MCAE25	Elective - 1	3	--	1	3	--	1	4
MCAL21	Artificial Intelligence and Machine Learning Lab	--	2	--	--	1	--	1
MCAL22	Soft Skill Development Lab	--	2	--	--	1	--	1
MCAL23	IOT and IIOT Lab	--	2	--	--	1	--	1
MCAL24	Skill based Lab Course. DevOps Lab	--	4	--	--	2	--	2
MCAL25	Skill based Lab Course User Interface Lab	--	2	--	--	1	--	1
MCAL26	Skill based Lab Course AI Development Tools Lab	--	2	--	--	1	--	1
MCAP21	Project Stage 1	--	2	--	--	1	--	1
Total		**15**	**16**	**3**	**15**	**8**	**3**	**26**

Course Code	Course Name	Teaching Scheme			Credits Assigned		
MCA22	Artificial Intelligence And Machine Learning	Contact Hours					
		Theory		Tutorial	Theory	Tutorial	Total
		3		--	3	--	3
		Examination Scheme					
		Theory			Term Work	End Sem Exam	Total
		CA	MT	Total			
		20	20	40	--	60	100

Prerequisite: Basics of data mining and Mathematical foundations of computer science-MCA11

Course Objectives: Course is aim to

Sr.No.	Course Objective
1	Understand different Artificial Intelligence concepts.
2	Elucidate knowledge of Artificial Intelligence techniques for problem solving.
3	Understand Artificial Intelligence search strategies and neural networks.
4	Provide an insight into the fundamentals of Machine Learning Techniques.
5	Become familiar with regression methods, classification methods, and clustering methods.
6	Become familiar with ensemble methods to improve the learning process.

Course Outcomes: On successful completion of the course, students will be able to

Sr.No.	Outcome	Bloom Level
CO1	Understand Artificial Intelligence concepts and applications.	Understanding
CO2	Apply Artificial intelligence techniques for problem solving.	Applying
CO3	Analyze the fundamentals of machine learning algorithms, and the paradigms.	Analyzing
CO4	Analyze the fundamentals of learning algorithms for Forecasting.	Applying
CO5	Analyze the fundamentals of kernel machines and ensemble methods.	Applying
CO6	Identify methods to improve machine learning results for better predictive performance.	Applying

Module	Detailed Contents	Hrs	
1	**Introduction:** Artificial Intelligence, Application of AI, AI Problems, Problem Formulation, Intelligent Agents, Types of Agents, Agent Environments, PEAS representation for an Agent, Architecture of Intelligent Agents. **Search Strategies:** Solving problems by searching, Search- Issues in the Design of Search Programs, Uninformed Search- BFS and DFS; Heuristic Search Techniques: Generate-And- Test, Hill Climbing, Best-First Search, A* Algorithm, AO*Algorithms. **Self-Learning topics**: Tabu search	10	
2	**Module: Artificial Neural Networks:** Introduction, Activation Function, Optimization algorithm- Gradient descent, Networks- Perceptrons, Adaline, Multilayer Perceptrons and Backpropagation Algorithms Training Procedures, Tuning the Network Size **Self-Learning topics:** Maxnet algorithm	6	
3	**Introduction to ML**: Machine Learning Basics, Applications of ML,Data Mining vs. Machine Learning vs. Big Data Analytics, Types of Learning. Supervised Learning- Naive Bayes Classifier, Classifying with K-Nearest Neighbour Classifier, Decision Tree Classifier, Naive Bayes Classifier Unsupervised Learning - Grouping unlabeled items using k-means clustering; Association analysis with the Apriori algorithm. **Self-Learning topics:** Density clustering, K-medoid	4	
4	**Forecasting and Learning Theory:** Non-linear regression, Logistic regression, Random Forest, Bayesian Belief networks, Bias/variance tradeoff, Tuning Model Complexity, Model Selection Dilemma Clustering: Expectation-Maximization Algorithm, Hierarchical Clustering, Supervised Learning after Clustering, Choosing the number of clusters, Learning using ANN **Self-Learning topics:** Maximum Likelihood Estimation	6	

5	**Kernel Machines and Ensemble Methods** Introduction, Optimal Separating Hyperplane, Separating data with maximum margin, Support Vector Machine (SVM), Finding the maximum margin, The Non-Separable case: Soft Margin Hyperplane, Kernel Trick, Defining Kernels Ensemble Methods: Bagging, Stacking, Boosting,, Implementing the AdaBoost algorithm, Classifying with AdaBoost , Bootstrapping and cross Validation Self-**Learning topics:** SMO Algorithm	10
6	**Dimensionality Reduction**: Introduction, Subset Selection, Principal Component Analysis, Multidimensional Scaling, and Linear Discriminant Analysis. **Self-Learning topics;** Feature selection, feature ranking and subset selection	3

Reference Books:

Reference No	Reference Name
1	George F Luger, Artificial Intelligence, Fifth Edition-2009, Pearson Education Publications, ISBN-978-81-317-2327-2
2	Stuart Russell, Peter Norvig, Artificial Intelligence – A Modern Approach, , Pearson Education / Prentice Hall of India, 3rd Edition, 2009 .ISBN- 13: 978- 0136042594
3	Elaine Rich, Kevin Knight, and S.B. Nair, Artificial Intelligence, 3rd Edition, Tata McGraw Hill-2008., ISBN 10: 0070087709 / ISBN 13: 9780070087705
4	Anandita Das ,Artificial Intelligence and Soft Computing for Beginners-,2nd Edition, ShroffPublication, ISBN- 9789351106159
5	Nils J. Nilsson, Artificial Intelligence: A new Synthesis, Morgan Kaufmann Publishers, Harcourt Asia Pvt. Ltd., 2000, ISBN-1-55860-535-5
6	Kumar Satish ,Neural Networks, Second Edition, Tata McGraw Hill-,2013, 2013, ISBN 1259006166, 9781259006166
7	EthemAlpaydn, Introduction to Machine Learning, PHI, Third Edition, ISBN No. 978-81-203- 5078-6.
8	Peter Harrington, Machine Learning in Action . Manning Publications , April 2012, ISBN 9781617290183
9	Tom Mitchell, Machine Learning, Mcgraw-Hill, First Edition, ISBN No. 0-07- 115467-1.
10	Christopher M. Bishop, Pattern Recognition and Machine Learning, Mcgraw- Hill, ISBN No. 978-81-322-0906-5
11	ShaiShalev-Shwartz and Shai Ben David ,Understanding Machine Learning From Theory to Algorithms, Cambridge University Press, First Edition, ISBN No. 978-1-107-05713-5

Web References:

Reference No	Reference Name
1	nptel.ac.in-A first course in Artificial Intelligence-Deepak Khemani,
2	nptel.ac.in -Introduction to machine learning – BalaramanRavindran, IIT Madras
3	Tutorial point.com/machine_learning_with_python/index.htm

Internal Assessment:

Assessment consists of one Mid Term Test of 20 marks and Continuous Assessment of 20 marks. Mid Term test is to be conducted when approx. 50% syllabus is completed Duration of the midterm test shall be one hour.

Continuous Assessment:-

Continuous Assessment is of 20 marks. The rubrics for assessment will be considered on approval by the subject teachers. The rubrics can be any 2 or max 4 of the following:-

Sr.no	Rubrics	Marks
1.	*Certificate course for 4 weeks or more:- NPTEL/ Coursera/ Udemy/any MOOC	10 marks
2.	Wins in the event/competition/hackathon	10 marks
3.	Content beyond syllabus presentation	10 marks
4.	Creating Proof of concept	10 marks
5.	Mini Project / Extra Experiments/ Virtual Lab	10 marks
6.	Assignment/Tutorials Based on Syllabus	10 marks
7.	Participation in event/workshop/talk / competition followed by small report and certificate of participation relevant to the subject(in other institutes)	5 marks
8.	Multiple Choice Questions (Quiz)	5 marks

End Semester Theory Examination:	
1	Question paper will be of 60 marks
2	Question paper will have a total of five questions
3	All questions have equal weightage and carry 20 marks each
4	Any three questions out of five need to be solved.