Aror University of Art, Architecture, Design & Heritage Sukkur.

BS(Artificial Intelligence)
Fall-2024
Artificial Intelligence

Course Title: Artificial Intelligence
Course Code: CSC205
Credit Hours: (2+1)
Course Instructor: Abdul Haseeb Shaikh
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Description:

Dive into the fundamentals of Artificial Intelligence in this comprehensive course designed for BS(AI) students. Explore key concepts such as machine learning, neural networks, natural language processing, and Generative AI. Through hands-on projects and real-world case studies, you'll gain practical experience in designing and implementing AI systems. This course emphasizes both theoretical understanding and practical application, preparing you for advanced studies and careers in the rapidly evolving field of AI.

Aims and Objectives:

• To gain an understanding of the core concepts in Artificial Intelligence.
• To understand and Implement Machine Learning Models
• To understand Deep Learning and Implement DL Models
• To gain the basic understanding of Natural Language Processing
• To explore the field of Generative AI and its applications

Assessment:

S. No	Assessment Activities	Percentage	Total Activities
1.	Sessional: Quizzes/ Assignments (Quizzes & Assignments)	30%	5
2.	Mid Term Exam	30%	1
3.	Final Exam	40%	1

Course Learning Outcomes (CLOs):

No.	Course Learning Outcome	Domain	Level	Assessment Tool
C1	**Master** core AI and ML Concepts	C	2	Class Participation, Quizzes, Mid Exams., Assignments
C2	**Develop and apply** Deep Learning Models	C	3	Class Activity, Quiz, Assignments
C3	**Implement and Evaluate** Generative AI Techniques	C	3	Worksheets, Project

Domains:
C=Cognitive, A=Affective, P=Psychomotor
Levels:
Cognitive = {1: Remembering, 2: Understanding, 3: Applying, 4: Analyzing, 5: Evaluating,
5: Creating}
Affective = {1: Receiving, 2: Responding, 3: Valuing, 4: Organizing, 5: Characterizing}
Psychomotor= {1: Imitation, 2: Manipulation, 3: Precision, 4: Articulation, 5: Naturalization}

Course Outlines:

Weeks	LEC#	SUBTOPICS .	REFERENCE
Week No: 01	**Lec: 01**	**Introduction:** ○ What is AI? ○ The foundations of AI	**Chapter#01/ Lecture Slides**
	Lec: 02	**Introduction:** ○ The History of AI ○ State of the Art AI ○ Strong AI vs Weak AI vs Evolutionary AI	**Chapter#01/ Lecture Slides**
Week No: 02	**Lec :03**	**Intelligent Agents:** ○ Agents and Environment ○ Good Behavior: The concept of Rationality	**Chapter#02/ Lecture Slides**
	Lec: 04	**Intelligent Agents:** ○ The Nature of Environments ○ The Structure of Agents	**Chapter#02/ Lecture Slides**
Week No: 03	**Lec: 05**	**Knowledge Representation and Reasoning:** ○ Introduction ○ Propositional Logic ○ First Order Logic ○ FL vs PL	**Chapter#07, Chapter#08/Lecture Slides**
	Lec: 06	**Inference in FL:** ○ Forward Chaining ○ Backward Chaining ○ Forward vs Backward Chaining	**Chapter#09/ Lecture Slides**
Week No: 04	**Lec: 07**	**Fuzzy Logic:** ○ Introduction to fuzzy logic ○ Characteristics of fuzzy logic ○ Membership function in fuzzy logic	**Lecture Slides**

	Lec: 08	**Learning from Examples:** o Machine Learning o Forms of Learning o Traditional Programming vs ML o The Machine Learning Process	**Chapter#18/ Lecture Slides**
Week No:05	**Lec: 09**	**Classification using Decision Tree:** o Philosophy of Decision Tree	**Chapter#18/Lecture Slides**
	Lec: 10	**Classification using Decision Tree:** o Decision Tree Algorithms	**Chapter#18/Lecture Slides**
Week No:06	**Lec: 11**	**Performance Metrics in Classification:** o Confusion Matrix o Precision, Recall, F1 Score	**Chapter#18/Lecture Slides**
	Lec: 12	**Classification Using Support Vector Machine:** o SVM Algorithm	**Chapter#18/Lecture Slides**
Week No:07	**Lec: 13**	**Classification Using Support Vector Machine:** o Linear vs Non-Linear SVM o Kernel Trick in SVM Solving Problems	**Chapter#18/Lecture Slides**
	Lec: 14	**Classification Using KNN Algorithm:** o Philosophy of KNN Algorithm o How to choose value of K? o Solving Problems using KNN Algorithm	**Chapter#18/Lecture Slides**
Week No: 08	**Lec: 15**	**Regression:** o Philosophy of Regression o Linear Regression	**Chapter#04**
	Lec: 16	**Regression:** o Multivariate Regression	**Chapter#04**

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MID TERM EXAMINTATION			
Week No: 10	**Lec: 17**	**Clustering:** ○ K means Clustering Algorithm	**Lecture Slides/Teacher Handouts**
	Lec: 18	**Natural Language Processing:** ○ Introduction ○ Regex for NLP	**Lecture Slides/Teacher Handouts**
Week No: 11	**Lec: 19**	**Natural Language Processing** ○ Three Category of Techniques for NLP ○ NLP Pipeline	**Lecture Slides/Teacher Handouts**
	Lec: 20	**Natural Language Processing:** ○ Spacy vs NLTK ○ Tokenization in Spacy ○ Label and one Hot Encoding	**Lecture Slides/Teacher Handouts**
Week No: 11	**Lec: 21**	**Natural Language Processing:** ○ Bag of Words ○ What are some other Models?	**Lecture Slides/Teacher Handouts**
	Lec: 22	○ TF-IDF ○ N-Grams	**Lecture Slides/Teacher Handouts**
Week No: 12	**Lec: 23**	**Deep Learning:** ○ How deep learning is different from Machine Learning? ○ Introduction to Artificial Neural Network	**Lecture Slides/Teacher Handouts**
	Lec: 24	○ Forward Propagation vs Backward Propagation ○ Types of Activation Function	**Lecture Slides/Teacher Handouts**
Week No:1	**Lec: 25**	**Deep Learning:** ○ Introduction to CNN ○ CNN Architecture	**Lecture Slides/Teacher Handouts**

	Lec: 26	o Digit Classification using CNN	**Lecture Slides/Teacher Handouts**
Week No: 14	**Lec: 27**	**RNN and Its types:** o LSTM o GRU	**Lecture Slides/Teacher Handouts**
	Lec: 28	**Moving to the world of Transformers:** o Transformer Architecture	**Lecture Slides/Teacher Handouts**
Week No:15	**Lec: 29**	**Generative AI**	**Lecture Slides/Teacher Handouts**
	Lec: 30	**Generative AI**	**Lecture Slides/Teacher Handouts**
Week No: 16	**Lec: 31,32**	**Vertex AI**	**Lecture Slides/Teacher Handouts**

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Text Book:

1. Artificial Intelligence A Modren Approach, Third Edition, Stuart J. Russell and Peter Norvig