Riphah International Colleges
A Project of Riphah International University
Course Outline

Course Information	Course Title	**Artificial Intelligence**			
	Course ID			Course Type	Computing Core
	Credit hours	3 (2-3)		Hours per week (C-L)	5 (2 Th + 3 Lab)
	Programs	ADP (Computing)		Preferred Semester	
	Date			Version	

Course Description	This course is designed to introduce the basic principles, techniques, and applications of Artificial Intelligence. Emphasis will be placed on the teaching of these fundamentals, not on providing a mastery of specific software tools or programming environments.

Course Objectives (CO)

The objective of this course is to enable students to understand;

No.	Objective	Relation with PEO
CO1.	Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.	PEO
CO2.	Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.	PEO
CO3.	Experience AI development tools such as an 'AI language' and Natural Language Processing (NLP)	PEO
CO4.	Explore the current scope, potential, limitations, and implications of intelligent systems.	PEO

Course Learning Outcomes (CLO)

At the end of this course students will be able to;

No.	Outcome	Relation with PLO	BT Level	PLO Level
CLO1.	**Know** various AI search algorithms (tree search, uninformed, informed, and heuristic), understand different types of AI agents, know how to build simple knowledge-based systems.	PLO1	C1	
CLO2.	**Understand** and identify problems where artificial intelligence techniques are applicable.	PLO1	C2	
CLO3.	**Apply** selected basic AI techniques; judge applicability of more advanced techniques.	PLO2	C3	
CLO4.	**Illustrate** proficiency in applying AI methods using modern tools and techniques	PLO4	C4	
CLO5.	Apply appropriate knowledge representation scheme, reasoning, machine learning techniques, and natural language processing for AI problems	PLO3	C3	
CLO6.	Illustrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.	PLO2	C4	

Lecture type	Lectures
Prerequisites	Know the basic concepts of programming and Data structure (trees and graphs).
Follow up Courses	

TEXTBOOKS AND REFERENCE BOOKS:

	Title	Edition	Authors	Publisher	Year	ISBN
Textbook	Artificial Intelligence: A Modern Approach	3rd	Stuart Russell and Peter Norvig,	Pearson Education	2010	978-0-13-604259-4
Reference Books & Reference Material	Pattern classification		Hart, P.E., Stork, D.G. and Duda, R.O.	John Willey & Sons	2001	
	AI algorithms, data structures, and idioms in Prolog, Lisp, and Java		Luger, G.F. and Stubblefield, W.A.	Pearson Addison-Wesley	2009	

Tools and Technologies	Python, NLP and ML tools
Design skills / techniques	Project based learning
Helping Material	CS-subject-Slides.url

GRADE DISTRIBUTION:

Evaluation Type	Percentage %	Activities

Assignments and Presentations	10 %	Min 4 in the semester
Quiz & Projects	10 %	Min 4 in the semester
Lab	15 %	On weekly basis
Mid-Term	25 %	Contents from Week-1 to Week-8
Final-Term	40 %	Contents from Week-10-Week-17
Total Points	100	
Methods of Evaluation	Quizzes, Assignments, Mid and Final Term, Lab Paper, Lab-Projects	
Note:	Labs are managed and evaluated separately	

General Classroom Norms:

♦ Class attendance is mandatory. You may miss up to 25% (8 out of 34 sessions) class sessions but save it for emergency only.
♦ In case you exceed this level, you will be withdrawn from the course.
♦ As a courtesy to the instructor and other students, be prepared to arrive at class and be in your seat on time.
♦ In addition, please note that each class lasts for 90 minutes (1.5 Hours).
♦ Cell phones should be powered off or kept on silent mode.
♦ Eatables should be avoided in the class.
♦ Disruptive behaviors are not acceptable in the class.
♦ The Dress Code defined by Campus Administration has to be observed, no warnings will be given, and violators will be referred to the discipline committee for further actions.
♦ Any other rules defined by campus are also mandatory to be followed.

Course Outline (Artificial intelligence)

	COURSE CONTENTS						
Week No.	Topic	Lecture No.	Lecture Contents	Relation with CLO	Lecture Material	Class Activity	Tasks
W1.	Introduction	L1.	Introduction, History	CLO1	Chapter 1	Discussion	
		L2.	component of AI, Agent, Agent technology, Applications, Future	CLO1	Chapter 2	Discussion	
W2.	Problem Solving	L3.	Problem-solving: Solving Problems by Searching,	CLO1	Chapter 3		Assignment 1: Evaluate any Intelligent system.
		L4.	Uninformed Searches, Depth first search, breadth first search	CLO1, CLO2	Chapter 3		
W3.	Problem Solving, Machine Learning	L5.	Informed Search, greedy, A* search	CLO, CLO2	Chapter 4,5		Select topic for semester project
		L6.	Introduction to ML	CLO3	Chapter 13		
W4.	Machine Learning	L7.	Types of learning, Supervised learning algorithms, Learning models	CLO2, CLO3	Chapter 14		Quiz 1
		L8.	Types of learning, Supervised learning algorithms, Classification, Naïve Bayes	CLO2, CLO3	Chapter 14		
W5.	Machine Learning	L9.	Accuracy, performance metrics	CLO2, CLO3	Chapter 14		Assignment 2: Apply ML on real time dataset
		L10.	Supervised learning algorithms, Linear Regression	CLO2, CLO3	Chapter 14		
W6.	Machine Learning	L11.	Supervised learning algorithms, Logistic Regression	CLO2, CLO3	Chapter 14		Quiz 2
		L12.	Unsupervised learning algorithms: K mean Clustering	CLO2, CLO3	Chapter 14,15		
W7.	Machine Learning	L13.	Decision Trees, Implementation of Decision tree by using ID-3	CLO2, CLO3	Chapter 15, 19		
		L14.	Association rules for decision making				
W8.		L15.	Neural Networks, perceptron	CLO2, CLO3	Chapter 20		
		L16.	Reinforcement learning	CLO2, CLO3	Chapter 20		
W9.	Mid Term Exam Week	L15, L16	Mid Term Examination				

W10.	Natural language Processing I	L17.	Stages of Natural language Processing, Phonetics, graphetics, lexical, morphology	CLO3, CLO4, CLO5			
		L18.	Stages of Natural language Processing: semantic, pragmatics, Discourse analysis	CLO3, CLO4, CLO5			
W11.	Natural language Processing I	L19.	Stages of Natural language Processing: API and NLTK, SPACY	CLO3, CLO4, CLO5			
		L20.	Annotation and evaluation	CLO3, CLO4, CLO5			Assignment 3:
W12.	Knowledge Representation	L21.	Knowledge Representation: Script, Ontology, logics, production rules	CLO2, CLO5			Quiz 3
		L22.	Knowledge Representation: Semantic Networks, Frames	CLO2, CLO5,			
W13.	Knowledge Representation	L23.	Prolog	CLO2, CLO5,			
		L24.	Prolog	CLO2, CLO5			Assignment 4:
W14.	Knowledge Representation	L25.	Introduction to Artificial General Intelligence	CLO2, CLO5			Quiz 4
		L26.	Introduction to Cognitive and Conscious Systems	CLO2, CLO5			
W15.	Knowledge Representation	L27.	Perception	CLO1, CLO5			
		L28.	Components of AGI	CLO2, CLO5			
W16.	Knowledge Representation	L29.	Intelligent system design,	CLO5			
		L30.	AI Robotics, issues Project Presentation	CLO5			
W17.	Project Demonstration	L31.	Deep Learning Transfer Learning	CLO 3			
		L32.	Project Presentation				
W18.			Final Term Exam				

COURSE OUTLINE (ARTIFICIAL INTELLIGENCE-LAB)

		LAB CONTENTS		
Week No.	Topic	Lab Contents / Activity	Home Tasks	Relation with CLO
W1.	Python	Python workshop	Install python	CLO
W2.	Python	Python workshop	Learning material	CLO
W3.	Searching	Implement uniformed search using python	Cousera learning material	CLO
W4.	Searching	Implement informed search using python		CLO
W5.	Machine learning	Machine learning tools		CLO
W6.	Machine learning	Naïve Bayes implementation		CLO
W7.	Machine learning	Regression Implementation		CLO
W8.	Machine learning	K-Mean Implementation	Cousera guided project	CLO
W9.	Mid Term Exam Week			
W10.	Natural Language processing	Install nltk, weka and corpus tools and their working practice		CLO
W11.	Natural Language processing	Apply language processing, stop words remove, POS tagger, stemmer		CLO
W12.	Natural Language processing	Semantic analysis using spacy	See database connectivity with python	CLO
W13.	Knowledge representation	Represent knowledge using list and mysql		CLO
W14.	Prolog	Basics of prolog		CLO
W15.	Prolog	Inference through prolog		CLO
W16.	Project discussion	Project discussion & Presentation		CLO
W17.		Lab Papers		CLO
W18.	Final exam	Final exam		CLO