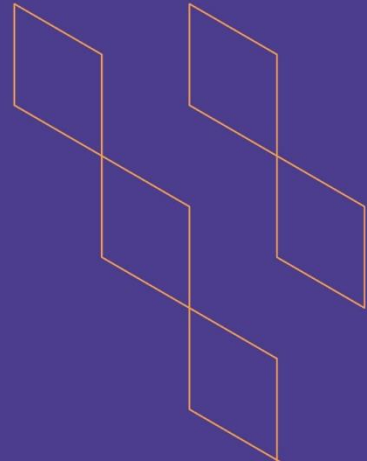T-104

Course Specification

Course Title: ARTIFICIAL INTELLIGENCE

Course Code: 441COMP-3

Program: Bachelor in Computer Science

Department: Computer Science

College: College of Computer Science and Information Technology

Institution: Jazan University

Version: V2

Last Revision Date: 27 SEPTEMBER 2022

Table of Contents:

A. General information about the course:

Course Identification	
1. Credit hours:	3

2. Course type

a.	University ☐	College ☐	Department ☒	Track ☐	Others ☐
b.	Required ☒	Elective ☐			

3. Level/year at which this course is offered:	Level 10/Year 3

4. Course General Description

This course introduces students' basic concepts of intelligence, innovation, achievements and advanced development in the areas of AI. It covers modern techniques for computers to represent task-relevant information and intelligent decisions system, solving problems by searching towards the achievement of goals. It covers some advanced topics namely Planning, Learning, Robotics and Multi-Agent Systems basics. The course also helps to understand human intelligence from a computational perspective.

5. Pre-requirements for this course (if any):

None

6. Co- requirements for this course (if any):

None

7. Course Main Objective(s)

- Understand the basic concepts of the Intelligence, Artificial Intelligence and innovative achievements in the development of AI.
- Identify and choose appropriate PEAS description, characteristics of environment and the agent architecture, for a given problem to be solved by an intelligent agent.
- Apply uninformed/ informed search strategies to solve a given search / optimization problem.
- Design and implement the concepts of Problem Solving and Algorithms.
- Identify the techniques in Planning, Learning, Robotics and Multi agent systems basics.
- Know and integrate various artificial intelligence techniques in intelligent system development and maintaining intelligent systems.

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	44	80%
2.	E-learning		
3.	Hybrid • Traditional classroom • E-learning		
4.	Distance learning (Self Learning)	11	20%

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	22
2.	Laboratory/Studio	22
3.	**Field**	
4.	Tutorial	
5.	Others (specify)	8
	Total	**52**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	**Describe** various Artificial Intelligent fundamentals and types of intelligent agents.	K1	Lectures /Presentations Media Lectures	Exam / Assignment Final Theory Exam
1.2	**Recognize** the recent trends in robotics and their architectures.	K2	Lectures /Presentations Media Lectures	Assignment/ Final Theory Exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
…				
2.0	Skills			
2.1	**Evaluate** various search strategies and techniques for problem solving.	S2	Lectures /Presentations Media Lectures Tutorials	Assignment / Final Theory Exam
2.2	**Compare** different categories of learning.	S1	Lectures /Presentation Media Lectures Tutorials	Assignment/ FinalTheory Exam
2.3	**Design** planning strategies to solve a planning problem.	S3	Lectures /Presentations Lab /Demonstration Media Lectures	Lab Exam/ Final Theory Exam
2.4	**Analyze** reasoning mechanisms in logical based knowledge representation issues using logical connectives to formulate more expressive queries	S1	Lectures / Presentations / Lab Demonstration	Mini Project Final Lab Exam Final Theory Exam
2.5	**Communicate** effectively by applying various AI techniques that require problem solving, inference, perception, knowledge representation and learning.	S5	Lectures /Presentations/ Lab / Demonstration Media Lectures	Mini Project Final Lab Exam
…				
3.0	Values, autonomy, and responsibility			
3.1	**Integrate** intelligent automated systems to solve real world problems of the society..	V1	Lectures /Presentations Lab/Demonstration/ Media Lectures	Final Theory Exam
3.2	**Demonstrate** the ability to work in a team to implement the various AI algorithms and techniques	V2	Group Discussion	Mini Project
…				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to AI: - What is AI?, Characteristics of Intelligence Behavior, Goal, Advantages of AI , Turing test approach, Categories of AI, Foundation of AI, Applications area of AI. Self Study Topic (s): History of AI & The State of the Art.	2.5T+2.5P
2.	**Intelligent Agents: -** The structure of Agents, Agents and Environments, PEAS - Performance, Environment, Actuators, Sensors, Types of Intelligent Agents, Simple Reflex Agents, Model-Based Reflex Agents, Utility-Based Agents, Goal based *agents*, Summary, Exercises.	2.5T+2.5P
3.	**Search Strategies: -** Problem Solving Agents, Well defined problems, Topy Problems: Vacuum World, 8 Puzzle, 8 Queens Problem. Real World Problem and Examples Search Strategies, Uninformed search Strategies: Breadth first, Depth First Strategies, Search, Comparison of Uniformed Search, Informed Search: - Greedy Best first search, A*, Heuristic function. Self Study Topic (s): Measuring Problems Solving, Operations in the queue, Iterative, Bidirectional search	4.5T+4.5P
4.	**Logical Agents: -** Knowledge Based Agent, Wumpus world Logic, Propositional logic, BNF Grammar Semantics ,Inference, Reasoning pattern in propositional logic, Resolution, CNF, Forward and Backward Chaining and Algorithm, Local Search Algorithm, Hill Climbing, Genetic Algorithm, Local beam, Online search agents. Self Study Topic(s): Genetic algorithms, Online Search Agents, Online Local Search	4.5T+4.5P
5.	**Planning**: - Planning problem, Partial order Planning with example, Graph Plan Algorithm, Types of Planning: Sensor less, Conditional, execution monitoring and Re-planning and Continuous planning.	2.5T+2.5P
6.	**Learning: -** Forms of Learning, learning agent, Components of Learning agent, Learning Elements, Types of Learning: - Supervised, Unsupervised, Reinforcement and Inductive learning.	2.5T+2.5P

| 7. | **Robotics**: - Definition, Robot, characteristics of robot, Types of Robot: Industrial robot, Mobile Robot, Hybrid Robot, Types of Sensors, Robotic Perception, Properties of Robot, Types of Motion, Robotic Software Architecture, Programming languages, Application of Robotics.

Self Study Topic (s):

Robotic Programming Language | 3T+3P |
| | **Total** | 22T+22P |

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Exam-1	5th -6thWeek	15%
2.	Assignment -1	3rd- 4th Week	10%
3.	Mini Project	9th Week	15%
4.	Lab Exam + Lab Assignment	As per schedule	20%
5.	Final Theory Exam	As per schedule	40%
…			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	• Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Prentice Hall, 4th Edition, 2021. ISBN-13: 978- 1292401133.
Supportive References	i). David L. Poole, Alan K Mackworth, Artificial Intelligence Foundations of Computational Intelligence, Cambridge University Press, 2nd Edition, 2017. ISBN: 978-1107195394. ii). Nils J. Nilsson, The Quest for Artificial Intelligence: A History of Ideas and Achievements, Cambridge University Press, 2015, ISBN: 0521122937.

	iii). Toshinori Munakata, Fundamentals of the New Artificial Intelligence: Neural, Evolutionary, Fuzzy and More, 2nd Edition, Springer, 2011, ISBN- 10: 9788184898743.
Electronic Materials	• **Blackboard:**https://lms.jazanu.edu.sa/webapps/portal/execute/tabs/tabAction?tab_tab_group_id=_1_1 • **Online Fedora support:** http://technet.microsoft.com/en-us/windowsserver/default.aspx www.Fedora.org • Purdue University : www.cs.purdue.edu • University of New South Wales : www.cse.unsw.edu.au/ • York University: www.cs.yorku.ca • IIT- Madras : www.iitm.ernet.in • New york University: www.cs.nyu.edu
Other Learning Materials	Online tutorial

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classroom equipped with projector, whiteboard, and sufficient seating arrangements. • Lab with software installed and individual computer terminal for each student.
Technology equipment (projector, smart board, software)	• Whiteboards and projectors for classroom and labs • Computer Lab equipped with 30 PCs having J2ME platform in Net beans 7.0 • An active internet connection.
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect (Course evaluation survey form)

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of students assessment	CRC / QAU / HoD	Direct (Course reports / result analysis)
Quality of learning resources	Track leaders / CRC	Indirect (Review, meetings and star rating with suggestions for further modification and improvements)
The extent to which CLOs have been achieved	CRC / QAU	Direct (CLO assessment template further verified at course coordinator, Track leader and QAU level)
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	
DATE	15/10/2022