



Course Specification

(Bachelor)

Course Title: **Artificial Intelligence: Principles and Techniques**

Course Code: **453CCN-3**

Program: **Bachelor of Science in Computer Networks**

Department: **Networks and Communication Engineering**

College: **College of Computer Science and Information Systems**

Institution: **Najran University**

Version: **1.0**

Last Revision Date: **Feb 2024**



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A. General information about the course:

1. Course Identification

1. Credit hours:

3 (3, 0, 1) [Theory, Lab, Tutorial]

2. Course type

A. University College Department Track Others

B. Required Elective

3. Level/year at which this course is offered: (Level 7/Year 4)

4. Course general Description:

This course will introduce the basic concepts and techniques of Artificial Intelligence. It gives an overview of underlying ideas such as search, knowledge representation and reasoning, expert systems, learning, natural language processing, robotics, and uncertainty. To gain the experience of doing independent study and research.

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

No

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

No

7. Course Main Objective(s):

Prepare the students with the basic concepts of Artificial Intelligence so that they can understand the underlying algorithms and develop the required skills to build Artificial Intelligence based software.

2. Teaching mode (mark all that apply)





No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		
3	Hybrid <ul style="list-style-type: none"> • Traditional classroom • E-learning 		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures [3 contact hours ' 15 weeks]	45
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial [1 contact hour 15 weeks]	15
5.	Others (specify)	
Total		60

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	Explain the difference in 'intelligence' and Artificial Intelligence, and the landmark achievements in the development of AI evolution.	K1	<p>TS-1: Relate Course Learning Outcomes (CLOs) to the topics.</p> <p>TS-2: Giving Lectures in PPT, recalling the lecture by asking Questions. Clarifying doubts on Lecture.</p> <p>TS-3: Conducting a discussion of real life. problems, among teachers, students</p>	Quiz1, Midterm Exam, and Final Theory Exam



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.2	Describe Artificial Intelligence techniques in solving problems (i.e. expert systems, natural language processing, robotics, reasoning with uncertainty, game playing, prolog, and computer vision)	K1, K2	<p>TS-1: Relate Course Learning Outcomes (CLOs) to the topics</p> <p>TS-2: Giving Lectures in PPT, recalling the lecture by asking Questions. Clarifying doubts on Lecture.</p> <p>TS-3: Conducting a discussion of real-life problems, among teachers and students.</p> <p>TS-4: Cooperative learning among the students. Encourage students to browse different journals,</p>	Midterm Exam, assignment, Final Theory exam
...				
2.0	Skills			
2.1	Apply different search techniques (i.e. Depth First Search, Breadth First Search, Iterative deepening search, Uniform Cost search, heuristic function, greedy search, A* search and iterative deepening A* search) to solve problems.	S1, S3 S4, S5	<p>TS-1: Conducting a discussion of real-life problems, among teachers and students.</p> <p>TS-2: Cooperative learning among the students. Encourage students to browse different journals, seminars, or websites at their leisure time to have a better understanding of the course</p>	Quiz2, and Final Theory Exam
2.2	Use knowledge representation techniques to represent knowledge in different domains.	S2, S4, S5	<p>TS-1: Relate Course Learning Outcomes (CLOs) to the topics</p> <p>TS-2: Giving Lectures in PPT, recalling the lecture by asking Questions. Clarifying doubts on Lecture.</p>	Final Theory exam
2.3	Apply Artificial Intelligence techniques in solving problems		<p>TS-1: Relate Course Learning Outcomes (CLOs) to the topics</p> <p>TS-2: Giving Lectures in PPT, recalling the lecture by asking Questions. Clarifying doubts on Lecture.</p>	



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	(Expert Systems, Natural Language Processing, Robotics).		<p>TS-3: Conducting a discussion of real-life problems, among teachers, and students.</p> <p>TS-4: Cooperative learning among the students. Encourage students to browse different journals, seminars, or websites in their leisure time to have a better understanding of the course</p>	
3.0	Values, autonomy, and responsibility			
3.1	Implement the learning of this course in terms of a course project based on AI techniques.	V1, S2	<p>TS-2: Giving Lectures in PPT, recalling the lecture by asking Questions. Clarifying doubts on Lecture.</p> <p>TS-3: Conducting a discussion of real-life problems, among teachers, students</p>	Midterm Exam, and Final Theory Exam

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Artificial Intelligence: (Definitions, Goals, approaches, Applications and History), Intelligent Agents; the Turing test, specify PEAS.	8
2.	Searching Techniques: Uninformed search algorithms (breadth first and depth first with related strategies; branch-and-bound and optimal path; memory-bounded search strategies), Heuristic search (Greedy search, A*-search, and hill-climbing).	8
3.	Knowledge Representation: Predicate and propositional logic, resolution, and deductive proof techniques (e. g. generalized modus ponens) Reasoning with uncertainty.	8
4.	Planning: Planning operators/languages, planning algorithms including (partial-order planning, re-planning, and conditional planning).	8





5.	Reasoning with uncertainty, decision: Introduction to probability, Bayes Rule, Belief Networks and inference with them; basic concepts of decision theory and decision making (decision tree and decision network).	8
6.	Learning: General concepts of learning with introduction to PAC theory. Decision trees and decision lists, hypothesis space learning, and perceptions.	8
7.	Agent interaction: Basic concepts of agent communication and coordination, including adversarial search and game theory.	4
8.	Constraint Satisfaction Problems: Game playing, machine learning, natural language processing, expert systems, vision and Robotics.	4
9.	Introduction to Prolog: Presentation of prologue (the program and query) and the facts (simple facts, facts with arguments and how to query).	4
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz-1	5th week	5%
2.	Quiz-2	9 th week	5%
3.	Assignment 1	4th week	10%
4.	Assignment 2 or mini project (presentation)	10 th week	10%
5.	Midterm Exam	6 th week	20%
6.	Final Theory Exam	12 th or 13 th week	50%

*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, Peter Norvig. Artificial Intelligence: A Modern Approach, 4 th Edition, Prentice Hall: 2020, ISBN: 13: 978-0134610993 (US Edition)
Supportive References	<ul style="list-style-type: none"> George F. Luger. Artificial Intelligence – Structures and Strategies for Complex problem solving, 6th Edition, Pearson International Edition, 2009. Ivan Bratko, Prolog Programming for Artificial Intelligence, 3rd Edition, Addison Wesley, 2012. ISBN- 13: 978-0321417466





	<ul style="list-style-type: none"> Wolfgang Erfel. Introduction to Artificial Intelligence, 3rd edition, Springer: New York, 2019. ISBN 978-0-85729-298-8
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms to accommodate 65 students per classroom with desks and chairs, labs to accommodate 25 students per lab with advanced computers.
Technology equipment (projector, smart board, software)	
Other equipment (depending on the nature of the specialty)	ACs for labs and classrooms, black curtains

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, instructors and peer review	<ul style="list-style-type: none"> Online course survey: By the end of each semester, students give their opinions about many factors in the course. They give feedback about teaching strategies, assessment methods, textbooks, instructors, etc. Feedback about Course Learning Outcomes (CLOs): A course survey is distributed to students to get their opinions about the CLOs.
Effectiveness of students' assessment	Instructor, faculty, and student	<ul style="list-style-type: none"> Discussion with other faculty members about students' understanding and the best way of teaching them. Peer consultation on teaching Discussions within the group of faculties teaching the same course before
Quality of learning resources	Instructor and Faculty	<ul style="list-style-type: none"> Describe the relationship between the course's topics and CLOs. Course syllabus must be distributed in the first week. It should contain the necessary information about the course (CLOs, assessment methods, descriptions, etc.) Feedback from the students about the understanding of lectures in academic advising hours.



Assessment Areas/Issues	Assessor	Assessment Methods
		<ul style="list-style-type: none"> - Analysis of the critical topics with real-life examples and preparation of good effective PPT slides. - By suggesting good teaching methodologies - Ensure that all students participate in the class. - Encourage students to attend during office hours to clarify their doubts.
The extent to which CLOs have been achieved	Peer and instructor	<ul style="list-style-type: none"> - The course coordinator has to approve the exams and grades of students in exams. - The curriculum committee will review all courses by the end of each semester and approve actions and improvements plan to be carried out. - Getting feedback from the students who will pass the course and work in the practical field. - The vice dean and the dean of the college have to approve the final grades.
the planning arrangements for periodically reviewing course effectiveness and planning for improvement	Instructor	<ul style="list-style-type: none"> - Each semester, the instructor has to teach the course according to the previous course materials (Course specification, report, improvement plan, etc.). - By the end of each semester, the instructor must prepare a course file which contains all activities and practices taken in the course. Achievements of CLOs can be used if the students' levels improved or not

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	NETWORK AND COMMUNICATIONS ENGINEERING DEPARTMENT COUNCIL
REFERENCE NO.	14450824-0482-00014
DATE	5/3/2024

