University of Asia Pacific (UAP)
Department of Computer Science and Engineering (CSE)

Course Outline

Program:	Computer Science and Engineering (CSE)
Course Title:	**Artificial Intelligence**
Course Code:	**CSE 410**
Semester:	**Spring 2019**
Level:	**4-2, Section A and Section B**
Credit Hour:	**3**
Name & Designation of Teacher:	Mohammad Shorif Uddin, Adjunct Professor
Office/Room:	
Class Hours:	**Wednesday & Thursday**: 2:00 p.m. - 3:30 p.m. 3:30 p.m. - 5:30 p.m.
Consultation Hours:	**Thursday**: 12:30 -2:00 p.m.
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Rationale:	This is a core course of CSE. It provides a basic on artificial intelligence (AI) and deals mostly with the imitation process of human knowledge into machines. We will cover topics including: knowledge, logic, agents, searching, optimization, gaming theory, uncertainty and learning.
Pre-requisite (if any)**:**	**Discrete Mathematics and Basic Programming**

Course Synopsis:

1. Introduction to Artificial Intelligence (AI), history, success and failures, mission and vision
2. Intelligent Agents
3. Knowledge and Expert Systems: General Concepts, Design and Representation
4. The Foundations of Logic, Formalized Symbolic Logic: First Order Predicate Logic (FOPL)
5. AI Languages: PROLOG
6. Problem Solving by Searching: uninformed & informed searches and Gaming Theory

7. Stochastic Searching Tool: Genetic Algorithms (GA)

8. Introduction to fuzzy systems and artificial neural network

Course Objectives (CO): The objectives of this course are:

- **a.** To describe the fundamentals of AI, logic, knowledge representation, organization, manipulation, inferencing, resolution, natural language processing and a general understanding of AI principles and practice.
- **b.** To introduce the concepts of building simple knowledge-based expert systems and learn various AI search optimization strategies (uninformed, informed, genetic algorithms)
- **c.** To expose the students to the AI programming tools and techniques for real-life problem solving.
- **d.** To develop different types of AI agents and fuzzy-based systems.
- **e.** To give introduction on artificial neural network systems to imitate human like learning and recognition system.

Learning Outcomes (LO): Upon completion of the course, the students will be able to:

LO 1: To **understand** the fundamentals of AI, logic, knowledge representation, organization, manipulation, inferencing, resolution, natural language processing and a general understanding of AI principles and practice.

LO 2: To **build** simple knowledge-based expert systems and various AI search optimization strategies (uninformed, informed, genetic algorithms).

LO 3: To **expose** to the AI programming tools and techniques for real-life problem solving.

LO 4: To **design** different types of AI agents, neural- and fuzzy-based systems.

Teaching-learning and Assessment Strategy: Lectures, assignments, quizzes, exams.

Linkage of LO with Assessment Methods & their Weights:

LO	Assessment Method	(%)
1, 2, 4	Quiz	10
1 – 4	Class attendance	10
3-4	Assignment	10
1– 2	Midterm Exam	20
1 – 4	Final Exam	50

Minimum attendance: 70% class attendance is mandatory for a student in order to appear at the final examination.

Mapping of Course LO and Generic Skills: MJ (Mojor), MN(Minor)

Learning Outcome (LO) of the Course	Generic Skills* (Appendix-1)											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1: To **understand** the fundamentals of AI, logic, knowledge representation, organization, manipulation, inferencing, resolution, natural language processing and a general understanding of AI principles and practice.	MJ											
LO 2: To **build** simple knowledge-based expert systems and various AI search optimization strategies (uninformed, informed, genetic algorithms).		MJ	MJ	MJ		MN	MN	MN	MN	MN	MN	MN
LO 3: To **expose** to the AI programming tools and techniques for real-life problem solving.					MJ						MN	
LO 4: To **design** different types of AI agents,neural-andfuzzy-based systems.		MJ	MJ	MJ	MJ	MN	MN	MN	MN	MN	MN	MN

Lecture Schedule

Lecture	Topic	Reading assignment	Work assignment
Lecture 1-2	Introduction to Artificial Intelligence (AI), history, success and failures, mission and vision	Handout, Introduction Chapter of both books	To be assigned during lecture.
Lecture 3-4	Intelligent Agents	Handout, Relevant Chapter of both books	To be assigned during lecture.
Lecture 5-6	Knowledge and Expert Systems: General Concepts, Design and Representation	Handout, Relevant Chapter of both books	To be assigned during lecture.

Lecture 7-10	The Foundations of Logic, Formalized Symbolic Logic: First Order Predicate Logic (FOPL)	Handout, Relevant Chapter of both books	To be assigned during lecture.
Lecture 11-13	AI Languages: PROLOG	Handout, Relevant Chapter of both books	To be assigned during lecture.
Lecture 14-18	Problem Solving by Searching: uninformed & informed searches and Gaming Theory	Handout, Relevant Chapter of both books	To be assigned during lecture.
Lecture 19-21	Stochastic Searching Tool: Genetic Algorithms (GA)	Handout, Relevant Chapter of both books	To be assigned during lecture.
Lecture 22-28	Introduction to fuzzy systems and artificial neural network	Handout, Relevant Chapter of both books	To be assigned during lecture.

Required References: Stuart J. Russel and Peter Norvig, Artificial Intelligence – A Modern Approach, Prentice-Hall, 2003.

Recommended References: Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems, Prentice-Hall, 2003.

Grading System: As per the approved grading scale of University of Asia Pacific (Appendix-2).

Student's responsibilities: Students must come to the class prepared for the course material covered in the previous class(es).
They must submit their assignments on time.
No late or partial assignments will be acceptable. There will be no make-up quizzes.

Appendix-1: Generic Skills

No.	Generic Skills
1.	**Engineering Knowledge**
2.	**Problem Analysis**
3.	**Design/Development of Solutions**
4.	**Investigation**
5.	**Modern Tool Usage**
6.	**The Engineer and Society**
7.	**Environment and Sustainability**
8.	**Ethics**
9.	**Communication**
10.	**Individual and Team Work**
11.	**Life Long Learning**

12.	**Project Management and Finance**

Generic Skills (Detailed):

1. **Engineering Knowledge (T)** -Apply knowledge of mathematics, sciences, engineering fundamentals and manufacturing engineering to the solution of complex engineering problems;
2. **Problem Analysis (T)** – Identify, formulate, research relevant literature and analyze complex engineering problems, and reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences;
3. **Design/Development of Solutions (A)** –Design solutions, exhibiting innovativeness, for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, economical, ethical, environmental and sustainability issues.
4. **Investigation (D)** Conduct investigation into complex problems, displaying creativeness, using research-based knowledge, and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions;
5. **Modern Tool Usage (A & D)** -Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations;
6. **The Engineer and Society (ESSE)** -Apply reasoning based on contextual knowledge to assess societal, health, safety, legal, cultural, contemporary issues, and the consequent responsibilities relevant to professional engineering practices.
7. **Environment and Sustainability (ESSE)** -Understand the impact of professional engineering solutions in societal, global, and environmental contexts and demonstrate knowledge of and need for sustainable development;
8. **Ethics (ESSE)** –Apply professional ethics with Islamic values and commit to responsibilities and norms of professional engineering code of practices.
9. **Communication (S)** -Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions;
10. **Individual and Team Work (S)** -Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
11. **Life Long Learning (S)** -Recognize the need and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
12. **Project Management and Finance (S)** -Demonstrate knowledge and understanding of engineering management and financial principles and apply these to one's own work, as a member and/or leader in a team, to manage projects in multidisciplinary settings, and identify opportunities of entrepreneurship.

<u>Appendix-2:</u> Grading Policy

Numeric Grade	Letter Grade	Grade Point
80% and above	A+	4.00
75% to less than 80%	A	3.75
70% to less than 75%	A-	3.50
65% to less than 70%	B+	3.25
60% to less than 65%	B	3.00

55% to less than 60%	B-	2.75
50% to less than 55%	C+	2.50
45% to less than 50%	C	2.25
40% to less than 45%	D	2.00
Less than 40%	F	0.00

Prepared by:	**Checked by:**	**Approved by:** **(Head of the Dept.)**
		
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