BIRZEIT UNIVERSITY

Faculty of Engineering and Technology
Department of Computer Science

Course information:

A. **Course Code:** COMP338
B. **Course Name:** Artificial Intelligence
C. **Prerequisite:** COMP233 & COMP242
D. **Co-requisite:** None

Instructors:

Section 1:

- Name: Dr. Radi Jarrar
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Section 2:

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Course Description:

This course will cover the fundamental techniques and mechanisms in Artificial Intelligence, artificial agents, problem solving and search mechanisms, game theory, knowledge representation and reasoning, expert system overview, reasoning under uncertainty, and supervised and unsupervised learning.

Course Goals:

The main goal of this course is to provide students with the fundamental knowledge in the field of Artificial Intelligence. Students should be able to identify computer-related problems that can be solved using Artificial Intelligence to be able to construct intelligent computer systems to tackle the related problems.

Course Outcomes:

Upon successful completion of this course, the student will be able to:

A. Knowledge and understanding
   1. Identify the different application areas of Artificial Intelligence
   2. Understand the fundamental concepts of artificial intelligence, techniques, and mechanisms
   3. Understand basic techniques and methodologies in knowledge representation, automated reasoning (search techniques), and different types of agents

B. Intellectual/Cognitive skills
   1. Identify problems that can be solved using AI techniques and which AI method to be applied to solve problems at hand
   2. Formalise a given problem, in programming languages, using different AI methods and techniques

C. Subject specific and practical skills
   1. Implement basic AI algorithms
   2. Design and conduct empirical evaluations of different AI algorithms

D. General and transferable skills
   1. Communication and oral skills by discussing matters related to AI techniques
   2. Working in groups to design and implement solutions of AI related problems
   3. State conclusions that the evaluations and comparisons of different algorithms support

Course Content:

Topic	Reading	Time (hour)
Introduction to AI	Ch1	1
Intelligent Agents	Ch2	1
Problem-solving by Search (9 hours)		
Uninformed Search	Ch3	2
Informed and heuristic Search	Ch4	3
Local Search	Ch4	2
Games and Adversarial Search	Ch6	2
Machine Learning (9 hours)		
Introduction to Machine Learning	Notes	2
Linear Regression Learning	Notes	3
Decision Tree Learning	Ch.18	3

K-Means Clustering	Notes	1
Natural Language Processing (11 hours)		
Introduction to NLP	Ch22+Notes	1
Text Parsing (English and Arabic)	Ch22+Notes	2
Probabilistic language modeling	Ch23	3
Information Retrieval	Ch23	2
Lexical Semantics and Lexical Resources	Notes	3
Knowledge and Reasoning (10 hours)		
Logical Agents	Ch7	1
First-Order-Logic	Ch8	2
Inference in First Order Logic	Ch9	5
Description Logic and Ontologies	Ch10+Notes	2

Teaching and learning method:

A. Lectures – introduce new concepts, and theory
B. Class discussion for more understanding and give examples

Assessment methods based on outcomes:

1. Exams to asses A1, A2, A3, B1, B2, C2
2. Projects to assess B1, B2, C1, C2, D1, D2

Weighting of assessments:

Midterm Exam	30%
Final Exam	40%
Assignments/Projects	30%
Total	%100

References:

A. Essential books /text books
    1. Artificial Intelligence: A Modern Approach 3rd edition. Russel and Norvig, Pearson, 2010

B. Recommended books and Readings
    1. Machine Learning. Tom Mitchell, McGrew Hill, 1997
    2. Artificial Intelligence Structures and Strategies for Complex Problem Solving 5th edition. George F Luger & W. A. Stubblefield, Addison-Wesley, 2005
    3. Artificial Intelligence A Guide to Intelligent Systems 2nd edition. Michael Negnevitsky, Addison Wesley, 2004
    4. D. Nardi, R. J. Brachman. *An Introduction to Description Logics. In the Description Logic Handbook*, edited by F. Baader, D. Calvanese, D.L. McGuinness, D. Nardi, P.F. Patel-Schneider, Cambridge University Press, 2002, pages 5-44.

http://www.inf.unibz.it/~franconi/dl/course/dlhb/dlhb-01.pdf (Only Sections 2.1 and 2.2 are required).
5. Thomas R. Gruber: *Toward Principles for the Design of Ontologies Used for Knowledge Sharing* http://tomgruber.org/writing/onto-design.pdf (Only Sections 1-3 are required, section 4 quick reading)
6. Nicola Guarino: *Formal Ontology and Information Systems*. IOS Press, 1998 http://www.loa-cnr.it/Papers/FOIS98.pdf
7. Jarrar, M.: Towards Methodological Principles for Ontology Engineering. PhD thesis, Vrije Universiteit Brussel (2005). http://www.jarrar.info (Only chapter 2 & 3)
8. Mustafa Jarrar: *Towards Effectiveness and Transparency in e-Business Transactions, An Ontology for Customer Complaint Management*. http://www.jarrar.info/publications/mjarrar-CCFORM-chapter.v08.pdf (Quick Reading)
9. George A. Miller, Richard Beckwith, Christiane Fellbaum, Derek Gross, and Katherine Miller: *Introduction to WordNet: An On-line Lexical Database*. http://www.mit.edu/~6.863/spring2010/readings/5papers.pdf