

" حيث تصبح الرؤية واقعاً "
"When Vision Becomes
Reality"

" عراقة وجودة "
Tradition and Quality

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| Detailed Course Description - Course Plan Development and Updating Procedures/ Computer Information Systems Department | QF01/0408-3.0E |
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| Faculty | Faculty of Science and Information Technology | Department | Computer Information Systems |
| Course Number | 0113414 | Course Title | Artificial Intelligence and Expert Systems |
| Number of Credit Hours | 3 | Pre-Requisite/Co-Requisite | Algorithms |

Brief Course Description

The course aims to: presenting the basic concepts of AI; Describing how to represent knowledge used in AI in both theory and practice with careful attention to the underlying principles of logic, search, and probability; Describing concepts of state space search and its strategies; Presenting blind and heuristic search algorithms and how to use these algorithms for problem solving; Describing the main concepts of production systems; Presenting basic concepts and roles of AI programming (PROLOG); Defining concepts of expert systems; and Defining concepts of machine learning.

| Course Goals and Learning Outcomes | |
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| Goal 1 | Presenting the concepts and Benefits of AI. |
| Learning Outcomes | 1.1 Understanding the basic concepts and techniques of AI. 1.2 Learning how to represent AI knowledge in both theory and practice with careful attention to underlying principles of logic, search, and probability. |
| Goal 2 | Describing concepts of state space search and its strategies. |
| Learning Outcomes | 2.1 Learning the state space search and its strategies. 2.2 Learning the concepts of blind search algorithms. 2.3 Learning Depth -first search and Breadth -first search algorithms. 2.4 Learning the concepts of heuristic search algorithms. 2.5 Learning how to use algorithms for problem solving and how to select appropriate search paradigms for problems. |
| Goal 3 | Describing the concepts of production systems. |
| Learning Outcomes | 3.1 Understanding the concepts of production systems. 3.2 Learning the main components of production systems. |
| Goal 4 | Presenting basic concepts and roles of AI programming (PROLOG). |
| Learning Outcomes | 4.1 Learning the concepts of PROLOG language. 4.2 Learning the statements, rules and queries of Prolog language. |
| Goal 5 | Describing Expert Systems and Machine learning. |
| Learning Outcomes | 5.1 Learning the concepts of expert systems and applications. 5.2 Learning the concepts of Knowledge Based Systems. 5.3 Learning the concepts of machine learning. |
| Textbook | Artificial Intelligence: Building Intelligent Systems. (1 st edition) by P. Kulkarni and P. Joshi, PHI Learning Private Limited, 2015. ISBN: 978-81-203-5046-5 |

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| Supplementary References | <ol style="list-style-type: none"> Russell and Norvig, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson Education, Inc., Prentice-Hall-Series, 2010. Jeff Heaton, Artificial Intelligence for Humans, Volume.1, Fundamental Algorithms, Kindle Edition, 2013. Alan Mackworth and David Poole, Artificial Intelligence: Foundations of Computational Agents, Cambridge Canada Press, 2010. Robots Are People Too: How Siri, Google Car, and Artificial Intelligence Will Force Us to Change Our Laws by John F. Weaver. Praeger, Nov. 2013. ISBN: 1440829462, 9781440829468 |
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Course Timeline

| Week | Number of Hours | Course Topics | Pages (Textbook) | Notes |
|-------|-----------------|---|----------------------|-------|
| 01 | 1 1 1 | 1. Introduction to artificial intelligence <ul style="list-style-type: none"> Artificial intelligence history and foundation Birth of artificial intelligence Artificial intelligence techniques Problem solving with AI | TXT: 1-7 | |
| 02 | 1 1 | 2. Problem solving <ul style="list-style-type: none"> Problem solving process Formulating problems Problem types and characteristics | TXT: 15-20 | |
| 02-03 | 1 1 1 | 3. Uniformed search <ul style="list-style-type: none"> General search algorithms Uniformed search methods (Breadth first search, Depth first search) | TXT:39-47 | |
| 04-05 | 1 1 1 | 4. Informed search <ul style="list-style-type: none"> Generate and test Best first search Greedy search A* search Local search algorithms and optimization problems (hill climbing search, genetic algorithms) | TXT- 56-65, 69-83 | |
| 06 | 1 1 1 | Revision First exam 20% | | |
| 07 | 1 1 | 5. Intelligent agents <ul style="list-style-type: none"> What is an intelligent agents | TXT: 95-99 | |

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| | 1 | <ul style="list-style-type: none"> - Rationality and rational agent - Performance measure | | |
| 08-10 | 1 1 1 | 7. Knowledge and reasoning <ul style="list-style-type: none"> - Knowledge representation - Knowledge-based agents - The Wumpus world - Logic - Propositional logic - Predicate logic - Unification and lifting inference in FOL - Representing knowledge using rules - Prolog | TXT: 134-160, 477-483 | |
| 11-12 | 1 1 1 | 8. Uncertain Knowledge and reasoning <ul style="list-style-type: none"> - Uncertainty and methods - Probabilistic reasoning - Perception - Other techniques in Uncertainty and reasoning process <p style="text-align: center;">Second Exam 20%</p> | TXT:170,171, 176, 182, 190- 192 | |
| 13 | 1 1 1 | 9. Planning <ul style="list-style-type: none"> - Planning problem - Simple planning agent - Planning as a state space search | TXT: 199-202, 210-212 | |
| 14 | 1 1 1 | 10. Learning <ul style="list-style-type: none"> - What is machine learning - Learning paradigms | TXT: 233-238 | |
| 15 | 1 1 1 | 11. Experts systems <ul style="list-style-type: none"> - Architecture of experts systems - Existing experts systems - Rule based expert systems | TXT:267-270, 271, 276-277 | |
| 16 | 1 1 1 | Final Exam 50% | | |

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| Theoretical Course Evaluation Methods and Weight | Participation = 10% First Exam 20% Second Exam 20% Final Exam 50% | Practical (Clinical) Course Evaluation Methods | Semester Students' Work = 50% (Reports, Research, Quizzes, Etc.) Final Exam = 50% |
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| Approved by Head of Department | | Date of Approval | |
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Extra information (to be updated every semester by corresponding faculty member)

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|-----------------------------|--|---------------|------------------|
| Name of Teacher | | Office Number | |
| Phone Number (Extension) | | Email | _____@zuj.edu.jo |
| Office Hours | | | |