Master of Science in Artificial Intelligence (<u>MSAI</u>)									
Course Name	Knowledge Represen	tation and Reasoning	التمثيل والاستدلال في المعرفة						
Course	Course Code	Course No.	Credit Hour	Prerequisite(s)					
Information	0911-1673	673	3 (3-0-6)	Foundations of AI					
Course Track	Program Core		Electives						

Course Description. Knowledge Representation and Reasoning (KRR) is branch of AI that explores formalisms to represent knowledge about the world on computer systems and what kinds of reasoning can be done about the represented knowledge. Such formalisms include findings from logic, semantics and ontologies will allow automated reasoning and making decisions easier and more accurate in complex systems and environments. Challenges of KRR include representation of commonsense knowledge and the ability to represent and manipulate uncertain knowledge and information. The course starts with overview to knowledge-based technologies and knowledge representation, propositional logic as a representation language and as a reasoning technique. Then, the course discusses both representing knowledge and reasoning in first order predicate logic. It covers existing representational formalisms developed within AI, their key concepts and their related inference and reasoning methods. Probabilistic models for reasoning and decision making such as Bayesian networks and Markov processes will be covered, as well. Other kinds of logics such as description logic, and lightweight description logics, either as a knowledge representation language or as a reasoning technique are covered. These concepts will be employed in several applications including rule-based knowledge representation and reasoning, semantic web, and knowledge-based ontologies.

Course Outcomes. After the completion of this course, the student will be able to:

- Describe the syntax and semantics of propositional and predicate logic and apply resolution in predicate logic
 [C]
- 2. **Represent** knowledge in description logics and frames and understand their relationship to predicate logic
- 3. Use planning techniques to determine best sequence actions to achieve specific goals in reasoning problems. [E]
- 4. Use ontologies to semantically model textual knowledge representations such as in the web. [E]
- 5. Model knowledge with uncertainty using probabilistic models. [B]

6. Apply basic probability to compute inference and make decisions in probabilistic Knowledge models. [D]

Assessment	Assignments	10%	Quiz	10%	Capstone	40%			
Policy (TC)	Midterm	20%	Final	40%	Project	40 /0			
Textbook	Stuart Russell, Peter Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, 4 th Edition, 2020, ISBN: 0134610997.								
References	Ronald J. Brachman, Hector J. Levesque: Knowledge Representation and Reasoning, Morgan Kaufmann, 2004, ISBN-13: 978-1-55860-932-7.								

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