Master of Science in Artificial Intelligence (MSAI)

Course Name	Deep Learning		التعلم العميق		
Course Information	Course Code	Course No.	Credit Hour	Prerequisite(s)	
	0911-1665	665	3 (3-0-6)	Machine Learning	
Course Track	Program Core	Electives			

Course Description. Deep learning is a branch of machine learning concerned with the development and application of advanced neural networks. Deep learning algorithms extract high-level representations of data in a layered architecture in such a way that maximizes performance on a given task. The goal of this course is to provide students a comprehensive understanding of the concepts of advanced artificial neural networks and their applications in several domains. The course starts with a recap of linear models and discussion of stochastic optimization methods that are crucial for the learning of deep neural networks. Then, the course covers a range of all popular building blocks of deep learning methodologies including standard and deep neural networks, fully connected networks, convolutional and recurrent network structures, generative adversarial networks, deep unsupervised and reinforcement learning. The course demonstrates the application of these models into real world problems in several domains including speech recognition, computer vision, and natural language understanding, and so on. Throughout the course, the student will have the opportunity to develop a project using the recent deep learning frameworks in Python such as Keras, TensorFlow, etc.

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

- 1. Understand the basic concepts of linear models and stochastic optimization methods. [A, C]
- 2. Distinguish and develop different building blocks of advanced deep neural networks in various domains. [B]
- 3. **Evaluate** deep learning models performance and interpret the results and compare their performance with alternative models. **[E]**
- 4. Understand the functioning and limitations of different deep learning models for a given setting. [F]
- 5. Apply deep learning algorithms to a specific practical and real world problem. [D]

Assessment	Assignments	15%	Quiz		Capstone	40%				
Policy (PC)	Midterm	15%	Final Exam	30%	Project	1070				
Textbook	Ian Goodfellow, Yoshua Bengio, Aaron Courville "Deep Learning", MIT Press, 2016. ISBN-13: 978-0262035613.									
References	 Francois Chollet, "Deep Learning with Python", Manning Publications, 2018, ISBN 9781617294433. Aurélien Géron. "Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems" O'Reilly Media, 2nd Edition, 2019. ISBN 9781492032649 									

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