THE CYPRUS INTERNATIONAL INSTITUTE OF MANAGEMENT
COURSE UNIT DESCRIPTION

Course Unit Title	**Applied Artificial Intelligence (AI) and Deep Learning (DL)**	
Course Unit Code	AT500	
Type of Unit	Core	
Level of Course Unit	Second cycle	
Year of Study	Modular	
Semester	On demand	
Number of ECTS Credits	6 ECTS	
Course Unit Objectives	The objective of this course is to introduce students to artificial intelligence with intelligent agents, knowledge representation, reasoning, machine learning, and deep learning. It will then present methods for language analysis and vision/robotics. The **first objective** will be to learn the **basic ideas in Artificial Intelligence** behind the design of intelligent agents and knowledge representation with logical/probabilistic reasoning for real-world data/problems. The latter include search, games, machine learning, and constraint satisfaction. The **next objective** will be to review basic ideas of design and analysis of **efficient algorithms**, including searching, graph algorithms, and dynamic programming. It will then emphasize on **supervised machine learning** techniques for regression and classification. The latter using the **scikit-learn library**. **Then,** it is to learn about datasets, architecture, optimization, training, and performance validation used for **neural networks and deep learning (DL)**. It will cover implementation with the **TensorFlow** and **Keras** deep learning frameworks. **Eventually**, the course will cover systems to analyze, understand, and produce **language and sequences**. Use machine and deep learning methods for language modeling. Examine applications such as information extraction, machine translation, and text generation. The **last topic** will be on computer vision and robotics. It will cover ideas on image processing, filtering, segmentation, object recognition, and detection with deep neural networks. Also, on vision algorithms and learning as the basis of robotic perception, interaction, and planning.	
Learning Outcomes	On completion of this course students are expected to know:	
	CILO 1	AI in terms of agents and knowledge representation/reasoning for real world data/problems.
	CILO 2	Algorithms such as searching, graph, and dynamic programming. Supervised learning for regression/classification. Implementation with the scikit-learn library.
	CILO 3	Architectures and training for deep learning. Implementation in TensorFlow/Keras framework.
	CILO 4	Natural language processing for text understanding. Applications for machine translation and text generation with DL.
	CILO 5	Computer vision. Image filtering, processing, and detection with DL. Integration with robotics.
Name of Lecturer(s)	Stathis Hadjidemetriou	
Mode of delivery	Face to Face	
Prerequisites or corequisites	BI420 Python Programming AT 300 Data structures and algorithms	
Course Content	Introduction to AI with agents/knowledge representation and reasoning for real world problems.	CILO 1
	Algorithms and machine learning. Overview of searching, graph, and dynamic programming. Supervised learning for regression/classification.	CILO 2
	Neural networks and deep learning. Architecture, training and implementation with TensorFlow/Keras.	CILO 3
	Natural language and sequence processing. Analysis and understanding of text. Applications for information extraction, machine translation, and text generation with DL.	CILO 4
	Computer vision with image filtering, processing, detection with DL. Integrate computer vision with robotics.	CILO 5

Recommended or required reading	Textbooks: Peter Norvig, Stuart J. Russell, Artificial Intelligence: A modern approach (4th edition), 2020 Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems 2nd Edition by Aurélien Géron (Author) Optional textbook: Deep Learning (Adaptive Computation and Machine Learning series) Illustrated Edition by Ian Goodfellow (Author), Yoshua Bengio (Author), Aaron Courville (Author) Deep Learning with Python 1st Edition by François Chollet (Author) Articles & Journals: Online sources: TensorFlow Keras Other online courses MIT Open courseware – Artificial intelligence MIT Introduction to Deep Learning NYU Deep Learning SP21 Stanford Engineering- Machine Learning
Planned learning activities and teaching methods	Lectures; in-class discussion and debates; in-class exercises; problem sets; team work; video case studies, team presentations, interactive online learning via Moodle (quizzes, assignments, forums)
Assessment methods and criteria	Participation: 10% Midterm exam: 30% Final Exam: 60%
Language of Instruction	English
Work Placement(s)	Not applicable