

The University of Jordan
School of Engineering
Computer Engineering Department
Spring Term 2022/2022



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| Course | AI and Machine Learning – 0917451 (3 Cr. – Core Course) |
| Catalog Description | The course helps the student gain understanding and skills in Artificial Intelligence (AI) and Machine Learning (ML) applications and algorithms. It also covers the basics of data preparation, training, and evaluation. The course concentrates on the practical skills to use AI and ML to solve real-life problems and includes a term project on designing and implementing a ML solution to solve a problem of the student choice. |
| Prerequisites by Course | Computer Applications Lab (0907311) and Linear Algebra (0301241) |
| Prerequisites by Topic | Students are assumed to have good background in mathematics, particularly, calculus, linear algebra, and statistics. Additionally, the students should have good programming skills using Python. |
| Textbooks | <ol style="list-style-type: none">1. Aurélien Géron, Hands-On Machine Learning with Scikit-Learn, Keras and TensorFlow: Concepts: Tools, and Techniques to Build Intelligent Systems, 2nd Edition, O’Reilly Media, Oct 2019.2. Prateek Joshi, Artificial Intelligence with Python, Packt Publishing, 2017. |
| References | <ol style="list-style-type: none">1. François Chollet, Deep Learning with Python, Manning Pub. 2018.2. Theodoridis S, Koutroumbas K, Pattern Recognition, 3rd ed. Academic Press, 2006. |
| Course Website | http://www.abandah.com/gheith/?page_id=2836 |
| Microsoft Team | Link |
| Schedule & Duration | 15 weeks; 45 lectures, 60 minutes each (including exams) |
| Student Material | Textbook, class handouts, some instructor keynotes, selected YouTube videos, and access to a personal computer and the internet. |
| College Facilities | Classroom with whiteboard and projection display facilities with speakers, library, and computer laboratory. |
| Course Objectives | The objectives of this course are: <ol style="list-style-type: none">1. Introduce students to the techniques used in ML including data preparation, training models, classification, neural networks, and deep learning.2. Introduce students to the practical techniques used in developing ML systems including sample collection, training, and evaluation.3. Introduce students to the programming techniques and libraries used in ML (Python, Scikit-Learn, Keras, and TensorFlow). |
| Course Outcomes and Relation to ABET Program Outcomes | Upon successful completion of this course, a student should be able to: <ol style="list-style-type: none">1. Solve an AI problem by developing an appropriate ML system [1].2. Communicate the development of a ML system through a detailed technical report [3].3. Use Python and its specialized libraries to develop programs for solving ML problems [2]. |

Course Topics

- Introduction to AI
- Introduction to ML
- Data preparation and regression
- Classification
- Training models
- Classical techniques: SVM, decision trees and ensembles
- Unsupervised learning and clustering

Midterm Exam

- Neural networks
- Deep neural networks
- Convolutional neural networks
- Recurrent neural networks
- Reinforcement learning
- Recommendation systems

Computer Usage

Practical aspects of the course are covered in class and through the term project.

Important Dates

| <u>Date</u> | <u>Event</u> |
|-------------------|------------------------------|
| Mon 28 Feb, 2022 | Classes Begin |
| TBA, 2022 | Midterm Exam |
| Wed 4 May, 2022 | Term project proposal is due |
| Wed 1 Jun, 2022 | Term project report is due |
| Thu 9 Jun, 2022 | Last Date to Withdraw |
| Wed 8 Jun, 2022 | Last Lecture |
| Jun 11 - 23, 2022 | Final Exam Period |

Policies

- Attendance is required. Class attendance will be taken every class and the university policies will be enforced in this regard.
- All submitted work must be yours
- Cheating will not be tolerated
- Open-book exams
- Check department announcements at:
<http://www.facebook.com/pages/Computer-Engineering-Department/369639656466107> for general department announcements.

Assessments

Reports, participation, and exams

Grading policy

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| Two quizzes | 10% |
| Term project report | 10% |
| Midterm Exam | 30% |
| Final Exam | 50% |

Instructors

Prof. Gheith Abandah

Email: abandah@ju.edu.jo

Homepage: <http://www.abandah.com/gheith>

Office Hours: Sun through Thu: 8:30 am – 2:00 pm

Time and Location

Section 1: Mon and Wed: 11:30–13:00, CPE 001, [Microsoft Teams](#)

Last Updated

Feb 23, 2022

Program Outcomes (PO)

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| 1 | an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics |
| 2 | an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors |
| 3 | an ability to communicate effectively with a range of audiences |
| 4 | an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts |
| 5 | an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives |
| 6 | an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions |
| 7 | an ability to acquire and apply new knowledge as needed, using appropriate learning strategies. |