



Introduction to Machine Learning and AI

3.0 Units

Fall 2021

Class Meeting Information

- Course dates: TBD
- Online - The class will meet "live" on Zoom. You can access your class by logging into Canvas through your DCE Account.

Instructor Information

Name: Dr. Majed Al-Ghandour

Dr. Majed Al-Ghandour has a PhD in Engineering from NC State University and teaches for UCI- Division of Continuing Education (DCE), NCSU, and Wake Technical Community College for over 24 years. Majed teaches several courses at UCI, Continuing Education including Introduction to Data Science, Data Engineering, and Introduction to Machine Learning, and Docker Fundamentals with AWS. Majed also teaches Data Analytics for MBA Graduates as a Visiting Lecturer for NCSU. He has extensive experience in data analytics, machine learning, and cloud computing.

Course Description

This course introduce concepts and topics essential to AI and Machine Learning. Topics covered include predictive analytics algorithms, artificial neural networks, data analysis, and data mining. Students will explore design, architecture, and applications of networks for practical applications. Students will also learn how artificial neural networks, such as multilayered perception, are implemented using Python.

Prerequisites - Classes or Knowledge Required Before Taking This Course

I&C SCI X426.59 Intermediate Python or equivalent experience

Course Sequencing

This course is a stand-alone course offered as an elective in the Experience University Research program.

Course Objectives

At the end of this course, students will be able to:

- Articulate the difference between Machine Learning and Deep Learning.
- Distinguish between Supervised v/s Unsupervised Machine Learning.
- Visualize results that are output by Machine Learning algorithms.
- Apply machine and deep learning concepts using industry software tools to solve business problems.

Course Material

There is ***no required textbook*** for this course.

Course materials will be provided in the learning management system, Canvas.

Course Outline

Part 1	Topics & Objectives	Key Topics Module 1: <ul style="list-style-type: none">• Introduction Machine Learning (ML) and AI?• ML v/s Deep Learning<ul style="list-style-type: none">○ ML approach (train, test, validate, optimize model)○ Python Package Scikit-learn Module 2: <ul style="list-style-type: none">• Survey of Machine Learning and AI tools Learning Objectives By the end of this lesson, you will be able to: <ul style="list-style-type: none">• Define Machine Learning• Define Deep Learning• Outline the differences between Machine Learning and Deep Learning• Discuss the different industry tools for Machine Learning and AI and explain how they fit into the ecosystem of a ML project
	Learning Activities	<ul style="list-style-type: none">• Reading assignments• Pre-recorded lectures• Asynchronous discussions• Synchronous sessions via zoom
	Assignments Due	Assignment 1 & 2 Discussion 1 Quiz 1

Part 2	Topics & Objectives	<p>Key Topics</p> <p>Module 3:</p> <ul style="list-style-type: none"> • Supervised Learning Models <ul style="list-style-type: none"> ○ Linear Regression <ul style="list-style-type: none"> ▪ Simple ▪ Multiple ○ Logistic Regression ○ Classification <ul style="list-style-type: none"> ▪ K Nearest Neighbors (k-NN) <p>Module 4:</p> <ul style="list-style-type: none"> • Unsupervised Learning Models <ul style="list-style-type: none"> ○ Clustering <ul style="list-style-type: none"> ▪ K-Means ▪ Neural Networks <p>Learning Objectives</p> <p>By the end of this lesson, you will be able to:</p> <ul style="list-style-type: none"> • Outline the different Machine Learning models methods for supervised and unsupervised data • Explain the scikit-learn package • Introduce most popular AI Python packages: Keras, TensorFlow and PyTorch
	Learning Activities	<ul style="list-style-type: none"> • Reading assignments • Pre-recorded lectures • Asynchronous discussions • Synchronous sessions via zoom • Lab
	Assignments Due	<p>Assignment 3</p> <p>Discussion 2</p> <p>Project Proposal</p> <p>Quiz 2</p>

Part 3	Topics & Objectives	<p>Key Topics</p> <p>Module 5</p> <ul style="list-style-type: none"> Unsupervised Learning Models <ul style="list-style-type: none"> a. Clustering <ul style="list-style-type: none"> i. K-Means ii. Neural Networks Visualize Machine Learning output <p>Module 6</p> <ul style="list-style-type: none"> Real-world, industry-based project (Capstone). Project Description <ul style="list-style-type: none"> Criteria and Business Problems (Challenges) and Goals How to improve or to predict or to solve. <p>Learning Objectives</p> <p>By the end of this lesson, you will be able to:</p> <ul style="list-style-type: none"> Leverage a data visualization tool to visualize ML output Describe the use of Convolutional Neural Network (CNN), Recurrent Neural Network (RNN) Create a Machine Learning project plan Propose and develop an industry-based machine learning project
	Learning Activities	<ul style="list-style-type: none"> Reading assignments Pre-recorded lectures Asynchronous discussions Synchronous sessions via zoom Lab
	Assignments Due	<p>Assignment 4</p> <p>Discussion 3</p> <p>Final Project</p> <p>Quiz 3</p>

Evaluation and Grading

Evaluation of Student Performance Weighted as Percentages of the Total Grade

Discussion Forums	25%
Assignments	30%
Quizzes	15%
Final Project	<u>30%</u>
	100%

Grading Scale

A	=	93%	–	100%
A-	=	90%	–	92%
B+	=	87%	–	89%
B	=	83%	–	86%
B-	=	80%	–	82%
C+	=	77%	–	79%
C	=	73%	–	76%
C-	=	70%	–	72%
D+	=	67%	–	69%
D	=	63%	–	66%
D-	=	60%	–	62%
F	=	59%		or less

Code of Conduct

All participants in the course are bound by the University of California Code of Conduct, found at <https://ce.uci.edu/resources/conduct/>.

Netiquette

In an online course, the majority of our communication takes place in the course forums. However, when we have a need for communication that is private, whether personal, interpersonal, or professional, we will use individual email or telephone. Our primary means of communication is written. The written language has many advantages: more opportunity for reasoned thought, more ability to go in-depth, and more time to think through an issue before posting a comment. However, written communication also has certain disadvantages, such as a lack of the face-to-face signaling that occurs through body language, intonation, pausing, facial expressions, and gestures. As a result, please be aware of the possibility of miscommunication and compose your comments in a positive, supportive, and constructive manner.

Academic Honesty Policy

The University is an institution of learning, research, and scholarship predicated on the existence of an environment of honesty and integrity. As members of the academic community, faculty, students, and administrative officials share responsibility for maintaining this environment. It is essential that all members of the academic community subscribe to the ideal of academic honesty and integrity and accept individual responsibility for their work. Academic dishonesty is unacceptable and will not be tolerated at the University of California, Irvine. Cheating, forgery, dishonest conduct, plagiarism, and collusion in dishonest activities erode the University's educational, research, and social roles.

Students who knowingly or intentionally conduct or help another student engage in dishonest conduct, acts of cheating, or plagiarism will be subject to disciplinary action at the discretion of UCI Division of Continuing Education.

Disability Services

If you need support or assistance because of a disability, you may be eligible for accommodations or services through the Disability Service Center at UC Irvine. Please contact the DSC directly at (949) 824-7494 or TDD (949) 824-6272. You can also visit the DSC's website: <http://www.disability.uci.edu/>. The DSC will work with your instructor to make any necessary accommodations. Please note that it is your responsibility to initiate this process with the DSC.