CS 455 / CS 595a: Artificial Intelligence
Term: Spring 2019

Instructor:

Richard S. Stansbury
Office: LB 346
Phone: 386-226-7923
Email: stansbur@erau.edu

Office Hours:

M, W, F 2-3pm
By Appointment

Course Description:

This course provides an introduction to the basic concepts of artificial intelligence (AI) and machine learning (ML) with applications in business, technology, and engineering. This course is introductory to the topic but assumes familiarity with a programming language.

Goals:

Students who successfully complete this course will be able to use modern techniques of artificial intelligence and machine learning to solve complex problems, explain data and make predictions. They will understand the properties of a range of methods, when to use each, how to execute each, and will be able to validate results.

1. Define common AI/ML algorithms and describe optimal use cases for each.
2. Translate problems in to suitable AI or ML problem formulations;
3. Collect and prepare data for the application of ML algorithms.
4. Implement or apply AI/ML algorithms in scripts and visual settings.
5. Interpret output from ML algorithms.
6. Understand hardware and performance considerations, and scale algorithms appropriately.
7. Identify pitfalls of common AI algorithms and ML models.
8. Understand the tradeoffs between performance and accuracy, and scale approach appropriately.
9. Verify results through cross-validation.

Textbook (required):

Aurelien Geron, Hands-On Machine Learning with Scikit-Learn & TensorFlow, O'Reilly: Sebastopol, CA, 2017.

Amazon.com Link: https://www.amazon.com/Hands-Machine-Learning-Scikit-Learn-TensorFlow/dp/1491962291

Additional readings will be assigned to provide additional theoretical depth to the topics covered.

Resources to tools discussed in class will also be available in the Resources Section of the Canvas Modules page.

Course Modules:

The course and its Canvas page is organized into modules. Each module will include its associated dates, learning outcomes, readings, and assignments.

The course has modules for each of its two exams and a module for final project presentations. The remaining course modules address the following topics:

- Introduction
- Search Algorithms
- Genetic Algorithms
- Introduction to ML and Classification
- Training Models
- Support Vector Machines
- Decision Trees
- Ensemble Learning and Random Forests
- Introduction to Artificial Neural Networks
- Convolutional Neural Networks
- Recurrent Neural Networks
- Reinforcement Learning

This course covers a lot of ground over the term, and as such some topics will be covered in greater depth than others, but each AI/ML approach covered will include a discussion of tools and applications.

Grading:

Each course module will have an assignment. A group project will be performed across multiple weeks of the semester. Two exams will be given. The dates of all assignments is on Canvas. As the term progresses, the assignment details will be added and announced both on Canvas and in class.

The grading breakdown is as follows:

Module Assignments	20%
Project	40%
Exams	40%
Total	**100%**

The final grade's assignment to a letter grade is as follows.

	CS 455	CS 595A
90 - 100%	A	A
80 - 89.9%	B	B
70 - 79.9%	C	C

60 - 69.9%	D	F
0 - 59.9%	F	

Course Policy:

What's the difference between CS 455 vs. CS 595A? This course is cross-listed for graduate and undergraduate students. Graduate students will be assigned additional tasks in the module assignments and the course project. CS 455 students are welcome to also work on these tasks and receive written feedback on your work, but they will not be graded for credit.

Announcements: Office course announcements will be made through the Canvas announcement's page. Please make sure your Canvas settings notify you of announcements either via email, on the web, or using the Canvas mobile app.

Phone/Email/Office Communication: I will try to reply to all student emails within 24-hours. I have an open-door policy so you are welcome to drop-in as needed when the door is open or during office hours. I can be reached on my work number at either of my two offices (M-104 or LB 346). I am typically in my Lehman office in the afternoon and when teaching.

Discussion Boards: Course discussion boards are set-up to facilitate discussion of topics in the course and their assignments. Please review periodically.

Attendance: Attendance will not be formally taken in this class. You are an adult and can prioritize your time; however, there will be some content covered during lecture that might not be available in the assigned reading or lecture materials online.

Failure to attend a scheduled exam or your final presentation will only be excused with a doctor's note or a significant life-event. Whenever possible, consulting with Dr. Stansbury prior to the absence would be advised.

Class will start promptly at 11am. Tardiness should be avoided. See late policy regarding timing for in-class deliverable submission.

Late Policy: Assignments are expected to be submitted by their due date/time. Failure to submit by this time will result in an initial late penalty of 10% for the first 24 hours, 25% for 24 – 48 hours, and 50% thereafter up to the last day of classes for the term (i.e. prior to study day).

Work submitted in class should be submitted prior to the start of class at the instructor's table/podium. If you fail to submit prior to the start of lecture, it will be treated as late, and should be submitted once the lecture is complete. Please do not interrupt the lecture.

Academic Integrity: This course follow's the University's academic integrity policy, which is available in the student handbook. Please be mindful of plagiarism of online source code including free open source software.

If you did not write the code, you must attribute the code appropriately identifying the original author and adhering to the source's license agreement. When in doubt, discuss with Dr. Stansbury please. This includes reuse of source code from examples provided by Dr. Stansbury.

All assignments are to be done individually unless stated otherwise on the assignment. Collaboration within study groups is acceptable, but the work submitted should reflect your own understanding of the material and the work you completed to achieve the assignment's intent.

Penalties for academic misconduct can include: failure on the assignment, reduction of final grade by a letter grade, or failure of the course.