IDSN 542 Machine Intelligence
Units:4
Term: Fall 2024
Day/Time: TTh 3:00–4:50pm
Location: Online
Instructor: Michael Crowley
Office Hours: By appointment
Contact Info: crowley@usc.edu

IT Help: https://iovine-young.usc.edu/ait/index.html
Hours of Service: 8:30am - 5:00pm
Contact Info: iyhelp@usc.edu, 213-821-6917

USC Technology Support Links
Zoom information for students
Blackboard help for students
Software available to USC Campus

Course Description

This course will cover the concepts of artificial intelligence and machine learning. Students will learn "traditional" AI topics such as agents and search as a basis for machine learning. Machine learning topics will be classification systems, training models with several methodologies, support vector machines, decision trees, and ensemble learning and random forests. Students will also learn about artificial neural networks. Lastly, students will learn the Python programming language as a basis for all labs and assignments.

Learning Objectives

Students will learn the following material:
- Understand the structure and use of intelligent agents
- Understand how to solve problems by searching for a solution
- Understand how to program in Python to solve machine intelligence problems
- Understand how classification systems are built and used
- Understand how machine intelligent models are trained
- Understand support vector machines as a machine learning model
- Understand decision trees as a machine learning model
- Understand ensemble learning and random forests as a machine learning model
- Understand artificial neural networks and how to use them to solve ML problems

Prerequisite(s): none
Co-Requisite(s): none
Concurrent Enrollment: none
Recommended Preparation: Basic programming skills

Course Notes
The course is for a letter grade. All labs, assignments, and lecture notes will be posted to Brightspace. In addition, all work in this class is individual work.

Required Readings
Hands-On Machine Learning with Scikit-Learn and TensorFlow, Aurelien Geron, 3rd edition, ISBN 978-1-098-12597-4

Machine Learning with PyTorch and Scikit-Learn, Sebastian Raschka, 1st edition, ISBN 978-1-80181-931-2

Optional Readings and Supplementary Materials
Python for Everyone, Horstmann and Necaise, 2nd edition

Grading Breakdown

Assignment	Points	% Grade
Labs (12 total)	180	25%
Assignments (5 total)	220	25%
Final Project (3 parts)	400	50%
TOTAL	800	100%

Grading Scale
Course final grades will be determined using the following scale:

A	95-100
A-	90-94
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 and below

Assignment Submission Policy
Labs: Labs are to be completed by Sunday 11:59 pm the week they are assigned.

Assignments and Final Project: Assignments are due at 11:59 pm on the due date included in the assignment. The 3 parts of the final project will have different length due dates but will also be due at 11:59 pm on their due date.

Grading Timeline
It is anticipated that most grading will be completed within one week of the due date.

Late work
Assignments submitted up to 24 hours late will receive a 20% deduction. Assignments between 24 and 48 hours

will receive a 50% deduction. Assignments more than 48 hours late will receive a grade of 0.

Any exceptions to this late grading policy must be requested and approved in advance.

Course Schedule: A Weekly Breakdown

	Topics/Daily Activities	Readings and Homework	Labs/Assignments Assigned
Week 1	Introduction to course and AI; Print Variables; Arithmetic; Input and Output Booleans and Conditionals	Horstmann and Necaise, chs 1 – 2	Lab 1 – First Python program
Week 2	Modules and While Loops More Loops; Sequences; Strings	Horstmann and Necaise, ch 3 – 4.5	Lab 2 – Decisions/Loops Assignment 1
Week 3	Structure of Agents Lists, Tuples and Dictionaries	Horstmann and Necaise, ch 4.6 – 4.9, 6	Lab 3 Assignment 2
Week 4	Searching for a Solution Functions and File Input	Horstmann and Necaise, ch 8.2-8.3	Lab 4 Assignment 3
Week 5	File Output and Exceptions Software Objects	Horstmann and Necaise, ch 5	Lab 5
Week 6	Introduction to Machine Learning; End-to-End ML Project Part 1 End-to-End ML Project Part 2	Geron chs 1-2	Lab 6 – Install and test Sci-Kit Assignment 4
Week 7	End-to-End ML Project Part 3 **No class on Thursday (Fall Recess)**	Geron ch 2 continued	Lab 7

Week 8	End-to-End ML Project Part 4 End-to-End ML Project Part 5	Geron ch 2 continued	Lab 8 Assignment 5
Week 9	Classification Part 1 Classification Part 2	Geron ch 3	
Week 10	Support Vector Machines Decision Trees; Ensemble Learning and Random Forests	Geron ch 5 Geron chs 6 and 7	Lab 9 Final Project Part 1
Week 11	Dimensionality Reduction Unsupervised Learning Techniques	Geron ch 8 Geron ch 9	Lab 10
Week 12	Training Simple Machine Learning Algorithms for Classification	Raschka ch 2	Lab 11 Final Project Part 2
Week 13	A Tour of machine Learning Classifiers Using Scikit-Learn	Raschka ch 3	Lab 12
Week 14	Learning Best Practices for Model Evaluation and Hyperparameter Tuning **No class on Thursday (Thanksgiving Break)**	Raschka ch 6	Final Project Part 3
Week 15	Combining Different Models for Ensemble Learning Applying Machine Learning to Sentiment Analysis	Raschka ch 7 Raschka ch 8	

Finals week, per the Schedule of Classes for the days/times of this course (Tuesday, 12/17): Presentation of Final Projects

Statement on Academic Conduct and Support Systems

Academic Integrity

The University of Southern California is foremost a learning community committed to fostering successful scholars and researchers dedicated to the pursuit of knowledge and the transmission of ideas. Academic misconduct is in contrast to the university's mission to educate students through a broad array of first-rank academic, professional, and extracurricular programs and includes any act of dishonesty in the submission of academic work (either in draft or final form).

This course will follow the expectations for academic integrity as stated in the USC Student Handbook. All students are expected to submit assignments that are original work and prepared specifically for the course/section in this academic term. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s). Students suspected of engaging in academic misconduct will be reported to the Office of Academic Integrity.

Other violations of academic misconduct include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see the student handbook or the Office of Academic Integrity's website, and university policies on Research and Scholarship Misconduct.

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment, or what information requires citation and/or attribution.

Policy for the use of AI Generators |
AI generators are not to be used in this course.

Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University's educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Support Systems:

Counseling and Mental Health - *(213) 740-9355 – 24/7 on call*

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

988 Suicide and Crisis Lifeline - 988 for both calls and text messages – 24/7 on call
The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline is comprised of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL) – 24/7 on call
Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086
Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services (OSAS) - (213) 740-0776
OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

USC Campus Support and Intervention - (213) 740-0411
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity, Equity and Inclusion - (213) 740-2101
Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call
Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-1200 – 24/7 on call
Non-emergency assistance or information.

Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)
A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

Occupational Therapy Faculty Practice - (323) 442-2850 or otfp@med.usc.edu
Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.