



IDSN 599 Special Topics: Machine Intelligence

Units: 4

Term: Fall 2024

Day and Time: TuTh 3:00-4:50pm

Location: ONLINE

Instructor: Michael Crowley, Ph.D.

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, search, logic and knowledge representation 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. Additionally, students will learn the Python programming language as a basis for all labs and assignments.

Learning Objectives and Outcomes

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 the use and importance of constraint satisfaction problems
- Understand first-order logic and how to use it to solve problems
- Understand how to represent knowledge in AI-based systems
- 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

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 Blackboard.

Required Readings and Supplementary Materials

Artificial Intelligence: A Modern Approach, Russell and Norvig, 3rd edition
Hands-On Machine Learning with Scikit-Learn and TensorFlow, Aurelien Geron, 2017

Optional Readings and Supplementary Materials

Python for Everyone, Horstmann and Necaise, 2nd edition

Description and Assessment of Assignments

There will be labs most weeks. There will also be assignments – like bigger labs. There will also be a three- part final project.

Grading Breakdown

| Assignment | Points | % Grade |
|-------------------------|------------|-------------|
| Labs (12 total) | 180 | 30% |
| Assignments (5 total) | 220 | 30% |
| Final Project (3 parts) | 400 | 40% |
| TOTAL | 800 | 100% |

Grading Scale (Example)

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.

Synchronous session recording notice

If not cited elsewhere, let students know that synchronous sessions will be recorded and provided to all students asynchronously (generally through recorded Zoom sessions, integrated into Brightspace). Information for faculty on recording class sessions can be found on the Academic FAQs for Faculty on the USC COVID-19 Resource Center.]

Course Schedule: A Weekly Breakdown

| | Topics/Daily Activities | Readings and Homework | Labs/Assignments Assigned |
|---------------|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------|
| Week 1 | Introduction to AI; Intelligent Agents Introduction to Python; Programming with Numbers and Strings | Russell and Norvig chs 1 – 2.3 Horstmann and Necaie, chs 1 – 2 | Lab 1 – First Python program |
| Week 2 | Decisions in Python; Introduction to Loops | Horstmann and Necaie, ch 3 – 4.5 | Lab 2 – Decisions/Loops Assignment 1 |
| Week 3 | Structure of Agents; Solving Problems by Searching Loops; Lists in Python | Russell and Norvig ch 2.4 – 3.2 Horstmann and Necaie, ch 4.6 – 4.9, 6 | Lab 3 Assignment 2 |
| Week 4 | Searching for a Solution Tuples and Dictionaries | Russell and Norvig ch 3.3-3.6 Horstmann and Necaie, ch 8.2-8.3 | Lab 4 Assignment 3 |
| Week 5 | Beyond Classical Search Functions in Python | Russell and Norvig ch 4 Horstmann and Necaie, ch 5 | Lab 5 |
| Week 6 | Python File Input Constraint Satisfaction Problems | Horstmann and Necaie, ch 7.1 - 7.2 Russell and Norvig ch 6 | Lab 6 Assignment 4 |
| Week 7 | Files and Exceptions in Python Objects and Classes | Horstmann and Necaie, ch 7 Horstmann and Necaie, ch 9 | Lab 7 |
| Week 8 | Knowledge Representation | Russell and Norvig ch 12 | Lab 8 – Install and test Sci-Kit Assignment 5 |
| Week 9 | Introduction to Machine Learning | Geron chs 1-2 | |

| | | | |
|----------------|-------------------------------------------------------------------------|-------------------|-------------------------------------------------------------------|
| | Spring Break – no classes, March 11 - 15 | | |
| Week 10 | Classification | Geron ch 3 | Lab 9 – Classification with Sci-Kit Final Project Part 1 |
| Week 11 | Training Models | Geron ch 4 | Lab 10 – Training Models with Sci-Kit Final Project Part 2 |
| Week 12 | Support Vector Machines | Geron ch 5 | Lab 11 – Support Vector Machines with Sci-Kit |
| Week 13 | Decision Trees | Geron ch 6 | Lab 12 – Decision Trees with Sci-Kit Final Project Part 3 |
| Week 14 | Ensemble Learning and Random Forests | Geron chs 7 | |
| Week 15 | Dimensionality Reduction; Introduction to Artificial Neural Networks | Geron ch 8 and 10 | |

Finals week (Week 16): 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.