IDSN 499: Machine Intelligeence
Units: 4
Spring 2023—Tuesdays & Thursdays—5:30-7:20pm

Location: Online

Instructor: Michael Crowley
Office: HSH 101; online
Office Hours: TBD
Contact Info: crowley@usc.edu

IT Help: Digital Campus Online Technical Support
Contact Info: 1-833-740-1273,
TechSupport@digitalcampus.2U.com

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: One semester programming course or equivalent experience.

Course Notes:

The course is for a letter grade. All labs, assignments, and lecture notes will be posted to the Digital Campus.

USC Technology Rental Program

The university realizes that attending classes online and completing coursework remotely requires access to technology that not all students possess. If you need resources to successfully participate in your classes, such as a laptop or internet hotspot, you may be eligible for the university's equipment rental program. To apply, please submit an USC Technology Rental Program Application .

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
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 Blackboard). 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 Necaise, chs 1 – 2	Lab 1 – First Python program
Week 2	Decisions in Python; Introduction to Loops	Horstmann and Necaise, ch 3 – 4.5	Lab 2 – Decisions/Loops Assignment 1
Week 3	Structure of Agents; Solving Problems by Searching Loops; Lists inPython	Russell and Norvig ch2.4 – 3.2 Horstmann and Necaise, 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 Necaise, ch 8.2-8.3	Lab 4 Assignment 3
Week 5	Beyond Classical Search Functions in Python	Russell and Norvig ch4 Horstmann andNecaise, ch 5	Lab 5
Week 6	Python File Input Constraint Satisfaction Problems	Horstmann and Necaise, ch 7.1 - 7.2 Russell and Norvig ch 6	Lab 6 Assignment 4
Week 7	Files and Exceptionsin Python Objects and Classes	Horstmann and Necaise, ch 7 Horstmann and Necaise, ch 9	Lab 7
Week 8	Knowledge Representation	Russell and Norvig ch12	Lab 8 – Install and test Sci-Kit Assignment 5
Week 9	Introduction to Machine Learning	Geron chs 1-2	
Week 10	Classification	Geron ch 3	Lab 9 – Classification withSci-

			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 VectorMachines	Geron ch 5	Lab 11 – Support Vector Machines with Sci-Kit
Week 13	Decision Trees	Geron ch 6	Lab 12 – Decision Trees withSci-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	

<h1 style="text-align:center">Statement on Academic Conduct and Support Systems</h1>

Academic Conduct:

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on Research and Scholarship Misconduct.

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

National Suicide Prevention Lifeline *- 1 (800) 273-8255 – 24/7 on call*
suicidepreventionlifeline.org
Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services *(RSVP) - (213) 740-9355(WELL), press "0" after hours – 24/7 on call*
Studenthealth.usc.edu/sexual-assault
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) *- (213) 740-5086*
eeotix.usc.edu
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*
usc-advocate.symplicity.com/care_report
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.usc.edu
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) 821-4710*
campussupport.usc.edu
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*
diversity.usc.edu
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*
dps.usc.edu, emergency.usc.edu
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) 442-120 – 24/7 on call*
dps.usc.edu
Non-emergency assistance or information.

Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)
ombuds.usc.edu
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) 442-33*40 or otfp@med.usc.edu
chan.usc.edu/otfp
Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.