



## **ITP-259: Basics of Artificial Intelligence**

**Units:** 4

**Term:** Spring 2024

**Time:** MW 12:00 pm ~ 1:50 pm

**Location:** GFS 116

**Instructor:** Reza Jafarkhani

**Office Hours:** TTh 2:30 pm ~ 3:30 pm RRB 211 (or Zoom)

**Contact Info:** Private post on course Piazza page (Email: [jafarkha@usc.edu](mailto:jafarkha@usc.edu))

**Course Assistants:**

**Office Hours:** Time and location posted on Blackboard

**IT Help:** Viterbi IT

**Hours of Service:** Monday – Friday, 8:30 a.m. – 5:00 p.m.

**Contact Info:** DRB 205

(213) 740-0517 [engrhelp@usc.edu](mailto:engrhelp@usc.edu)

### **Course Description**

Learn the basics of artificial intelligence. Explore how machines can be programmed to learn. Appreciate the state-of-the-art as well as the challenges in AI. Understand the gains made in artificial narrow intelligence (ANI).

### **Catalogue Description**

Concepts and techniques in artificial intelligence. Approaches in artificial narrow intelligence. Applications of AI that are already changing society. Ethical and social questions in AI.

### **Learning Objectives**

After completing the course students will be able to:

- Define artificial intelligence and its use cases
- Describe latest advances in artificial intelligence
- Explain the basics of specific AI techniques and their applications
- Think critically about the impact (benefits and challenges) of AI on the world

**Prerequisite(s):** ITP 115 or ITP 116

## Course Notes

Grading Type: Letter grade

Lecture slides, assignments, readings, announcements, and other class information will be posted on Blackboard.

Outside of class time, course discussion will take place on Piazza.

## Piazza

The preferred way to communicate with the instructor and CPs is posting on Piazza (<http://piazza.com>). All the students, instructor, and CPs will have access to the same class on Piazza. Information about accessing Piazza is available on Blackboard. If you have questions about assignments, labs, tests, and other aspects about this course, please post on Piazza. You can make public posts which all members can see and answer or private posts which are only accessible to instructor and CPs.

## Technological Proficiency and Hardware/Software Covered

Platforms, packages, and tools that will be used for the class will be provided to students free of charge. The following software will be used in the class. Students should have access to a computer.

- Python packages – Keras, TensorFlow, scikit-learn - <https://www.tensorflow.org/>
- Google Colab - <https://colab.research.google.com/>

## Required Readings and Supplementary Materials

Readings will be assigned from the following sources. All books are available online through USC Safari Books. <https://libraries.usc.edu/databases/safari-books>

- Getting Started with Artificial Intelligence, by Tom Markiewicz, Josh Zheng (“MZ”)
  - Publisher: O'Reilly Media, Inc.
  - Release Date: October 2020
- Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, 2nd Edition, by Aurélien Géron (“AG”)
  - Publisher: O'Reilly Media, Inc.
  - Release Date: September 2019
- Hands-On Artificial Intelligence for Beginners, by Patrick D. Smith (“PS”)
  - Publisher: Packt Publishing
  - Release Date: October 2018

## Description and Assessment of Assignments, Grading Breakdown

The Course Schedule describes assignment description and due dates.

Assignment	% of grade
Homework	40
Exam 1	20
Exam 2	25
Final Project	15
<b>TOTAL</b>	<b>100</b>

Homework will be assessed on timeliness, completeness, thoroughness, and conclusions drawn. Each component of the assessment will have points associated with it. This will vary for each assignment and will be listed in the homework instructions. Grader will provide feedback for each component of the assessment through Blackboard.

Homework instructions will be posted on Blackboard with a due date, objective, expectations, data files, resources, and deliverables. In most cases, the deliverable will be answers in a Word document along with source code and any other output files.

### **Assignment Submission Policy**

Students are responsible for completing individual assignments by stated deadlines. Assignments must be turned in to Blackboard. Late assignment submissions will be subject to a late penalty. Assignments turned in late will have 25% of the total points deducted from the graded score for each late day up to 3 days. No assignments will be accepted later than 72 hrs from the due date. You will have 3 “grace days” for the semester. i.e., no late penalty on HW for a cumulative 3 days. No grace days are available for Project.

### **Grading Timeline**

Assignments Grading will typically be completed 2 weeks after the deadline for submission. Any variations will be announced in class or on blackboard. All grading discrepancies must be resolved within a week of grade release.

For grade disputes, contact your grader first by writing a private post (private to the instructors) on Piazza. If resolution is not reached, contact the instructor.

### **Additional Policies**

No make-up exams (except for documented medical or family emergencies or religious observance) will be offered. If student will not be able to attend an exam due to an athletic game or other valid reason, then they must coordinate with the instructor before the exam is given. Student may arrange to take the exam before they leave, with an approved university personnel during the time they are gone, or within the week the exam is given. If students do not take an exam, they will receive a 0 for the exam.

If students need accommodations authorized by OSAS (*Office of Student Accessibility and Services*), notify the instructor at least two weeks before the exam by writing a private post on Piazza (Select OSAS Accommodation). This will allow time for arrangements to be made.

### **Course Content Distribution and Synchronous Session Recordings Policies**

USC has policies that prohibit recording and distribution of any synchronous and asynchronous course content outside of the learning environment.

Recording a university class without the express permission of the instructor and announcement to the class, or unless conducted pursuant to an Office of Student Accessibility Services (OSAS) accommodation. Recording can inhibit free discussion in the future, and thus infringe on the academic freedom of other students as well as the instructor. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

Distribution or use of notes, recordings, exams, or other intellectual property, based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study. This includes but is not limited to providing materials for distribution by services publishing

course materials. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relationship to the class, whether obtained in class, via email, on the internet, or via any other media. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

## **Zoom**

Zoom synchronous sessions will be recorded and provided to all students asynchronously.

## **Policy on the use of AI generators**

In this course, I encourage you to use artificial intelligence (AI)-powered programs to help you with assignments that indicate the permitted use of AI. You should also be aware that AI text generation tools may present incorrect information, biased responses, and incomplete analyses; thus they are not yet prepared to produce text that meets the standards of this course. To adhere to our university values, you must cite any AI-generated material (e.g., text, images, etc.) included or referenced in your work and provide the prompts used to generate the content. Using an AI tool to generate content without proper attribution will be treated as plagiarism and reported to the Office of Academic Integrity. Please review the instructions in each assignment for more details on how and when to use AI Generators for your submissions.

## Course Schedule

Week	Topics/Daily Activities
<b>1</b>	Course introduction
	What is AI?
<b>2</b>	History of AI,1950 – present
	Landmark achievements
	AI categories – ANI, AGI, ASI
	Where is AI today?
<b>3</b>	Turing test
	Basics of AI approaches
<b>4</b>	Rule-based approach to AI
	Heuristics approach to AI
<b>5</b>	Machine learning approach to AI
	Review of Supervised ML
<b>6</b>	Supervised ML contd.
	Review of Unsupervised ML
<b>7</b>	Unsupervised ML contd.
	Perceptron
<b>8</b>	Neural networks
	Deep neural networks
<b>9</b>	TensorFlow
	<b>Exam I</b>
<b>10</b>	Keras
	Building Keras NN
<b>11</b>	Training DNN
	Computer vision
<b>12</b>	CNN Convolutional neural networks
	Kernels, feature maps, CNN layers
<b>13</b>	Training CNN
	CNN for image classification
<b>14</b>	Bias in AI/ML, Ethics in AI. Guest speaker.
	CNN contd.
<b>15</b>	<b>FINAL Project due</b>
<b>16</b>	<b>Final Exam: Friday May 3, 11:00 am ~ 1:00 pm</b>

## Statement on Academic Conduct and Support Systems

### **Academic Integrity:**

The University of Southern California is a learning community committed to developing successful scholars and researchers dedicated to the pursuit of knowledge and the dissemination of ideas. Academic misconduct, which includes any act of dishonesty in the production or submission of academic work, compromises the integrity of the person who commits the act and can impugn the perceived integrity of the entire university community. It stands in opposition to the university's mission to research, educate, and contribute productively to our community and the world.

All students are expected to submit assignments that represent their own original work, and that have been prepared specifically for the course or section for which they have been submitted. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s).

Other violations of academic integrity include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), collusion, 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. All incidences of academic misconduct will be reported to the Office of Academic Integrity 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.

### **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](https://osas.usc.edu). You may contact OSAS at (213) 740-0776 or via email at [osasfrontdesk@usc.edu](mailto: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](mailto: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.