Cal State Fullerton
Department of Computer Science

CPSC 481 - ARTIFICIAL INTELLIGENCE
Fall 2023 (Sections 1, 3, and 6)

Instructor:	Mira Kim
Email:	mira.kim@fullerton.edu
Office hours:	Tuesday 8:30-9:30am
	Tuesday and Thursday 1-2pm, or by appointment
	Office (CS-510) or zoom
Office:	CS-510 or https://fullerton.zoom.us/my/mirakim
Class Days/Time:	Section 1 – Tuesday and Thursday 11:30 am - 12:45 am, RGC 019
	Section 3 – Tuesday and Thursday 2:30 pm - 3:45 pm, CS 102A
	Section 6 – Tuesday and Thursday 10:00 am - 11:15 am, RGC 019
Final Exam Date:	Section 1 – 12/14 11:00 am- 12:50 pm, RGC 019
	Section 3 – 12/14 1:00 pm - 2:50 pm, CS 102A
	Section 6 – 12/12 9:00 am - 10:50 am, CS 102A

COURSE DESCRIPTION

Artificial Intelligence (AI) is a computer science disciple that is dedicated to creating software systems that can mimic human intelligence and perform tasks that would normally require human intelligence. The adoption of AI has been growing at a rapid pace in various sectors of society and industry including healthcare, finance, e-commerce, transportation, manufacturing, education, agriculture, entertainment, and home.

This course is designed to deliver students with a theoretical foundation of AI, representative approaches to problem solving with AI, and an overview of machine learning that is an emerging area of AI. The theoretical foundation of AI is crucial for understanding the underlying principles of AI. It also allows students to comprehend the potential, the limitations, and the implications of AI. Studying different approaches to problem-solving with AI can equip students with the tools and techniques they need to apply AI to real-world problems. Machine learning has a high applicability to building advanced AI systems in various sectors such as voice assistants, object recognition, online recommendation, medical diagnosis systems, and autonomous systems.

Students are expected to spend a fair amount of time and effort in learning the comprehensive contents of the lecture, solving assignments, an individual project, and taking quizzes and exams. Active class participation is essential for effective learning.

PREREQUISITES

- CPSC 335, MATH 338

- Computer Science or Computer Engineering major or minor; or
  Computer Science or Computer Engineering graduate standing

LEARNING OUTCOMES

- To provide an overview and applications of Artificial Intelligence (AI)

- To discuss the concepts, theories, and techniques of AI, focusing on complex problem-solving strategies for practical applications

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- To introduce subjects including knowledge representation, heuristic search, evolutionary computation, reasoning, learning, and stochastic methods for complex decision making.

- To introduce other relevant subjects to develop intelligent systems.

- To define intelligence and intelligent agents and explain its role in different problem domains.

- To understand and choose appropriate representations for a problem.

- To choose and apply heuristic search and evolutionary computation methods to solve complex problems

- To have a capstone experience through a project

TEXTBOOK

- Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, 4th edition, Pearson, 2021.

- Supplementary materials, if needed, will be provided by the instructor

TENTATIVE CLASS SCHEDULE

WEEK	CONTENTS	TASKS
1 (8/22, 8/24)	**INTRODUCTION TO AI** • What is Artificial Intelligence? (Sections 1.1, 1.2) • Intelligent Agents (Sections 2.1 ~ 2.3)	**Assignment 1**
2 (8/29, 8/31)	**SOLVING PROBLEMS BY SEARCHING** • Problem Solving Agents (Section 3.1) • Search Algorithms (Section 3.3)	**Quiz 1**
3 (9/5, 9/7)	**SOLVING PROBLEMS BY SEARCHING** • Uninformed Search Strategies (Section 3.4) • Informed Search Strategies (Section 3.5)	**Assignment 2**
4 (9/12, 9/14)	**ADVERSARIAL SEARCH AND GAMES** • Game Theory (Section 5.1) • Optimal Decisions in Games (Section 5.2) • Heuristic Alpha-Beta Tree Search (Section 5.3)	**Assignment 3**
5 (9/19, 9/21)	**LOGICAL AGENTS** • Knowledge-based Agents (Section 7.1) • The Wumpus World (Section 7.2) • Logic (Section 7.3) • Propositional Logic (Section 7.4)	**Assignment 4**
6 (9/26, 9/28)	**FIRST-ORDER LOGIC** • Syntax and Semantics of First-Order Logic (Section 8.2) • Using First-Order Logic (Section 8.3) • Knowledge Engineering in First-Order Logic (Section 8.4)	**Quiz 2**
7 (10/3, 10/5)	**ETHICS IN AI & GUEST SPEAKER (TENTATIVE)**	**Assignment 5**
8	**QUANTIFYING UNCERTAINTY**	

Week	Topics	
(10/10, 10/12)	• Basic Probability Notation (Section 12.2) • Inference Using Full Joint Distribution (Section 12.3) • Independence (Section 12.4) • Bayes' Rule and Its Use (Section 12.5) • Naïve Bayes Models (Section 12.6)	
9 (10/17, 10/19)	**MIDTERM REVIEW AND MIDTERM** • Covers weeks 1 Through 7	**Midterm Exam**
10 (10/24, 10/26)	**PROBABILISTIC REASONING** • Representing Knowledge in Uncertain Domain (Section 13.1) • Bayesian Networks (Section 13.2)	**Submit project proposal**
11 (10/31, 11/2)	**PROBABILISTIC REASONING (CONTINUED)** • Exact Inference in Bayesian Networks (Section 13.3) • Approximate Inference for Bayesian Networks (Section 13.4)	**Quiz 3**
12 (11/7, 11/9)	**MACHINE LEARNING** • Forms of Learning (Section 19.1) • Supervised Learning (Section 19.2) • Learning Decision Trees (Section 19.3)	**Assignment 6**
13 (11/14, 11/16)	**MACHINE LEARNING** • Linear Regression (Section 19.6) • Support Vector Machine (Section 19.7)	**Quiz 4**
14 (11/21, 11/23)	**THANKSGIVING WEEK – NO CLASSES**	
15 (11/28, 11/30)	**DEEP LEARNING** • Neural Network, Deep Learning (Sections 21.1, 21.2) **REINFORCEMENT LEARNING** • Learning from Rewards (Section 22.1) **GENERATIVE AI**	**Assignment 7**
16 (12/5, 12/7)	**PRESENTATION SHOULD INCLUDE:** • Problem Specification • Scope of Work and Timeline • Requirement Specification • Design and Implementation	**Project Presentation**
	FINAL EXAM (CHECK EXAM DATE, TIME AND LOCATION) • Covers weeks 8 through 15	**Final Exam**

TECHNICAL REQUIREMENTS

Programming project will be implemented in **Python.** You can use your own computer or borrow a computer from CSUF for free through the Long-Term Laptop check out process.

Students are also expected to

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1. Have basic computer competency which includes:

   - The ability to use a personal computer to locate, create, move, copy, delete, name, rename, and save files and folders on hard drives, secondary storage devices such as USB drives, and cloud such as Google Drive (Titan Apps);
   - The ability to use a word processing program to create, edit, format, store, retrieve, and print documents
   - The ability to use their CSUF email accounts to receive, create, edit, print, save, and send an e-mail message with and without an attached file
   - The ability to use an internet browser to search and access web sites in the World Wide Web.

2. Have ongoing reliable access to a computer with Internet connectivity for regular course assignments
3. Access their CSUF student email account
4. Apply their educational technology skills to complete expected competencies
5. Utilize other software applications as course requirements dictate

GRADING

Quizzes: 10%   Course participation: 5%

Assignments: 20%   Programming project: 15%

Midterm: 25%   Final: 25%

LETTER GRADES

98 - 100%	A+	93 – 97.9%	A	90 - 92.9%	A-
87 – 89.9%	B+	83 – 86.9%	B	80 - 82.9%	B-
77 - 79.9%	C+	73 – 76.9%	C	70 - 72.9%	C-
67 - 69.9%	D+	63 – 66.9%	D	60 - 62.9%	D-
0 - 59.9%	F				

Grade boundaries may be adjusted/curved depending on the class average.

COURSE COMMUNICATION

All course announcements and individual emails are sent through CANVAS which only uses CSUF email accounts. Therefore, you must check your CSUF email on a regular basis (several times a week) for the duration of the course.

EMAILS AND RESPONSE TIME

If you are sending email to the instructor, please include **"CPSC 481:"** at the beginning of the subject. You should always send email messages from your fullerton.edu email account. Class announcements will be sent to your CSUF account. There will be no reply to any free web-based email accounts such as Gmail, Hotmail or Yahoo. I will strive to respond to emails within one-to-two business days (excluding weekends and holidays).

QUIZZES

Quizzes can be completed in groups of no more than 3 or individually. Only one attempt will be allowed. **All quizzes will be due on Friday at 11:59pm.**

ASSIGNMENTS

Assignments can be completed in groups of no more than 3 or individually. Unlimited attempts will be allowed. **All assignments will be due on Friday at 11:59pm.**

If you have any questions or complaints about the grading of assignment, please clearly explain your concerns in an email within one week from the date grades are posted. No late work will be accepted unless the student can provide acceptable compelling reasons with appropriate documentation before the deadline.

COURSE PARTICIPATION

Class participation points are given to encourage your active class participation and discussion. You will be given a perfect score as long as you frequently come to class and actively contribute to the class discussion during lectures.

PROGRAMMING PROJECT

There will be one course project which will involve designing, implementing in Python, and analyzing a substantial program. Students will present their course project to the class during the last week of the semester. You can complete the project in a group of no more than 4. You may also work individually.

EXAMINATIONS

Midterm and final examinations are not cumulative. Midterm will cover material from weeks 1-8. Final will cover material from after the midterm. All exams are to be completed individually. Please be on time for the exams. **No one will be allowed to begin taking an exam after the first student has submitted the exam.** Make-up exams may be considered only in extraordinary circumstances, such as serious illness or accident if appropriate documentation can be provided. Requests for re-evaluation of graded material must be made within one week of grades being posted. All requests must be accompanied by a written explanation of your dispute.

MAKE-UP AND LATE SUBMISSION

No late work will be accepted unless the student can provide acceptable compelling reasons with appropriate documentation **before** the deadline.

EXTRA CREDIT

There will be no extra credit given.

IMPORTANT DATES

- CSUF's Academic Calendar - https://apps.fullerton.edu/AcademicCalendar/
  - The Academic Calendar contains all the campus closures and holidays you should be aware of

- CSUF's Admissions Calendar - http://records.fullerton.edu/apps/calendars.aspx
  - The Admissions Calendar contains all the major dates with respect to adding, dropping, and withdrawing from your classes

- Final exam schedule - https://www.fullerton.edu/scheduling/final_exam_schedule/fall-schedule.php
  - Makeup exams are only available by advance request for documented exceptional circumstances

ACADEMIC DISHONESTY

Please read through CSUF's policy on academic dishonesty - http://www.fullerton.edu/senate/publications_policies_resolutions/ups/UPS%20300/UPS%20300.021.pdf

You have what it takes to succeed in this course without engaging in academic misconduct. Do not jeopardize the hard work you've put into this course. By submitting work for evaluation, students are acknowledging that they have adhered to the spirit of the university's academic honesty policy and that their submission is an original work done by them unless otherwise directed to work in groups.

Academic dishonesty includes such things cheating, inventing false information or citations, plagiarism, and helping someone else commit an act of academic dishonesty. Cheating is defined as the act of obtaining or attempting to obtain credit for work by the use of any dishonest, deceptive, fraudulent or unauthorized means. Examples of cheating include but are not limited to using notes or aids or help of other students on tests and examinations in the ways other than those expressly permitted by the instructor, plagiarism as defined below, tampering with grading procedure, and collaborating with others on any assignment where such collaboration is expressly forbidden by the instructor. Plagiarism is defined as the act of taking the specific substance of another and offering it as one's own without giving credit to the source (e.g., copying another person's program). When you use sources, you must acknowledge the original author or source following standard scholarly practice.

Failure to follow the spirit of the academic honesty policy will result in a severely negative evaluation of your work in question. Each offense will be reported to the Department Chair and to the Dean of Students office, Student Conduct. A first offense will result in a zero score on the offending assignment or quiz or exam. A subsequent offense will result in an F in the course.

INCLUSION AND DIVERSITY

At CSUF, we embrace and celebrate diversity in all its forms. We believe that a diverse and inclusive educational environment enhances the learning experience. Our commitment to diversity encompasses a wide range of identities, including but not limited to race, ethnicity, gender, sexual orientation, socio-economic background, religion and age.

We are dedicated to creating a welcoming and respectful space where all students feel comfortable expressing their ideas, experiences, and perspectives. We recognize that diversity fosters innovation, critical thinking, and creative problem-solving by providing diverse set of viewpoints that can challenge assumptions and widen understanding.

In this course, we strive to uphold these principles by promoting open dialogue and valuing every student's opinions and contributions. We encourage active participation, respectful debate, and sharing of experiences as we collectively explore the course of AI. Our aim is to create an inclusive learning environment that promotes both academic and personal growth for all students, regardless of their background or identity. Your

understanding, cooperation, and commitment to our diversity and inclusion efforts are deeply appreciated. Let us work together to create a dynamic and inclusive learning experience.

SUPPORT FOR STUDENT WITH DISABILITIES

If you are in need of accommodation for a disability, please let me know at your earliest convenience. Some aspects of this course, such as the assignments, in-class activities, or the way I teach may be modified to facilitate your participation and progress. Any student who, because of a disability, may require special arrangements in order to meet course requirements must register with the Office of Disability Support Services within the first week of classes.

The Office of Disability Support Services' website - http://www.fullerton.edu/DSS. They can also be reached by phone at 657-278-3117 or TDD at 657-278-2786. Their email address is dsservices@fullerton.edu. Their office is located in University Hall, room 101.

The instructor may request verification of need from the Dean of Students Office. Students requesting accommodations shall inform their instructors during the first week of classes about any disability or special needs that may require specific arrangements/accommodations related to attending class sessions, completing course assignments, writing papers or quizzes, or examinations.

ACKNOWLEDGEMENT

Portions of this syllabus are drawn from syllabus authored by Professor Anand Panangadan