Principles of Artificial Intelligence (CSci 166)

Fall 2022

Course Modality: In-person
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Course ID	**CSCI 166**	**Department**	**Computer Science**
Units	**3**	**Instructor**	**Athanasios Aris (Thanos) Panagopoulos**
Lecture Time	**TuTh 2:00PM - 3:15PM**	**Office Space**	**Science II Bldg. #248 and Zoom (ID: 956 3671 0198)**
ssLecture Space	**McKee-Fisk Building Room 208**	**E-Mail**	**apanagopoulos@csufresno.edu**
Prerequisites	**CSCI 164**	**Telephone**	**+1 559-278-5152**
Website	**fresnostate.instructure.com and www.apanagopoulos.com**	**Office Hours**	**TuTh 12:45PM - 1:45PM**

Course description: Artificial intelligence is intelligence demonstrated by machines. The respective field of study focuses on the science needed to develop intelligent and autonomous agents. This course covers the principles of artificial intelligence. Topics include agent theory, optimization, unsupervised learning, supervised learning, and reinforcement learning.

Required Course Materials

None

Supplementary Course Materials

- *Artificial intelligence a modern approach* by Russell, ISBN: 9780137505135
- *Reinforcement learning: An introduction* by Richard S. Sutton and Andrew G. Barto, ISBN: 978-0262193986
- *Introduction to Probability, Second Edition by* Dimitri P. Bertsekas and John N. Tsitsiklis, ISBN: 978-1886529236
- *Python Cookbook, Third edition* by David Beazley and Brian K. Jones, ISBN: 978-1449340377
- *Psychology, The Science of Mind & Behavior* by Michael W. Passer Ronald E. Smith ISBN13 978-1760422790

- Neural Networks for Pattern Recognition Illustrated Editio by Christopher M. Bishop, ISBN-13: 978-0198538646

Course Specifics

Course goals: The goal of this course is to provide the students with the necessary knowledge to effectively design and evaluate autonomous intelligent agents in various settings.

Student Learning Outcomes: By the end of this course, students will be able to

- Identify the principles and terminology of artificial intelligence and machine learning
- Demonstrate effective use of several artificial intelligence and machine learning algorithms
- Effectively evaluate several artificial intelligence and machine learning algorithms in various settings
- Effectively communicate artificial intelligence and machine learning findings to various audiences using appropriate metrics and data visualizations
- Collaborate and demonstrate leadership in projects involving artificial intelligence and machine learning

Course requirements/assignments: Your course grade is a function of your performance in two exams, two problem-set assignments, two hands-on project assignments, two presentations, and participation.

Assessment	Percent of Final Grade
Problem-sets (2)	16% (8% each)
Midterm Exam	20%
Projects (2)	30% (15% each)
Final Exam	20%
Presentations (2)	10% (5% each)
Participation	4%
	100%

Grade	Range
A	90-100
B	80-89
C	70-79
D	60-69
F	0 - 59

Exams: The exams will be taken during the scheduled times. These are individual assessments based on readings and concepts covered in the course. Please see the

syllabus for the dates. Missed exams cannot be made up. It is only in case of an emergency that a missed exam can be made up of written, verifiable documentation.

Problem-sets: Problem-sets are a core component of this class and are used to provide hands-on experience in concepts and notions taught in class. All problem-sets will be carried out by student groups of 1-4 students. Problem-sets are cumulative so do not leave them for the last minute.

Projects: Projects are a core component of this class. Projects are used to provide hands on experience in concepts and notions taught in class. All projects will be carried out by student groups of 1-4 students. Each group will conduct twosss projects. These projects can be selected out of several choices offered throughout the semester. It is also possible for a group to conduct a project of their choice which is outside of the options offered. Nevertheless, this requires explicit permission by the instructor. Please see the schedule on the last page for project due dates.

Presentation: On the day assigned, each group will present the results and outcomes of their projects. The presentation should be no longer than 20 minutes. The group will also lead a 10-minute class discussion on the results, so bring relevant questions to spark discussion.

The following rubric can be used as a general guideline for the presentation assessment:

	Exemplary (90%- 100%)	**Proficient (70%-89%)**	**Developing (50%-69%)**	**Unacceptable (0-49%)**
Organization	The presentation follows a logical and interesting sequence that the audience can follow in a seamless manner	The presentation mostly follows a logical and interesting sequence that the audience can follow	The presentation only partially follows a logical and interesting sequence that the audience can follow	The audience cannot understand the presentation because there is no sequence of information
Audience involvement	The audience is involved as the presenter is eloquent and keeps eye contact.	The audience is mostly involved as the presenter is eloquent and keeps eye contact for the most part.	The audience is partially involved as the presenter is sometimes eloquent and keeps minimum eye contact.	The audience is not involved as the presenter is not eloquent and does not keep eye contact.
Technical quality	The presentation is well thought and interesting, and the presenter is knowledgeable, being able to answer the questions from the audience	The presentation is mostly well thought and interesting, and the presenter is knowledgeable being able to answer most questions from the audience	The presentation is somehow well thought and interesting, and the presenter is quite knowledgeable, being able to answer some questions from the	The presentation is not well thought nor interesting, and the presenter is not knowledgeable, not being able to answer any questions from the audience

			audience	

Participation: Class participation facilitates application and integration of acquired knowledge and is expected in this class. Time and self-management skills are crucial and consider a big part of participation assessment.

Your class contribution will be graded using the following criteria:

1. Participation in class discussions.
2. Quality of your class participation. The following activities will contribute positively to your class participation:
    a. You should be ready to participate in class discussions about the concepts and problems discussed in the lecture.
    b. You should apply theory and concepts from the readings and lectures to the analysis of cases and problems discussed in class.
    c. You should engage with other class members in discussions.
    d. Your contribution should move the class discussion forward.

The following rubric can be used as a general guideline for the participation quality assessment:

	Exemplary (90%- 100%)	**Proficient (70%-89%)**	**Developing (50%-69%)**	**Unacceptable (0-49%)**
Frequency of participation in class	Student routinely initiates contributions.	Student usually initiates contributions.	Student sometimes initiates contributions.	Student rarely initiates contributions.
Quality of comments	Student comments are always genuine and relevant to the discussion.	Student comments are usually genuine and relevant to the discussion.	Student comments are mostly genuine and relevant to the discussion.	Student comments are rarely relevant to the discussion.
Listening skills	Student always listens attentively	Student usually listens attentively	Student mostly listens attentively	Student rarely listens attentively

Virtual Space: If needed, the Zoom room that will be used is the Virtual Space | Thanos Panagopoulos (VSTP) (Meeting ID: 956 3671 0198).

Topic: **Virtual Space | Thanos Panagopoulos (VSTP)**
Time: This is a recurring meeting Meet anytime

Join Zoom Meeting
https://fresnostate.zoom.us/j/95636710198

Meeting ID: 956 3671 0198
One tap mobile
+16699006833,,95636710198# US (San Jose)
+12532158782,,95636710198# US (Tacoma)

Dial by your location
+1 669 900 6833 US (San Jose)
+1 253 215 8782 US (Tacoma)
+1 346 248 7799 US (Houston)
+1 646 876 9923 US (New York)
+1 301 715 8592 US (Germantown)
+1 312 626 6799 US (Chicago)
Meeting ID: 956 3671 0198
Find your local number: https://fresnostate.zoom.us/u/acfiYwPi9

Join by SIP
95636710198@zoomcrc.com

Join by H.323
162.255.37.11 (US West)
162.255.36.11 (US East)
115.114.131.7 (India Mumbai)
115.114.115.7 (India Hyderabad)
213.19.144.110 (EMEA)
103.122.166.55 (Australia)
64.211.144.160 (Brazil)
69.174.57.160 (Canada)
207.226.132.110 (Japan)
Meeting ID: 956 3671 0198

Zoom is a video and web conferencing program that can be used for any type of online meeting. Zoom functionality includes synchronous (live) or asynchronous (pre-recorded) lectures, online class meetings, virtual office hours, student presentations, etc. For additional details and guidelines on using Zoom, review the Zoom at Fresno State Start Guide. Access your Zoom account using this link: http://fresnostate.zoom.us/

Course Policies & Safety Issues

Late Work: Late work will not be accepted, unless an extreme emergency occurs, and an extension has been approved. Failure to complete all parts of an assignment by the due dates will result in zero points for the assignment.

Class Attendance: Class attendance is expected. This is a highly participative class with in-class exercises and your absence will impact not only the quality of class discussions but also your performance.

Plagiarism/cheating: There will be zero-tolerance for plagiarism/cheating. Plagiarism and/or cheating will result in a 0 for the class. For more information on the University's policy regarding cheating and plagiarism, refer to the Class Schedule (Legal Notices on Cheating and Plagiarism) or the University Catalog (Policies and Regulations).

Plagiarism Detection: The campus subscribes to Turnitin, a plagiarism prevention service, through Canvas. You will need to submit written assignments to Turnitin. Student work will be used for plagiarism detection and for no other purpose. The student may indicate in writing to the instructor that he/she refuses to participate in the plagiarism detection process, in which case the instructor can use other electronic means to verify the originality of their work. Turnitin Originality Reports WILL NOT be available for your viewing.

Intellectual Property: All course materials, including but not limited to the syllabus, readings, quiz questions, exam questions, and assignments prepared by the instructor are property of the instructor and University. Students are prohibited from posting course materials online (e.g., Course Hero) and from selling course materials to or being paid for providing materials to any person or commercial firm without the express written permission of the professor teaching this course. Doing so will constitute both an academic integrity violation and a copyright violation. Audio and video recordings of class lectures are prohibited unless I give you explicit permission in advance. Students with an official letter from the Services for Students with Disabilities office may record the class if SSD has approved that service. Otherwise, recordings of lectures are included in the intellectual property notice described above.

Student Ratings of Instruction: In the final weeks of the semester, you will be asked to complete a short survey to provide feedback about this class. The primary goal of student ratings is to help your instructor improve the class. Feedback will also be reviewed by the department chair and the college dean. You will be given 15 minutes of class time to complete student ratings. Please offer feedback honestly and thoughtfully. Your participation is appreciated. You can access your student rating surveys and get more information at: https://sites.google.com/mail.fresnostate.edu/fresno-state-sri/fssri-for-students.

The following sections regarding COVID are subject to change given changing circumstances on-campus and in the community. Please check the COVID website for the most up-to-date information at:

covid.fresnostate.edu

Vaccination: All Students who access Campus/Programs must be Fully Vaccinated (including the booster dose when eligible to receive it) in order to participate in any in-person course-related activities (either on-campus or off-campus). Students may select that they will not be participating in any in-person activities (which includes use of the Library, Student Union and/or Student Health & Counseling Center) and/or may attest to a Medical or Religious Exemption from the vaccine policy requirement in accordance with CSU and campus procedures. Students should go to the Student Portal to update their COVID self-certification form and vaccine documentation. Requests for exemptions can be found there. You are not to come to campus if any of the following are true:

- You are not considered fully vaccinated, and you have not attested to a medical or religious exemption.
- You have attested to an exemption, but you have not completed your mandatory weekly COVID-19 test.

Health Screening: Please do not come to campus or off-campus learning site if any of the following is true:

- If you have experienced COVID-19 symptoms (vaccinated or not).
- If you have tested positive within the past 10 days.

Please complete the campus online reporting form (https://covid.fresnostate.edu/cases/reporting.html), and you will then receive further guidance.

Safety Measures: The instructor has the discretion to require face coverings for their in-person classes as they evaluate the health and safety needs of their individual classroom environments.
Individuals can pick up face coverings, provided at no cost, at any of the following locations:

- Library
- University Student Union
- Student Health and Counseling Center
- Student Housing Atrium
- COVID Testing Site – check the below website for location

Please see university website for the most updated information:
www.fresnostate.edu/coronavirus

Please remember that the same student conduct rules that are used for in-person classroom instruction also apply for virtual/online classrooms. Students are prohibited from any unauthorized recording, dissemination, or publication of any academic presentation, including any online classroom instruction, for any commercial purpose. In addition, students may not record or use virtual/online instruction in any manner that would violate copyright law. Students are to use all online/virtual instruction exclusively

for the educational purpose of the online class in which the instruction is being provided. Students may not re-record any online recordings or post any online recordings in any other format (e.g., electronic, video, social media, audio recording, web page, internet, hard paper copy, etc.) for any purpose without the explicit written permission of the faculty member providing the instruction. Exceptions for disability-related accommodations will be addressed by Student Disability Services working in conjunction with the student and faculty member.

Dispute Resolution: If there are questions or concerns that you have about this course that you and I are not able to resolve, please feel free to contact the Chair of the department to discuss the matter.

Dr. Shih-Hsi "Alex" Liu
Department of Computer Science
shliu@mail.fresnostate.edu
+1559.278.4789

University Policies

Students with Disabilities: Upon identifying themselves to the instructor and the university, students with disabilities will receive reasonable accommodation for learning and evaluation. For more information, contact Services to Students with Disabilities in the Henry Madden Library, Room 1202 (278-2811).
The following University policies can be found on the web at:

- Adding and Dropping Classes
- Cheating and Plagiarism
- Computers
- Copyright Policy
- Disruptive Classroom Behavior
- Honor Code
- Title IX

University Services

The following University services can be found on the web at:

- Associated Students, Inc.
- Students with Disabilities
- Dream Success Center
- Library
- Learning Center Information
- Student Health and Counseling Center
- SupportNet

- Survivor Advocacy
- Writing Center

Subject to Change Statement

THIS SYLLABUS AND SCHEDULE ARE SUBJECT TO CHANGE IN THE EVENT OF EXTENUATING CIRCUMSTANCES.

Tentative Course Schedule

(Tuesday, Thursday Course)

#	Date	Topic	Deadline	
1	Tues., Aug 23	Class Intro		
2	Thurs., Aug 25	Overview of Artificial Intelligence		
3	Tues., Aug 30	Optimization Basics and Gradient Descent		
4	Thurs., Sept 1	Introduction to Neural Networks		
5	Tues., Sept 6	Unsupervised Learning I		
6	Thurs., Sept 8	Unsupervised Learning II		
7	Tues., Sept 13	Clustering Evaluation		
8	Thurs., Sept 15	Information Theory		
9	Tues., Sept 20	Feature Scaling		
10	Thurs., Sept 22	Supervised Learning I		
11	Tues., Sept 27	Supervised Learning II		
12	Thurs., Sept 29	Supervised Learning III		
13	Tues., Oct 4	Clustering Evaluation		
14	Thurs., Oct 6	Monte Carlo II		
15	Tues., Oct 11	Temporal Difference I		

#	Date	Topic	Deadline	
16	Thurs., Oct 13	Temporal Difference II		
17	Tues., Oct 18	Generalization and Function Approximation		
18	Thurs., Oct 20	Generalization and Function Approximation		
19	Tues., Oct 25	Review	**Problem-set I is Due**	
20	Thurs., Oct 27	**Midterm Exam I**		
21	Tues., Nov 1	Policy Gradient and Actor Critic Methods		
22	Thurs., Nov 3	Learning Theories and Memory Models II		
23	Tues., Nov 8	Learning Theories and Memory Models I		
24	Thurs., Nov 10	**Student Presentations**		
25	Tues., Nov 15	**Student Presentations**		
26	Thurs., Nov 17	**Student Presentations**		
27	Tues., Nov 22	**Student Presentationss**		
	Thurs., Nov 24	Thanksgiving Break		
28	Tues., Nov 29	Special Topics		
29	Thurs., Dec 1	Special Topics		
30	Tues., Dec 6	Review	**Problem-set II, Project I and II are Due**	
Finals week			**Days**	**Dates**
Final Exam Preparation & Faculty Consultation Days:			Thursday and Friday	Dec 8 - 9
Final Semester Examinations			Monday – Thursday	Dec 12 - 15
Final Exam			Thursday	Dec 15, 03:30P-05:30P

Note: The Schedule is subject to revision