San José State University
School/Department
CS 156 Section 02, Introduction to Artificial Intelligence, Spring, 2021

Course and Contact Information

Instructor:	Sanjoy Paul
Office Location:	[TBD]
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Email:	paul.sanjoy@sjsu.edu
Office Hours:	[TBD]
Class Days/Time:	TuTh: 18:00-19:15 PST
Classroom:	Zoom
Prerequisites:	CS 146 and either CS 151 or CMPE 135 with a grade of C- or better in each

Course Format

Technology Intensive, Hybrid, and Online Courses

This course will be taught online. You need Internet connectivity and zoom installed on your a computer to participate in the classroom activities and/or submit assignments. You need to have a Python software development environment installed on your computer to do the projects.

Course Description

Basic concepts and techniques of artificial intelligence: problem solving, search, deduction, intelligent agents, knowledge representation. Topics chosen from logic programming, game playing, planning, machine learning, natural language, neural nets, robotics.

Course Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Understand what web search, speech recognition, face recognition, machine translation, autonomous driving, and automatic scheduling have in common.
2. Use artificial intelligence (AI) to tackle complex real-world problems with programming & mathematics.
3. Internalize the foundational principles that drive complex real-world applications. Specific topics include machine learning, search, game playing, Markov decision processes, constraint satisfaction, graphical models, and logic.
4. Leverage the latest AI tools to tackle new AI problems one might encounter in life.
5. Implement some of the core AI algorithms taught in class.

Recommended Textbook

Artificial Intelligence: A Modern Approach. 4th. Edition. Stuart Russell and Peter Norvig. Pearson, 2020. ISBN 978-0134610993

Software

Python 3

https://www.python.org/downloads/release/python-363/

PyCharm Professional or Community Edition – **Recommended IDE**

Other technology requirements / equipment / material

We will use Zoom for our online sessions

Installing Zoom

https://www.youtube.com/watch?v=fVu9BILRkww

Course Requirements and Assignments

Homework Assignments:

Homework assignments will be posted and submitted on Canvas. For full credit, they must be submitted by the posted due date.

Weekly Quizzes:

We will have a weekly quiz aimed at checking your understanding of the previous week's material. I will count the 10 best scores out of the 12 total quizzes in the semester. You must be in the online classroom to take the quiz. Missed quizzes cannot be made up.

Midterm Exam:

The midterm exam will take place in the classroom during class time on Tuesday March 16 during regular class hours.

Final Exam:

The final exam will take place on Tuesday May 25 – 17:15-19:30

Grading Information

The final grade in the course will be calculated based on the following percentages:

Homework Assignments: 30%

Weekly Quizzes: 20%

Midterm: 20%

Final Exam: 30%

Late Work:

Late assignments will not be accepted.

Grade Scale:

The letter grade will be determined based on the following scale:

A+ = 96% - 100%	A = 91% - 95%	A- = 86% - 90%
B+ = 81% - 85%	B = 76% - 80%	B- = 71% - 75%
C+ = 66% - 70%	C = 61% - 65%	C- = 56% - 60%

D = 51% - 55%
F = below 50

Classroom Protocol

Regular attendance is an integral part of the learning process. Please arrive on time for the classes.

University Policies

Per University Policy S16-9 *(http://www.sjsu.edu/senate/docs/S16-9.pdf)*, relevant information to all courses, such as academic integrity, accommodations, dropping and adding, consent for recording of class, etc. is available on Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/". Make sure to visit this page, review and be familiar with these university policies and resources.

CS156 Introduction to Artificial Intelligence, Spring 2021, Course Schedule

Please note that this schedule is subject to change with fair notice. Any changes will be announced in class and posted on the Canvas course site.

Course Schedule

Week	Date	Topics	Readings AIMA	HW Due date
1	Jan 28	Course Logistics – What is AI? Why is it important? Overview of the Course	Chapter 1-2	
2	Feb 2	Python - numpy, pandas, matplotlib etc.	https://jakevdp.github.io/PythonDataScienceHandbook/02.02-the-basics-of-numpy-arrays.html https://cloudxlab.com/blog/numpy-pandas-introduction/ https://realpython.com/python-matplotlib-guide/	HW1 Feb 10
2	Feb 4	Machine Learning #1 (Supervised) – Regression-1 – Linear, Multi-linear, Backward Elimination	Chapter 19-20	
3	Feb 9	Machine Learning #2 (Supervised) – Regression-2 – Polynomial, Decision Tree, Random Forest	Chapter 19-20	Quiz#1
3	Feb 11	Machine Learning #3 (Supervised) – Classification-1 – Linear, Support Vector Machines, Kernel SVM, K Nearest Neighbor	Chapter 19-20	HW2 Feb 24
4	Feb 16	Machine Learning #4 (Supervised) – Classification-2 – Decision Tree, Random Forest, Naïve Bayes	Chapter 19-20	Quiz#2
4	Feb 18	Machine Learning #5 (Unsupervised) – Clustering – K-means, Generalization	Chapter 19-20	HW3 Mar 3
5	Feb 23	Search #1 (state based) – Uninformed Search – DFS, BFS, Dynamic Programing, Uniform Cost Search	Chapter 3-4	Quiz#3
5	Feb 25	Search #2 (state based) – Informed Search – A* algorithm, Admissibility and Consistency, Relaxation	Chapter 3-4	HW4 Mar 10
6	Mar 2	Search #3 (state based) – Search under uncertainty – Markov Decision Processes #1, Policy evaluation, Policy iteration		Quiz#4
6	Mar 4	Search #4 (state based) – Search under uncertainty – Markov Decision Processes #2, Value iteration, Reinforcement Learning	Chapter 22	HW5 Mar 20
7	Mar 9	Search #5 (state based) – Adversarial Search / Gaming - Expectimax, Minimax, Evaluation Functions, Alpha-beta pruning	Chapter 5	Quiz#5

7	Mar 11	Search #6 (state based) – Adversarial Search / Gaming – TD Learning, Game theory	Chapter 5	
8	Mar 16	Constraint Satisfaction Problem #1 (variable based) – Factor graphs, Backtracking search	Chapter 6	Quiz#6
8	Mar 18	Midterm		Oct 21
9	Mar 23	Constraint Satisfaction Problem #2 (variable based) – Dynamic ordering, Arc consistency	Chapter 6	HW6 Apr 8
9	Mar 25	Constraint Satisfaction Problem #3 (variable based) – Beam search, Local search, Conditional independence, Variable elimination	Chapter 6	
10	Mar 30	Bayesian Networks #1 – Bayesian inference, Hidden Markov Models (HMMs)	Chapter 12-17	Quiz#7
10	Apr 1	Bayesian Networks #2 – Bayesian Network modeling, Hidden Markov Models (HMMs), Particle Filtering	Chapter 12-17	
11	Apr 6	Bayesian Networks #3 – Learning in Bayesian networks, Laplace smoothing, Expectation maximization	Chapter 12-17	Quiz#9
11	Apr 8	Bayesian Networks #3 –Laplace smoothing, Expectation maximization	Chapter 12-17	HW7 Apr 24
12	Apr 13	Logic #1 – Syntax versus semantics, Propositional logic	Chapter 7-8	Quiz#8
12	Apr 15	Logic #2 – Propositional logic, Modus ponens, Horn Clauses	Chapter 8-9	
13	Apr 20	Logic #3 – Propositional logic, Resolution	Chapter 8-9	Quiz#10
13	Apr 22	Logic #4 – First-order logic, Resolution	Chapters 8-9	
14	Apr 27	Perceptron, Artificial Neural Networks	Chapters 18, 21	Quiz#11 HW8 May 13
14	Apr 29	Stochastic Gradient Descent, Deep Learning	Chapters 18, 21	
15	May 4	Recurrent Neural Networks (RNN)	Chapter 23-24	Quiz#12
15	May 6	Natural Language Processing	Chapter 23-24	
16	May 11	Convolutional Neural Networks (CNN)	Chapter 25-26	
16	May 13	Image Analytics, Computer Vision, Robotics	Chapter 25-26	
Final		FINAL EXAM	17:15-19:30	