San José State University
Computer Science Department
CS 256, Topics in Artificial Intelligence, Section 80, Fall 2023

Course and Contact Information

Instructor:	H. Chris Tseng
Office Location:	DH239
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Email:	chris.tseng@sjsu.edu
Office Hours:	Mon/Wed: 8:45 – 9:15 PM, Tue/Thur: 5:45-6 PM, and Sat 4:30 – 5:00 PM by 1-1 appointment or email
Class Days/Time:	Mon/Wed 7:30 – 8:45 PM
Classroom:	Online
Prerequisites:	CS 156 and Graduate standing. Allowed Declared Major: Computer Science, Bioinformatics, Data Science. Or instructor consent.

Course Format

Technology Intensive, Hybrid, and Online Courses

This course combines theories with hands-on assignments. Students are expected to work in teams to accomplish machine learning project(s) using open source technologies. Students are expected to be proficient in Python.

Faculty Web Page and MYSJSU Messaging

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on the Canvas Learning Management System course login website at http://sjsu.instructure.com. You are responsible for regularly checking with the messaging system through MySJSU at http://my.sjsu.edu to learn of any updates.

Course Description

Catalog description: Introduction to topics in artificial intelligence such as problem solving methods, game playing, understanding natural languages, pattern recognition, computer vision, and the general problem of representing knowledge. Students will be expected to use LISP.

Course Learning Outcomes (CLO)

This course aims to introduce students to the underlying theories and applications for AI/Machine Learning.

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

- Explain regression and classification concepts, modeling principles, and evaluation metrics.
- Use software tools such as Google Colaboratory, Matplotlib, Scitkit- Learn, Pandas, Numpy, and PyTorch to analyze and visualize data.

- Understand and apply Neural Networks and Deep Learning methodologies for natural languages, pattern recognition, and summarization problems.
- Build, evaluate, and refine Neural Networks models for prediction and identification from data sets.
- Design, implement, and present a team project with applications

Required Texts/Readings

Textbook

No textbook is needed. Class material will be posted on the Canvas account under http://sjsu.instructure.com.

References

1. Introduction to Machine Learning with Python, (https://www.amazon.com/exec/obidos/ASIN/1449369413/ref=nosim/sjsu-20) Andreas C. Müller and Sarah Guido, 2016, O'Reilly.
2. Deep Learning (Adaptive Computation and Machine Learning), (https://www.amazon.com/exec/obidos/ASIN/0262035618/ref=nosim/sjsu-20) Goodfellow, Bengio, etc., 2016, The MIT Press
3. Mathematics for Machine Learning, (https://mml-book.github.io/book/mml-book.pdf) Deisenroth, Faisal, and Ong, 2020, Cambridge University Press.

Additional Readings

A list of additional readings will be provided on the Canvas page associated with this class under http://sjsu.instructure.com.

Other technology requirements / equipment / material

You will be required to have a wireless-network ready laptop computer to participate in the class. You will also need to use your own laptop with wireless access to submit your assignment inside the SJSU campus. Your laptop needs to have wireless capability and you need to register a free wireless account at https://one.sjsu.edu/.The instructor is not responsible for providing either laptops or alternatives.

Course Requirements and Assignments

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.

a. Projects:

A final team project topic will be provided for you to practice AI/Machine Learning principles. Self-selected teams of 5 people will work together to solve some selected problems discussed in the course.

Project activities will start with reading and presentations of papers in the assigned area, followed by implementation of selected techniques of your choice to deliver the specified project requirements.

This team project will be a collaborated group project. You are free to choose your own partners but you cannot change your partners in the middle of the project. Paper presentation and progressive design and implementation of the term project will be done through assignments as part of the learning objectives.

b. Exams:
There will be one midterm and one final exam.

c. Quizzes:
There will be 1-2 quizzes and each will be counted as a HW.

d. Homework:
There will be 5-7 HWs. Quizzes and intermediate milestones of your team project will also be counted as HW grades.

e. Participation
All students are encouraged to participate in the Q&A discussion after technical presentation by other students in the team project stage. This will be logged in Canvas for grading purposes. Please note complimentary comments will not count toward this item. Those whose participation is on par with the average weekly participation of the semester will score 90/100 for this item. Proportionally higher/lower scores will be assigned to those who participate above or below the class average.

What counts towards your participation:

***Verbal Q&A interactions** after other students' presentations (interaction over the Zoom chat does NOT count).

*Complimentary comments will not count.

*For presenters, your response to questions will not count towards participation. It is part of your duty to respond to everyone's question after your presentation.

What you should do to have your participation recorded:
Immediately after the end of the class, students should send a participation email to the TA (Nidhi Zare < nidhi.zare@sjsu.edu >)/Cc the instructor so their participation can be logged
Sample email with the title "My participation in CS256":
"Dear Professor Tseng,
The following list is my participation for today:

1) (Trainerable Document Summarizer: Asked why and how the linguistic model formulated by Neural Network is trainbale."

2) (Optimizing text summarization): Asked why the computation order of complexity is exponential with respect to the number of tokens.

Thank you,

Mary Lee"

f. Tentative course exam and HW due dates:
(Please note that this is "subject to change at the discretion of the instructor")
HW/Quiz/Project milestones/paper presentation: One of these will be assigned about once a week.
Midterm: Mon., Oct 9, 2023
Final: (Per SJSU final schedule) 7:45 PM, Monday, Dec. 11, 2023.

Grading Information

Grades:

Participation	10%
HW assignments and quizzes	20 %
Midterm	20 %
Final Team Project	30 %
Final	20 %

Determination of Grades

Grades will be assigned as described below. These intervals, however, may change (i.e., either way!) according to the performance of the class as a whole. C- is a passing grade.

- A: [93, 100]
- A-: [90, 93)
- B+: [87, 90)
- B: [83, 87)
- B-: [80, 83)
- C+: [75, 80)
- C: [70, 75)
- C-: [65, 70)
- D+: [60, 65)
- D: [55, 60)
- D-: [50, 55)
- F: [0, 50)

Classroom Protocol

You are expected to attend classes. If you cannot attend, it is your responsibility to get a copy of the lecture notes and class announcements from a reliable classmate. The instructor reserves the right to ignore frivolous or inappropriate e-mail inquiries. Students are expected to participate actively to provide improvement to presentations by other classmates.

University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on the Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/. Make sure to review these policies and resources.

CS 256, Topics in AI, Section 80, Fall, 2023 Course Schedule

Online Zoom link: https://sjsu.zoom.us/j/87821522502 *(Need to login to your SJSU account to gain access to Zoom. All students must turn on the video to participate)*

The schedule is subject to change at the discretion of the instructor.

Course Schedule

Week	Date	Topics, Readings, Assignments, Deadlines
1	8/21/2023	Introduction; Google Colaboratory
1	8/23/2023	Python Review
2	8/28/2023	EDA with Pandas and Numpy; HW#1 due
2	8/30/2023	Visualization with Pandas, Matplotlib, and Seaborn
3	9/4/2023	*Labor Day (no class)*
3	9/6/2023	Introduction to Machine Learning; Scikit-Learn; Linear Regression; HW#2 due
4	9/11/2023	Modeling and feature selection; Feature engineering; One-hot-encoding
4	9/13/2023	Calculus for machine learning ; HW#3 (Linear Regression) due
5	9/18/2023	Feedforward Neural Network;
5	9/20/2023	Back propagation; HW#4 (NN explained) due
6	9/25/2023	Introduction to NLP; Count Vectorization;
6	9/27/2023	Stemming and Lemmatization; TF-ID; HW#5 (NLP) due
7	10/2/2023	Neural Networks hidden layer units and depth; learning rate and convergence; Quiz #1
7	10/4/2023	Application of Neural Networks to digit recognition problems; Review
8	10/9/2023	midterm
8	10/11/2023	Final project team forming; Keras for Neural Networks
9	10/16/2023	Classification metrics: Confusion matrix and classification report
9	10/18/2023	Convolutional Neural Networks; HW# 6 (NN with Keras)
10	10/23/2023	Final project milestone 1 due (presentation)
10	10/25/2023	NLP: Relationship and Spacy
11	10/30/2023	Paper presentation by selected students
11	11/1/2023	Topics Based Summarization With Pretrained Models
12	11/6/2023	Paper presentation by selected students

Week	Date	Topics, Readings, Assignments, Deadlines
12	11/8/2023	Applications of Neural Networks to time series data and image recognition problems;
13	11/13/2023	Paper presentation by selected students
13	11/15/2023	Recurrent Neural Networks
14	11/20/2023	Paper presentation by selected students
14	11/22/2023	*Thanksgiving Holiday(No class)*
15	11/27/2023	LSTM Recurrent Neural Networks
15	11/29/2023	Time Series Prediction with LSTM Recurrent Neural Networks
16	12/4/2023	Refining Neural Networks models; Hyperparamenters; Grid searching
16	12/6/2023	Final team project presentation
Final Exam	7:45 PM Monday, Dec. 11, 2023	Final exam