

Introduction to Machine Learning

CS 171

Fall 2026 Section 04 In Person 3 Unit(s) 08/19/2026 to 12/07/2026 Modified 08/14/2026

Contact Information

Instructor: Nagib Z Hakim, PhD

Office Location: Duncan Hall 282

Telephone: 408 307-4484

Email: nagib.hakim@sjsu.edu (<mailto:nagib.hakim@sjsu.edu>)

Office Hours: Tue 1:00 - 2:00 p.m. (please email before)

Class Days/Time: Tue-Th 4:30 - 5:45 p.m.

Classroom: Duncan Hall 318

Course Description and Requisites

Covers a selection of classic machine learning techniques including backpropagation and several currently popular neural networking and deep learning architectures. Hands-on lab exercises are a significant part of the course. A major project is required.

Prerequisite(s): CS 146 (with a grade of "C-" or better). Computer Science or Software Engineering majors only.

Letter Graded

Classroom Protocols

Class begins on time

Turn off cell phones

Student must be respectful of the instructor and other students.

Valid picture ID required at all times

Cheating and Plagiarism are sanctioned by university and department policies.

Program Information

Diversity Statement - At SJSU, it is important to create a safe learning environment where we can explore, learn, and grow together. We strive to build a diverse, equitable, inclusive culture that values, encourages, and supports students from all backgrounds and experiences.

Course Goals

The goal of this course is to introduce the students to a range of techniques for machine learning and develop their acumen in this field. The techniques cover a range of machine learning models and applications, model fitting, data preparation, performance metrics, and the ethical use of machine learning..

Course Learning Outcomes (CLOs)

After completing this course students will be able to:

(CLO1) Understand and implement a variety of machine learning techniques:

- a) Objective specification
- b) Model definition and parameterization
- c) Parameter optimization

(CLO2) Apply the appropriate models to different domains and tasks.

(CLO3) Apply dataset preparation and augmentation techniques

(CLO4) Analyze results, assess model performance, provide recommendations to mitigate issues

(CLO5) Present the results using common ML performance indicators and charts.

Course Materials

Textbook

Machine Learning: An Algorithmic Perspective, Second Edition, 2014, Chapman and Hall/CRC

Authors: Stephen Marsland

ISBN-13 : 978-1-4665-8333-7 (eBook - PDF)

Other Readings

- [Andrew Ng Stanford / Coursera class notes](https://cs229.stanford.edu/lectures-spring2022/main_notes.pdf)Links to an external site. (https://cs229.stanford.edu/lectures-spring2022/main_notes.pdf)
- Machine Learning with Applications in Information Security, by Mark Stamp, published by Chapman Hall/CRC in 2017. ISBN-10 : 1138626783, ISBN-13 : 978-1138626782

Course Requirements and Assignments

Course Format

In-person

Faculty Webpage and mySJSU messaging

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

Course Requirements and Assignments

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found in University Policy S12-3 at <http://www.sjsu.edu/senate/docs/S12-3.pdf>.

Homework, exams, in-class exercises and quizzes and a final project are expected for this class. Homework is due on Canvas by midnight on the due date. Each assigned problem requires a solution and an explanation (or work) detailing how you arrived at your solution. Cite any outside sources used to solve a problem. When grading an assignment, I may ask for additional information.

There will be a weekly in-class quiz or exercise on the previous week's material. The answer to the quiz will either be multiple choice, true-false, or a simple numeric answer. Each quiz is worth a maximum of 1 or 2pts with no partial credit being given. These points are bonus points that will be added to the midterm and final exams grades, not to exceed 50% of the difference between the combined exam grade and 100%.

NOTE that University policy F69-24 at <http://www.sjsu.edu/senate/docs/F69-24.pdf> states that "Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to insure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading."

University Policies

Per [University Policy S16-9 \(PDF\)](http://www.sjsu.edu/senate/docs/S16-9.pdf) (<http://www.sjsu.edu/senate/docs/S16-9.pdf>), relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on the [Syllabus Information](https://www.sjsu.edu/curriculum/courses/syllabus-info.php) (<https://www.sjsu.edu/curriculum/courses/syllabus-info.php>) web page. Make sure to visit this page to review and be aware of these university policies and resources.

Course Schedule

Schedule (subject to change):

Week	Day	Date	Topics
1	Th	20-Aug	Introduction

2	Tue	25-Aug	Linear model regression: Linear Algebra
2	Th	27-Aug	Gradients - Linear Model Regression - LMS
3	Tue	1-Sep	Logistic Regression
3	Th	3-Sep	Kernels - SVM
4	Tue	8-Sep	sklearn, KNN, bias - variance tradeoff
4	Th	10-Sep	Objectives and Result Analysis
5	Tue	15-Sep	Neural Networks
5	Th	17-Sep	Additional layers - Keras - Model Optimization
6	Tue	22-Sep	CNNs
6	Th	24-Sep	CV
7	Tue	29-Sep	Hands On: Model fine-tuning
7	Th	1-Oct	Data Preprocessing, feature extraction
8	Tue	6-Oct	PCA
8	Th	8-Oct	Review
9	Tue	13-Oct	EXAM 1: Midterm
9	Th	15-Oct	Generative models: GAN
10	Tue	20-Oct	Decision Trees
10	Th	22-Oct	Boosting
11	Tue	27-Oct	Recommendation Systems 1:
11	Th	29-Oct	Recommendation system 2
12	Tue	11/03.26	Time Series Prediction
12	Th	5-Nov	Recurrent Neural Networks
13	Tue	10-Nov	Knowledge Representation: Embeddings
13	Th	12-Nov	Attention: The Transformer
14	Tue	17-Nov	Pretrained models: BERT
14	Th	19-Nov	LLM: From BERT to GPT to Chat-GPT
15	Tue	24-Nov	Reinforcement Learning
15	Th	26-Nov	Thanksgiving: No class
16	Tue	1-Dec	Special topic; TBD
16	Th	3-Dec	Final Review
17	Tue	8-Dec	Study day: No class
17	Th	10-Dec	Exam2: Final