

# Introduction to Machine Learning

## CS 171

Fall 2026 Section 03 In Person 3 Unit(s) 08/19/2026 to 12/07/2026 Modified 08/14/2026

### Contact Information

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

Class Days/Time: Tue-Th 3:00 - 4:15 p.m.

Classroom: Duncan Hall 318

### Course Description and Requisites

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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

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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

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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

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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)

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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

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### 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](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

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## 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."

## Grading Information

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### Breakdown

Homework: 25%

Exam 1: 25%

Exam 2: 25%

Final Project: 25%

## Determination of Grades

### Nominal Grading Scale (after any curve fitting)

| Percentage Grade |    |
|------------------|----|
| 97 – 100+        | A+ |
| 93 – 96          | A  |
| 90 – 92          | A- |
| 87 – 89          | B+ |
| 83 – 86          | B  |
| 80 – 82          | B- |
| 77 – 79          | C+ |
| 73 – 76          | C  |
| 70 – 72          | C- |
| 67 – 69          | D+ |
| 63 – 66          | D  |
| 60 – 62          | D- |
| 0-59             | F  |

NOTE that "All students have the right, within a reasonable time, to know their academic scores, to review their grade-dependent work, and to be provided with explanations for the determination of their course grades." See University Policy F13-1 at <http://www.sjsu.edu/senate/docs/F13-1.pdf> for more details.



## University Policies

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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

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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                         |

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| 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        |