COEN 240 Machine Learning, Spring 2023
Dept. of Computer Engineering,
Santa Clara University, Santa Clara, California

Instructor

Dr. Alex Sumarsono
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Office hours: after class on Wednesdays or by appointment (zoom)

Grader: Ridham Kachhadiya
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Lectures

Monday 7:10 – 9:00 pm
Wednesday 7:10 – 9:00 pm

Course Description

This course presents an introduction to Machine Learning, the study of computing systems where performance improvements come with experience. The primary focus of the course will be on understanding the underlying theory and algorithms of major approaches used in various learning systems.

Prerequisites

AMTH 108 or AMTH 210, MATH 53 or AMTH 246, COEN 179 or 279.

Recommended Textbook

Hands-on Machine Learning with Scikit-Learn, Keras & Tensorflow, 2nd edition, by Aurelien Geron, O'Reilly Media.

Reference Textbooks

1 *Machine Learning: A Probabilistic Perspective*, by Kevin P. Murphy, The MIT Press, 2012.
2 *Machine Learning with TensorFlow*, by Nishant Shukla, Manning Publications, 2018.
3 *Pattern Recognition and Machine Learning*, by Christopher M. Bishop, Springer, 2006.
4 *Pattern Classification, 2nd edition*, by R.O. Duda, P.E. Hart and D.G. Stork, Wiley, 2001.

Learning Outcomes

- Demonstrate knowledge and ability to solve problems in foundational topics of machine learning including logistic regression, linear discriminant analysis, Bayesian classification and SVM.
- Implement supervised learning algorithm, such as decision trees and linear regression.
- Implement unsupervised learning algorithm, such as clustering and principal component analysis.
- Work with real datasets, create training and test sets, analyze results of learning algorithms.
- Demonstrate knowledge of neural networks particularly backpropagation.

Schedule (subject to change)

The following schedule is subject to change at the instructor's discretion. See *Weekly Course Schedule* on Google drive.

Week	Chapter(s)	Discussion Topic(s)
1	1	Introduction, Linear Algebra Review
2	2	Multivariable Calculus Review, Linear Regression
3	3, 4	OLS, Classification
4	5	Logistic Regression
5	6	SVM, Decision Trees
6	7	Multivariate Gaussian, Probability Theory Review, MLE
7	8	Bayesian Classifier, Linear Discriminant Analysis
8	9	Principal Component Analysis, K-Means Clustering
9	10, 14, 15	Neural Networks, Deep Learning Case Studies
10		Presentations

- Midterm Exam: Monday, May 15.
- Final Exam: Week of June 12. The exact date is TBD.
- No class on Memorial Day, May 29.

Links

The weekly schedule will be posted on Google drive.
https://drive.google.com/drive/folders/1EJE2NBeM1f3AA_hjj5kKu_KIA9lCi02s?usp=share_link

Zoom link (will be used as needed).
https://scu.zoom.us/j/91566639906?pwd=dGZ3ejBFeHJ5NVJnSTJIUVM5U0Qvdz09

Meeting ID: 915 6663 9906
Passcode: 737729

Grading Policy

The course grade will be determined based on the following:

- Attendance (taken randomly, drop two, no questions asked, no exceptions) = 10%
- Homework = 20%
- Projects = 20%
- Research & presentation (final project) = 10%
- Midterm & final exams (weighted equally) = 40%

Grading scheme

94 – 100: A	77 – 79: C+
90 – 93: A-	74 – 76: C
87 – 89: B+	70 – 73: C-
84 – 86: B	60 – 69: D
80 – 83: B-	0 – 59: F

Late Assignment Submission and Make-up Assignment Policies

Pay attention to due dates and instructions as outlined in *Weekly Course Schedule*. Late submissions will be accepted with a late penalty of 50% of the maximum score before the solutions are posted/discussed or until three (3) days after their due dates, whichever is earlier.

Make-up assignments will not be given unless approved by the instructor, usually in advance, for legitime reasons with supporting documentation.

Academic Integrity

The Academic Integrity pledge is an expression of the University's commitment to fostering an understanding of -- and commitment to -- a culture of integrity at Santa Clara University. The Academic Integrity pledge, which applies to all students, states: *I am committed to being a person of integrity. I pledge, as a member of the Santa Clara University community, to abide by and uphold the standards of academic integrity contained in the Student Conduct Code.*

Students are expected to uphold the principles of this pledge for all work in this class. For more information about Santa Clara University's academic integrity pledge and resources about ensuring academic integrity in your work,see http://www.scu.edu/academic-integrity.

Disabilities Resources

If you have a documented disability for which accommodations may be required in this class, please contact The Office of Accessible Education (OAE), Benson 1, https://www.scu.edu/oae/ as soon as possible to discuss your needs and register for accommodations with the University.