

DSC 255R: MACHINE LEARNING FUNDAMENTALS

Winter 2025

Course Syllabus

Instructor Information

Faculty of Record: **Sanjoy Dasgupta**

Email: dasgupta@eng.ucsd.edu

Live session: **Wed 7-8pm PST**

Lead Instructional Assistant: **Konstantin Garov**

Email: kgarov@ucsd.edu

Office hours: **To be arranged**

Zoom address: xxx (use during office hours only)

Instructional Assistant: **TBA**

Email: **TBA**

Office hours: To be arranged

Zoom address: xxx (use during office hours only)

Course location & live session meeting times

Canvas Course Location: <https://canvas.ucsd.edu/courses/51658/>

Live Session Schedule: **Wed 7-8pm PST**

Course Description

DSC 255R introduces a variety of supervised and unsupervised learning algorithms and the theory behind those algorithms. Using real-world case studies, you will learn how to classify images, identify salient topics in a corpus of documents, partition people according to personality profiles, and automatically capture the semantic structure of words and use it to categorize documents.

Covered topics include classification, regression, and conditional probability estimation; generative versus discriminative approaches to classification; linear models, such as logistic regression and support vector machines; kernel machines; decision trees and ensemble methods including boosting and random forests; generalization theory; and neural networks.

Students will apply techniques from this course in a variety of mathematical exercises as well as in programming assignments using Jupyter notebooks.

Prerequisites

This course assumes that students have prior experience with:

- Basics of probability and statistics
- Basics of linear algebra
- Basics of multivariate calculus
- Programming in Python and Jupyter notebooks

Some of the required mathematical background will be reviewed as it is needed in the course.

Textbooks

There is no required textbook for the course. Students seeking supplementary reading material are encouraged to consult:

Hastie, Tibshirani, Friedman. *The Elements of Statistical Learning*. Springer.
An electronic copy of this book is available for free from the [authors' websites](#).

VanderPlas. *Python Data Science Handbook*.
Available free at <https://jakevdp.github.io/PythonDataScienceHandbook/>

Evaluation and Grading

The course material is divided into modules, each with accompanying conceptual questions, mathematical exercises, and programming projects. There will be a weekly homework assignment consisting of written and programming problems. All assignments will be turned in on Gradescope.

The final grades will be based entirely on submitted work, with the following weighting.

Assignments	% of Grade
Weekly Problem Sets	100%
Total	100%

Grading Scale

This course uses the following grading scale.

Letter Grade	Percentage
A	95% - 100%
A-	90% - 94.99%
B+	87% - 89.99%
B	84% - 86.99%
B-	80% - 83.99%
C+	77% - 79.99%
C	74% - 76.99%
C-	70% - 73.99%
D+	67% - 69.99%
D	64% - 66.99%
D-	60% - 63.99%
F	< 60%

Course Workflow

Every week, students should:

- Download the slides for that week
- Watch the videos for that week and fill in missing details on the slides while doing so
- Attend the live session
- Attend office hours and/or ask questions on Piazza
- Complete the week's homework and submit on Gradescope

UCSD Policies

Code of Conduct

All participants in the course are bound by the **University of California Code of Conduct** (<https://aisc.uci.edu/students/index.php>)

Netiquette

Be respectful. Be sensitive. Be aware. Effective written communication and open academic dialogue are crucial for sustaining a learning community that is respectful, considerate, relevant, creative, and thought-provoking. In an online classroom, expressions, meaning, and tone can quickly be taken out of context, making it imperative that online learners adhere to the communication guidelines below:

- Treat your classmates with respect.
- Be thoughtful and open in a discussion.
- Be aware and sensitive to different perspectives.
- Build one another up and encourage one another to succeed.

The following behavior should be avoided:

- Using insulting, condescending, or abusive words.
- Using all capital letters, which comes across as SHOUTING.
- Contacting learners or posting advertisements and solicitations.
- Posting copyrighted material.

Academic Integrity

Academic Integrity is expected of everyone at UC San Diego. This means you must be honest, fair, responsible, respectful, and trustworthy in your actions.

Lying, cheating, or other forms of dishonesty will not be tolerated because they undermine learning and the University's ability to certify students' knowledge and abilities. Thus, any attempt to get, or help another get, a grade by cheating, lying, or dishonesty will be reported to the Academic Integrity Office and result in sanctions. Sanctions can include an F in the class and suspension or dismissal from the University.

So, think carefully before you act. Before you act, ask yourself the following questions: a) is my action honest, fair, respectful, responsible, and trustworthy, and b) is my action authorized by the instructor? If you are unsure, don't ask a friend; ask your instructor, instructional assistant, or the Academic Integrity Office. You can learn more about academic integrity at academicintegrity.ucsd.edu.

Disability Services

University of California, San Diego is committed to providing a barrier free environment for persons with documented disabilities. If you have a disability and feel you need accommodations in this course, please contact the Disability Services Center, 858-534-4382, or apply for services online at <https://osd.ucsd.edu/>. DSC approved accommodations will be provided for students who present a Faculty Notification Letter from the DSC.