

ISE 529 Predictive Analytics
Section: 31529 D
Fall 2024 Mon, Wed 12:00 – 1:50 PM; OHE 122

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Please be sure to send emails to any of the TAs for appointments.

Optional textbooks

1. Learning from Data (optional), by Yaser S. Abu-Mostafa, Malik Magdon-Ismail, and Hsuan-Tien, Lin (<http://amlbook.com>)
2. Machine Learning: A Probabilistic Perspective (optional), The MIT Press, by Kevin P. Murphy
3. Neural Networks and Deep Learning (optional): A Textbook, Springer, by Charu Aggarwal
4. The Elements of Statistical Learning, Data Mining, Inference, and Prediction (optional), by Robert Tibshirani, and more!

Recommended Preparation :)

- <https://www.datacamp.com/courses/intro-to-python-for-data-science>
- <https://www.datacamp.com/tracks/python-data-fundamentals>

Workload

- Roughly eight homework assignments for the semester
- No late homework will be accepted
- Start your homework assignments early
- Some quizzes are class activities. The quiz will also possibly count as extra

credit. **Examinations**

- Two exams: 1 Midterm exam, 1 Final exam

Grade Distribution

- Homework 35%, Midterm 25%, Final 25%, Participation 15%

Goals

This course aims to learn fundamental machine learning methods for practical implementations and experimentation.

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

- SLO1: Students will be able to demonstrate the different types of machine learning algorithms.
- SLO2: Students will be able to demonstrate using linear models for regression and classification estimations.
- SLO3: Students will be able to recognize and explain why a support vector machine (SVM) is a powerful and versatile machine learning model.
- SLO4: Students will be able to implement an end-to-end machine-learning project.
- SLO5: Students will be able to describe the main approaches for dealing with imbalance data and outliers.
- SLO6: Students will be able to analyze the impact of unsupervised learning models on real-world application.
- SLO7: Students will be able to identify the architectures of neural networks and implement basic deep learning networks.

SCHEDULE

Class days	Homework	Date assigned Topic
Aug 26		Introduction / Syllabus
Aug 28		Introduction to Machine Learning
Sep 2		No Class (Labor Day)
Sep 4		Preprocessing
Sep 9	HW 1 Preprocessing available	Data Preprocessing and Simple Linear Regression
Sep 11		Multiple/Polynomial Linear Regression, Decision Tree, RandomForest
Sep 16	HW2 Regression Models available	Support Vector Regression, Evaluation metrics for regression, review all regression models
Sep 18	Challenging Dataset (not Mandatory) available	K-means, K-means++, Elbow method
Sep 23		Quiz 1 (Class Activity)

Sep 25		Logistic Regression, KNN, Support Vector Machine K-means, Clustering
Sep 30	HW3 Classification available	XGBoost, CatBoost
Oct 2	HW4 NLP available	NLP
Oct 7		Naïve Bayes, Metrics for classification models, review all classification models
Oct 9		Review for the Midterm
Oct 14		Quiz 2 (Class activity)
Oct 16		Midterm Exam
Oct 21	HW5 Clustering available	K-means cont. Clustering
Oct 23		Neural Networks
Oct 28		Neural Networks
Oct 30	HW6 ANN available	CNN
Nov 4		CNN
Nov 6	HW7 Imbalanced Data available	Imbalanced data & Handling Outliers
Nov 11		Veterans Day Holiday
Nov 13		Interview Questions Session 1
Nov 18		Interview Questions Session 2
Nov 20	HW8 CNN available	Quiz 3 (class activity)
Nov 25		Final Review
Nov 27		Thanksgiving Holiday
Dec 2		Final Exam
Dec 4		Advance topics (TBD)



Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the Office of Equity and Diversity <http://equity.usc.edu> or to the Department of Public Safety <http://capsnet.usc.edu/departments/departments-public-safety/online-forms/contact-us>. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. The Center for Women and Men <http://www.usc.edu/student-affairs/cwm/> provides 24/7 confidential support, and the sexual assault resource center webpage <http://sarc.usc.edu> describes reporting options and other resources.

Support Systems:

Student Health Counseling Services - (213) 740-7711 – 24/7 on call
engemannshc.usc.edu/counseling Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call suicidepreventionlifeline.org Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, seven days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-4900 – 24/7 on call
engemannshc.usc.edu/rsvp Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) | Title IX - (213) 740-5086
equity.usc.edu, titleix.usc.edu

Information about how to get help or help a survivor of harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

The university prohibits discrimination or harassment based on the following protected characteristics: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic which may be specified in applicable laws and governmental regulations.

Bias Assessment Response and Support - (213) 740-2421

studentaffairs.usc.edu/bias-assessment-response-support Avenue to report incidents of bias, hate crimes, and microaggressions for appropriate investigation and response.

The Office of Disability Services and Programs - (213) 740-0776

[Dsp.usc.edu](https://dsp.usc.edu) Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test-taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Support and Advocacy - (213) 821-4710

studentaffairs.usc.edu/ssa Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101

diversity.usc.edu Information on events, programs, and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various student resources.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

dps.usc.edu, emergency.usc.edu

Emergency assistance and avenues to report a crime. Latest updates regarding safety, including how instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call [Dps.usc.edu](https://dps.usc.edu)

Non-emergency assistance or information.