

CSE 575: STATISTICAL MACHINE LEARNING

Fall 2022

(This syllabus is subject to further change and revision)

Instructor	YooJung Choi (yj.choi@asu.edu)
Lectures	MW 1:30pm–2:45pm, CDN68
Office Hours	MW 11am–12pm, BYENG 558 or Zoom https://asu.zoom.us/j/86071943266
TA	Yanxi Chen (ychen855@asu.edu) Office hours: TF 3–4pm, Zoom https://asu.zoom.us/j/4906033598
Grader	Shivam Mathur (smathu26@asu.edu) Office hours: MW 3:30–4:30pm, Zoom https://asu.zoom.us/j/3197961055

Catalog Description

Probability distributions, maximum likelihood estimation, regression, classification, decision tree, boosting, kernel methods, clustering, mixture models, graphical models, dimensionality reduction, Bayesian networks, Hidden Markov Models, and heterogeneous learning.

Prerequisites

Basics of linear algebra, probability, statistics algorithm design and analysis, proficient programming in one of the following languages (Matlab, Python, C++ or Java).

Textbook

Pattern Recognition and Machine Learning, Christopher M. Bishop, 2006.

Course Objective

An in-depth understanding of machine learning and statistical pattern recognition techniques and their applications in a variety of real problems.

Topics

- Probability Basics, MLE
- Classifications (KNN, Bayes Classifier, Naïve Bayes Classifier, Logistic Regression and SVM)
- Clustering (K-means, GMM, Spectral clustering)
- Feature Selection and Dimension Reduction (PCA and SVD)
- Model Selection: Variance and Bias, Cross-validation
- Hidden Markov Model
- Advanced topics (as time permits)

Course Assessment Plan

Exams	40%
■ Two exams, each accounting for 20%.	
Written Assignments	30%
■ Three assignments, each accounting for 10%.	
Project	30%
■ Around five students form a group to carry out a research project. It can be an implementation and a comparative study of existing methods, a review of a specific topic, or the development of new ideas. Each team will submit a proposal (10%), make a 15-minute presentation at the end of the semester (10%), and submit a project report (10%). All team members will receive the same grade for the project.	

All homework assignments are due by its specified due date/time. Late submissions will be penalized by *25% per each day late*.

We will post an announcement whenever the grade for a particular work is made available. Any grade appeal must happen *within one week* from posting of grades. Late appeals will not be considered.

Absence & Make-up Policies

Accommodations will be made for religious observances provided that students notify the instructor at the beginning of the semester concerning those dates. Students who expect to miss class due to officially university-sanctioned activities should inform the instructor early in the semester. Alternative arrangements will generally be made for any examinations and other graded in-class work affected by such absences. The preceding policies are based on [ACD 304-04](#), “Accommodation for Religious Practices” and [ACD 304-02](#), “Missed Classes Due to University-Sanctioned Activities.”

There will be no make-up for missed exams in general. If you have to miss an exam due to religious holidays or university-sanctioned activities, make-up requests should be made as early as possible, and at least one week prior to the anticipated absence; these requests will most likely be approved by the instructor.

If you have to miss an exam due to a medical problem, you may request a make-up by submitting a document from a health professional as soon as possible. If you missed an exam due to an accident while traveling to class, you may request a make-up by submitting a police report on the day.

Excused absence from class or exams does not relieve students from responsibility for any part of the course work required during the period of the absence. If you have a medical problem or need to attend the funeral of an immediate family member, you need to talk to the instructor early. It is the instructor’s decision whether or not you will receive an extension or an opportunity for makeup without penalty.

Academic Integrity

Students in this class must adhere to ASU’s academic integrity policy, which can be found at <https://provost.asu.edu/academic-integrity/policy>. Students are responsible for reviewing this policy and understanding each of the areas in which academic dishonesty can occur. In addition,

all engineering students are expected to adhere to both the [ASU Academic Integrity Honor Code](#) and the [Fulton Schools of Engineering Honor Code](#). All academic integrity violations will be reported to the Fulton Schools of Engineering Academic Integrity Office (AIO). The AIO maintains record of all violations and has access to academic integrity violations committed in all other ASU college/schools.

Disability Accommodations

Suitable accommodations will be made for students having disabilities. Students needing accommodations must register with the ASU disabilities resource Center and provide documentation of that registration to the instructor. Students should communicate the need for an accommodation in sufficient time for it to be properly arranged.

Harassment and Sexual Discrimination

Arizona State University is committed to providing an environment free of discrimination, harassment, or retaliation for the entire university community, including all students, faculty members, staff employees, and guests. ASU expressly prohibits discrimination, harassment, and retaliation by employees, students, contractors, or agents of the university based on any protected status: race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, and genetic information.

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at <https://sexualviolenceprevention.asu.edu/faqs>.

As an employee of the University I am considered a mandated reporter and therefore obligated to report any information regarding alleged acts of sexual discrimination that I am informed of or have a reasonable basis to believe occurred. ASU Counseling Services, <https://eoss.asu.edu/counseling>, is available if you wish to discuss any concerns confidentially and privately.

Copyright

Course content, including lectures, are copyrighted materials and students may not share outside the class, upload to online websites not approved by the instructor, sell, or distribute course content or notes taken during the conduct of the course (see [ACD 304-06](#), “Commercial Note Taking Services” and [ABOR Policy 5-308 F.14](#) for more information).

You must refrain from uploading to any course shell, discussion board, or website used by the course instructor or other course forum, material that is not the student’s original work, unless the students first comply with all applicable copyright laws; faculty members reserve the right to delete materials on the grounds of suspected copyright infringement.