TEXAS A&M UNIVERSITY

Course Information

Course Number:	ECEN 758
Course Title:	Data Mining and Analysis
Section:	600 & 602
Time:	MW, 5:45 PM – 7:00 PM
Location:	BLOC 166
Credit Hours:	3

Instructor Details

Instructor:	Dr. Joshua Peeples
Office:	WEB 212E
Phone:	979-458-7026
E-Mail:	jpeeples@tamu.edu
Office Hours:	MW 2:30 PM – 3:30 PM

Course Description

A broad overview of data mining, integrating related concepts from machine learning and statistics; exploratory data analysis, pattern mining, regression, clustering, and classification; with applications to scientific and online data. **Cross Listings:** CSCE 676 and STAT 639

Course Prerequisites

None

Course Learning Outcomes

Acquire knowledge of foundations and application of methods in data mining and data analysis; prepare students to use methods and tools of data science in research in methods or applications.

Upon the completion of the course, the student should be able to:
- Conduct exploratory data analysis including visualization and summarization
- Apply selected unsupervised machine learning methods to data analytical problems
- Apply selected supervised machine learning methods to data analytic problems
- Select appropriate machine learning method applicable to common problem types
- Understand usage rationale, underpinnings, and limitations of machine learning methods
- Apply common libraries and tools to data analytical problems

Textbook and/or Resource Materials

[ZM] Data Mining and Machine Learning: Fundamental Concepts and Algorithms, M. Zaki & W. Meira, Jr. Cambridge University Press, 2020, https://dataminingbook.info, Online and through the TAMU Library

[MMDS] Mining of Massive Datasets, J. Leskovec, A. Rajaraman, & J, Ullman, http://mmds.org/

Grading Policy

Discussion of homework assignments is encouraged, but homework must be executed independently. Copying is not allowed. Assignments must be typeset and handed in on time to receive full credit.

Graded Items & Weights

Assignments   50%
Project   20%
Midterm   15%
Final Exam   15%

Scale

A = 90-100; B = 80-89; C = 70-79; D = 60 – 69; F = <60

Late Work Policy

- No assignments submitted after announced deadlines will be accepted for full credit unless justified by an official document such as a doctor's note
- Any late work submitted will incur a penalty of 50% up to a 24-hour period after the submission deadline (zero credit after 24 hours).
- Work submitted by a student as makeup work for an excused absence is not considered late work and is exempted from the late work policy (Student Rule 7).

Course Schedule

Week	Topic	Required Reading
1	Data and Attributes	ZM Chapters 2, 3
2	Dimensionality Reduction	ZM Chapter 7
3	Frequent Itemset Mining & Association Rules	ZM Chapter 8, MMDS Chap. 6
4	Representative Clustering	MMDS Chapter 7
5	Gaussian Mixture Clustering & EM Method	ZM Chapter 13
6	Hierarchical Clustering	ZM Chapter 14
7	Density Estimation & Density-Based Clustering	ZM Chapter 15
8	Bayesian & Nearest Neighbor Classification	ZM Chapter 18
9	Decision Tree Classification	ZM Chapter 19
10	Graphs, Pagerank & Search	MMDS Chapter 5
11	Recommendation Systems	MMDS Chapter 9
12	Linear and Logistic Regression	ZM Chapters 23 & 24
13	Support Vector Machines	MMDS Chapter 11, ZM Chapter 21
14	Perceptrons & Networks	MMDS Chapter 11, ZM Chapter 25
15	Deep Learning and Data Mining Applications	MMDS Chapter 13, ZM Chapter 26
Midterm Exam: Wednesday, October 18, 2023, 5:45 PM – 7:00 PM Final Exam: Thursday, December 7, 2023, 7:30 AM - 9:30 AM		

University Policies

Attendance Policy

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to Student Rule 7 in its entirety for information about excused absences, including definitions, and related documentation and timelines.

Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor.

Please refer to Student Rule 7 in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" (Student Rule 7, Section 7.4.1).

"The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" (Student Rule 7, Section 7.4.2).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See Student Rule 24.)

Academic Integrity Statement and Policy

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case" (Section 20.1.2.3, Student Rule 20).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at aggiehonor.tamu.edu.

Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact the Disability Resources office on your campus (resources listed below) Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Disability Resources is located in the Student Services Building or at (979) 845-1637 or visit disability.tamu.edu.

Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see University Rule 08.01.01.M1):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, a person who is subjected to the alleged conduct will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with Counseling and Psychological Services (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's Title IX webpage.

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in healthy self-care by utilizing available resources and services on your campus

Students who need someone to talk to can contact Counseling & Psychological Services (CAPS) or call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at suicidepreventionlifeline.org.