Applied Machine Learning

Course	BUAN 6341.002, MIS 6341.002, OPRE 6343.002
Course Title	Applied Machine Learning
Professor	Ziyi Cao
Term	2024 Spring
Meetings	Tuesday 1:00PM – 3:45PM, JSOM 2.717

Contact Information

Instructor	Dr. Ziyi Cao
Office Location	JSOM 14.318
Email Address	ziyi.cao@utdallas.edu
Office Hours	Wednesday 10:00AM – 11:00AM
TA	TBD
TA Email Address	TBD

Course Information

Course Modality	Face-to-Face
Pre-requisites	Python programming knowledge is recommended.
Required Software	Python 3.7 or later, Jupyter Notebook.
Required Textbook	**No required Textbook**.
Suggested Readings	*Introduction to Machine Learning with Python: A Guide for Data Scientists*, 1st edition, by Andreas Müller & Sarah Guido, Publisher: O'Reilly Media. ISBN-10: 1449369413; ISBN-13: 978-1449369415
	Introduction to Machine Learning, second edition, Ethem Alpaydin, The MIT Press February 2010: ISBN-10: 0-262-01243-X, ISBN-13: 978-0-262-01243-0

Course Description

This course covers fundamental machine learning concepts and techniques, including regression, clustering, classification, and neural networks. Students will be provided with: (1) the understanding of model frameworks and model evaluation, (2) hands-on experience of model application with Python. Eventually, students will be able to apply proper machine learning methods to conduct data-driven analytics and solve real-world problems.

Students Learning Objective

1. Obtain a general understanding of ML/AI concepts.
2. Perform machine learning analysis, from problem identification, data processing, model application and evaluation, to results interpretation.
3. Understanding the strength and limitations of various machine learning methods.
4. Apply proper ML/AI techniques to real world problems.

Grading

Weighting Scheme	Individual Assignments – 30% (10% each) Exam I – 20% Exam II – 20% Group Project – 25% Participation – 5%	
Tentative Grading Scale	A	>= 93
	A-	>= 90 & < 93
	B+	>= 85 & < 90
	B	>= 80 & < 85
	B-	>= 77 & < 80
	C	>= 75 & < 77
	C-	>= 65 & < 75
	D	>= 60 & < 65
	F	< 60

Note: The final cut-offs may be adjusted at the end of the semester based on the degree of difficulty of the graded material.

Individual Assignments

- All homework assignments should be submitted in electronic form via eLearning.
- Any assignment turned in after the deadline, but within 24 hours will be considered as late and will receive half credit, after that NO CREDIT, unless previous arrangements have been made with the instructor. The instructor reserves the right to modify the assignment schedule as the need arises so long as students are given adequate notice so as not to jeopardize their performance or grades.

Group Project

- There will be one semester-long project, to be completed in teams. Each team will have a maximum of 6 members. The project has two components, (i) a presentation in Week 14 – 15 and (ii) a project report.
- **No late submission** will be accepted.
- The project involves finding a business dataset and applying analytical methods described in the course to the data to derive useful insights for decision-making.
- You can use private corporate data or publicly available data from the Internet. If you use corporate data, the data can remain confidential, but you will have to present your results to the class.
- Some available data source:
     http://www.kaggle.com/competitions
     http://2013.msrconf.org/challenge.php#challenge_data
     http://www.google.com/trends/

Exams

- The exams will be computer-based, in-classroom or take-home.
- Everything that is on the slides or on the notes to the slides is up for testing.

- **No Make-up exams** will be given except for documented medical reasons.

Course Policies

- You must communicate with the instructor via your UTD email account only (for privacy and FERPA purposes). Remember to write the course number and your purpose in the subject line of the email.
- This class will involve extensive use of Python programming technologies. Laptop is needed for in-class practice.
- Unless otherwise specified, assignments are due at 11:59PM on their respective due dates.
- Generative AI tools are not allowed for your work.
- Exams information will be posted as the semester proceed.

Class Participation

Regular class participation is expected. Students who fail to participate in class regularly are inviting scholastic difficulty. A portion of the grade for this course is directly tied to your participation in this class. It also includes engaging in group or other activities during class that solicit your feedback on homework assignments, readings, or materials covered in the lectures (and/or labs). Class participation is documented by faculty. Successful participation is defined as consistently adhering to University requirements, as presented in this syllabus. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Class Recordings

Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless the AccessAbility Resource Center has approved the student to record the instruction, students are expressly prohibited from recording any part of this course. Recordings may not be published, reproduced, or shared with those not in the class, or uploaded to other online environments except to implement an approved AccessAbility Resource Center

accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

The instructor may record meetings of this course. These recordings will be made available to all students registered for this class if the intent is to supplement the classroom experience. If the instructor or a UTD school/department/office plans any other uses for the recordings, consent of the students identifiable in the recordings is required prior to such use unless an exception is allowed by law.

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

"As a Comet, I pledge honesty, integrity, and service in all that I do."

Academic Support Resources

The information contained in the following link lists the University's academic support resources for all students.

Please see http://go.utdallas.edu/academic-support-resources.

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please review the catalog sections regarding the credit/no credit or pass/fail grading option and withdrawal from class.

Please go to http://go.utdallas.edu/syllabus-policies for these policies.

Tentative Schedule

Week	Date	Lecture Topics	Assignments
01	1/16	Syllabus and Course Introduction Python Basics	
02	1/23	Data Visualization and Preprocessing Supervised and Unsupervised Learning Basics	
03	1/30	Regression Analysis	
04	2/6	Regularization – Ridge / Lasso Regression Model Selection and Cross Validation	
05	2/13	Classification Model I	Assignment 1 Due
06	2/20	Classification Model II	
07	2/27	Advanced Classification Models	Project Proposal Due
08	**3/5**	**Exam I**	
09	**3/12**	**Spring Break**	
10	3/19	Unsupervised Learning Basics Clustering Model	
11	3/26	Dimension Reduction Natural Language Processing Basics	Assignment 2 Due
12	4/2	Introduction to Deep Learning I	
13	4/9	Introduction to Deep Learning II	
14	4/16	Final Project Presentation I	Presentation Slides Due
15	4/23	Final Project Presentation II	Assignment 3 Due
16	**4/30**	**Exam II**	
	5/7		Project Report Due