Course Syllabus

Course Information

Course Number/Section	CS4375.001
Course Title	Introduction to Machine Learning
Term	Spring 2024
Days & Times	Mon & Wed 10:00 am-11:15 am
Location	FN 2.102 (or Teams)

Professor Contact Information

Professor	Xinya Du
Email Address	xinya.du@utdallas.edu
Office Location & Hours	Online, Friday 1:30-2:30pm
Class Web Page	Link

Teaching Assistant Information

Teaching Assistant	Ruosen Li, Liqiang Jing
Email Address	ruosen.li@utdallas.edu
Office Hours	Monday 1-2pm on Teams.

Course Prerequisites, Co-requisites, and/or Other Restrictions

CS3345: Data Structures and Introduction to Algorithmic Analysis
CS3341: Probability and Statistics in Computer Science
Familiarity with basic probability, algorithms, (differential) multivariable calculus, and linear algebra is also assumed.

Course Description

Algorithms for creating computer programs that can improve their performance through learning. Topics include: cross-validation, decision trees, neural nets, statistical tests, Bayesian learning, computational learning theory, instance-based learning, reinforcement learning, bagging, boosting, support vector machines, Hidden Markov Models, clustering, and semi-supervised and unsupervised learning techniques.

Textbooks and Materials

- (Recommended) A Course in Machine Learning by Hal Daumé III. (**CIML**)
- (Recommended) Dan Jurafsky & James H. Martin, *Speech and Language Processing (*3^{rd} *Edition)* — https://web.stanford.edu/~jurafsky/slp3/ **(J&M)**.
- Pattern Recognition and Machine Learning by Christopher M. Bishop
- Machine Learning by Tom Mitchell
- Machine Learning: a Probabilistic Perspective by Kevin Murphy

Assignments & Academic Calendar (*Tentative, Due Date: all 11:59pm CST)*

Day	Date	Topic	Assignments	Recommended Readings
Mon	Jan 15	Intro and Linear Regression		Bishop, Ch. 1
Wed	Jan 17	-		differential calculus matrix calculus
Mon	Jan 22	Perceptron		
Wed	Jan 24	SVM		Bishop, Ch. 7
Mon	Jan 29	SVM ~~Duality~~ & ~~Kernel~~ Methods		Boyd, Ch. 5
Wed	Jan 31	-		
Mon	Feb 5	SVM with ~~Slack~~ (Ruochen Li guest lecture)	a1 out	
Wed	Feb 7	Logistic Regression (RZ)		CIML 9.6
Mon	Feb 12	Perceptron Review and Demo (Li)		
Wed	Feb 14	Python/Pytorch Tutorial (recording)		python notebook
Mon	Feb 19	Linear Model for Textclass		
Wed	Feb 21	Neural Networks (NN)		J&M 7 (.1--.4), Primer
Mon	Feb 26	-		
Wed	Feb 28	Word Embedding	a1 due	J&M 6, word2vec explained
Mon	Mar 4	BackProp	final project out	J&M 7, Intro to Computation Graphs, cs231n
Wed	Mar 6	RNN	a2 out	**illustrated Transformer**, Annotated Transformer, Paper
Mon	Mar 11	Spring break		
Wed	Mar 13			
Mon	Mar 18	-		J&M 9 (.1--.6), Karphacy15
Wed	Mar 20	RNN, seq2seq, Attention		J&M 9, J&M 10 (.2, .3), Luong 15
Mon	Mar 25	-		
Wed	Mar 27	**Midterm Review**		
Mon	Apr 1	**Midterm (in class)**		
Wed	Apr 3	Decision Trees / KNN (Demo)		Ch. 8.7 & Ch. 15, Mitchell, Ch. 3
Mon	Apr 8	Final project abstract (group-based meeting on Teams)		
Wed	Apr 10	Transformers, BERT	a2 due	**illustrated Transformer**,

				Annotated Transformer, Paper
Mon	Apr 15	-		
Wed	Apr 17	LLM and prompting		
Mon	Apr 22	LLM + quiz (1pt)		
Wed	Apr 24	Final presentations (group 20 -- 14)		members in group i+1 ask questions regarding the presentation of group i
Mon	Apr 29	Final presentations (group 13--8)		
Wed	May 1	Final presentations (group 7-1)		
	May 6		final project report due (11:59pm)	

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the instructor.

Homework

We expect you to try solving each problem set on your own. However, if you get stuck on a problem, I encourage you to collaborate with other students in the class, subject to the following rules:

- You may discuss a problem with any student in this class, and work together on solving it. This can involve brainstorming and verbally discussing the problem, going together through possible solutions, but should not involve one student telling another a complete solution.
- Once you solve the homework, you must write up your solutions on your own, without looking at other people's write-ups or giving your write-ups to others.
- In your solution for each problem, you must write down the names of any person with whom you discussed it. This will not affect your grade.

Grading

- Assignments/Projects 39%
- In-class quiz 1%
- Midterm (closed-book) 30%
- Final project presentation 10%
- Final project report 20%

Grading Scale

- A+ >= 96
- A 93-96
- A- 90-93
- B+ 87-90
- B 83-87
- B- 80-83
- C+ 77-80
- C 74-77
- C- 65-75
- F 65 or below

Course Policies

Late Work Policy	If the homework is turned in after the deadline, the grade for the homework shall be reduced by 20% for the first 24 hours, 50% for the next 24 hours. Later homeworks will **NOT** be accepted except in extreme circumstances or those permitted by university policy (e.g., a religious holiday). All such exceptions MUST be cleared in advance of the due date if possible.
Make-up exams	There will be no make-up exams, projects, or homework.
Class Attendance	Regular class participation is expected. Students who fail to participate in class regularly are inviting scholastic difficulty.
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."*
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 https://go.utdallas.edu/syllabus-policies for these policies.

Class Materials

The professor may provide class materials that will be made available to all students registered for this class as they are intended to supplement the classroom experience. These materials may be downloaded during the course, ***however, these materials (including exams) are for registered students' use only and should not be posted publicly.*** *Classroom materials may not be reproduced or shared with those not in class, or uploaded to other online environment*s except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Academic Integrity

The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in his or her scholastic work.

Scholastic dishonesty includes, but is not limited to, statements, acts or omissions related to applications for enrollment or the award of a degree, and/or the submission as one's own work or material that is not one's own. As a general rule, scholastic dishonesty involves one of the following acts: cheating, plagiarism, collusion and/or falsifying academic records. Students suspected of academic dishonesty are subject to disciplinary proceedings.

Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details). This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.

Withdrawal from Class

The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.

These descriptions in this syllabus are subject to change at the discretion of the Professor, and Welcome to the course!