

# Introduction to Machine Learning (INF385T)

## University of Texas at Austin School of Information

### Class Meetings

Wednesdays 3-6pm  
UTA 1.210A

### Instructor

Danna (pronounced similar to "Donna") Gurari (rhymes with Ferrari)  
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### Course Overview

#### *Summary*

This class will cover core and cutting edge concepts employed in machine learning to solve artificial intelligence problems. Students will learn the theory behind a range of machine learning tools and practice applying the tools to, for example, textual data (natural language processing), visual data (computer vision), and the combination of both textual and visual data. The class format is split between reading and lab assignments for the first half of the semester followed by a research project the second half of the semester. Each class is split between a lecture, small group discussions, and in-class lab tutorials.

#### *Objectives*

By the end of the course, the goals are for students to:

1. Understand the key concepts in machine learning, a critical precursor to effective collaborations in industry or academia. Towards this aim, students will:
  - Characterize the process to train and test machine learning algorithms
  - Critique core and cutting edge machine learning algorithms
  - Identify the challenges for designing modern machine learning systems that can harness today's "big" datasets
  - Recognize ways to evaluate the predictive power of machine learning systems
2. Apply machine learning systems to perform various artificial intelligence tasks. Towards this aim, students will:
  - Employ cloud computing resources in order to take advantage of modern hardware and software platforms
  - Develop programming skills by writing code in Python
  - Experiment with machine learning libraries, including scikit-learn and TensorFlow

- Evaluate machine learning algorithms for tasks in various application domains, including for analyzing text and analyzing images
3. Conduct and communicate original research. Towards this aim, students will:
- Propose a novel research idea (this will be an iterative process)
  - Design and execute experiments to support the proposed idea
  - Write a research paper about the project (and possibly submit it for publication)
  - Present the project to the class

### *Prerequisites*

While there are no requirements, a background in programming is strongly recommended.

### *Website*

<https://www.ischool.utexas.edu/~dannag/Courses/IntroToMachineLearning/>

### *Class Participation*

Students are expected to attend every class. Every student should demonstrate ongoing engagement in class discussions and complete the material discussed in every lab session.

### *Reading Assignments*

Students will have weekly assigned readings with associated questions to answer about the material. Each assignment description will be posted on the course website before the due date. These assignments will offer training in thinking critically about machine learning concepts and brainstorming novel research ideas to fill existing gaps/problems. Each assignment must be submitted in Canvas by 11:59pm on its due date.

### *Lab Assignments*

Four lab assignments will be assigned for the first half of the course. Each assignment description will be posted on the course website before the due date. These lab assignments will develop students' skills to build systems similar to those described in the weekly readings. Each assignment must be submitted in Canvas by 11:59pm on its due date.

### *Final Project*

Assignments related to the final project will be due during the second half of the course. Details about each assignment will be posted on the course website prior to its deadline. The goal for the final project is to further develop students' skills in conducting and communicating original research.

*Tentative Schedule*

Week	Lecture Topic(s)	Assignment Due
1	Introduction	
2	Regression, Regularization	Problem Set 1
3	Classification: Decision Tree, Naive Bayes	Lab 1
4	Classification: Nearest Neighbor, Support Vector Machine	Problem Set 2
5	Feature Representation/Reduction, Unsupervised Learning	Lab 2
6	Ensemble Learning	Problem Set 3
7	Deep Learning: Neural Networks, Gradient Descent	Lab 3
8	Deep Learning: Convolutional Neural Networks	Problem Set 4
9	Transfer Learning	Lab 4
10	Deep Learning: Recurrent Neural Networks	Project Pre-Proposal
11	Deep Learning: Autoencoders	Project Proposal
12	Deep Learning: Generative Adversarial Nets	
13	Active Learning, Curriculum Learning	Project Outline
14	Ethics, Course Review	
15	<i>Students' Project Presentations</i>	

## Grading

Final course scores will be calculated as follows:

% of Final Class Grade	
Class Participation	10%
Reading Assignments	20%
Lab Assignments	30%
Final Project	40%

Final course scores represent the following grades (scores are rounded to the nearest integer):

Grade	% of Final Class Grade
A+	97-100%
A	94-96%
A-	90-93%
B+	87-89%
B	84-86%
B-	80-83%
C+	77-79%
C	74-76%

For detailed information about what grade is required for you to receive credit for this class, please refer to [UT's Graduate Catalog](#). For example, students in the School of Information (iSchool) are required to receive a grade of B or higher in order to include this course in their [program of work toward graduation](#). In addition, the UT Graduate School requires a minimum grade of C or higher to count a course for credit.

### *Late Policy*

Late submissions will be penalized 1% of the grade per hour up to 12 hours. After 12 hours, no credit will be given.

## Resources

There are no required textbooks. We will draw heavily from online tutorials. Links to these resources will be posted on the course website for each class meeting.

## Policies

### *Academic Honor Code*

Students who violate University rules on academic dishonesty are subject to severe disciplinary penalties, such as automatically failing the course and potentially being dismissed from the University. Please do not take the risk. The following site offers more details: <http://deanofstudents.utexas.edu/sjs>.

### *Coping with Stress and Personal Hardships*

Life can bring extreme challenges and unexpected, undesired surprises to each of us. If you are facing any personal difficulties in coping with your life experiences, please consider taking advantage of the incredibly valuable services available to you from the [Counseling and Mental Health Center](#). Having support and assistance can make a huge difference when facing life difficulties.

### *Accommodations for Disability*

If you qualify for accommodations because of a disability, please submit to me a letter from the Division of Diversity and Community Engagement, Services for Students with Disabilities in a timely manner so that your needs can be addressed. To determine if you qualify, please contact the [Services for Students with Disabilities](#) at 512-471-6259 (voice) or 512-471-4641 (TTY for users who are deaf or hard of hearing).

### *Excused Absences: Religious Observance and Military Service*

A student will be given an opportunity to complete any work missed due to absences in observance of a religious holy day or military service. For a holy day, the student must notify me at least two weeks in advance of the absence. Please see the following link for more details: <http://catalog.utexas.edu/general-information/academic-policies-and-procedures/attendance/>. The student will not be penalized for excused absences, but must complete the missed material within a reasonable time after the excused absence.