CSE 6363-001/101
Machine Learning

Spring 2023 - TTh 3:30pm-4:50pm Central Time - NH 110
Optional Question/Example Section TBD
Instructor: Manfred Huber (huber@cse.uta.edu)

1 Instructor Information

Instructor: Manfred Huber

Office Number: ERB 128 or ERB 522

Office Telephone Number: (817) 987 6576

Email Address: huber@cse.uta.edu (please indicate the course number in the subject line)

Faculty Profile: https://mentis.uta.edu/explore/profile/manfred-huber

Office Hours: TTh 5:00pm - 6:00pm - ERB 128 or ERB 522
An optional Question and Example Section will be held weekly with time and location TBD

2 Course Description

Course Delivery:
This course is an in-person course. All Quizzes in the course will be in-person, at the beginning of the corresponding class period.

Contents and Outcomes:
Machine learning techniques that allow computers to form representations, make predictions, or apply controls automatically from data have become increasingly prevalent in modern technologies and are opening up new approaches in a wide range of domains. This course provides an introduction to the field of Machine Learning and covers fundamental and state-of-the-art machine learning algorithms. It will cover unsupervised, supervised, semi-supervised, as well as reinforcement learning techniques with a focus on unsupervised and supervised learning. Students completing this course will gain an understanding of the area of machine learning and the ways in which different learning algorithms operate. They will also be able to apply the covered methods to real-world problems.

Prerequisites:
Many of the techniques covered in this course are based on statistics and linear algebra and knowledge in these areas is required. Prerequisite for this course is *Data Modeling (CSE 5301)*, an advanced (equivalent) statistics course, or consent of instructor. Prior knowledge of *Artificial Intelligence (CSE 5361)* and *Algorithms (CSE 5311)* is useful.

Course Materials:

The recommended textbook for this course is:
Pattern Recognition and Machine Learning, Christopher M. Bishop, 2006.
Additional readings in the form of book chapters or research papers will be made available either through the course Canvas site.

Technology Requirements;

Students will have to have access to a computer to perform the programming components of the assignments and projects. For the latter, programming can use any standard programming language but should not depend on any particular programming environment (such as Microsoft Studio) to run. If the instructor or GTA can not compile and/or run code, the student is responsible to provide an appropriate environment to evaluate the code.

E-mail and WWW page:

There is a course web page at http://www-cse.uta.edu/∼huber/cse6363 as well as a Canvas page. All changes and supplementary course materials will be made available through Canvas and usually through the web site. In addition, necessary changes or important announcements will also be distributed by through Canvas.

Tentative Office Hours:

Office hours for the course will be held by the instructor as Teams meetings T,Th 5:00pm-6:00pm Central time. In addition, a weekly, optional Question/Example session will be held with time and location TBD. Times are subject to change and will be posted.
e-mail: huber@cse.uta.edu

Teaching Assistants:

There will be a Teaching Assistants for this course. Their details will be announced on Canvas.

3 Course Work and Grading

Homework Assignments/Projects :

Three hands-on homework assignments will be given where learned techniques are applied to practical problems.

Projects:

Three small projects will be assigned where students implement and test some of the techniques.

Quizzes:

There will be 6 quizzes, each to be held in the class after an assignment or project was due. Quizzes will test knowledge of material taught in the course as well as of the assignment submitted.

Final Project:

In addition, every student will perform a final project that will be presented at the end of the course.

Late submission policy:

All assignments and Projects are graded out of 100 points. Assignments submitted late will be penalized, at a rate of 4 penalty points per hour. The submission time will be the time shown on Canvas. Any assignment submitted more than 25 hours late will receive no credit for the assignment. To receive credit for the assignment portion of the corresponding quiz you will have to hand in an assignment before the quiz.

- Exceptions to late submission penalties will only be made for emergencies documented in writing, in strict adherence to UTA policy. For all such exception requests, the student must demonstrate that he or she made all efforts to notify the instructor as early as possible.
- Computer crashes, network crashes, software or hardware failure, temporary Canvas failure, e-mail failure, will NOT be accepted as justification for late submissions. If you want to minimize chances of a late submission, aim to submit early. You can always revise your submission till the deadline.

Attendance:

At The University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator in student success. Each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, I will require course attendance and attendance and participation will contribute to the course grade. Note that you are responsible for any course content covered in class irrespective of it being in the class notes. However, while UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism in place to mark when Federal Student Aid recipients begin attendance in a course. UT Arlington instructors will report when students begin attendance in a course as part of the final grading process. Specifically, when assigning a student a grade of F, faculty report the last date a student attended their class based on evidence such as a test, participation in a class project or presentation, or an engagement online via Canvas. This date is reported to the Department of Education for federal financial aid recipients.

Grading Policy:

The final grade will be calculated using the following policy:

Assignments	24 %
Projects	24 %
Quizzes	32 %
Final Project	15 %
Attendance & Participation	5%

4 Course Topics

Topics covered in this course include:

- Machine Learning Representations and Evaluation Metrics
  - Bayesian Learning Models
  - Support Vector Machines
  - Neural Networks
  - Classification
- Supervised Learning
  - Regression
  - Classification
- Unsupervised Learning
  - Clustering
  - Feature Learning
  - Structure Learning
- Semi-Supervised Learning
- Fundamentals of Reinforcement Learning
- Introduction to Deep Learning

5 Tentative Class Schedule

CSE 6363
Machine Learning
Tentative Lecture and Assignment Schedule
Spring 2023 - TTh 3:30pm - 4:50pm

Class	Date	Readings	Lecture Topics	Assignments
1	01/17		Course Details and Overview	
2	01/19		Background: Probability, Information, utility	
3	01/24		Supervised Learning	
4	01/26		Supervised Learning	
5	01/31		Regression	
6	02/02		Regression	
7	02/07		Regression & Classification	
8	02/09		Classification	Homework 1 due
9	02/14		Neural Networks	Quizz 1
10	02/16		Neural Networks	
11	02/21		Support Vector Machines	
12	02/23		Decision Trees	Project 1 due
13	02/28		Ensemble Methods	Quizz 2
14	03/02		Unsupervised Learning	
15	03/07		Clustering	
16	03/09		Unsupervised Feature Learning	Homework 2 due
	03/14		*Spring Break - No Class*	
	03/16		*Spring Break - No Class*	
17	03/21		Regularization and Complexity	Quizz 3
18	03/23		Semi-Supervised learning	
19	03/28		Graphical Models	
20	03/30		Graphical Models	Project 2 due
21	04/04		Structure Learning	Quizz 4
22	04/06		Introduction to Reinforcement Learning	
23	04/11		MDPs and Reinforcement Learning	
24	04/13		Reinforcement Learning	Homework 3 due
25	04/18		Reinforcement Learning	Quizz 5
26	04/20		Deep Learning	
27	04/25		Deep Learning	
28	04/27		Advanced Learning Topics	Project 3 due
29	05/02		Advanced Learning Topics	Quizz 6
30	TBD		**Final Project Presentations**	**During Finals Week**

[1] All information and dates tentative and subject to change.

6 University Policies and Services

Institution Information

UTA students are encouraged to review the below institutional policies and informational sections and reach out to the specific office with any questions. To view this institutional information, please visit the Institutional Information page (https://resources.uta.edu/provost/course-related-info/institutional-policies.php) which includes the following policies among others:

- Drop Policy
- Disability Accommodations
- Title IX Policy
- Academic Integrity
- Student Feedback Survey
- Final Exam Schedule

Face Covering Policy

Face coverings are not mandatory, all students and instructional staff are welcome to wear face coverings while they are on campus or in the classroom.

Emergency Exit Procedures:

Should we experience an emergency event that requires evacuation of the building, students should exit the room and move toward the nearest exit, which is located to the left or right once exiting the room. When exiting the building during an emergency, do not take an elevator but use the stairwells instead. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

Academic Success Center:

The Academic Success Center (ASC) includes a variety of resources and services to help you maximize your learning and succeed as a student at the University of Texas at Arlington. ASC services include supplemental instruction, peer-led team learning, tutoring, mentoring and TRIO SSS. Academic Success Center services are provided at no additional cost to UTA students. For additional information visit: Academic Success Center (https://www.uta.edu/student-success/course-assistance). To request disability accommodations for tutoring, please complete this form (https://www.uta.edu/student-success/course-assistance/tutoring/request).

The IDEAS Center

(2nd Floor of Central Library) offers FREE tutoring to all students with a focus on transfer students, sophomores, veterans and others undergoing a transition to UT Arlington. Students can drop in, or check the schedule of available peer tutors at www.uta.edu/IDEAS, or call (817) 272-6593.

The English Writing Center

(411LIBR): The Writing Center offers FREE tutoring in 15-, 30-, 45-, and 60-minute face-to-face and online sessions to all UTA students on any phase of their UTA coursework. Register and make appointments online at https://uta.mywconline.com. Classroom visits, workshops, and specialized services for graduate students and faculty are also available. Please see www.uta.edu/owl for detailed information on all our programs and services.
The Library's 2nd floor Academic Plaza offers students a central hub of support services, including IDEAS Center, University Advising Services, Transfer UTA and various college/school advising hours. Services are available during the library's hours of operation. http://library.uta.edu/academic-plaza

7 Library - library.uta.edu

Resources for Students

Research or General Library Help

Academic Plaza Consultation Services: library.uta.edu/academic-plaza

Ask Us: ask.uta.edu/

Library Tutorials: library.uta.edu/how-to

Subject and Course Research Guides: libguides.uta.edu

Librarians by Subject: library.uta.edu/subject-librarians

Research Coaches: http://libguides.uta.edu/researchcoach

Resources

A to Z List of Library Databases: libguides.uta.edu/az.php

Course Reserves: pulse.uta.edu/vwebv/enterCourseReserve.do

Study Room Reservations: openroom.uta.edu/