The University of Texas at Dallas
Applied Deep Learning
Fall 2023
BUAN 6382

Course Information

Course Number/Section: BUAN 6382.001
Course Title: Applied Deep Learning
Day & Times: Monday 4:00 pm –6:45 pm
Classroom: JSOM 12.214

Instructor Contact Information

Professor   Harpreet Singh
Office Phone   972-883-4770
Email Address   harpreet@utdallas.edu
Office Location   JSOM 3.430
Office Hours: By Appointment
TA name: Shashanka Ranade (shashanka.ranade@utdallas.edu)
TA Office Hours: By Appointment

Course Pre-requisites

Prerequisites or Corequisite: BUAN 6341

Course Description

This course covers the fundamentals of Deep Learning, including Feedforward Artificial Neural Networks, Convolutional Neural Networks, and Transformer Networks. It emphasizes computer vision and NLP applications, such as image and text classification, object detection, and segmentation.

Course Learning Objectives

By the end of this course, students will be able to:

- Grasp fundamental deep learning concepts such as backpropagation.
- Understand PyTorch as a low-level framework.
- Comprehend the essentials of feed-forward neural networks, Convolutional Neural Networks, and Transformer networks.
- Utilize high-level APIs (like PyTorch Lightning) for efficient experimentation.
- Apply pre-trained Neural Networks for image classification, object detection, and object segmentation.

Communication

We will use regular email (harpreet@utdallas.edu) and a web conferencing tool (Teams) during the semester. Please copy TA on all communications. **Student emails and messages will be answered within 3 working days under normal circumstances**.

Textbook:

There is no required Textbook for the course.

Recommended Textbooks:

The following texts are useful, but none is required. All of them are free.

- Ian Goodfellow, Yoshua Bengio, and Aaron Courville. Deep Learning – **Free.**
- Aston Zhang, Zachary C. Lipton, Mu Li and Alexander J. Smola. Dive into Deep Learning- **Free**.
- Francois Chollet. Deep Learning with Python. **Not Free.**

Tools and Languages used

- **Language**: Python
- **Deep Learning Framework**: PyTorch, High level API (Pytorch Lightning, Fast AI, Keras Core)

Class Lectures

This course will be taught in a traditional in class mode. The lectures will have a code along sessions. Instructor might post some videos as well.

Class Materials

The Instructor 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 are for registered students' use only. Classroom materials may not be reproduced or shared with those not in class, or uploaded to other online environments except to implement an approved Office of Student Access Ability accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Homework Assignments:

The Homework assignments **require individual work**. You will submit your assignments in the required file format through eLearning. Instructions and dates for each assignment will be posted on eLearning.

Late work Policy for HWs :

- Homework assignments will be turned in on eLearning and are due at 11:59 pm CT on their assigned due date.
- **Each student has a total of three free late days to use on assignments throughout the semester**.
- There is no restriction on how you can use the late days. You can use the late days on one assignment or across multiple assignments.

- You do not need permission to use free late days. We will keep track of late days that you have used.
- After you have exhausted free late days, you will receive a penalty of 25% per late day. You do not need to take any permissions. The minimum score in the assignment will be 0.

Exams:

There are two exams for this course.

Both exam will be proctored at the UTD Testing Center. **Students will need to make reservation using "Reserve Your Seat" tool at least 72 hours prior to the exam time**. Please see the UTD Testing Center web pages https://ets.utdallas.edu/testing-center/ for more information. Please be sure to review the Testing Center Student Guidelines.

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Grading Policy

Your grade in the course will be based on the following items:

Class Participation	10
Homework Assignments	50
Exam 1	20
Exam 2	20
Total	100

These are the only scores that will be used to determine your grade. **There will be no extra work or repeat exams will be given and no late work will be accepted, so please do not ask for an exception**. Your semester average will be rounded using the convention in rounding and your final letter grade will be determined as follows:

Grading Scale:

Relative grading allows educators to convert the outcomes of a student's test, project or assignment and adjust that final grade in relation to grades from other students in the course. Relative grading is similar to bell curving or grading on a curve, and considers the highest score as the baseline (A), relatively adjusting all others compared to that score. Student should earn a passing grade for each projects and exam grading components in order to be considered for a letter grade in the range of C to A. Note: this grading system is following the UTD/JSOM policy to keep the class grade average between B to A-.

Your course grade will depend on your overall score relative to your peers.
1) The students with scores in the 80th percentile and above will get an A grade.
2) The students with scores between the 80th and the 60th percentile will get an A- grade.
3) The students with scores between the 60th and the 40th percentile will get a B+ grade.
4) The students with scores between the 40th and the 20th percentile will get a B grade.
5) The students with scores between the 20th and the 10th percentile will get a B- grade.
6) The instructor will decide the students with scores below the 10th percentile.

Tentative Class Schedule
Additional notes, instructions and useful links will be posted on eLearning/Teams, so please make sure to stay current on materials and announcements posted between meetings. *You are*

responsible for keeping up with all posted material and announcements, so make sure you <u>check eLearning/Teams on a daily basis.</u>

<u>**These descriptions and timelines are subject to change at the discretion of the instructor.**</u>

Date	Content
21-Aug	Course Intro/Intro to PyTorch Tensors /Stochastic Gradient Descent
28-Aug	Single Layer NN/ Cost Functions/Computation Graphs
4-Sep	Labor Day
11-Sep	Multilayer NN / Deep dive to PyTorch API
18-Sep	Organizing Code / Training Deep NN
25-Sep	Complete Example Training Deep NN
2-Oct	Convolutional Neural Network (CNN) -I
9-Oct	CNN- II
16-Oct-20-Oct	**Exam1**
23-Oct	Case Study – Image Classification -I
30-Oct	Case Study – Image Classification - II
6-Nov	Large Language Models (LLMs)
13-Nov	Case Study – Text Classification
20-Nov	Break
27-Nov	Object Detection/Segmentation -I
4-Dec	Case Study – Image Segmentation
11-Dec – 15-Dec	**Exam2**

Make-Up policy

You are required to take all homework assignments, exams, and projects on the designated dates and with your own class. Generally, <u>there will be no makeup quizzes or exams given</u>. If you believe you cannot take an exam or quiz on the regularly scheduled date, you should talk to the instructor as soon as possible. If you cannot take an exam or quiz due to a compelling personal reason such as emergency surgery or death in the immediate family, you have to notify me <u>before the exam</u>. Supporting documentation, such as hospital admission, will be required. Routine or regular doctor's office visits will not be an acceptable excuse. Failure to give notification before the exam will result in an automatic 15% deduction for the quiz/exam grade if a makeup is approved. There will be no make-up of assignment if not submitted by due date.

Academic Integrity

The faculty and administration of the School of Management expect from our 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. We want to establish a reputation for the honorable behavior of our graduates, which extends throughout their careers. Both your individual reputation and the school's reputation matter to your success.

Dishonesty includes, but is not limited to plagiarism, cheating, collusion, facilitating academic dishonesty, fabrication, failure to contribute to a collaborative project and sabotage.

- **Plagiarism:** The adoption or reproduction of ideas, words, statements, images or works of another person as one's own without proper acknowledgement.
- **Cheating:** Using or attempting to use unauthorized materials, information, or study aids in any academic exercise. Academic exercise includes all forms of work submitted for credit or hours.
- **Fabrication:** Falsification or creation of any information, data or citation in an academic exercise.
- **Collaboration and/or Collusion:** Seeking or providing aid to another student in completion of any assignment submitted for academic credit without permission from the faculty member. http://www.utdallas.edu/judicialaffairs/UTDJudicialAffairs-Basicexamples.html

Students in this course suspected of academic dishonesty are subject to disciplinary proceedings, and if found responsible, the following minimum sanctions will be applied:

- **Assignment – Zero for the Assignment**
- **Exams – F for the course**

These sanctions will be administered only after a student has been found officially responsible for academic dishonesty, either through waiving their right for a disciplinary hearing, or being declared responsible after a hearing administered by Judicial Affairs and the Dean of Student's Office.

In the event that the student receives a failing grade for the course for academic dishonesty, the student is not allowed to withdraw as a way of preventing the grade from being entered on their record. Where a student receives an F in a course and chooses to take the course over to improve their grade, the original grade of F remains on their transcript, but does not count towards calculation of their GPA.

The School of Management also reserves the right to review a student's disciplinary record, on file with the Dean of Students, as one of the criteria for determining a student's eligibility for a scholarship.

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