Course	BUAN/MIS 6341.0w1, OPRE 6343.0w1
Course Title	Applied Machine Learning
Professor	Uri Smashnov
Term	Spring 2022
Meetings	Virtual Learning - pre-recorded lectures

Professor Contact Information

Professor Uri Smashnov
Email Address uri.smashnov@utdallas.edu
Office hours Only virtual office hours. Details will be posted on the eLearning or Teams page of the course.

Course Modality and Expectations

Instructional Mode	In class / traditional
Course Platform	Course material and videos are on the eLearning page of the course. Weekly discussions and reviews will be delivered to MS Teams.
Expectations	Students should watch the videos, read the required readings for each week before the weekly discussion sessions.
Asynchronous Learning Guidelines	Synchronous meetings are on MS Teams platform.

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

Please consult CourseBook (https://coursebook.utdallas.edu/search/buan6341.0w1.22s) and your academic advisor.

Course Description

This course covers machine learning models for business data including supervised and unsupervised modeling, non-linear regression models, resampling methods and advanced neural networks and artificial intelligence-based models for data-driven analytics. The course will be taught using Python language. It is expected that students are comfortable enough with Python programming language. There will be very limited emphasize on reviewing Python concepts. The course will cover ML interpretability concepts such as: global and local explainability, model debugging and model trust.

Student Learning Objectives/Outcomes

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

1. Identify the difference between a supervised (classification) and unsupervised (clustering) technique.
2. Identify which technique they need to apply for a particular dataset and need, engineer features to meet that need, and write python code to carry out an analysis.
3. Being able to construct ML experiments to reduce model overfitting and achieve optimal results based on available data and given business problem.
4. Understand and apply ML interpretability concepts.

Required Textbooks and Materials

Required Texts

No text book is required for this course. Supporting material will be provided through eLearning course page.

Required Hardware and Software

Latest sub-version of Python 3.8 - Additional packages you need to have for this course are H2O-3, numpy, scipy, sklearn, pandas, matplotlib, seaborn, graphviz, TensorFlow, and keras. Exact version of Python will be posted on eLearning.
GitHub – each student will need to have account on GitHub with Private repository created for the class. Private repository will be shared with class instructor only.
You can use either Windows, Mac or Linux PC.
H2O-3 has Java version 1.8 or later requirement.

Recommended Texts

Introduction to Machine Learning with Python
ISBN 978-1-4493-6941-5
Publisher O'Reilly Media, Incorporated

Introduction to Machine Learning
Author Ethem Alpaydin and Francis Bach
ISBN 9780262028189
Publisher MIT Press

Introduction to Statistical Learning
Author Gareth James; Trevor Hastie; Robert Tibshirani; Daniela Witten
ISBN 978-1-4614-7137-0
Publisher Springer

Online Sklearn and H2O-3 documentation and tutorials.

Textbooks and some other bookstore materials can be ordered online or purchased at the UT Dallas Bookstore.

Technical Requirements
In addition to a confident level of computer and Internet literacy, certain minimum technical requirements must be met to enable a successful learning experience. Please review the important technical requirements on the on the Getting Started with eLearning webpage.

Course Access and Navigation
The course can be accessed using your UT Dallas NetID account on the eLearning website. Please see the course access and navigation section of the Getting Started with eLearning webpage for more information.

To become familiar with the eLearning tool, please see Student eLearning Tutorials webpage.

UT Dallas provides eLearning technical support 24 hours a day/7 days a week. The eLearning Support Center includes services include a toll free telephone number for immediate assistance (1-866-588-3192), email request service, and an online chat service.

Communication
All class discussions will be performed on MS Teams under appropriate channel. For example, we will use Project-1 channel for Project-1 discussion. Use of email is appropriate for personal questions only.

Distance Learning Student Resources
Online students have access to resources including the McDermott Library, Academic Advising, The Office of Student AccessAbility, and many others. Please see the eLearning Current Students webpage for more information.

Server Unavailability or Other Technical Difficulties
The University is committed to providing a reliable learning management system to all users. However, in the event of any unexpected server outage or any unusual technical difficulty which prevents students from completing a time sensitive assessment activity, the instructor will provide an appropriate accommodation based on the situation. Students should immediately report any problems to the instructor and also contact the eLearning Help Desk. The instructor and the eLearning Help Desk will work with the student to resolve any issues at the earliest possible time.

Student Assessments

Grading Criteria:
In line with the applied nature of this class, a large portion of the assessment will be made through homework. There will be approximately 3 project assignments. The homework will contain some theory questions but the majority of the material will involve implementing the different methods that we cover in class using the computer package. There will be one take-home exam. The breakdown will be:

Item	Point
Project 1	20
Project 2	20
Weekly Labs	30
Take-home Exam	30
Total	100

Grading Scale:

Relative grading is a system of assessment to determine students' grades by comparing them against those of their peers. Unlike the system of absolute grading, where a student's score on a given test or assignment directly converts into a letter grade (for example, 93/100 is A, etc.), relative grading means students' marks fluctuate depending on how they did compared to others in class. Relative grading refers to a system of evaluation that 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-.

Grade	Range of marks
A	80 percentile and above
A-	60 percentile to 80 percentile
B+	40 percentile to 60 percentile
B	20 percentile to 40 percentile
B-	Below 20 percentile
F	Failing grade in any grading components. (grade bellow 60 out of 100)

Accessing Grades:
Students can check their grades by clicking "My Grades" on the course menu after the grade for each assessment task is released.

Projects:
There are 2 individual projects for this course. Project details will be posted in the course.

Labs:
There are 7 Labs as individual assessment activities. Students will study the lab documents and when ready, take the lab quiz. Some Labs will use auto-grader and students will have only **1 attempt** until the due date of each lab.

Exams:
There is one take home exam for this course. The exam is a mini project. Details of the exam and grading rubrics will be posted on eLearning.

(Continued on the next)

Course Outline/Academic Calendar

Week of	Topic/Lectures	Reading	Assignment/Activity
Week 1 1/18	Course access and self-introduction		Lab 0 – working environment installation and set-up
	Intro Video Syllabus	Syllabus	Python, H2O-3, GitHub
Week 2 1/24	Module 1: Introduction to Pandas	Scikit-learn: Machine Learning in Python	Lab 1
Week 3 1/31	Module 2: Introduction to Machine Learning	H2O-3 – documentation	Lab 2
Week 4 2/7	Module 3: Supervised Learning	• A Few Useful Things to Know about Machine Learning • Genetic test for Autism refuted • Support-Vector Networks • Introduction of decision trees	Lab 3
Week 5 2/14	Module 3 continued		**Project 1 – Posted**
Week 6 2/21	Module 3 continued		Lab 4
Week 7 2/28	Module 4: Model Evaluation and Selection		Lab 5
Week 8 3/7	Module 4 continued		
Spring Break			
Week 9 3/21	Module 5: Ensemble Learning	Combining Multiple Learners	**Project 2 - Posted** Lab 6
Week 10 3/28	Module 5 continued		
Week 11 4/4	Module 6: Dimensionality Reduction	Dimensionality Reduction: PCA and GLRM (H2O)	Lab 7
Week 12 4/11	Module 7: Neural Networks	• Perceptron Learning • Weighted Networks - The perceptron • The Perceptron: A probabilistic model for information storage and organization in brain	
Week 13 4/18	Module 7 continued		
Week 14 – 4/25	ML Interpretability		
Week 15 – 5/2	ML Interpretability continued		
5/7 – 5/13	Take Home Exam	Exact 24 hour window will be posted later.	

Course Policies

Make-up exams

No makeup exam is allowed in this course.

Extra Credit

There is not any extra credit activity for this course.

Late Work

Late Project submissions past grace period will not be allowed. Each submission will have grace period to help deal with eLearning technical problems only. Grace period is not designed to allow for extra time to work on assignments.

Special Assignments

All assignments are programming/coding assignments.

Class Participation

Class participation is encouraged.

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 go to UT Dallas Syllabus Policies webpage for these policies.

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