SYLLABUS: Machine Learning

COURSE & INSTRUCTOR INFORMATION

Course

Course Prefix, Number, Section, Title: COSC 40023-074 Machine Learning

Semester and Year: Spring 20XX

Number of Credits: 3

Course Component Type: Lecture

Class Location: XXX

Class Meeting Day(s) & Time(s): XXX

Instructor

Instructor Name: XXX

Office Hours: XXX

Preferred Method of Contact: Email

Email: XXX

Response Time: Emails will be responded within 24 hours including weekends.

Final Evaluative Exercise & Important Dates

FINAL EXAM: MONDAY, MAY 5 **2:00 – 4:30 PM AT RJH 112**
MIDTERM EXAM (TENTATIVE): WEDNESDAY, MARCH 5 **4:00 – 5:20 PM AT RJH 112**
GROUP PROJECT CHECK-UP DUE: THURSDAY, APRIL 17
LAST DAY TO DROP: TUESDAY, APRIL 1
LAST DAY TO SELECT P/NC: MONDAY, APRIL 21

Note for students: The syllabus is your first course reading. It provides an orientation to, overview of the flow, and expectations of the course. You should turn to the syllabus for details on assignments and course policies.

Grader

XXX

Student Resources & Policy Information

Click or scan QR code for resources to support you as a TCU student. Please note section on Student Access and Accommodation, Academic Conduct & Course Materials Policies, and Emergency Response & TCU Alert.

COURSE DESCRIPTION

Description

Students will study the principles and practices of machine learning. Specifically, regression and classification will be studied to obtain and analyze patterns in datasets. To facilitate exploratory data analysis, students will also study data preprocessing techniques and data visualization practices.

Prerequisites & Concurrent Enrollment

COSC/MATH 30103, MATH 30224, and prerequisite MATH 10043 or corequisite MATH 30853; all with C- or better.

COURSE MATERIALS

Required Material

Textbooks: Both textbooks can be accessed for free through https://learning.oreilly.com for TCU students.

- (Recommended, not required) Andreas C. Müller and Sarah Guido, *Introduction to Machine Learning with Python: A Guide for Data Scientists*, 1st Edition, ISBN: 978-1449369415
- (Optional, not required) Scott V. Burger, *Introduction to Machine Learning with R: Rigorous Mathematical Analysis*, 1st Edition, ISBN: 978-1491976449

Lecture Files: Lecture files including sample code will be made available on TCU Online.

Device Information: Students **MUST** be able to access laptops to complete all assignments and exams. Students should also bring their laptops to **EVERY** lecture. The operating system can be Windows or macOS.

LEARNING OUTCOMES

1. Skillfully program in Python & R.
2. Have a solid intuition of machine learning models.
3. Understand basic concepts to construct robust machine learning models.
4. Effectively use Python & R to implement machine learning models.
5. Be able to explain the results generated from machine learning models.

6. Understand basic rules to improve prediction accuracy.
7. Know which machine learning model to choose for each type of problem.
8. Know how to combine machine learning models to solve real-life datasets.

COURSE REQUIREMENTS

Assessments

Assignments:

- There are seven assignments. Assignments only contain programming questions.
- Since all assignments are small-scale, late assignments are **NOT** allowed and are worth 0 points.
- Students are encouraged to share thoughts and ideas. However, a student should **NEVER** share his code to another student. It is **PROHIBITED** to even share one line of code.

Group Project:

- Three or four students will form a group in the middle of the semester. Each group will choose a real-life dataset and analyze the dataset using different machine learning models.
- Each group **MUST** attend the office hours for code check-up and demonstration.
- At the end of the semester, presentations will be delivered during the lecture time.

Exams:

- Both exams are taken in the lecture classroom. The exams only contain programming questions, and students are asked to use their laptops to take the exams. The final exam is comprehensive with an emphasis on the second half of the semester.
- Both exams are open book. Students can use the notes on paper and the notes stored locally on the laptops.
- The laptops **MUST** remain disconnected from the Internet except for downloading exam questions and submitting exam solutions.
- **ONLY** the final exam can be rescheduled, rescheduling of the final exam is **ONLY** permitted to meet the 24-hour rule.

Grading Philosophy & Policy

Late Work: Since all assignments are small-scale, late assignments are **NOT** allowed and are worth 0 points.

Coupon System:

- Each student has **ONE** coupon for the semester, which can be applied to one of the seven assignments.
- If you receive a low grade for any reason, including but not limited to incorrect submission format, missed submission, incorrect files submitted, or incomplete work, you can submit the updated solution to Coupon Redemption on TCU Online.
- The grader will then regrade your updated solution with a 20% penalty applied.

Make-Up Work:

- Make-up work will **ONLY** be permitted for two reasons: an official university absence or documented medical appointments.
- A student who has an official university absence must contact the instructor **BEFORE THE ABSENCE** to schedule a make-up of any assessment that will be missed.
- Because it is considered an infringement on student privacy for me to have access to student medical records, I cannot accept medical documentation to justify absences. If you have a legitimate reason for your absence and want to provide verification, please access the Absence Documentation Form here. Such medical-related absences will be rescheduled accordingly.

Extra Credits:

- Extra credits/work will **NOT** be given with no exceptions. This policy will be strictly enforced toward the end of the semester.
- The final course grades will **NOT** be curved with no exceptions.

Attendance: Attendance will not be taken. Students will be considered **RESPONSIBLE** for all material presented during their missed lectures.

Cheating and Plagiarism: Students are encouraged to share thoughts and ideas. However, a student should **NEVER** share his code to another student. It is **PROHIBITED** to even share one line of code.

Course Assignments & Final Grade

Assessment	Percent Per Instance	Quantity	Percent
Assignments	≈ 6.67%	7	≈ 46.67%
Group Project Check-Up	≈ 6.67%	1	≈ 6.67%
Group Project Presentation	≈ 6.67%	1	≈ 6.67%
Exams	20%	2	40%

Grading Scale: The final course grades will **NOT** be curved with no exceptions. Please also be aware that extra work will **NOT** be given with no exceptions.

Grade	Score	Grade	Score
A	⩾ 93	C	⩾ 73 and < 77
A-	⩾ 90 and < 93	C-	⩾ 70 and < 73
B+	⩾ 87 and < 90	D+	⩾ 67 and < 70
B	⩾ 83 and < 87	D	⩾ 63 and < 67
B-	⩾ 80 and < 83	D-	⩾ 60 and < 63
C+	⩾ 77 and < 80	F	< 60

COURSE SCHEDULE (TENTATIVE)

This schedule represents current course plans. Due to a significant increase in enrollment, the schedule is tentative. Due dates will be communicated and announced during lectures, and the definite due dates will be reflected on TCU Online.

Week	Topic	Due
1	Introduction	
2	Data Preprocessing	
3	Simple Linear Regression	Assignment 1
4	Multiple Linear Regression	
5	Polynomial Regression	Assignment 2
6	SVR	
7	Decision Tree Regression	Assignment 3
8	**Midterm Exam**	
9	Random Forest Regression	Assignment 4
10	*Spring Break*	
11	Logistic Regression	Assignment 5
12	k-NN	
13	Naïve Bayes	Assignment 6
14	Decision Tree Classification	Group Project Check-Up
15	Random Forest Classification	Assignment 7
16	Group Project Presentation	
17	**Final Exam**	