CSCI, 574, 01E, Machine Learning

COURSE SYLLABUS: Fall 2020

INSTRUCTOR INFORMATION

Instructor: Derek Harter, Ph.D.
Office Location: Science 355
Office Hours: Zoom / By Appointment
University Email Address: Derek.Harter@tamuc.edu
Preferred Form of Communication**:** e-mail

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings

Required:

Hands-On Machine Learning with Scikit-Learn, Keras and Tensorflow: Concepts, Tools, and Techniques to Build Intelligent Systems (2ed) by Aurelien Geron, O'Reilly Media, 2019, ISBN:1492032646

Recommended:

Machine Learning: An Algorithmic Perspective. By Marsland, CRC Press, 2009.

How to Think Like a Computer Scientist: Learning with Python 2ed by Jeffrey Elkner, Allen B. Downey and Chris Meyers (Open Book Project)
http://www.greenteapress.com/thinkpython/

Introduction to Machine Learning with Python by Andreas C. Muller and Sarah Guido, O'Reilly Media, 2016, ISBN: 1449369413

Machine Learning: A Probabilistic Perspective by Kevin P. Murphy, MIT Press, ISBN: 0262018020

The *syllabus/schedule are subject to change.*

Data Science Job: How to become a Data Scientist by Przemek Chojecki, ISBN: 979-8606148011

Course Description

In this semester's machine learning course, we will look at classic unsupervised and supervised learning methods, used in the field to classify data, cluster it and find optimizations. This will include looking at k-means and hierarchical clustering, self-organizing maps, linear regression, decision trees, optimization techniques such as genetic algorithms, etc. We will cover ways of getting hold of interesting datasets, ideas on how to collect data from users, and many different ways to analyze and understand the data once you've found it. Prerequisites: CSCI 515. (3 credit hours)

Student Learning Outcomes
1. (SLO574.1) Develop familiarity with high-level Python scripting language.
2. (SLO574.2) Learn basics of fundamental machine learning techniques, such as regression, clustering, k-nearest neighbor, kernel methods, etc.
3. (SLO574.3) Learn basic distinction between supervised and unsupervised machine learning methods.
4. (SLO574.4) Learn basic machine learning training and testing techniques, including cross validation and data optimization.

COURSE REQUIREMENTS

Minimal Technical Skills Needed
Students should be proficient in a high level programming language, like C/C++ and have knowledge of undergraduate level statistics and linear algebra mathematics.

Instructional Methods
All materials, assignments and tests will be conducted through the D2L MyLeo Online learning system.

Student Responsibilities or Tips for Success in the Course
To plan a minimum of three hours of outside preparation for each hour of class is a safe time allocation for successfully completing the course.

GRADING

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Final grades in this course will be based on the following scale:

A = 90%-100%
B = 80%-89%
C = 70%-79%
D = 60%-69%
F = 59% or Below

Assessments

Exams (2 Midterm and Final): 40% (20% each)
Machine Learning Python Programming Assignments (approx. 6): 48% (8% each)
Machine Learning Final Project: 12%

TECHNOLOGY REQUIREMENTS

LMS

All course sections offered by Texas A&M University-Commerce have a corresponding course shell in the myLeo Online Learning Management System (LMS). Below are technical requirements

LMS Requirements:
https://community.brightspace.com/s/article/Brightspace-Platform-Requirements

LMS Browser Support:
https://documentation.brightspace.com/EN/brightspace/requirements/all/browser_support.htm

YouSeeU Virtual Classroom Requirements:
https://support.youseeu.com/hc/en-us/articles/115007031107-Basic-System-Requirements

ACCESS AND NAVIGATION

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or helpdesk@tamuc.edu.

Note: Personal computer and internet connection problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These

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methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's home, the local library, office service companies, Starbucks, a TAMUC campus open computer lab, etc.

COMMUNICATION AND SUPPORT

If you have any questions or are having difficulties with the course material, please contact your Instructor.

Technical Support

If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778. Other support options can be found here:

https://community.brightspace.com/support/s/contactsupport

Interaction with Instructor Statement

Please use e-mail and through the MyLeoOnline course to ask questions and for help, and to set up additional appointments if needed. We may use some of the MyLeoOnline virtual classroom tools this semester for online class feedback sessions.

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Course Specific Procedures/Policies

There will be no make up or extra credit for late assignments. You must turn in all assignments by the require due date, or notify the instructor with a valid reason for missing an assignment.

Syllabus Change Policy

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

University Specific Procedures

Student Conduct

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail in the Student Guidebook.
http://www.tamuc.edu/Admissions/oneStopShop/undergraduateAdmissions/studentGuidebook.aspx

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Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum: https://www.britannica.com/topic/netiquette

TAMUC Attendance

For more information about the attendance policy please visit the Attendance webpage and Procedure 13.99.99.R0.01.
http://www.tamuc.edu/admissions/registrar/generalInformation/attendance.aspx

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/academic/13.99.99.R0.01.pdf

Academic Integrity

Students at Texas A&M University-Commerce are expected to maintain high standards of integrity and honesty in all of their scholastic work. For more details and the definition of academic dishonesty see the following procedures:

Undergraduate Academic Dishonesty 13.99.99.R0.03

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf

Graduate Student Academic Dishonesty 13.99.99.R0.10

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/graduate/13.99.99.R0.10GraduateStudentAcademicDishonesty.pdf

Students with Disabilities-- ADA Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services
Texas A&M University-Commerce
Gee Library- Room 162
Phone (903) 886-5150 or (903) 886-5835
Fax (903) 468-8148
Email: studentdisabilityservices@tamuc.edu
Website: Office of Student Disability Resources and Services

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Nondiscrimination Notice

Texas A&M University-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

Campus Concealed Carry Statement

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.

For a list of locations, please refer to the Carrying Concealed Handguns On Campus document and/or consult your event organizer.

Web url: http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/
rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf

Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

COURSE OUTLINE / CALENDAR

Week	Topic / Activity	Read	Assignment
1	Course Introduction, Python, Visualization	Think Python	
2	Scientific Python: Numpy, Pandas, Scipy	Ch 1	01: Python
3	Scikit-Learn: Python Machine Learning Framework	Ch 2	
4	Machine Learning Classification Problems	Ch 3	02: Classification
5	Regression Problems and Linear Regression	Ch 4a	
6	Logistic Regression	Ch 4b	03: Linear and Logistic Regression

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7	Test 01: Midterm		Midterm Exam
8	k-nearest neighbors (kNN) and Naive Bayes		
9	Support Vector Machine (SVM)	Ch 5	04: SVM
10	Decision Trees	Ch 6	
11	Ensemble Learning	Ch 7	05: Trees and Ensembles
12	Dimensionality Reduction	Ch 8	
13	Unsupervised Learning	Ch 9	06: PCA and UL
14	Practical Advice on Applying Machine Learning		
15	Test 02: Final Exam		Final Exam
16	Machine Learning Final Project		Project

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