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CSCI 556 (01W) Data Analysis & Visualization

COURSE SYLLABUS: FALL 2023

(Revision date: August 8, 2023)

INSTRUCTOR INFORMATION

Instructor: Jinoh Kim, Ph.D.
Office Location: CS/JOUR 217
Office Hours: Will be announced through course page
University Email Address: Jinoh.Kim@tamuc.edu

COURSE INFORMATION

Textbook(s):

- Practical Statistics for Data Scientists (50 Essential Concepts), 1st Edition, ISBN 10: 1491952962 / ISBN 13: 9781491952962

Software Required:

- Weka (http://old-www.cms.waikato.ac.nz/~ml/weka/)

Optional Texts and/or Materials:

- Data Mining: Practical Machine Learning Tools and Techniques, 4th Edition. ISBN-13: 978-0128042915, ISBN-10: 0128042915

Course Description

Big scientific data sets are growing exponentially both in size and complexity. Extracting meaningful information from these data requires not only programming skills, but also understanding the analysis work-flows, mathematical models and visualization tools that help to condense large amounts of information into a comprehensible story. We will introduce standard statistical data analysis and modeling methods such as correlation functions, linear regression, clustering, pattern extraction, classification, data mining, as well as Monte Carlo methods which are commonly used in creating simulations in the computational sciences. Different analysis and visualization packages popular in scientific modeling, analysis, and visualization will be introduced.

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Student Learning Outcomes (Should be measurable; observable; use action verbs)

1. The student will gain detailed knowledge about the goal and techniques of the data analysis and visualization process.
2. The student will understand the steps in characterizing and understanding data.
3. The student will be able to build effective predictive models.
4. The student will be able to build models that rely on memorizing training data.
5. The student will be able to build models that have an explicit additive structure.
6. The student will be able to build models for data that has no labeled training data available: Unsupervised learning
7. The student will be able to use software applications for data analysis.

COURSE REQUIREMENTS

Prerequisites

None

Minimal Technical Skills Needed

- Basic knowledge of computer and operating systems
- Basic knowledge of data structure, algorithms, and statistics/probability

Instructional Methods

- Recorded lecture with presentation slides
- Utilization of an open-source data analysis and visualization tool: WEKA (http://old-www.cms.waikato.ac.nz/~ml/weka/)

Student Responsibilities or Tips for Success in the Course

- **Assignments**: On-time submission of assignments; Your answers should be typed and submitted in a single PDF file (unless otherwise instructed) – Any handwritten answers and non-PDF formatted submissions may not be graded resulting in a zero point.
- **Exams**: Well prepared for exams (with an ability to answer questions within the given exam time); Due to increasing cheating incident reporting, this course employs the following format for online testing: (1) You can see one question per page, (2) you cannot proceed to the next question unless you answer the current question, and (3) it is not allowed to go back to the previous question. This should be strictly applied to minimize any possibility of academic dishonesty/misconduct
- **Communications**: This is an online-formatted course, and it is mandatorily required that the student reads announcements from the course page on a daily basis and email messages from the instructor without any significant delay (within 48 hours).

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GRADING (Tentative)

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

Weights of the assessments in the calculation of the final letter grade:

Components	Weight	Remarks
Assignments	30%	One lowest score will be discarded
Midterm exam	35%	Two exams: the lower score will be discarded
Final exam	35%	

Attendance Policy:

This is an asynchronous, Web-based section and there will be no synchronous meetings (as it is not allowed by the university). For successful communications, the students are required for reading announcements with no significant delay (within 48 hours), disseminated through the course page and email messages.

Assignment Policy:

The deadline for the assignment can be extended with a 15% penalty per day, up to two days (48 hours). Any submission later than 48 hours after the deadline will not be accepted and graded. No extension/resubmission request will be accepted (and even responded to); One lowest assignment score will be discarded.

Exam Policy:

Makeup exams will not be given for any reason. However, students will have two midterm exams, and the higher score will only be considered for the final grade calculation. If a student is unable to take the final exam for any emergency reason, the student may receive an 'X' (incomplete), which is defined as follows:

"When an "X" is given for a grade in a course, the credit hours and grade point averages are not included until a grade is received which can be up to one year. If the "X" is not removed by that time, the grade becomes an F, and the hours are included in the number of hours attempted."

Academic Misconduct:

The violation of academic integrity (including cheating and plagiarism) may cause a zero point on that work. Subsequent misconducts may result in a failing grade with the official filing of the case.

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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 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:

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

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Course Specific Procedures/Policies

N/A

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

N/A

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

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
Undergraduate Student Academic Dishonesty Form

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http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/documents/13.99.99.R0.03UndergraduateStudentAcademicDishonestyForm.pdf

Graduate Student Academic Dishonesty Form

http://www.tamuc.edu/academics/graduateschool/faculty/GraduateStudentAcademicDishonestyFormold.pdf

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.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
Velma K. Waters Library Rm 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
http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/

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.

A&M-Commerce Supports Students' Mental Health

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Artificial Intelligence and ChatBots

Texas A&M University-Commerce acknowledges that there are legitimate uses of Artificial Intelligence, ChatBots, or other software that has the capacity to generate text, or suggest replacements for text beyond individual words, as determined by the instructor of the course.

Any use of such software must be documented. Any undocumented use of such software constitutes an instance of academic dishonesty (plagiarism).

Individual instructors may disallow entirely the use of such software for individual assignments or for the entire course. Students should be aware of such requirements and follow their instructors' guidelines. If no instructions are provided the student should assume that the use of such software is disallowed.

In any case, students are fully responsible for the content of any assignment they submit, regardless of whether they used an AI, in any way. This specifically includes cases in which the AI plagiarized another text or misrepresented sources.

13.99.99.R0.03 Undergraduate Academic Dishonesty
https://inside.tamuc.edu/aboutus/policiesproceduresstandardsstatements/rulesprocedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf

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13.99.99.R0.10 Graduate Student Academic Dishonesty
https://inside.tamuc.edu/aboutus/policiesproceduresstandardsstatements/rulesprocedures/13students/graduate/13.99.99.R0.10.pdf

COURSE OUTLINE / CALENDAR

Course schedule: The schedule may be subject to change.

- Part 1: Introduction, exploratory analysis & statistics, input/output (Week 1-5)
- Midterm exam 1 (Week 6)
- Part 2: Regression, prediction, classification (Week 7-10)
- Midterm exam 2 (Week 11)
- Part 3: Statistical classification, unsupervised learning (Week 12-14)
- Part 4: Advanced topics – feature selection, projection (Week 15)
- Final exam (Week 16)