M358K Syllabus

M358K: Applied Statistics - Fall 2023 - Syllabus

COURSE-SPECIFIC INFORMATION

Welcome to M358K! Here is some information and some ground learning about any changes to the syllabus. .

adult and professional life. You should therefore expect a substantial portion of your grade to come from your use of quantitative skills to analyze real-world problems. Instructor. Milica Čudina; my office is PMA 13.142 (2515 Speedway, Austin, TX 78712).

Office Hours. MWF 10am-10:50am in PMA 13.142.

Email. It's best to use Canvas to email the instructor. The instructor's email address is mcudina@math.utexas.edu. The teaching assistant's contact information will be shared at a later date by email.

Course info

Course description. This course covers introductory topics in applied statistics. The material includes: data visualization techniques,

foundations of statistical inference, inference for numerical and categorical data, and simple linear regression. Learning objectives.

• Students will become familiar with the basics of the programming language R and the RStudio IDE. They will learn how to use R to simulate random variables.

• Students will become versed in techniques for data visualization and interpretation of graphical representations of information and data.

- Students will build up the basic vocabulary indispensable in the data-driven workplace. • Students will acquire the principles of statistical inference both in terms of skills necessary to perform a simple statistical analysis and in terms of critical thinking when faced with others' conclusions (say, in the press).

You can find additional information about Lectures Online at: https://sites.la.utexas.edu/lecturesonline/.

Prerequisites. The formal prerequisite is the grade C- or better in M362K. Students are assumed to be at home with the basics of probability as presented in, e.g., Ross's First Course in Probability, Pitman's Probability or Asimow and Maxwell's Probability and Statistics with Applications.

Lectures online. This class is using the *Lectures Online* recording system. This system records the audio and video material presented in class for you to review after class. Links for the recordings will appear in the Lectures Online tab on the Canvas page for this class. You will find this tab along the left side navigation in Canvas.

To review a recording, simply click on the Lectures Online navigation tab and follow the instructions presented to you on the page. You can learn more about how to use the Lectures Online system at http://sites.la.utexas.edu/lecturesonline/students/how-to-access-recordings/.

Students are **not** assumed to have any prior programming experience and the basics of R will be covered from scratch.

recommended. In case you need to be absent, you are responsible for covering the missed material independently. Class notes will be provided on the course website. As noted above, we will be using the Lectures Online recording system. There will be no synchronous online option for this course. You are strongly encouraged to stay home if you are sick or contagious, not only to stop the spread of disease but also to promote your personal wellness. Here are some university resources on COVID-19 and a link to the university's Exposure Action Chart. If **students** are isolating, too sick to attend class, or experiencing another type of absence, they should:

If the **instructor** is isolating, or too sick to attend class, she will do her best to change class modality to Zoom (with an alternative instructor if

Class format and attendance. Attendance for the purposes of grading will not be taken. However, regular attendance is strongly

the situation calls for such drastic measures and if it's possible).

Textbook. The required textbook is: OpenIntro Statistics by David Diez, Mine Çetinkaya-Rundel, and Christopher D Barr.

contact the Student Emergency Services immediately, and

email the instructor as soon as they feel well enough to do so.

Required devices. You will need access to a computer to be able to work on projects and homework. The instructor requests that you have your computer (or another device capable of running R) available in the exams as well.

1. Course website: https://mcudina.github.io/page/M358K/M358K.html I recommend bookmarking this course site in your default browser for easy access.

2. Canvas will be used in this course to keep track of grades and for communication purposes. The students are responsible for the

content of these announcements. The easiest way not to miss any is to turn on (i.e., not turn off) Announcements in their account's Notification menu.

Online resources.

- 3. Ed Discussion will be used for informal class discussion. The system is highly catered to getting you help fast and efficiently from classmates and myself. Rather than emailing questions to the instructor, I encourage you to post your questions on Ed Discussion. It is accessible via the menu on the left-hand side in Canvas.
- **Sharing of Course Materials is Prohibited.** No materials used in this class, including, but not limited to, lecture hand-outs, videos, assessments (quizzes, exams, papers, projects, homework assignments), in-class materials, review sheets, and additional problem sets, may be shared online or with anyone outside of the class unless you have my explicit, written permission. Unauthorized sharing of materials promotes cheating. It is a violation of the University's Student Honor Code and an act of academic dishonesty. I am well aware of the sites

including failure in the course. Class Recordings. Class recordings are reserved only for students in this class for educational purposes and are protected under FERPA. The recordings should not be shared outside the class in any form. Violation of this restriction by a student could lead to Student Misconduct proceedings.

used for sharing materials, and any materials found online that are associated with you, or any suspected unauthorized sharing of materials,

will be reported to Student Conduct and Academic Integrity in the Office of the Dean of Students. These reports can result in sanctions,

deadline. Not handing in this assignment does not exempt you from abiding by this First-Day Handout. The lowest three homework scores will be dropped. The homework assignments and their due dates will be announced as the term progresses. Projects. There will be six in-term group projects and an individual final project. The nature and content of the projects will be described in

Homework assignments. Homework assignments will be available on the course website. You will be uploading your solutions using Canvas.

Your solutions need to be in order and you should number the pages. Having read and understood this First-Day Handout in its entirety will

count as a part of the zeroth homework assignment. To get the credit, read this entire document with understanding by the homework

2. include data gathering (in our current circumstances this will probably be using already available data from external sources or simulating data in R);

• the pre-exam quiz (20 points)

• the in-class exam (65 points)

• the post-exam reflection (15 points)

work means for you!

Homework

Group projects

The final exam

94 - 100

A-

properly notified each instructor.

time after the excused absence.

pregnant, nursing, and parenting students.

http://safety.utexas.edu/

Number

3

4

5

6

8

12

13

14

15

19

20

21

22

23

24

25

26

33

34

37

38

39

40

41

42

titleix@austin.utexas.edu, or call 512-471-0419.

http://www.utexas.edu/ugs/slc or call 512-471-3614 (JES A332).

activation or announcement requires exiting and assembling outside.

the one you used when entering the building.

http://www.utexas.edu/emergency

The SCHEDULE of CLASSES

Date

Aug 21

Aug 23

Aug 25

Aug 28

Aug 30

Sept 1

Sept 6

Sept 8

Sept 18

Sept 20

Sept 22

Sept 25

Oct 4

Oct 6

Oct 9

Oct 18

Oct 20

Nov 6

Nov 8

Nov 29

Dec 1

Dec 4

Behavior Concerns Advice Line): 512-232-5050. Your call can be anonymous.

Weekday

Mon

Wed

Fri

Mon

Wed

Fri

Wed

Fri

Mon

Wed

Fri

Mon

Wed

Fri

Mon

Wed

Fri

Mon

Wed

Wed

Fri

Mon

Assessment and grading

3. involve statistical analysis and data presentation; 4. require critical thinking and drawing logical conclusions. The projects are designed to include open-ended problems which do not necessarily have a unique final answer. For that reason, there is no

checklist-type rubric for the projects. In fact, as part of your first project submission, you will have to contemplate and formulate what quality

The formulations and due dates for the group projects will be available on the course website. The individual final projects will be due on Monday, December 11, 2023 at midnight. You are more than welcome to choose your own final-project topic. As soon as you come up with an idea, email me to get permission to write on that topic. If you do not feel inspired, I will post a set of possible final-project topics on the course website for you to choose from.

In-term exams. There will be three in-term exams. All will be individual and conducted in-person in our classroom. The exam coverage will be

shared on the course website ahead of the exam itself. If you miss an exam due to illness or other extenuating circumstances, the final exam

will take the weight of the in-term exam you missed. If you miss more than one in-term exam, you are strongly encouraged to seek assistance

No late projects or homework are accepted except in exceptional circumstances.

from the Office of the Dean of Students to explore what your options are in such a dire situation.

more detail as new techniques are introduced. However, every group-project will:

1. be done as part of a self-assigned group of students;

The Final Exam. This course has a comprehensive final exam. For this course and section, according to the Registrar's office, the date and time of the final exam is Monday, December 11, 2023 at 10:30 am-12:30 pm. **Final grade.** The final grade is composed as follows: **Assignment** Percentage of final grade

8%

10%

GENERAL, UNIVERSITY- or STATE-MANDATED INFORMATION

There is no curve in this class and the letter grades are assigned according to the following table:

6259, 471-4641 (TTY), 1-866-329-3986 (video phone) or go to http://ddce.utexas.edu/disability/

Education Code relate to absences by students and instructors for observance of religious holy days.

48% (8% each)

C+

In-term exams 24% (8% each) The final project 10%

B+

86 - 90

Each in-term exam will consist of the following three components:

Drop dates. The procedure/consequences are different, depending on whether you drop before or after the 4th day of classes (08/24), and then, before or after the <i>main drop (Q-drop) date</i> (10/23). (See https://ugs.utexas.edu/vick/academic/adddrop for details)
Academic (dis)Honesty. Students who violate University rules on academic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University. Since such dishonesty harms the individual, all students, and the integrity of the University, policies on academic dishonesty will be strictly enforced. For further information, please visit the Student Conduct and Academic Integrity website at: http://ceanofstudents.utexas.edu/conduct For a more detailed document, please consult: https://catalog.utexas.edu/general-information/appendices/appendix-c/student-conduct-and-academic-integrity/ Please, pay particular attention to the section on <i>plagiarism</i> .
Students with Disabilities. The University of Texas at Austin provides upon request appropriate academic accommodations for qualified students with disabilities. If you have a documented disability and you need accommodations as a result of your disability, please let me know

as soon as possible, but definitely within the first 3 weeks of class. For more information, contact the Office of the Dean of Students at 471-

Religious holy days. Religious holy days sometimes conflict with class and examination schedules. Sections 51.911 and 51.925 of the Texas

Section 51.911 states that a student who misses an examination, work assignment, or other project due to the observance of a religious holy

day must be given an opportunity to complete the work missed within a reasonable time after the absence, provided that he or she has

It is the policy of The University of Texas at Austin that the student must notify each instructor at least fourteen days prior to the classes

scheduled on dates he or she will be absent to observe a religious holy day. For religious holidays that fall within the first two weeks of the

semester, the notice should be given on the first day of the semester. The student may not be penalized for these excused absences but the

instructor may appropriately respond if the student fails to complete satisfactorily the missed assignment or examination within a reasonable

Counseling and mental health. Counseling and other mental-health services are available from Counseling and Mental Health Center,

Title IX Reporting/SB 212. Texas Senate Bill 212 requires all employees of Texas universities, including faculty, report any information to the

Title IX Office regarding sexual harassment, sexual assault, dating violence and stalking that is disclosed to them. Your instructor in a

Student Services Bldg (SSB), 5th Floor. (hours: M-F 8am-5pm. phone: 512 471 3515, web: http://www.cmhc.utexas.edu)

C-

D+

D

D-

50 - 55

mandatory reporter. By law, your instructor must be fired if she does not report. Our Student Ombuds is confidential. If you wish to speak with someone who can provide support without making an official report to the university, please email advocate@austin.utexas.edu. If you would like to speak with a case manager, who can provide support, resources, or academic accommodations, in the Title IX Office, please email supportandresources@austin.utexas.edu. Case managers can also provide support, resources, and accommodations for

For more information about reporting options and resources, please visit: https://titleix.utexas.edu, contact the Title IX Office via email at

Sanger Learning Center. All students are welcome to take advantage of Sanger Center's classes and workshops, private learning specialist

appointments, peer academic coaching, and tutoring for more than 70 courses in 15 different subject areas. For more information, please visit

Important Safety Information. If you have concerns about the safety or behavior of fellow students, TAs or Professors, call BCAL (the

Further information about (campus) safety and security can be obtained from the Office of Campus Safety and Security, 512-471-5767,

Occupants of buildings on The University of Texas at Austin campus are required to evacuate buildings when a fire alarm is activated. Alarm

• Familiarize yourself with all exit doors of each classroom and building you may occupy. Remember that the nearest exit door may not be

• In the event of an evacuation, follow the instruction of faculty or class instructors. Do not re-enter a building unless given instructions by the following: Austin Fire Department, The University of Texas at Austin Police Department, or Fire Prevention Services office. information regarding procedures Link emergency evacuation routes and emergency can be found at:

Orientation. Introductions.

R and RStudio setup. Basic R.

Data presentation [graphical].

Data presentation [numerical].

Review of discrete random variables.

Median. Quartiles. (Sections 2.1.5, 2.1.6, 2.1.1)

Review of continuous distributions. Expectation. Variance.

The Central Limit Theorem [review] (Sections 5.1.3 and 7.1.1).

Statistical inference. Statistics and the sampling distribution. Point estimates and

R scripts. R notebooks. Functions in R. If ... else in R.

Simulations of random variables. Plots. Histograms. (Section 2.1.3)

• Students requiring assistance in evacuation shall inform their instructor in writing during the first week of class.

Topic

Scatterplots (Section 1.2.3). 9 Sept 11 Mon 10 Sept 13 Wed Sampling principles and strategies. More on sampling principles and strategies. Randomized response. 11 Sept 15 Fri

Experiments.

In-Term One

In-Term Two

proportion.

Hypothesis-testing practice.

Testing for goodness-of-fit.

16 The normal distribution (review). Sept 27 Wed More on the normal distribution. 17 Sept 29 Fri The normal approximation to the binomial [review] (Sections 4.3.2 and 4.3.3). 18 Oct 2 Mon

Sample mean (the normal sample).

Confidence intervals (the normal case).

sampling variability.

- Oct 11 Wed Principles of hypothesis testing. The p-value. Fri Oct 13 More on hypothesis testing in the normal case. Oct 16 The reasoning of tests of significance. Inference as a decision. Mon
- 27 Oct 23 Types of errors. Mon 28 Oct 25 Power of test. Wed 29 Oct 27 Fri The sampling distribution for counts and proportions. Confidence intervals for a
- 30 Oct 30 Mon Hypothesis testing for a proportion. 31 Nov 1 Comparing two proportions. Wed The χ^2 – distribution. Tail probabilities of the χ^2 – distribution. 32 Nov 3 Fri
- χ^2 —connections to normal samples.t—distribution. 35 Nov 10 Fri 36 Nov 13 One-sample means with the t-distribution. Confidence intervals for the mean of a Mon normal population.
 - Nov 15 Wed t-test. *t*-procedures practice. Paired data. Fri Nov 17 Nov 27 Comparing two means. Mon
 - In-Term Three Correlation. Causation.

Analysis of two-way tables. Testing for independence in two-way tables.

Fitting a line, residuals, and correlation. Simple linear regression.

- rules. Read carefully and let me know if there is anything unclear by the twelfth day of classes, i.e., September 6th. This syllabus is subject to change; students who miss class are responsible for
- Basic info Course number. M358K (unique: 55635) Course meets. MWF 11:00am - 11:50am in PMA 5.104 Flags. QR (Quantitative Reasoning): This course carries the Quantitative Reasoning flag. Quantitative Reasoning courses are
- designed to equip you with skills that are necessary for understanding the types of quantitative arguments you will regularly encounter in your