STAT 3201 INTRODUCTION TO PROBABILITY FOR DATA ANALYTICS
AUTUMN SEMESTER 2021

Lecture: MWF 11:30AM-12:25PM in Cockins Hall 240

Instructor:
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Prerequisites: Prerequisites: Math 1152 or 1161.xx or 1172 or 1181 or equivalent, and CSE Placement Level A or equivalent; or permission of the instructor.

Textbook: The required textbook for this course is:

- *Mathematical Statistics with Applications* (7th edition) by Wackerly, Mendenhall and Sheaffer; available through the CARMENBOOKS reader link in the course navigation of your Carmen course for this class.

Course material will be supplemented with the freely available textbook

- *Introduction to Probability and Statistics using R* by Kerns; available online at https://cran.r-project.org/web/packages/IPSUR/vignettes/IPSUR.pdf

Website: The course has a web page on Carmen. You will find the class schedule, homework assignments, solutions, and other course announcements on the web page. Please check it on a regular basis.

Course Description

An introduction to probability and its role in statistical methods for data analytics. Equal emphasis is placed on analytical and simulation-based methods for quantifying uncertainty. Approaches to assessing the accuracy of simulation methods are discussed. Students should have some prior knowledge of basic programming. Applications of probability and sampling to big-data settings are discussed.

Upon successful completion of the course, students will be able to

(1) Quantify uncertainty about events using mathematical descriptions of probability
(2) Quantify uncertainty about events using simulation methods
(3) Assess the quality and accuracy of simulation-based descriptions of uncertainty
(4) Update a description of uncertainty based on new information
(5) Identify appropriate probability models for experiments/data and summarize expected outcomes from such models
(6) Use correlation and conditional expectation to describe the relationship between two random variables.
(7) Quantify uncertainty about summary statistics for large data sets

Grading

In order to obtain full credit on homework and exam problems you need to show a justification or full work. Answers without supporting work will not receive full credit. The following is a breakdown of the final course grade:

Homework: 25%
Exam 1: 20%
Exam 2: 20%
Final Exam: 25%
Project: 10%

The lowest homework grade will be dropped at the end of the semester. The following rubric will be used to compute the final letter grade: A: 93 – 100, A-: 90 – 92.9, B+: 87– 89.9: B: 83 – 86.9, B-: 80-82.9, C+: 77-79.9, C: 73 – 76.9, C-: 70–72.9, D+: 67 – 69.9, D: 60–66.9, E: below 60. The instructor reserves the right to make appropriate changes to the above if necessary. However, as usual there are no exceptions nor arbitrary grade adjustments for individual students, nor grade guarantees of any kind, for any reason.

Homework: Homework will be assigned approximately biweekly. It will consist of mostly textbook-style problems, problems motivated by data analytics applications, and small computer simulation problems. Question numbers referenced in the homework are from the textbook edition listed above. If you are using a different edition/version of the textbook, it is your responsibility to check that you have solved the correct questions. No points will be awarded for answering a question other than the one being assigned. You are encouraged to work together on the problems, but each student must hand in his or her own work, written in his or her own words. **Do not copy any part of another student's homework including computer code or output**. Use of homework solutions distributed in previous offerings of the course or available on the web constitutes academic misconduct and will be handled according to university rules. **Sharing or disseminating solutions, or in any way knowingly enabling others to commit academic misconduct also constitutes academic misconduct, and will be reported. A hard copy of the homework solutions should be submitted at the beginning of class on the due date.** The solutions may be handwritten or typed, except any R code and output, which must always be typed. Please be sure that the questions are clearly labeled, all supporting work (including computer code) can be easily identified, and that all figures/tables are referenced and interpreted in the text. **Electronic versions of homework submissions will not be accepted unless permission from the instructor is obtained in advance.** If advance permission is not obtained, and the reason is not a provable emergency, the instructor reserves the right to consider the homework as late. In other words, please do your best to get hard copies of your assignments to me on time. For example, consider sending a copy to a friend in the class and have them print it an submit it. **Please staple all submissions as pages of loose homework often become lost. Neither I nor the grader will accept responsibility for any lost pages if the homework is not stapled.**

Exams: There will be three in-class exams. Coverage includes lecture material, assigned reading, and homework. Tentative dates are provided on the weekly lesson plan. Statistical tables will be provided as needed. Calculators may be used, but no communication devices are allowed (e.g. mobile phones). You may use one 8.5×11 inch handwritten sheet of paper (both sides) with formulas for all exams. Make-up exams require a valid excuse and official proof if the instructor is not notified in advance or as soon as possible. A make-up exam must be taken within a week of the missed exam. Exceptions to this policy are permitted only in extreme situations such as serious injury immediately prior to an exam or severe illness requiring hospitalization.

Project: A class project will consist of a written report and will require use of the R software.

Computing

The class requires you to use the statistical software package R, which can be downloaded for free at http://www.r-project.org. Instructions for using R will be given in class. Many students prefer to use RStudio, an IDE designed for use with R. RStudio is available for free at http://www.rstudio.com.

Academic Misconduct

Although students are encouraged to work together on assignments, each student must submit their own written work in his or her own words. Academic misconduct will not be tolerated and will be dealt with procedurally in accordance with University Rule (`oaa.osu.edu/procedures`).

Special Accommodations

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; `http://www.ods.ohio-state.edu`.

Mental Health Statement

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614-292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614-292-5766 and 24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273-TALK or at suicidepreventionlifeline.org.