MATH 3338 Probability

Introduction

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Introduction

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Outline

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Course Information

- Instructor: Dr. Wenjiang Fu
- Office: PG Hoffman Hall (PGH) 684
- Office Hours: Wednesday 4:00 pm - 5:00 pm, online through Teams
- Email: wfu2@uh.edu
- Coursepage: www.canvas.uh.edu

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Relevance of Probability

- Probability is a measure of the likelihood of an event to occur. Many events cannot be predicted with complete certainty, one can figure out only the chance of an event to occur i.e., how likely to happen.

- There have been many ways to use probability.
  Typical examples include
  gambling (roulette wheel, horse racing, casino),
  Election vote through survey,
  Science and Medicine: precision medicine,
  Finance: Stock market, Cryptocurrency, etc.
  Engineering: Prediction of failure, Boeing 737 Max.
  Business: survival time of start-up.
  AI for finance: how likely a customer may default.

- Simulation for complex cases.

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Interesting facts about Probability

- Probability started to be considered when people paid attention to gambling and games of chance back in the 16th century.
- First systematical calculation of probability is by Gerolamo Cardano (1501-1576)
- Discussions between two giant mathematicians Pascal and Fermat

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What Will Be Taught In This Course?

1. Basic concepts and calculation of probability, involving sets and rules, probability laws and distributions.

2. Difficult cases can be done with simulations. Hence simulation using R software is also important.

3. Important inequalities and theory are needed to further our understanding of the laws governing probability.

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Learning Objectives

The student will be able to:

- Demonstrate the ability to understand basic theory of probability.
- Understand fundamentals of probability, distribution theory and sampling models.
- Interpret data using probability models.
- Samping and simulations
- Apply fundamental concepts and theory to real world problems.

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Assessments

Participation and in class quizzes	10%
Homework assignments	20%
2 Exams	40% (20% each)
Final Exam	30%

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Quizzes

- The in-class quizzes are taken in the class only, and must be handed-in in the class.
- Other quizzes will be submitted online to the canvas, similar to the homework assignments.
- The quizzes will close at 11:59 pm on the closed date. No late submission will be accepted except for emergency.
- One of the lowest quizzes will be dropped.
- All quizzes must be submitted in one PDF file. No separate sheet files accepted.
- Working with other students on the quizzes is prohibited. Violation will result in penalty and affect final grade.

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Homework

- Homework assignments will be submitted online to the CANVAS. No late submission will be accepted except for emergency.
- Working with other students on the assignments is highly recommended. However, each student's homework must present the original work. Otherwise this will affect your grade.
- One of the lowest homework scores will be dropped.

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Exams

Exam	Sections Covered	Dates
Exam 1	Ch 1-6	Feb 22, in-class
Exam 2	Ch 7-10	April 11, in-class
Final Exam	Comprehensive	May 7, 10:00 am - 12:00 pm.

- These exams have to be proctored and cannot be taken at home online.
- There is no opt-out for the final exam.
- The score on the final exam can replace your lowest test score.

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Textbook

- The textbook: Grinstead and Snell: Introduction to Probability
  Download for free at
  https://math.dartmouth.edu/~prob/prob/prob.pdf.
- A more mathematical rigorous book by M Evens and J Rosenthal: Probability and Statistics – The Science of Uncertainty, 2003
  is a good reference book and can be downloaded for free at
  https://www.bkstr.com/houstonstore/product/casa-math-access-code-286013-1

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Computer Software

- For simulations on the concepts and for complex cases, the statistical software R is required to use.
- This software is a free package that you can download on to your personal computer.
  - You first need to download R: `https://www.r-project.org/`, this is the program.
  - Then you can download Rstudio: `https://www.rstudio.com/`, this is the interface we will be using.

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Other Information

This is a challenging course. Each student is responsible for his/her learning. If a section of the textbook and/or homework problem is puzzling you, it is your responsibility to make an appointment to see the instructor or a tutor as soon as possible. You are encouraged to ask questions during lectures and office hours. The following are the resources available to you for help in this course.

- **Instructor**: Online office hour, or make appointment by email.

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Email policy

- (Required!)Include “MATH 3338 Section XXXXX” as well as a searchable description of the issue in the subject line for ALL course-related email correspondence.
- Send a follow-up email if I do not respond to your email within two working days.

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