MATH 4720 / MSSC 5720 **Sec 101** - Statistical Methods

Fall 2025

Instructor: Dr. Cheng-Han Yu

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Website: math4720-f25.github.io/website/
Office Hours: MoWe 4:50–5:50PM, Tu 1-2PM Cudahy Hall 353
Class Hours: MoWe 2–3:15PM
Help Desk Hours: To be announced.
Class Room: Cudahy Hall 131

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1 Course Objectives

To introduce the ideas of data summary and visualization, probability, and statistics with applications to natural and social sciences and daily life. Topics include: random variables, discrete and continuous probability distributions, sampling distributions, confidence intervals, hypothesis testing, analysis of variance, linear regression. This course builds a foundation for statistical inference, machine learning, and data modeling.

2 Prerequisites

MATH 1400, 1410, or 1450. Basic computer and internet use expected. The course will also assume facility with using the internet and a personal computer. A portion of the course involves programming in R using RStudio, but prior programming experience is not required.

3 Textbooks

- **[IS]** *Introduction to Statistics*, by Dr. Cheng-Han Yu. (My online book)
- **[OI] (optional)** *Introduction to Modern Statistics, 2nd edition*, by Mine Çetinkaya-Rundel and Johanna Hardin. Publisher: OpenIntro. (computation and data-oriented)

4 Course Management

- All course materials are posted on our course website https://math4720-f25.github.io/website/.
- Course grades are saved and managed in **D2L** > **Assessments** > **Grades**.
- Course work is submitted to **D2L** > **Assessments** > **Dropbox**.
- **D2L** > **News** for new announcement.

5 E-mail Policy

- I will attempt to reply your email quickly, at least **within 24 hours**.

- **Expect a reply on Monday if you send a question during weekends**. If you do not receive a response from me within two days, re-send your question/comment in case there was a "mix-up" with email communication (Hope this won't happen!).
- Please start your e-mail subject line with **[math4720]** or **[mssc5720]** followed by a clear description of your question. See an example in Figure 1.

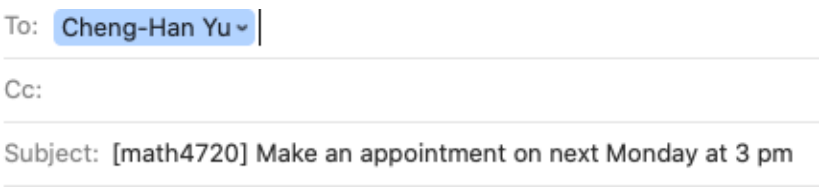


Figure 1: Email Subject Line Example

- Email etiquette is important. Please read this article to learn more about email etiquette.
- I am more than happy to answer your questions about this course or statistics in general. However, due to time constraint, I may choose **NOT** to respond to students' e-mail if
  1. The student could answer his/her own inquiry by reading the syllabus or information on the course website or D2L.
  2. The student is asking for an extra credit opportunity. The answer is "no".
  3. The student is requesting an extension on homework. The answer is "no".
  4. The student is asking for a grade to be raised for no legitimate reason. The answer is "no".
  5. The student is sending an email with no etiquette.

6 Grading Policy

- The final grade is earned out of **1000 total points** distributed as follows:
  - **Homework 1 to 8: 175 pts (25 pts each)**
  - **Quiz 1 to 4: 200 pts (50 pts each)**
  - **Exam 1 and 2: 300 pts (150 pts each)**
  - **In-class final exam: 150 pts**
  - **AI Project: 150 pts**
  - **Class participation: 25 pts**
- You will **NOT** be allowed have any extra credit projects/homework/exam to compensate for a poor average. Everyone must be given the same opportunity to do well in this class. Individual exam will **NOT** be curved.
- The final grade is based on your percentage of points earned out of 1000 points and the grade-percentage conversion Table. $[x, y)$ means greater than or equal to x and less than y. For example, 94.1 is in $[94, 100]$ and the grade is A and 92.8 is in $[90, 94)$ and the grade is A-.

Table 1: Grade-Percentage Conversion

Grade	Percentage
A	[94, 100]
A-	[90, 94)
B+	[87, 90)
B	[83, 87)
B-	[80, 83)
C+	[77, 80)
C	[73, 77)
C-	[70, 73)
D+	[65, 70)
D	[60, 65)
F	[0, 60)

- This is not a course that gives most of students a grade of A. If you want to get a good grade, study hard. No pain, no gain.

7 Homework

- Homework will be assigned through the course website.
- To submit your homework, please go to **D2L > Assessments > Dropbox** and upload your homework in **PDF** format.
- There will be 8 homework sets.
- Every homework is due by **Friday 11:59 PM (Don't miss it. This is a hard deadline. No late submission**).
- MSSC 5720 students may have more or different homework questions.
- The lowest score of the homework sets will be dropped when your final grade is calculated.
- Generative AI (GenAI) is allowed, but you **must carefully cite it or reveal your use of AI.** See Section 12 for more details.

8 Quizzes

- There will be 4 in-class 15-min quizzes.
- Quizzes are individual and in **closed-book** and **no-tech** format, except a calculator.
- No cheat sheet or GenAI is allowed.
- **No make-up quizzes** unless you got excused absence.
- If you miss a quiz due to an excused absence as defined in Attendance in Academic Regulations, the 50 pts will be added to your prorated final exam pts, i.e., (150 + 50 = 200) pts. If you miss more than one quiz, only one quiz pts can be added to the final exam. You get 0 pt for other quizzes.

9 Exams

- There will be 2 midterm exams and 1 final exam.
- Midterm exams have in-class part and take-home part. The in-class part tests your understanding of mathematical and statistical intuitions. The take-home part tests your ability to do statistical data analysis using statistical software such as R.
- For the in-class parts, one piece of **letter size** cheat sheet is allowed. It has to be turned-in with your exam.
- For the take-home parts, you are allowed to use GenAI tools. However, you **must carefully cite it or reveal your use of AI.** See Section 12 for more details.
- Please go to **Assessments** > **Dropbox** to submit your take-home exam in **PDF** format.
- Exam 1 covers **Week 1 to 6**. Exam 2 covers **Week 7 to 11**. In-class final exam is comprehensive and covers **all course materials**.
- **No make-up exams** for any reason unless you got an excused absence
- If you miss an midterm exam due to an excused absence defined in Attendance in Academic Regulations, the 150 pts will be added to your prorated final exam pts, i.e., (150 + 150 = 300) pts. If you miss two midterm exams, only one exam pts can be added to the final exam. You get 0 pt for the other.

10 AI Project

- There will be one (or two?) project released around Week 13.
- You have to use GenAI to self learn a topic that is not covered in my lectures, and generate a data analysis report.
- The project topic will also be tested in the final exam.
- You **must carefully cite your GenAI tool or reveal your use of AI.** See Section 12 for more details.

11 Class Participation

- I will randomly take attendance throughout the semester.
- If you are absent on a day when attendance is taken once (twice), 15 (25) points will be deducted from your grade unless you have excused absences.

12 Generative Artificial Intelligence (GenAI) Policy

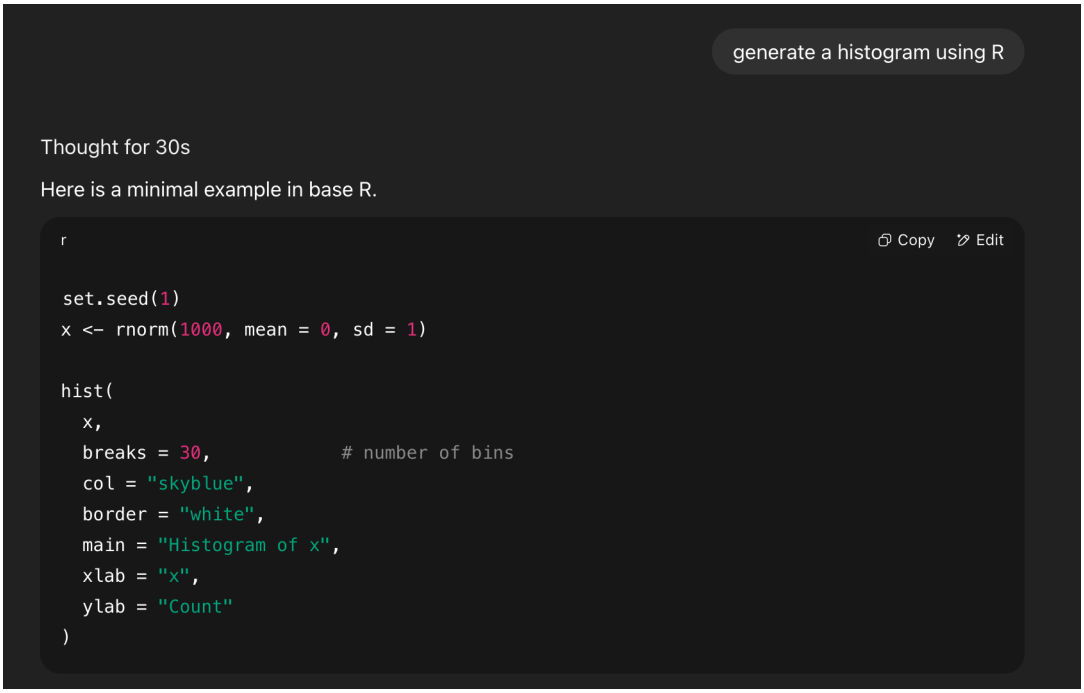
- *You are responsible for the content of all work submitted for this course.*
- For your homework, take-home exams, and project, you are allowed to use generative AI tools such as ChatGPT to generate a draft of text of your work.
- To avoid any academic integrity issue, you **must cite your AI usage, or screenshot your entire AI usage history**. Check the followings on how to cite it.
  - How to cite ChatGPT

  - How to Cite AI-Generated Content

- If you use GenAI, please include the followings in your submitted work:
  - **How I used AI (prompts or questions)**
  - **Generated output (screenshot or copy-paste excerpt)**
  - **How I used the output**

Here is an example.

- **How I used AI (prompts and questions)**
  - *I asked ChatGPT to generate a histogram using R.*
- **Generated output (screenshot or copy-paste excerpt)**



- **How I used the output**
  - *I reviewed the suggestions, but I did not use the exact code. Instead, I change the code format and breaks value to 50.*

13 Academic Integrity

- Watch this video about academic integrity issue of using GenAI.
- This course expects all students to follow University and College statements on academic integrity.
- **Honor Pledge and Honor Code**: *I recognize the importance of personal integrity in all aspects of life and work. I commit myself to truthfulness, honor, and responsibility, by which I earn the respect of others. I support the development of good character, and commit myself to uphold the highest standards of academic integrity as an important aspect of personal integrity. My commitment obliges me to conduct myself according to the Marquette University Honor Code.*

14 Accommodation

If you need to request accommodations, or modify existing accommodations that address disability-related needs, please contact Disability Service.

15 Tentative Course Schedule

Week 1, 8/25 - 8/31: Statistics and Data Science; Statistical Studies and Data Collection; Data Type

- Syllabus; IS Ch 1 - 2
- HW 1 issued

Week 2, 9/1 - 9/7: R Software and Programming

- IS Ch 3
- **Labor day 9/1**
- **Drop deadline 9/2 11:59 PM**
- **HW 1 due on Friday, 9/5 11:59 PM**

Week 3, 9/8 - 9/14: Summarizing Data

- IS Ch 5 - 6
- HW 2 issued

Week 4, 9/15 - 9/21: Probability Fundamentals and Random Variables

- IS Ch 7 - 9
- HW 3 issued
- **HW 2 due on Friday, 9/19 11:59 PM**
- **Quiz 1**

Week 5, 9/22 - 9/28: Discrete and Continuous Probability Distributions

- IS Ch 10 - 11
- HW 4 issued
- **HW 3 due on Friday, 9/26 11:59 PM**

Week 6, 9/29 - 10/5: Sampling Distribution and Central Limit Theorem

- IS Ch 12 - 13; OI Ch 5.1
- **HW 4 due on Friday, 10/3 11:59 PM**
- **Quiz 2**

Week 7, 10/6 - 10/12: Inference about Population Means: Confidence Intervals

- IS Ch 14; OI Ch 7.1
- **In-class Exam 1 on 10/6**
- **Take-home Exam 1 due on Wednesday, 10/8 11:59 PM**

Week 8, 10/13 - 10/19: Inference about Population Means: Hypothesis Testing

- IS Ch 16; OI Ch 7.1
- HW 5 issued

Week 9, 10/20 - 10/26: Comparing Two Population Means

- IS Ch 17
- HW 6 issued
- **Midterm grade submission 10/21 by noon**
- **HW 5 due on Friday, 10/24 11:59 PM**

Week 10, 10/27 - 11/2: Inference about Population Variances

- IS 18
- HW 7 issued
- **Quiz 3**
- **HW 6 due on Friday, 10/31 11:59 PM**

Week 11, 11/3 - 11/9: Analysis of Variance (ANOVA)

- IS Ch 24
- **HW 7 due on Friday, 11/7 11:59 PM**

Week 12, 11/10 - 11/16: Multiple Comparison; Correlation

- IS Ch 25, 27.1
- **In-class Exam 2 on 11/10**
- **Take-home Exam 2 due on Wednesday, 11/12 11:59 PM**
- **Withdrawal Deadline 11/14**

Week 13, 11/17 - 11/23: Simple Linear Regression

- IS Ch 27

Week 14, 11/24 - 11/30: Simple Linear Regression

- IS Ch 27
- HW 8 issued
- **AI Project due on Friday, 11/28 11:59 PM**
- **Thanksgiving holidays: 11/26 - 11/30**

Week 15, 12/1 - 12/7: Inference for Categorical Data

- IS Ch 19 - 20
- **Quiz 4**
- **HW 8 due on Friday, 12/5 11:59 PM**

Week 16, 12/8 - 12/14

- **In-class Final Exam on Wednesday, 12/10 10:30 AM - 12:30 PM**
- **Final grade submission 12/16 by noon**

Instructor reserves the right to update the syllabus.