WILLIAM & MARY
CHARTERED 1693

Math 106 Elementary Probability & Statistics
Spring 2024

Instructor: Yuming Sun

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Office Hours: MW   10:00 AM – 11:00 AM

Zoom Office: https://cwm.zoom.us/j/7869287456 (by appointment)

Course Dates: Jan 24, 2024 – May 14, 2024

Course Times: MW   3:30 PM – 4:50 PM

Classroom: Boswell Hall, Room 342

Course Description

This course is an introduction to the basic concepts and procedures behind probability and statistics. Data collection, statistics, least-squares regression, probability, classic probability distributions (including the binomial & normal distributions), estimation and hypothesis testing will be covered. This course fulfills the GER 1 requirement and must meet the following criteria:

- ✓ Involve numerical calculations.
- ✓ Include mathematical justifications explaining why the approaches and calculations used in the course actually work.
- ✓ Include applications of mathematics to real-world settings or to disciplines other than mathematics.

Required Resources

- ➢ Course Website: https://blackboard.wm.edu/
- ➢ Textbook: Fundamentals of Statistics (4th, 5th, or 6th Edition), Mike Sullivan III (Pearson Prentice Hall)
- ➢ Graphing/Statistical Calculator: TI-83/84
  (TI-83/84 is preferred, but if you have and know how to use another brand statistical calculator, I will allow it. Do understand though, I may not be able to help you with the non-TI-83/84 calculator.)

Course Policies

- ➢ Access to a graphing calculator is necessary for this course. TI-83/84 user instructions are included in both the textbook and the lectures.
- ➢ Grades and course materials will be posted regularly on Blackboard.
- ➢ Homework exercises have been assigned for each section. These exercises will not be graded. However, you are expected to complete the exercises as they will support your understanding of the material and similar exercises will be included on quizzes and tests.
- ➢ The quizzes are a way to grade you for keeping up with the course material. There is a short quiz after every chapter.
- ➢ Make up quizzes will not be given without **prior permission**. Please email me **before** the scheduled quiz to let me know that you will not be able to take the quiz. Missed quizzes must be made up **within a week**.
- ➢ Makeup exams will only be considered for **VERY VALID** reasons like a serious illness or a University excused absence. Official documentation **MUST** be provided in advance.
- ➢ Tests are designed to find out what you understand. The problems on the exams will cover all of the material presented.

Participation

If you're feeling unwell, regardless of whether it's related to COVID or not, please refrain from attending the class in person. For students who test positive for COVID, it's essential to meet W&M's stipulated requirements before resuming in-person attendance. Even if your COVID test comes back negative, if you exhibit symptoms consistent with COVID, please prioritize your health and avoid coming to class.

Consistent attendance and active participation are expected. If, due to a valid reason, you need to miss a class, please contact me in advance. For short absences of less than a week, you'll have access to pre-recorded lectures by Professor Heather Sasinowska on Blackboard. I will assist you in catching up on missed quizzes and homework reviews. Missed quizzes must be made up within a week.

Longer absences, spanning over a week, will be handled on a case-by-case basis. Our aim is to strategize for your continued success. Zoom meetings with me are one option to keep you on track.

In the event that I need to miss a class, I will make a pre-recorded lecture and upload it to Blackboard. If I need to miss multiple classes, aside from the pre-recorded content, we will also meet for a brief homework session and answer questions during the lecture time over Zoom.

Grading Structure

Quizzes	30%
Mid-terms	40%
Final Exam	30%

➢ The lowest quiz grade will be dropped.
➢ There will be two midterms, and each will account for 20% of the final score. The midterms will not be cumulative. Formula sheet will be provided.
➢ The final exam will be cumulative. Formula sheet will be provided.
➢ Final Grading Schema:
  - 93 - 100   A
  - 90 - 92   A-
  - 87 - 89   B+
  - 83 - 86   B
  - 80 - 82   B-
  - 77 - 79   C+
  - 73 - 76   C
  - 70 - 72   C-
  - 67 – 69   D+
  - 63 – 66   D
  - 60 – 62   D-
  - Under 60   F

Important Dates

➢ The add/drop deadline is **Friday, Feb 2nd.** The withdraw deadline is **Monday, March 25th.**
➢ **Two mid-term exams** are scheduled for **Friday, Feb 21st** and **Friday, Apr 3rd.**
➢ **The final exam** is a block exam scheduled for **Monday, May 13th, at 9:00 AM.**

Students Accessibility Services

William & Mary accommodates students with disabilities in accordance with federal laws and university policy. Any student who feels they may need an accommodation based on the impact of a learning, psychiatric, physical, or chronic health diagnosis should contact Student Accessibility Services staff at 757-221-2512 or at sas@wm.edu to determine if accommodations

are warranted and to obtain an official letter of accommodation. For more information, please see www.wm.edu/sas.

You should request accommodations at the beginning of the semester or as soon as a disability becomes known. Any student who needs accommodations should contact me as soon as possible so that I have sufficient time to make arrangements.

Honor Code

All students are expected to follow the W&M Honor Code. Any suspected violation of academic integrity will be taken very seriously and pursued to the furthest extent possible.

Artificial Intelligence

➢ The use or incorporation of any AI-generated content (from ChatGPT, Dall-e, etc.) in assignments is not allowed.

Some Campus Resources

➢ **Tribe TutorZone:** Free 1 on 1 assistance
   https://www.wm.edu/offices/deanofstudents/services/academic-wellbeing/tutors/index.php

➢ **Counseling Center:** Offers mental health services to students wanting help with personal concerns and consultation to friends concerned about a fellow student in distress.
   http://www.wm.edu/offices/counselingcenter/students/index.php

➢ There is also a new link for all student services
   https://www.wm.edu/offices/deanofstudents/services/caresupportservices/resources/studentresources/index.php

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Tentative Schedule

Week #	Date 2023	Chapter Sections	Quizzes
1	24-Jan	Syllabus, Chapter 1 – (1.1-1.5)	
2	29-Jan	Chapter 2 – (2.1-2.2)	Quiz 1 - Chapter 1
	31-Jan	Chapter 2 – (2.2-2.3)	
3	5-Feb	Chapter 3 – (3.1-3.3)	Quiz 2 - Chapter 2
	7-Feb	Chapter 3 – (3.3-3.5)	
4	12-Feb	Chapter 4 – (4.1-4.2)	Quiz 3 - Chapter 3
	14-Feb	Chapter 4 – (4.1-4.2)	
5	19-Feb	Homework questions (Review)	Quiz 4 - Chapter 4
	21-Feb	Test 1 (Chapters 1, 2, 3, 4)	
6	26-Feb	Chapter 5 – (5.1-5.2)	
	28-Feb	Chapter 5 – (5.3-5.4)	
7	4-Mar	Chapter 6 – (6.1-6.2)	Quiz 5 - Chapter 5
	6-Mar	Homework questions	
8	11-Mar	Spring Break	
	13-Mar	Spring Break	
9	18-Mar	Chapter 7 – (7.1-7.2)	Quiz 6 - Chapter 6
	20-Mar	Chapter 7 – (7.1-7.2)	
10	25-Mar	Chapter 8 – (8.1-8.2)	Quiz 7 - Chapter 7
	27-Mar	Chapter 8 – (8.1-8.2)	
11	1-Apr	Homework questions (Review)	Quiz 8 - Chapter 8
	3-Apr	Test 2 (Chapters 5, 6, 7, 8)	
12	8-Apr	Chapter 9 – (Intro - 9.1)	
	10-Apr	Chapter 9 – (9.1 - 9.2)	
13	15-Apr	Chapter 10 – (10.1 - 10.2)	Quiz 9 - Chapter 9
	17-Apr	Chapter 10 – (10.2 - 10.3)	
14	22-Apr	Chapter 11 – (11.1-11.2)	Quiz 10 - Chapter 10
	24-Apr	Chapter 11 – (11.2-11.3)	
15	29-Apr	Homework questions (Review)	Quiz 11 - Chapter 11
	1-May	Review	

Homework Problems

Fundamentals of Statistics*,* Mike Sullivan III (Pearson Prentice Hall)

Chapter 1:   Data Collection

1.1: Introduction to the Practice of Statistics (OMIT 1.1.5: Level of Measurement of a Variable)

> 1-6, 7-30 odd, 39-48 odd, 49, 51

1.2: Observational Studies versus Designed Experiments (OMIT 1.2.2: Types of Observational Studies)

> 1-4, 9-16 odd, 19

1.3: Simple Random Sampling

> 1-4, 5-12 odd, 15

1.5: Bias in Sampling

> 1-4, 5-21 odd

Chapter 2:   Organizing and Summarizing Data

2.1: Organizing Qualitative Data

> 1-4, 5-15 odd, 19, 23, 27, 31, 33

2.2: Organizing Quantitative Data: The Popular Displays

> 1-8, 9-15 odd, 23, 25, 33, 45, 47

2.3: Graphical Misrepresentations of Data

> 1-11 odd

Chapter 3:   Numerically Summarizing Data

3.1: Measures of Central Tendency

> 1-6, 7-19 odd, 29, 33, 43, 47

3.2: Measures of Dispersion (OMIT Chebyshev's Inequality)

> 1-3, 5-15 odd, 21, 23, 29, 31, 37, 39, 45-55 odd

3.3: **OMIT**

3.4: Measures of Position and Outliers

> 1-4, 5-13 odd, 17, 21, 25, 37, 39

3.5: The Five-Number Summary and Boxplots

> 1-5, 7-11 odd, 15

Chapter 4:   Describing the Relation between Two Variables

4.1: Scatter Diagrams and Correlation

      1-8, 9-17 odd, 21, 25, 33, 41

4.2: Least-Squares Regression

      1-5, 7, 13-19 odd, 27 (Do not need to find the estimates by hand; use calculator functions.)

4.3: **OMIT**

4.4: **OMIT**

Chapter 5:   Probability

5.1: Probability Rules

      1-10, 11-35 odd, 45, 51

5.2: The Addition Rule and Complements

      1-4, 5-23 odd, 25, 31, 33, 39, 45

5.3: Independence and the Multiplication Rule

      1-6, 7-15 odd, 19, 21, 29, 31

5.4: Conditional Probability and the General Multiplication Rule

      1, 2, 3-25 odd, 29, 37, 41, 43

5.5: **OMIT**

5.6: Putting It Together: Which Method Do I Use? (OPTIONAL for extra help)

      2-6, 8, 9, 13, 15, 21, 27

Chapter 6:   Discrete Probability Distributions

6.1: Discrete Random Variables

      1-4, 5-17 odd, 23, 25, 27, 31, 33

6.2: The Binomial Probability Distribution

      1-6, 7-31 odd, 35, 39, 41, 43, 49

Chapter 7:   The Normal Probability Distribution

7.1: Properties of the Normal Distribution

      1-6, 7-15 odd, 19-35 odd

7.2: Applications of the Normal Distribution

      1-4, 5-41 odd, 47, 49, 51

7.3: **OMIT**

7.4: **OMIT**

Chapter 8: Sampling Distributions

8.1: Distribution of the Sample Mean

1-8, 9-21 odd, 27, 29

8.2: Distribution of the Sample Proportion

1-6, 7-19 odd

Chapter 9: Estimating the Value of a Parameter

9.1: Estimating a Population Proportion

1-6, 7-25 odd, 29, 33, 39, 45

9.2: Estimating a Population Mean

1-6, 7-19 odd, 23, 27, 29, 33, 35, 37, 47, 49

9.3: Putting It Together: Which Procedure Do I Use? (OPTIONAL for extra help)

1-15 odd

Chapter 10: Hypothesis Tests Regarding a Parameter

10.1: The Language of Hypothesis Testing

1-8, 9-33 odd, 37

10.2: Hypothesis Tests for a Population Proportion (OMIT 10.2.3: Using the Binomial Probability Distribution)

1-6, 7-11 odd, 15, 17, 19, 25

10.3: Hypothesis Tests for a Population Mean

1-13 odd, 21, 25, 29, 31, 35

10.4: Putting It Together: Which Procedure Do I Use? (OPTIONAL for extra help)

1-15 odd

Chapter 11: Inference on Two Samples

11.1: Inference about Two Population Proportions (OMIT 11.1.4: Regarding Dependent Samples)

1, 2, 3-15 odd, 19-27 odd, 37, 39

11.2: Inference about Two Means: Dependent Samples

1-15 odd

11.3: Inference about Two Means: Independent Samples

1-17 odd

11.4: Putting It Together: Which Method Do I Use? (OPTIONAL for extra help)

3-9 odd, 13, 17, 19