MTH 217-003, 007, Introduction to Statistics

Spring 2024, 003: TWF 8:30-9:20am 002: TWF 9:30-10:20am
Feinstein 112

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Drop-in Hours: T 1-2:30pm, F 10:30am-12pm (or by appointment)

Required Textbook: *Beginning Statistics*, 3rd ed, by Warren, Denley, and Atchley.

The Hawkes Learning software is a required component of this course. You will use Hawkes to complete and submit your homework, which accounts for 20% of your grade. Textbook should be pre-loaded for you on Canvas.

Recommended Materials: While you will not need them in every class, you will want to have access to a **calculator** (TI-83 and up suffice) and a computer with **Microsoft Excel**.

Course Website: Course information and documents will be posted to the Canvas page (log in at `https://canvas.providence.edu`). Class slides and solutions will be posted here. You should check this page regularly. Homework will not be on the Canvas page and must be accessed through the Hawkes online portal.

Course Description: We encounter statistics frequently in our everyday lives. Individuals use them to make informed decisions and the media uses them to convince readers of a specific point of view. In today's "age of information," statistical literacy has become a crucial skill for all citizens.

MTH 217 is designed to provide an introduction to basic statistical methods and their applications. The main objective of the course is to learn the principles underlying various statistical tools and to learn how, when, and why to apply these tools for different problems from other scientific fields. Topics include descriptive statistics, sampling, probability, normal distributions, correlation, regression, inference for means and proportions (estimation and hypothesis testing), and categorical data analysis.

We will cover the following chapters and sections of the textbook in the given order:

- Chap 1: 1.1–1.4 Introduction to Statistics
- Chap 2: 2.1–2.3 Graphical Descriptions of Data
- Chap 3: 3.1–3.3 Numerical Descriptions of Data
- Chap 4: 4.1–4.5 Probability, Randomness, and Uncertainty
- Chap 5: 5.1–5.2 Discrete Probability Distributions
- Chap 6: 6.1–6.5 Normal Probability Distributions
- Chap 7: 7.1–7.3 The Central Limit Theorem

- Chap 8: 8.1–8.4 Confidence Intervals
- Chap 9: 9.1–9.2, 9.4 Confidence Intervals for Two Samples*
- Chap 10: 10.1–10.4 Hypothesis Testing
- Chap 11: 11.1–11.2, 11.4, 11.6 Hypothesis Testing (Two or More Populations)*
- Chap 12: 12.1–12.3 Regression, Inference, and Model Building

** time permitting, likely abbreviated*

Learning Goals:

- Basic statistical literacy:
  - Familiarity with fundamental statistical vocabulary and concepts (e.g. mean, standard deviation, variable, correlation, outlier, normal distribution).
  - Ability to organize and communicate data in convenient forms (e.g. graphs, charts, tables).
  - Basic knowledge of standard statistical methods (e.g. regression techniques, hypothesis testing).
  - Ability to read, interpret, and critique statistical articles in the media.
- Basic mathematical literacy: Students should be able to read mathematical formulas, use them to compute values, and interpret what those values mean in context.
- Familiarity with Microsoft Excel features related to the topics covered in the course.
- Increased understanding of personal learning style and confidence in one's ability to learn mathematics.

Homework: Problem sets will be due weekly and graded for accuracy. Assignments will be submitted online through the Hawkes Learning portal. You will have multiple attempts (typically 5) on most problems. You are encouraged to discuss homework problems with your classmates, but all submitted work must be your own.

HOW TO USE HAWKES

Each lesson of the software offers three modes:

1. Learn is an interactive presentation of the material found in your textbook and includes instructional video clips and example problems.
2. Practice gives you access to unlimited practice problems, provides error- specific feedback for commonly made mistakes, hints for all incorrect answers, and includes an interactive Tutor with Step-by-Step guidance and fully worked out solutions. Note that every question type from Certify can be found in the Practice mode.
3. Certify is the homework portion of the lesson. If you are not able to Certify in your attempt, you are able to start a new set of questions over again with no penalty. In the meantime, you may wish to spend more time in the Practice mode before attempting Certify again. You have unlimited attempts in each lesson to receive full credit before the due date.

Additional videos can be found at www.hawkestv.com.

GETTING HELP

Contact Hawkes with any technical questions, including creating your username and password, finding your Access Code or license number, or completing your work. Phone support is available Monday-Friday, from 8:00am-10:00pm ET. Chat support is available 24/7.
Phone: 1.800.426.9538
Email: support@hawkeslearning.com
Chat: www.hawkeslearning.com/chat

Grading Overview: This semester I will be using specifications based grading to determine final course letter grades. Rather than assigning points to each individual assignment, course grades will be based on how many of the course targets you have achieved. On the last page of the syllabus there are the 25 listed **targets** we will cover during the semester. You will have an opportunity to demonstrate your knowledge of these targets by completing **checkpoints** throughout the semester.

Grading Specifics:

There will be *checkpoints* throughout the semester. Each checkpoint will be announced in advance and will take place either in class or as a take-home assignment. Each checkpoint will evaluate your understanding on several targets. I will announce which targets will be on each checkpoint in advance. Each question on a checkpoint will be scored as, "meets expectations", "not yet", or "minor revision needed".

> Once you have scored "meets expectations" once for a given target you will earn the level of **Proficiency** for that target. After scoring "meets expectations" twice for a given target you will earn the level of **Fluency** for that target.

If you are unable to achieve the level of fluency on a target during the checkpoints in class you may come to office hours to attempt a target a third time within two weeks of missing it. Alternatively, there will also be 2 scheduled "make-up days" during the semester around mid-term and near the end of class where you can make your third attempt.

During the regular semester you will have three opportunities to earn "meets expectations" on each target. This will determine your final grade range.

Our final exam will take place TBD and will be a cumulative assessment of a select 10 major targets (announced ahead of time). It will determine what your final grade will be.

Grading Formula:

- Gaining Proficiency in a target awards 3 grade points (GP)
- Gaining Fluency in a target awards an additional 2 GP
- Your Homework average will grant you up to 25 GP

There is a total of 150 GP available in the semester. Your final grade will be determined by your score on the final exam based on the following charts:

Final Grade	GP ≥ 135	GP ≥ 125	GP ≥ 110	GP < 110
A	7	9		
A-	6	8	10	
B+	5	7	9	
B	-	6	8	10
B-		5	7	9
C+		-	6	8
C			5	7
C-			4	6
D+			-	5
D				4
D-				3
F				-

I reserve the right to change the formula, but only in a way that **increases** student scores.

Example Grade Calculations:

Student 1 achieves fluency in 15 targets and proficiency in 9 targets and has a homework average of 94%. They would have

$$\text{GP} = (15) \times 5 + (9) \times 3 + (.94) \times 25 = 125.5$$

This puts them in the third column of the grade chart. If they score a 7/10 on the final exam, then they would receive a B+. If they managed to instead score above a 9/10 on the final exam, then they would receive an A.

Student 2 achieves fluency in 20 targets and proficiency in 5 targets and has a homework average of 90%. They would have

$$\text{GP} = (20) \times 5 + (5) \times 3 + (.90) \times 25 = 137.5$$

This puts them in the second column of the grade chart. This guarantees them a final grade of at least a B.

If they score above a 7/10 on the final exam, then they would receive an A.

Resources:

- **Office Hours:** Please drop in during my office hours if you have any questions or concerns regarding the course material. Office hours provide students with additional opportunities to review or ask questions about the class discussions and assignments. Meeting one-on-one also gives me a chance to learn more about you and your interests, both inside and outside the classroom. If you are unable to make it to my office hours or could not get all of your questions answered during that time, I am happy to schedule another time to meet with you.
- **Student Success Center (SSC):** The SSC, located on the upper level of the Philips Memorial Library, offers a wide variety of support services for all PC students, including group and individual tutoring, academic skills, mentoring, disability support, and writing assistance. For additional information about the office, go to https://academic-services.providence.edu.

Academic Integrity: Academic integrity is of the utmost importance in maintaining the high standards of scholarship in our community. Academic dishonesty is considered to be a serious offense against the community and represents a significant breach of trust between the professor, the classmates, and the student. There are many forms of academic dishonesty including plagiarism, falsifying data, misrepresenting class attendance, submitting the same work in two courses without prior approval, unauthorized discussion or distribution of exams or assignments, and offering or receiving unauthorized aid on exams or graded assignments. Violations of academic integrity will not be tolerated and will typically result in a grade of 0% on an exam or assignment. Serious or repeat offenses may result in a grade of F for the entire course.

Special Accommodations: If you have a documented disability and have been approved for academic accommodations, please contact me privately during my office hours as early as possible in the semester. All accommodations must be arranged through the SSC. You may reach Disability Support at 865-1121.

Diversity and Inclusion: It is my intent to provide students from all backgrounds the best course possible. The diversity students bring into the class is a resource, a strength, and a benefit. I will make every effort to present material and activities that are respectful of your various identities, including (but not limited to) those tied to ethnicity, race, gender, religion, sexuality, disability, age, socioeconomic status, and culture. It is critical that we work together to create a safe and bias-free learning environment in which all students can thrive and succeed. I take this mission very seriously and your suggestions on how to best accomplish it are always encouraged and appreciated.

Mental Health: As a student, you may experience a range of challenges that can interfere with learning, such as strained relationships, increased anxiety, substance use, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may affect your ability to attend class, concentrate, complete work, take an exam, or participate in daily activities. If mental health and adjustment concerns are causing distress, please speak to me and/or reach out for personal support. Remember that asking for help is a sign of strength and courage.

	Learning Targets:	**P**	**F**
1.	(Ch1) Pros and cons of different types of studies	☐	☐
2.	(Ch1) Identifying variables – explanatory, response, confounders	☐	☐
3.	(Ch1) Bias in experiments	☐	☐
4.	(Ch2) Measures of spread – standard deviation, range, IQR	☐	☐
5.	(Ch2) Measures of center – mean, median	☐	☐
6.	(Ch2) Shapes of data sets – skew, modality	☐	☐
7.	(Ch3) Computing variables – variance, standard deviation, mean, median, IRQ	☐	☐
8.	(Ch3) z-scores, percentiles	☐	☐
9.	(Ch4) Probability Rules: Not, Or, And	☐	☐
10.	(Ch4) Conditional probabilities and Bayes Theorem	☐	☐
11.	(Ch4) Probability and Counting – combinations and permutations	☐	☐
12.	(Ch5) Expected value – computing and interpreting	☐	☐
13.	(Ch5) Binomial distribution	☐	☐
14.	(Ch6) Normal distribution – computing probabilities	☐	☐
15.	(Ch6) Normal distribution – computing percentiles/ranges	☐	☐
16.	(Ch7) Sampling distribution – mean ($\bar{x}$) and proportion ($\hat{p}$)	☐	☐
17.	(Ch7) Central Limit Theorem – criteria for normality of sampling distribution	☐	☐
18.	(Ch8) Creating confidence intervals	☐	☐
19.	(Ch8) Interpreting confidence intervals	☐	☐
20.	(Ch8) Student's t-curve	☐	☐
21.	(Ch10) Hypothesis Testing – fundamentals and setup	☐	☐
22.	(Ch10) Conducting Hypothesis Tests – means and proportions	☐	☐
23.	(Ch11) Conducting Hypothesis Tests – comparing means	☐	☐
24.	(Ch12) Correlation – computing and interpreting variables	☐	☐
25.	(Ch12) Regression Analysis	☐	☐

The first box in each row (column **P**roficient) is worth **3** EXP, the second box in each row (column **F**luent) is worth **2** EXP.