

ECO 45: Statistical Methods

Instructor: Muzhe Yang

Spring 2025 (syllabus version: 01/22/2025)

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Class Hours: Tu & Th 12:10-1:25 PM

Class Room: Business Innovation Building 111

Course Overview

This course focuses on developing an understanding of the basic tools of statistical analysis and learning how to apply them to a wide variety of situations and data encountered in the areas of business and economics. Topics include descriptive statistics, probability and probability distributions, sampling, estimation, hypothesis testing, correlation and simple linear regression.

Course Objectives

By the end of this course, students should be able to do the following:

1. Compute and interpret basic descriptive statistical measures;
2. Understand the basic concepts of probability and utilize elementary probability rules;
3. Apply techniques of statistical inference (estimation and hypothesis testing);
4. Work with measures of statistical association (correlation and regression).

Required Materials

1. **Textbook:** Anderson, Sweeney, Williams, Camm, Cochran, Fry and Ohlmann (ASWCC), *Statistics for Business and Economics*, the 14th edition.
2. **Calculator:** A good calculator is helpful for working on problem sets. During examinations, however, you may use a *non-programmable* calculator that performs only basic arithmetic functions. You can purchase one of these calculators at the Lehigh University Bookstore.
3. **Statistical Software:** ASWCC has appendices that explain how to use statistical software to work out problems. Former students report that these appendices are sufficient.

Course Requirements

My responsibilities are to come to class prepared; respond to and encourage questions and other appropriate class participation; oversee the grading of problem sets; grade exams; and hold regular office hours.

My regular office hours are Tuesdays and Thursdays 1:30–3:00 PM, during which I will be available on Zoom or in my office—Rauch Business Center 456. To join a Zoom session for office hours,

please click this [link](#). If you want to secure a 15-minute time slot for a meeting during office hours, please make a reservation by going to this [website](#), where you can select the slot (and I will then be notified automatically). If my regular office hours do not work for you, please feel free to make additional appointments with me by e-mail.

Your responsibilities are to attend and participate in lectures; complete assigned readings in time; complete all problem sets on time; give an in-class presentation; and take two midterms and one final exam.

Grading Components

Your course grade will be based on your work on problem sets, one in-class presentation, two midterms and one final exam. Your letter grade for the course, with plus or minus marks possible, will be assigned after the final exam is graded. The weights that will be used to compute the weighted average score, based on which the letter grade will be determined, are listed below.

Grade Components	Notes	Weights
Problem sets (PS)	Posted on course site, 10 in total	15%
In-class presentation	Detail explained below	5%
Midterm #1 (1 hour)	02/25 (Tuesday), in class	20%
Midterm #2 (1 hour)	04/08 (Tuesday), in class	25%
Final exam (3 hours)	Date and location to be determined	35%

Each required grading component must be completed for a student to receive a passing grade. If you do not complete each required component, the weights will be adjusted.

Converting a Weighted Average Score to a Letter Grade

X = Weighted Average Score (0–100)	Letter Grade
$93 \leq X \leq 100$	A
$90 \leq X < 93$	A-
$87 \leq X < 90$	B+
$83 \leq X < 87$	B
$80 \leq X < 83$	B-
$77 \leq X < 80$	C+
$73 \leq X < 77$	C
$70 \leq X < 73$	C-
$67 \leq X < 70$	D+
$63 \leq X < 67$	D
$60 \leq X < 63$	D-
$0 \leq X < 60$	F

Problem Sets

Please see the section titled “Lecture Topics and PS Due Dates” for detailed information about the due dates of all problem sets. In order for me to post answer keys to Course Site in a timely manner, please remember that problem sets cannot be accepted after the due date.

Requirements for the problem sets:

- All problem sets should be submitted online through [Course Site](#).
- Be sure to *show steps* in your answer.
- You may work together in a group on the problem sets. However, each person in the group must turn in his or her own set of solutions to the problem sets.

Grading of the problem sets:

- Grading is based upon completeness, instead of correctness, using a 0–3 ordinal scale: “0” means not submitted, or submitted but with nothing completed; “1” means $0 < \text{completeness} < 50\%$; “2” means $50\% \leq \text{completeness} < 100\%$; and “3” means 100% completeness.
- The problem set that receives the lowest score (e.g., zero) will be dropped from the course grade calculation. So in the end, nine out of the 10 problem sets will be counted for the course grade calculation.
- Copying of another student’s work or other outright dishonesty can result in no credit, a reduced course grade or Disciplinary Committee action.
- Problem sets will be graded by Xinye Li (the assistant for our course), whose e-mail address is xilb24@lehigh.edu.

In-Class Presentation

Each student is required to give an in-class, five-minute-or-so presentation. The presentation should be about using data to answer specific research questions through statistical analyses, either using descriptive statistics (e.g., plots of numerical measures) or inferential statistics (e.g., interval estimation and hypothesis testing), or both.

The presentation schedule will be posted on Course Site. It will be updated when there is a change in student enrollment status or availability.

The grading of the in-class presentation uses a 0–5 ordinal scale, with 5 representing the best and 0 representing non-completion. The grading is based on the *clarity* of the presentation, as well as using *appropriate* statistical methods to answer specific research questions. The grading is *not* based on how *complex* the statistical analysis is.

For this in-class presentation, you may use data provided by the textbook, such as those in the case problems, or data that are available online, such as [kaggle](#). You may also seek advice from the [Philip Rauch Center for Business Communication](#), such as receiving feedback on your presentation slides.

Midterm Exams

There will be two midterm exams, both using our class time and classroom. Each exam will be a one-hour exam. There will be no make-up exam if a midterm exam is missed. An absence from a midterm exam will only be allowed in the case of a medical or other emergency. In such situations a note from the Dean of Students Office is necessary. If a midterm exam is missed with valid reasons, the remaining graded work will have adjusted weights. An unexcused absence from a midterm exam will receive a zero score.

Final Exam

The final exam will be a three-hour exam. The date and location of the exam will be determined by the Office of the Registrar (formerly named Registration & Academic Services). If you are unable to take the final exam, you must follow the procedures described in the “[Definition of Grades](#)”:

“The grade X (grade) is used to indicate absence from the final examination when all other course requirements have been met. In such cases, the instructor calculates the parenthetical grade by assigning an F (or zero score) for the missing final exam. The X grade may be removed by a make-up examination if the absence was for good cause (e.g., illness or other emergency). *To be eligible for a make-up exam the student must submit a petition to the Dean of Students.* If the student fails to petition, or if the petition is not granted, or if the student fails to appear for the scheduled make-up examination, then the X grade will be converted into the parenthetical grade after the first scheduled make-up examination following the receipt of the X grade. If the petition is granted and the final examination is taken, the X grade will be changed by the instructor using the make-up examination procedures and the parenthetical grade will be dropped from the transcript.”

No make-up final exam will be given except on the official make-up day, which will be determined by the Office of the Registrar together with the instructor.

Attendance

It is important to attend all lectures. Each lecture covers a lot of materials and the materials are cumulative. Missing even one lecture can put you behind in a short time.

Tutoring Options

The College of Business [Undergraduate Programs Office](#) helps coordinate tutoring options for students. It is best to seek out tutoring early in the semester and to continue to use it regularly for best results. No matter the GPA, tutoring is a way for students to take proactive action to ensure their success. The [Center for Academic Success](#) offers tutoring in most College of Business first-year and sophomore-level core courses free of charge to students.

Tutoring begins the third week of classes and continues through the last week of classes every semester. Students have the option of participating in walk-in tutoring at the Center for Academic Success, located in 451 Williams Hall, where upperclass undergraduate students are available on a walk-in basis for specific courses. Weekly group tutoring is another option in which students sign up for a weekly tutoring session (usually no more than six students in a group) with an upperclass undergraduate student. The weekly group tutoring is also course-specific, and students may sign up for tutoring in more than one course.

The College of Business Undergraduate Programs Office has a [website](#) outlining the various business tutoring options and times at the beginning of every semester. For general tutoring information, please click [here](#).

Accommodations for Students with Disabilities

Lehigh University is committed to maintaining an equitable and inclusive community and welcomes students with disabilities into all of the University’s educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact

Disability Support Services (DSS), provide documentation, and participate in an interactive review process. If the documentation supports a request for reasonable accommodations, DSS will provide students with a Letter of Accommodations. Students who are approved for accommodations at Lehigh should share this letter and discuss their accommodations and learning needs with instructors as early in the semester as possible. For more information or to request services, please contact Disability Support Services in person in Williams Hall, Suite 301, via phone at 610-758-4152, via email at indss@lehigh.edu, or online at <https://studentaffairs.lehigh.edu/disabilities>.

Students who are approved for testing accommodations through Disability Support Services are strongly encouraged to meet with their instructor to discuss their testing needs as soon as possible, but *no later than seven (7) business days before an exam*. In the rare event that the instructor and the department are unable to accommodate the testing needs, students are able to submit a “[Testing Services Request Form](#)” to make arrangements through the Center for Academic Success’ testing services. Request forms must be submitted *at least five (5) business days prior to the exam* and will be approved on a first-come, first-served basis. Students who do not communicate with their faculty and the Center for Academic Success in a timely manner risk the opportunity for taking their exam with testing services.

Use of Citation and Advice on Avoiding Plagiarism

Please visit [this website](#) to learn when and why to cite, paraphrasing, and constructing citations.

Use of Artificial Intelligence (AI) Tools

AI tools, such as ChatGPT, can be used for: (1) making tables and figures and checking answers when working on problem sets; (2) preparing presentations. When using AI tools in cases (1) and (2), please provide appropriate citations by following the examples given [here](#).

For writing, you can only use AI tools to check grammar mistakes and to improve sentence structures. In these cases, you do *not* need to provide citations for the AI tools used.

No AI tools will be allowed in any exam.

Lehigh University Undergraduate Student Senate Statement on Academic Integrity

“We, the Lehigh University Student Senate, as the standing representative body of all undergraduates, reaffirm the duty and obligation of students to meet and uphold the highest principles and values of personal, moral and ethical conduct. As partners in our educational community, both students and faculty share the responsibility for promoting and helping to ensure an environment of academic integrity. As such, each student is expected to complete all academic course work in accordance to the standards set forth by the faculty and in compliance with the University’s Code of Conduct.” (source: <https://studentaffairs.lehigh.edu/content/academic-integrity-resources>)

Lehigh University Policy on Harassment and Non-Discrimination

Lehigh University upholds The Principles of Our Equitable Community and is committed to providing an educational, working, co-curricular, social, and living environment for all students, staff, faculty, trustees, contract workers, and visitors that is free from harassment and discrimination on

the basis of age, color, disability, gender identity or expression, genetic information, marital or familial status, national or ethnic origin, race, religion, sex, sexual orientation, or veteran status. Such harassment or discrimination is unacceptable behavior and will not be tolerated. The University strongly encourages (and, depending upon the circumstances, may require) students, faculty, staff or visitors who experience or witness harassment or discrimination, or have information about harassment or discrimination in University programs or activities, to immediately report such conduct.

If you have questions about Lehigh's Policy on Harassment and Non-Discrimination or need to report harassment or discrimination, contact the Equal Opportunity Compliance Coordinator (Alumni Memorial Building / 610.758.3535 / eocc@lehigh.edu).

The Principles of Our Equitable Community

Lehigh University is committed to [diversity, inclusion and engagement](#). Lehigh University endorses [The Principles of Our Equitable Community](#). We expect each member of this class to acknowledge and practice these Principles. Respect for each other and for differing viewpoints is a vital component of the learning environment inside and outside the classroom.

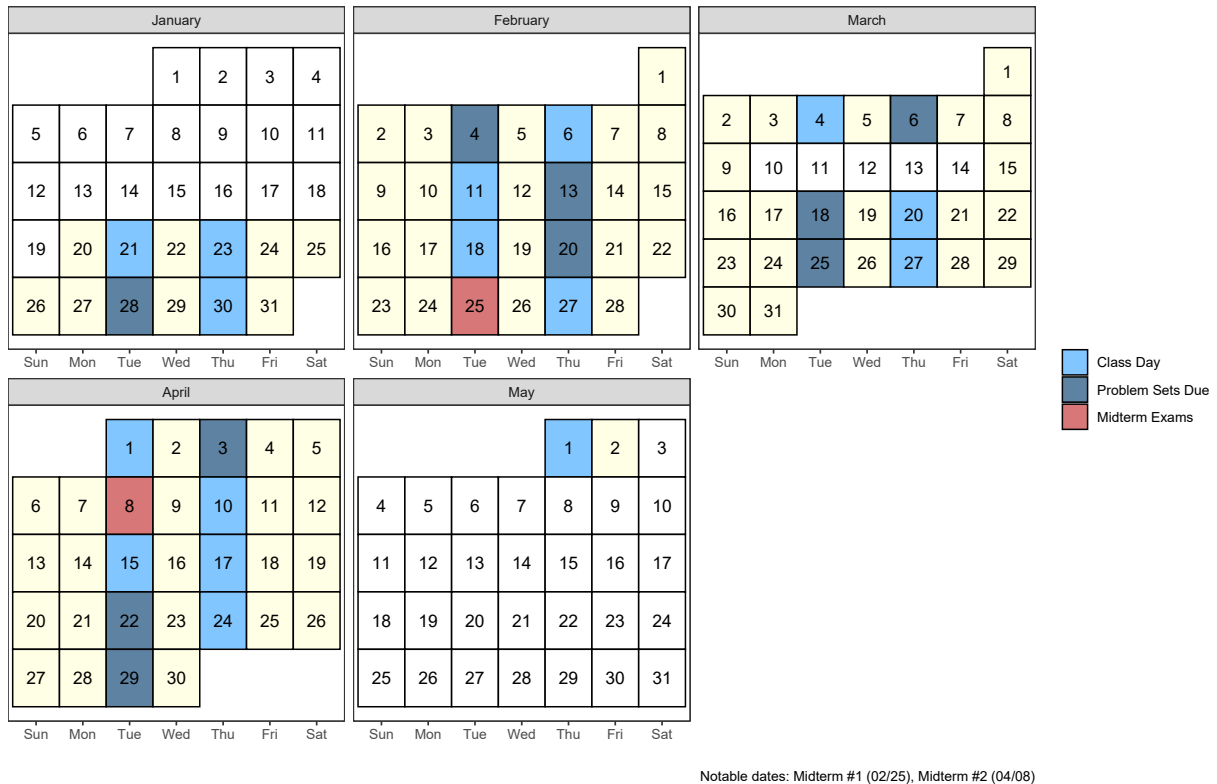


Figure 1: A Calendar for the Class (Eco 45, Spring 2025)

Lecture Topics and PS Due Dates

Week 01, 01/21 and 01/23: Data and descriptive statistics (ASWCC Chapters 1 and 2)

- ASWCC 1.1–1.5, skip 1.6–1.9
- ASWCC 2.1–2.2, Appendix 2.1–2.3 (self-study), skip 2.3–2.5

Week 02, 01/28 and 01/30: Descriptive statistics (ASWCC Chapter 3)

- ASWCC 3.1–3.2
- ASWCC 3.2–3.3 and Appendix 3.1–3.3 (self-study), skip 3.4–3.6
- PS#1 due 01/28, 11:59 PM

Week 03, 02/04 and 02/06: Introduction to probability (ASWCC Chapter 4)

- ASWCC 4.1–4.2
- ASWCC 4.3–4.4
- PS#2 due 02/04, 11:59 PM

Week 04, 02/11 and 02/13: Introduction to probability and discrete probability distributions (ASWCC Chapters 4 and 5)

- ASWCC 4.4–4.5
- ASWCC 5.1–5.3, 5.5
- PS#3 due 02/13, 11:59 PM

Week 05, 02/18 and 02/20: Discrete probability distributions (ASWCC Chapter 5)

- ASWCC 5.5–5.6, Appendix 5.1–5.3 (self-study), skip 5.4 and 5.7
- Review session for Midterm #1
- PS#4 due 02/20, 11:59 PM

Week 06, 02/25 and 02/27: Midterm #1 and continuous probability distributions (ASWCC Chapter 6)

- *Midterm #1* on 02/25
- ASWCC 6.1–6.2, Appendix 6.1–6.3 (self-study), skip 6.3–6.4
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Week 07, 03/04 and 03/06: Sampling distributions (ASWCC Chapter 7)

- ASWCC 6.2 (continued) and ASWCC 7.1–7.5
- ASWCC 7.5–7.7, Appendix 7.2–7.4 (self-study), skip 7.8–7.9
- PS#5 due 03/06, 11:59 PM

Week 08, 03/11 and 03/13: Spring Break

Week 09, 03/18 and 03/20: Interval estimation (ASWCC Chapter 8)

- ASWCC 8.1–8.2
- ASWCC 8.3–8.4, Appendix 8.1–8.3 (self-study), skip 8.5
- PS#6 due 03/18, 11:59 PM

Week 10, 03/25 and 03/27: Hypothesis tests (ASWCC Chapter 9)

- ASWCC 9.1–9.3
- ASWCC 9.3–9.4
- PS#7 due 03/25, 11:59 PM

Week 11, 04/01 and 04/03: Hypothesis tests (ASWCC Chapter 9)

- ASWCC 9.4–9.6, Appendix 9.1–9.3 (self-study), skip 9.7–9.9
- Review session for Midterm #2
- PS#8 due 04/03, 11:59 PM

Week 12, 04/08 and 04/10: Midterm #2 and statistical inference (ASWCC Chapter 10)

- *Midterm #2* on 04/08
- ASWCC 10.1–10.2, Appendix 10.1–10.3 (self-study), skip 10.3–10.4

Week 13, 04/15 and 04/17: Statistical inference (ASWCC Chapters 10 and 12)

- ASWCC 10.2 (continued) and ASWCC 12.3, skip 12.1 and 12.2
- ASWCC 2.4, 3.5 and 5.4

Week 14, 04/22 and 04/24: Simple linear regression (ASWCC Chapter 14)

- ASWCC 14.1–14.3
- ASWCC 14.4–14.5, Appendix 14.3–14.5 (self-study), skip 14.6–14.10
- PS#9 due 04/22, 11:59 PM

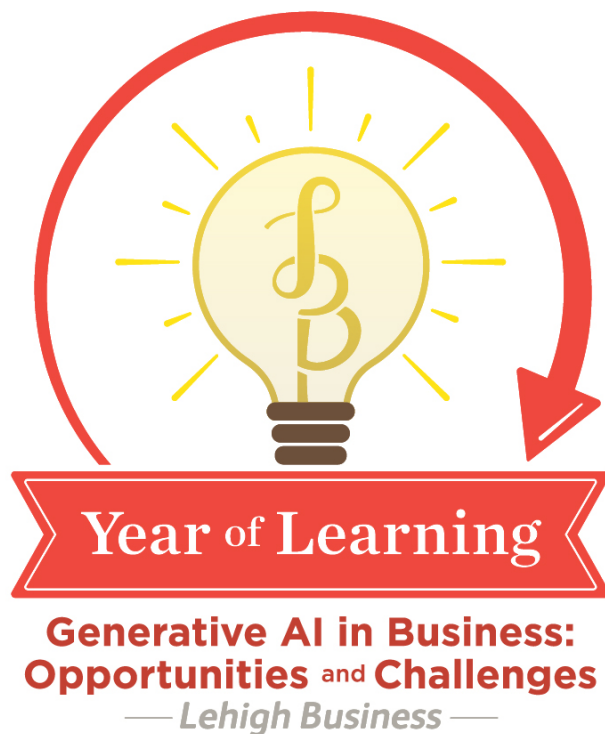


Figure 2: Year of Learning

Week 15, 04/29 and 05/01: Review (or make-up for any missed class)

- Discussion on Year of Learning (required by the College of Business)
- Review session for the final exam
- PS#10 due 04/29, 11:59 PM