# ECO 45: STATISTICAL METHODS

**Instructor's Contact Information**

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Office Hours: Wednesday 10:00 - 11:00, Friday 10:00 - 12:00 or by appointment.

**Course Information**

Section 10: Monday and Wednesday, 12:45 - 2:00, RBC 271.
Section 11: Monday and Wednesday, 2:35 - 3:50, RBC 271.

## Course Description and Objectives

The purpose of this course is to give students, primarily those in the fields of business administration and economics, a conceptual introduction to the field of statistics and its many applications. By the end of the semester, 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);
5. Apply chi-square tests of goodness of fit;
6. Utilize EXCEL for statistical computing.

## Required Materials

1. **Text:** Anderson, Sweeny, Williams, Camm, and Cochran (ASWCC), *Statistics for Business and Economics*, the $13^{th}$ edition.
2. **Calculator:** A pocket-calculator with statistical functions is helpful for working through problem sets. During exams, however, you may only use a (non-programmable) four-function calculator. You can purchase one of these calculators at the Lehigh University Bookstore.
3. **Excel:** We will be using EXCEL on occasion throughout the course. So make sure you know what EXCEL output tells you about the topics covered in our course. ASWCC has appendices that explain how to use EXCEL to work out problems.

## Course Website

I will post problem sets, answer keys, and additional class material on Course Site. You are responsible for checking the course website regularly and downloading any assignments, including supplemental readings and problem sets. Please let me know immediately if you have difficulty downloading anything from Course Site.

# Course Requirements and Grading

Course grades will be based on two midterm and final exams as well as analytical problem sets and two unannounced short class quizzes. The weights that will be used to compute your weighted average score, based on which a letter grade will be determined, are listed as follows.

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|---|---|
| Two Quizzes | 5% |
| Problem Sets | 10% |
| First Examination | 25% |
| Second Examination | 25% |
| Final Exam | 35% |

- **Attendance & Two Quizzes**

  Class attendance is **mandatory**. Excessive absences will affect your grade for the course, so please be very careful to avoid missing any. We will be covering a considerable amount of material during each of the class meetings. Since most of the material is cumulative, a missed class will put you very far behind in a very short time. Two unannounced quizzes also serve the purpose of checking attendance. Quizzes are graded on a scale of zero to three: 3 (no mistakes), 2 (minor mistakes), 1 (major mistakes), 0 (not attended). There will no make-ups for the quizzes, and if your absence is excused the weight will be carried to the next quiz. If you must miss a class, please contact me beforehand.

- **Problem Sets**

  Assignments will be made available on Course Site weekly basis and should be submitted on $8\frac{1}{2}$" × 11" paper (not torn out of a spiral notebook) with the sheets stapled together. I will collect the assignments in class. Be sure to show all of the steps in your answer. You need to show me that you understand how and why your solution or response is correct and supported with solid thinking. Although you may consult with me or other students, the work which you hand in should be your own. Obvious copying of another students work or other outright dishonesty can result in no credit, a reduced course grade and Disciplinary Committee action. Please keep in mind that **no late problem sets will be accepted**. If you have a question about the grading of a particular problem or problem set, please first look at the solutions posted on Course Site and then write a note explaining your question. I will return it to the grader to give your answers another look.

- **Midterms**

  Two midterms will be given in class during the semester: two one-hour exams. Exams are closed book, closed notes. You must bring a simple calculator to quizzes and exams. **No make-ups** will be given for the midterms. An excused absence or non-completion from an 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 one midterm is missed with a valid excused absence or non-completion, the remaining graded work will have higher weight(s).

- **Final Exam**

  The final exam will be comprehensive. The date will be announced as soon as the final exam schedule from the Registrar Office comes out. If you are unable to take the final at the designated time, you must follow the procedures in the Lehigh Student Handbook. No make-up finals will be given except on the official make-up day, which will be determined by the Registrar Office.

## Academic Integrity

Lehigh University Student Senate Statement of Academic Integrity. "We, the Lehigh University Student Senate, as the standing representative body of all undergraduates, reaffirm the duty and obligation of the 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."

## Academic Support Services for Students with Disabilities

Accommodations for Students with Disabilities: If you have a disability for which you are or may be requesting accommodations, please contact both your instructor and the Office of Academic Support Services, University Center 212 (610-758-4152) as early as possible in the semester. You must have documentation from the Academic Support Services office before accommodations can be granted.

## The Principles of Our Equitable Community

Lehigh University endorses The Principles of Our Equitable Community [http://www.lehigh.edu/~inprv/initiatives/PrinciplesEquity_Sheet_v2_032212.pdf]. 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.

## Course Outline:

**Introduction & Frequency Distributions**
Introduction to statistics
Frequency distributions
Visual representations of data

**Reading:** Chapters 1, 2

**Descriptive Statistics**
Measures of location, variability, and skewness
Standardizing data
The "empirical rule" and Chebyshev's theorem
Measures of association: covariance and correlation

**Reading:** Chapters 3

**Introduction to Probability**
Interpreting probabilities
Elementary probability rules
Bayes'rule
Counting techniques

**Reading:** Chapters 4

## First Hourly Exam

**Probability Distributions**
Random Variables
Expected Value
Discrete and continuous probability distributions

**Reading:** Chapters 5 & 6

**Sampling and Sampling Distributions**
Parameters and statistics
Random sampling
Sampling error
Sampling distributions
Unbiased estimators
The central limit theorem

**Reading:** Chapters 7

**Statistical Estimation**
Point estimation and sampling error for means and proportions
Confidence intervals
Appropriate sample size determination
The t-distribution

**Reading:** Chapters 8

# Second Hourly Exam

**Hypothesis Testing**
One- and two-tailed tests of means and proportions
Type I and type II errors
Two-population tests

**Reading:** Chapters 9 & 10

**Chi-Square Analysis & Correlation Analysis**
Goodness-of-fit tests
Product-moment correlation coefficient
**Reading:** Chapters 12 (Section 12.3 only) & Chapters 3 (Section 3.5 only)

**Regression Analysis**
Simple linear regression
Standard error of estimate
Coefficient of determination
Inference in regression analysis

**Reading:** Chapters 14 & 15

# FINAL EXAM: TBD