

## Applied Statistics for Management and Economics BUS 2340; ECN 2340

**Instructor:** Dr. Ben Taft

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**Office:** 235 Lentz Hall

**Hours:** TR 9-9:30, 11:45-12:15

**Text:** Salkind, Neil. 2016. Statistics for People Who (Think They) Hate Statistics. SAGE Publications. ISBN: 9781506333830

**Section 2:** Clausen 206, TR 12:30-2:10 PM

**Section 3:** Clausen 206, TR 2:20 - 4:00 PM

**Section 4:** Straz 62, TR 9:50-11:30 AM

**Synopsis:** Statistics is a language for expressing imperfect knowledge. Its mathematical idioms let us report what we know, and also to quantify how uncertain we are about what we know. Like any language, statistics has customary parlance and characteristic turns of phrase that connote fluency and facilitate communication. In effect, this is an introductory language course. Its goal is making you conversant in statistics. That proficiency will help you in your professional career as you assess and prepare reports, make decisions in the face of uncertainty, and help your coworkers communicate.

One of the core insights that makes statistics so useful is that many different phenomena can be described and understood using a small number of mathematical tools. Since this isn't a math course, we're going to take the abstraction even further and say that many different phenomena can be described and understood using just **four basic statistical questions**:

- **How good is your estimate and how do you know?**
  - e.g. "What is the margin of error of this survey?"
- **Is what you observed what you expected and how do you know?**
  - e.g. "Was this year's demand for widgets predicted by last year's demand?"
- **Which is bigger and how do you know?**
  - e.g. "Does our product have better market share in Peoria than theirs?"
- **Are these things related and how do you know?**
  - e.g. "How much of a discount can we give our customer for each extra thousand units that they buy?"

**In-class Work** will include brief lectures, data collection labs, analysis labs, discussion, and presentations.

**Other Policies:** Please think of this as a laboratory course, and make every effort to attend each class.

All homework is due by the beginning of the next class meeting. Half credit for work turned in later that day, and no credit for later homework, unless you are absent for a College-approved reason.

Plagiarism will be dealt with according to the policies in the Carthage Faculty Handbook.

Carthage has a [Center for Student Disabilities](#). Please contact me as early as possible if I can provide accommodation.

**Assessment:** This course will use something called “specifications grading.” Each assignment has a set of specifications. Any work that meets every specification passes. Work that goes beyond the specifications earns a superior pass. Falling short on any aspect of the specifications fails. This is much more like the business world than letter grades are. For example, after a sales pitch you either close the deal or not, or after an interview you get a job or do not. In the real world, however, sometimes you have second chances. You might apply again in a year and get that job, or make three more calls before landing the sale. This isn’t free: the extra time and effort costs you. Correspondingly, I will accept late work, but at a penalty.

There are **four types of assignment** in this course. First, a **professional digital portfolio** brings together all of your lab and case work with a self-assessment of your experience. By reflecting on what you have done and the skills that you have learned, you will build a document that will help you apply for jobs. Second, the **12 chapter quizzes** assess your rote understanding of the chapter information, as well as a baseline understanding of the learning outcomes. They will be administered at the beginning of class and graded on a percentage basis. Third, **lab assignments and case studies** assess how well you have integrated the information from the book, lectures, and group discussions. They will be graded superior/pass/fail, with a penalty for being late. Finally, the **semester project** will assess your ability to integrate the same knowledge as in the lab assignments, but to express that knowledge in a more synthetic and creative context.

The grade that you earn will depend upon how much of the assigned work you complete. You must complete the portfolio to pass the course. A minimum chapter quiz average of 70% is also required for a D. The percent of superior or passing labs/cases that you complete affects your maximum possible grade (90% or better for an A, 80% for a B, 70% for a C). Finishing the semester project makes it possible to earn an A (for a strong, independent effort) or B (for a less independent, but still competent, effort).

Grade	Portfolio	Chapter Quiz Average	Labs & Case Studies Passed	Semester Project
A	Done.	70%	90%	Done by answering a question of your own devising.
B	Done.	70%	80%	Done by answering a question handed to you.
C	Done.	70%	70%	Not Done
D	Done.	70%	0%	Not Done

**Learning Outcomes:**

1. Students will apply sampling techniques through the extraction of data subset from a large database for analysis.
  - Without data, there can be no applied statistics. Therefore, students should be able to obtain data.
2. Students will determine descriptive measures of central tendency and dispersion for data sets and explain what they mean.
  - Computing and understanding these numerical descriptive statistics is a necessary foundation for any more advanced statistical work. For some simple problems, descriptive statistics is all that people use.
3. Students will use data visualization techniques to explain their findings.
  - Although data visualization is becoming its own discipline beyond traditional graphical descriptive statistics, this class will emphasize standard graphs since they, like numerical

descriptive statistics, are a necessary foundation for advanced statistics and sometimes are all that's needed to address a problem.

4. Students will demonstrate mastery of the hardware and software required to complete the course.
  - There's nothing wrong with using calculators, tables, and formulas for statistical work but it's nearly impossible to do so with large datasets and modern applied statistics requires competency with at least one computer-based tool.
5. Students will explain the concepts of estimation and confidence intervals and use them to determine whether the sample size of their data sets is adequate to measure a statistical outcome.
  - This directly covers the big question "How good is your estimate and how do you know?". We rarely know any quantity with absolute certainty so we need to understand how statistical estimation works.
6. Students will demonstrate understanding of the concept of probability by defining and explaining what a p-value is and what it means when applied to a statistical test of significance.
  - While p-values are relevant for all statistical tests, we'll start with single-sample tests to address the question "Is what you observed what you expected and how do you know?".
7. Students will set up statistical questions and execute statistical tests for differences, similarities, correlations, and the general linear model and explain what they mean (parametric and non-parametric).
  - These are the statistical tools used to address "Which is bigger and how do you know?" and "Are these things related and how do you know?".
8. Students will determine whether their data set requires a parametric or non-parametric statistical test.
  - Now we're back to .... data. Obtaining data (Objective 1) is the beginning, but you also need to know what to do with data after you get it and different types of data require different types of analysis.

### Schedule:

Week	Meeting	Date	Topic
1	1	2 Feb	Intro
2	2	7 Feb	Measures of Center and Scatter
2	3	9 Feb	Graphs and Intervals
3	4	14 Feb	Defining Hypotheses
3	5	16 Feb	Probability, including Distributions
4	6	21 Feb	Testing Hypotheses
4	7	23 Feb	t-Tests
5	8	28 Feb	ANOVA
5	9	2 Mar	ANOVA
6	10	7 Mar	Correlation
6	11	9 Mar	Regression
7	12	14 Mar	Goodness of Fit
7	13	16 Mar	There's more out there...
9-15	14-26		Case Studies!

### Finals:

<b>10:30 AM</b>	<b>16 May</b>	<b>Final for Section 4 (9:50-11:30)</b>
<b>3:30 PM</b>	<b>16 May</b>	<b>Final for Section 3 (2:20-4:00)</b>
<b>1:00 PM</b>	<b>17 May</b>	<b>Final for Section 2 (12:30-2:10)</b>