

Econ 378: Statistics for Economists

Winter 2019 Section 1: MW 3:30-4:45pm, B190 JFSB

Instructor Joseph McMurray
Office hours 133 FOB by appointment; 801-422-9198
joseph.mcmurray@byu.edu

Teaching Assistants Caden Nixon cadennixon@gmail.com
Aaron Pfof apfof11@gmail.com

Description

Economists rely heavily on data analysis, to (1) measure economic outcomes or patterns, (2) find evidence for or against economic theories, (3) forecast future economic variables, and (4) calibrate public policies and business decisions. Probability theory is also frequently used in economic modeling, to describe the uncertainty that decision-makers face. Economics 378 introduces students to probability distributions, providing them with basic analytical tools for summarizing and analyzing statistical data. Topics include discrete and continuous random variables, joint and conditional distributions, correlation, common parametric distributions, estimators and estimation methods, confidence intervals, hypothesis tests, simple regressions, and an introduction to matrix algebra. This course is also a prerequisite for Econometrics (Econ 388) and for most upper-level Economics courses.

Information

Prerequisites Calculus (Math 112), Principles of Economics (Econ 110). This course is math-intensive; if necessary, a calculus review is available (Eng T 295R). Previous training in Statistics is helpful, but not required.

Materials (1) Scientific calculator (logs, exponents, and factorials)
(2) Homework questions packet (\$2 BYU Store OR \$0 Learning Suite)
(3a) *Mathematical Statistics with Applications*, 7th Edition, 2008, by Wackerly, Mendenhall, and Scheaffer (\$200).
or (3b) Textbook excerpts packet (\$20 BYU Store).¹

¹ The WMS textbook is also available on course reserve in the Harold B. Lee library. If you use the 6th edition or the E-book or international version of the 7th edition, the homework questions are numbered differently, but there is a conversion document available on Learning Suite. The textbook covers almost all of the material from

Lectures

Data analysis is complicated, and can often be quite abstract. I try hard to present examples in class that will foster deep intuition. I invite every student to participate actively, to make sure that key concepts are being internalized. I also invite students to pray at the beginning of class. If you prefer not to pray or not to participate, that is completely fine: I have no problem if you decline such invitations, or request that I not call on you.

Homework

Mastering statistics requires practice, so I assign homework every class period. You may submit problem sets in groups of up to four students. Homework is due at the beginning of each lecture (*not* in the TA box). Late work is penalized by 25% (exceptions may be made *in advance*). To accommodate illness or other conflicts, your two lowest scores from the semester will be dropped. To reduce the grading load, the TAs will grade *either* the odd questions *or* the even questions (with equal probability), *not* both. Corrected homework will be distributed in class, but if you prefer, I am happy to make other arrangements; just let me know.

Data Project

Students use the tools learned in this course to analyze data of their own interest, and then to write a short report of their findings. The project consists of three parts, with due dates indicated on the course schedule. The penalty for late submissions is 15%.

Exams

Exams include problems similar to the homework, but designed to combine multiple topics from the course, and also to stretch students to apply familiar concepts in unfamiliar settings. The final exam is not comprehensive, per se, except that material learned early in the course lays a foundation for more advanced concepts. To compensate for any adverse circumstances during exam weeks, your overall exam grade will place 60% weight on the better of your two exam scores, and 40% weight on your lower score.

Grades

Final grades are based on two exams (35% each), daily homework assignments (20%), and a data analysis project (10%). I try to ensure that grading is timely, accurate, and fair. You may request that any homework or exam question be re-graded, but should do so *in writing* no later than *one week* after the grade is received. Each written appeal will receive a written response; no grade will be decreased in response to an appeal.

this course, but readings are optional, as all course material will also be presented during lectures. The BYU Store packet includes all of the textbook problems that will be assigned as homework, but no explanatory text.

Extra Credit

Periodically, our department hosts visiting scholars from other universities, or a department-wide seminar from one of our own faculty. These are usually Thursdays at 11am. If you attend one of these, I will give you 5 points extra credit, applied to your composite homework score. If you cannot attend any of these, you may read an Economics journal article instead. These extra credit points can be earned only once.

Tips for Success

- *Lecture notes.* Lecture notes are available at the BYU store (\$5) or Learning Suite (\$0). Some find it helpful to use these during lectures, so that they write less and listen more.
- *Participate.* When you solve problems in class, you might make mistakes. This can be embarrassing, but is extremely useful, both to you and to other students, because it highlights potential pitfalls that you will need to be careful to avoid on homework, exams, and in the real world of data analysis.
- *TA Lab/study groups.* The TA and your classmates are invaluable resources, but try to solve problems on your own first. If you do get help, make sure you clearly understand what you did and why, so you can do it on your own next time.
- *Arrive on time.* If you miss the intuition for mathematical derivations, you may get lost in the messy details.
- *Apply the material.* With every new concept that is presented, think about how it applies to your own data analysis project.
- *Ask questions.* Lectures tend to be fast-paced, but if you feel confused, let's pause and resolve your confusion, before we pile on additional material. Your question is a service to other students who are confused, and to those who think they understand, but actually *misunderstand*.
- *Practice problems.* At the end of most homework assignments I list examples and exercises from the textbook that may be useful for additional practice, if you need it.
- *Start early.* Start your data analysis project early, to avoid a time crunch later on.

Thanks

Thanks to students and TAs in previous semesters and to Heather Howard and Joe Price for their useful suggestions for this course.

University Policies

Honor Code

In keeping with the principles of the BYU Honor Code, students are expected to be honest in all of their academic work. Academic honesty means, most fundamentally, that any work you present as your own must in fact be your own work and not that of another. Violations of this principle may result in a failing grade in the course and additional disciplinary action by the university. Students are also expected to adhere to the Dress and Grooming Standards. Adherence demonstrates respect for yourself and others and ensures an effective learning and working environment. It is the university's expectation, and every instructor's expectation in class, that each student will abide by all Honor Code standards. Please call the Honor Code Office at 422-2847 if you have questions about those standards.

Preventing & Responding to Sexual Misconduct

In accordance with Title IX of the Education Amendments of 1972, Brigham Young University prohibits unlawful sex discrimination against any participant in its education programs or activities. The university also prohibits sexual harassment—including sexual violence—committed by or against students, university employees, and visitors to campus. As outlined in university policy, sexual harassment, dating violence, domestic violence, sexual assault, and stalking are considered forms of "Sexual Misconduct" prohibited by the university.

University policy requires all university employees in a teaching, managerial, or supervisory role to report all incidents of Sexual Misconduct that come to their attention in any way, including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Incidents of Sexual Misconduct should be reported to the Title IX Coordinator at t9coordinator@byu.edu or (801) 422-8692. Reports may also be submitted through EthicsPoint at <https://titleix.byu.edu/report> or 1-888-238-1062 (24-hours a day).

BYU offers confidential resources for those affected by Sexual Misconduct, including the university's Victim Advocate, as well as a number of non-confidential resources and services that may be helpful. Additional information about Title IX, the university's Sexual Misconduct Policy, reporting requirements, and resources can be found at <http://titleix.byu.edu> or by contacting the university's Title IX Coordinator.

Student Disability

Brigham Young University is committed to providing a working and learning atmosphere that reasonably accommodates qualified persons with disabilities. If you have any disability which may impair your ability to complete this course successfully, please contact the University Accessibility Center (UAC), 2170 WSC or 422-2767. Reasonable academic accommodations are reviewed for all students who have qualified, documented disabilities. The UAC can also assess students for learning, attention, and emotional concerns. Services are coordinated with the student and instructor by the UAC. If you need assistance or if you feel you have been unlawfully discriminated against on the basis of disability, you may seek resolution through established grievance policy and procedures by contacting the Equal Employment Office at 422-5895, D-285 ASB.

Schedule

<u>Date</u>	<u>Day</u>	<u>Topics</u>	<u>Text</u>	<u>HW</u>	<u>Proj</u>
Jan 7	M	L1 Math preview	-	-	-
9	W	L2 Probability, Combinatorics	2.1-6	1	-
14	M	L3 Conditional Probability	2.7-10	2	-
16	W	L4 Distributions	3.1-3	3	-
21	M	<i>No class (Civil Rights Day)</i>	-	-	-
23	W	L5 Correlation	5.1-8	4	-
28	M	L6 Continuous distributions	4.1-3	5	-
30	W	L7 Continuous joint distributions	4.1-3	6	-
Feb 4	M	L8 Conditional distributions	5.3	7	-
6	W	L9 Regressions	11	8	-
11	M	L10 Common distributions	3.4,4.4	9	-
13	W	L11 Common distributions	4.5-6	10	Part 1
18	M	<i>No class (Presidents Day)</i>	-	-	-
19	T	L12 Common distributions	4.6	11	-
20	W	Review	-	12	-
21-26	Th-T	Exam 1 (testing center)	-	-	-
27	W	L13 Method of Moments Estimation	9.6	-	-
Mar 4	M	L14 Maximum Likelihood Estimation	9.7	13	-
6	W	L15 Properties of Estimators	8.2,9.2	14	-
11	M	L16 Confidence Intervals	7.2-3	15	-
13	W	L17 Hypothesis Testing	8.5-9	16	-
18	M	L18 Differences in Means, Proportions	10.2-8	17	-
20	W	L19 Variance Estimation	8.6,10.3	18	-
25	M	L20 Regression Estimation	8.9,10.9	19	-
27	W	L21 Regression Inference	11.1-9	20	-
Apr 1	M	Data project discussion groups	-	-	Part 2
3	W	L22 Matrix algebra	A1.1-7	21	-
8	M	L23 Matrix algebra	A1.8-11	22	-
10	W	L24 Matrix algebra	-	23	-
15	M	L25 Matrix algebra	-	24	-
17	W	Review	-	25	Part 3
19-24	F-W	Exam 2 (testing center)	-	-	-