

ECON 3640-001: Probability and Statistical Inference for Economists

Spring 2023

Instructor:	Bruno Miller Theodosio	Time:	TuTh 14:00 - 15:20
Email:	bruno.millertheodosio@utah.edu	Place:	AEB 330.
Office Hours:	Before or after class, or by appointment	Website:	Canvas

Overview

This course will introduce students to the most important statistical concepts, both in theory and applied examples. You will learn descriptive, probabilistic, and inferential tools both in the classical (inferential) and Bayesian approaches.

Obs.: This is an applied course.

Important: For guidelines and practical recommendations concerning COVID-19, please constantly check out <https://coronavirus.utah.edu/>.

Main references

- G. Keller, (**GK**) *Statistics for Management and Economics*, 10th edition, South-Western/Cengage, 2014. ISBN 13: 978-1-285-42545-0 (*Accessed on Canvas, Bookshelf tab*)
Exercise data, and other resources found at [Student Companion Site](#)
- A. Johnson, M. Ott, and M. Dogucu, (**JOD**) *Bayes Rules! An Introduction to Applied Bayesian Modeling*, CRC Press, 2022.
– Available online at <https://www.bayesrulesbook.com/>

Additional References (optional)

- Frederick J Gravetter, Larry B. Wallnau, Lori-Ann B. Forzano. (2018) *Essentials of Statistics for The Behavioral Sciences*. 9th Edition. Cengage. ISBN-13: 978-1337098120.
- David Moore, George P. McCabe, Layth C. Alwan, and Bruce A. Craig *The Practice of Statistics for Business and Economics* 4th Edition. ISBN13: 9781319079482

Software Requirements

Our classes will always have *theoretical* and applied components. The latter will be done using R, an open-source and completely *free* statistical/programming language. In applied lectures, I use the RStudio IDE (Integrated Development Environment), which is also freely available. However, students are welcome to use the platform they prefer. In addition, having a spreadsheet editor (e.g., Excel) is strongly recommended. University of Utah students should have free access to Microsoft Office programs through [Office 365](#).

No previous knowledge in R is required. The course will guide students through every step in the applied lectures.

- Download R: <https://cloud.r-project.org/>
- Download RStudio: <https://rstudio.com/products/rstudio/>

Prerequisites

College algebra, ECON 2010 and ECON 2020.

Course outcomes

At the end of this course, the student will be able to:

1. **Critically assess the most common statistical tools;**
2. **Manipulate data sets;**
3. **Perform statistical inference in both classical (frequentist) and Bayesian approaches;**
4. **Comfortably use R to perform basic statistical analyses.**

Assignments, Exams, and Grading

- **Class participation:** In the absence of symptoms and contact with potentially infected individuals, attendance is a crucial part of the course.
- **Problem Sets:** Whenever enough content is seen in class, a new problem set will be uploaded to our Canvas course page. Students are not required to turn these in, so they can take their own time to complete them. The instructor will upload the answer keys two days before each exam. Thus, do not rely on waiting for the answer sheets to prepare for exams.
- **Applied research project (30%):** Since this is an applied course, students will be asked to select a data set of their interest and perform statistical analyses on it. Projects may involve thorough descriptive work, inferential analyses, etc. We will have several checkpoints throughout the semester to track everyone's progress. The project must be between 8 and 10 pages, double-spaced. All necessary assistance will be provided by the instructor upon students' requests.
- **Midterm exam (30%):** The midterm exam will ask theoretical and applied questions on descriptive statistics and some probability concepts.
- **Final exam (40%):** The Final exam is comprehensive, covering all studied topics. In principle, the final exam will also be take-home. As we get closer, new procedures may be adopted by the University. We will discuss an appropriate window allowing every student to have time to complete the exams.

Tentative Course Schedule:

<i>Week</i>	<i>Tu</i>	<i>Th</i>	<i>Topic</i>	<i>Chapter</i>
Week 1	Jan 10	Jan 12	Course overview and introduction	GK 1
Week 2	Jan 17	Jan 19	Descriptive Statistics I	GK 2,3
Week 3	Jan 24	Jan 26	Descriptive Statistics II	GK 4,5
Week 4	Jan 31	Feb 02	Probability Theory I	GK 6
Week 5	Feb 07	Feb 09	Probability Theory II	GK 6
Week 6	Feb 14	Feb 16	Bayesian Estimation I	JOD 1, 2, 3, 4
Week 7	Feb 21	Feb 23	Bayesian Estimation II	JOD 5, 6, 7
Week 8	Feb 28	Mar 02	Frequentist Statistics I	GK 7
Week 9	Spring Break			
Week 10	Mar 14	Mar 16	Frequentist Statistics II	GK 8
Week 11	Mar 21	Mar 23	Hypothesis Testing I	GK 9, 10
Week 12	Mar 28	Mar 30	Hypothesis Testing II	GK 11,12
Week 13	Apr 04	Apr 06	Case studies	TBA
Week 14	Apr 11	Apr 13	Open for adjustments	-
Week 15	Apr 18	Apr 20	Course wrap-up and review	-

Important dates:

- **Classes begin:** Monday, January 9
- **Last day to add, drop (delete), audit, and elect CR/NC:** Friday, January 13
- **Martin Luther King Jr. Day holiday:** Monday, January 16
- **Last day to withdraw from classes:** Friday, February 3
- **Presidents Day holiday:** Monday, February 20
- **Midterm:** Friday, February 10
- **Spring break:** Sun.-Sun., March 5-12
- **Final:** Monday, April 1
- **Classes end:** Tuesday, April 25

Letter Grade Distribution:

<i>Performance</i>	<i>Letter Grade</i>
Excellent, superior performance	A (93-100%), A- (90-92.9%)
Good performance	B+ (87-89.9%), B (83-86.9%), B- (80-82.9%)
Standard performance	C+ (77-79.9%), C (73-76.9%), C- (70-72.9%)
Substandard performance	D+ (67-69.9%), D (63-66.9%), D- (60-62.9%)
Unsatisfactory performance	E (0-59.9%)

Class Policy:**What you can expect from me**

- The exam questions will reflect the learning from the lectures and what was viewed in the Problem Sets;
- I usually answer emails within 24 hours on weekdays. During the weekend, I do not answer emails, and you will get your answer by the next Monday;
- I grade and provide feedback on assignments and exams within two weeks from the due date;
- I will create a safe environment for everyone to express their questions and comments;
- I will provide time for office hours as stated on page 1, where students can ask any question and talk about any issues/concerns relative to our course;
- Ignore emails asking me to raise grades by the end of the semester.

What I expect from you

- Come to class on time;
- Check out *Announcements* and new content updates as soon as possible;
- Take the exams on the scheduled dates. ***NO MAKE-UP EXAMS WILL BE ALLOWED;***
- I will not tolerate plagiarism of any kind. The Turnitin app will be turned on on Canvas.

Note 1: I support, recommend and suggest you to work together, but **you must provide your own answer sheet;**

Note 2: Partial credits will be given depending on the student's reasoning, meaning that only a correct final answer with no explanation does not count as partial.

Caveat! If two assignments are equal, both students will get a zero.

- Respectfully participate in in-class discussions and activities;
- Immediately notify me in the event of an emergency that prevents you from doing an exam or completing the course;
- Ask questions if any expectations or assignments are unclear.

Important Note:

This syllabus is meant to serve as an outline and guide for our course. Please note that I may modify it with reasonable notice to you. I may also modify the Course Schedule to accommodate the needs of our class. Any changes will be announced in class and posted on Canvas under *Announcements*.

Institutional Policies and Procedures:

Faculty and Student Responsibilities

All students are expected to maintain professional behavior in the classroom setting, according to the Student Code, spelled out in the Student Handbook. Students have specific rights in the classroom as detailed in Article III of the Code. The Code also specifies proscribed conduct (Article XI) that involves cheating on tests, plagiarism, and/or collusion, as well as fraud, theft, etc. Students should read the Code carefully and know they are responsible for the content. According to Faculty Rules and Regulations, it is the faculty responsibility to enforce responsible classroom behaviors, beginning with verbal warnings and progressing to dismissal from class and failing grade. "Students have the right to appeal such action to the Student Behavior Committee. "Faculty . . . must strive in the classroom to maintain a climate conducive to thinking and learning." PPM 8-12.3, B.

"Students have a right to support and assistance from the University in maintaining a climate conducive to thinking and learning." PPM 8-10, II. A.

Wellness Statement

Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student's ability to succeed and thrive at the University of Utah. For helpful resources contact the Center for Student Wellness: www.wellness.utah.edu, 801-581-7776.

Academic Dishonesty

The instructor of this course will take appropriate actions in response to Academic Dishonesty, as defined in the University's Student Code. Acts of academic dishonesty include but are not limited to:

- Cheating: using, attempting to use, or providing others with any unauthorized assistance in taking quizzes, tests, examinations, or in any other academic exercise or activity. Unauthorized assistance includes:
 - Working in a group when the instructor has designated that the quiz, test, examination, or any other academic exercise or activity be done individually;
 - Depending on the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments;
 - Substituting for another student, or permitting another student to substitute for oneself, in taking an examination or preparing academic work;
 - Acquiring tests or other academic material belonging to a faculty member, staff member, or another student without express permission;
 - Continuing to write after time has been called on a quiz, test, examination, or any other academic exercise or activity;
 - Submitting substantially the same work for credit in more than one class, except with prior approval of the instructor; or engaging in any form of research fraud.
- Falsification: altering or fabricating any information or citation in an academic exercise or activity.

- Plagiarism: representing, by paraphrase or direct quotation, the published or unpublished work of another person as one's own in any academic exercise or activity without full and clear acknowledgment. It also includes using materials prepared by another person or by an agency engaged in the sale of term papers or other academic materials.

Sexual Harassment

Title IX of the Education Amendments of 1972 prohibits sex discrimination against any participant in an educational program or activity that receives federal funds. The act is intended to eliminate sex discrimination in education. Title IX covers discrimination in programs, admissions, activities, and student-to-student sexual harassment. It is the policy of the University of Utah to maintain an academic and work environment free of sexual harassment for students, faculty, staff and participants. A claim under this policy may be brought by any faculty, staff member, student or participant based on the conduct of any University employee or student that is related to or in the course of University business. A claim may also be brought by an administrator acting on behalf of the University. The Office of Equal Opportunity and Affirmative Action (OEO/AA) will handle all alleged sexual harassment matters pursuant to the Procedures set forth in Policy 5-210.

Any student, staff, faculty member, or participant in university services or activities who believes that there is or has been sexual harassment should contact any of the following:

- the cognizant academic chair of the department or the dean of the college within which the conduct occurred;
 - the immediate supervisor or director of the operational unit within which the conduct occurred;
 - the Human Resources Division (Address: 420 Wakara Way, Suite 105, Salt Lake City, Utah 84108; Phone: 801-581-2169; TDD: 801-585-9070);
 - directors or deans of Student Affairs and Services (Associate Dean - SW 108; Phone: 801-581-8828);
 - or the Office of Equal Opportunity and Affirmative Action (201 South Presidents Circle, John Park Building, Room 135, Salt Lake City, Utah 84112; Phone/TDD: 801-581-8365).

Once informed, the supervisor, chair or dean shall consult with OEO/AA. Similarly, OEO/AA shall advise as appropriate the cognizant dean, staff director or administrator of any complaints of sexual harassment OEO/AA receives concerning a member of the faculty, staff or student body.

Withdrawal Policy and “I” Grade

Failure to withdraw from school results in a E or EU grade being recorded in all classes. Students may officially withdraw (W) from a class or all classes after the drop deadline through the midpoint of a course. A W grade is recorded on the transcript and appropriate tuition/fees are assessed. The grade of W is not used in calculating the students GPA.

An Incomplete grade can be given for work not completed due to circumstances beyond your control. You must be passing the course and have completed at least 80% of the required coursework. Arrangements must be made between you and the instructor concerning the completion of the work. You may not retake a course without paying tuition. If you attend class during a subsequent term, in an effort to complete the coursework, you must register for the course. Once the work has been completed, the instructor submits the grade to the Registrars Office. The I grade will change to an E if a new grade is not reported within one year. A written agreement between you and the instructor may specify the grade to be given if the work is not completed within one year. Copies of the agreement are kept by the instructor and the academic department.

Americans with Disabilities Act (ADA) Statement

The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in alternative format with prior notification to the Center for Disability Services. Additionally, the University endeavors to provide reasonable accommodations and to ensure equal access to qualified persons with disabilities. Inquiries concerning perceived discrimination or requests for disability accommodations may be referred to the University's Title IX/ADA/Section 504 Coordinator: Director, Office of Equal Opportunity and Affirmative Action, 201 South Presidents Circle, Rm. 135, Salt Lake City, UT, 84112. 801-581-8365 (voice/tdd), 801-585-5746 (fax). www.oeo.utah.edu.