

MATH 3070: APPLIED STATISTICS I

Fall 2018

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| Instructor: Jonathan Bown | Time: Tu,Th 6:00 – 7:30 PM |
| Email: bown@math.utah.edu | Place: CSC 10-12 |
| Website: www.math.utah.edu/ bown | Homepage: Canvas |

Office Hours: Tue, Thu 4:30 PM - 5:45 PM and by appointment, JWB 121 in my cubicle

Course Materials:

- Jay L. Devore, *Probability and Statistics for Engineering and the Sciences, Ninth Edition*, Cengage Learning, 2016. (Required)
- John Verzani, *Using R for Introductory Statistics, Second Edition*, CRC Press, 2014. (Optional)
- A calculator with statistics functions (a TI-83 or any calculator of equivalent or lesser functionality is fine, though if in doubt, ask me)
- You will need to download the [R statistical software package](#). I also highly recommend you download the R IDE [RStudio](#); this is very helpful when coding in R.

Course Description: MATH 3070 teaches the fundamentals of probability theory and principles of data analysis (including visualization and interpretation of data, data collection, statistical model building, roles of parameters, estimation theory and hypothesis testing). The general methodology is illustrated and supplemented by several data examples from engineering, chemistry, social and life sciences. Students are encouraged to participate in the classroom discussions.

The course comes with a computer lab. R statistical software is used to teach the students how theoretical considerations apply to real data. Students are introduced to statistical software, learn how to combine several R packages, test statistical software, and perform simulations including Monte Carlo and data driven simulations.

The data sets include changes in river flows, quality control, comparing traffic flow observations from several years and/or different locations, the role of gender in university admission and some financial data sets.

The students learn to get the data from several sources, including the Internet. Weekly assignments include the study of a data set. The data analysis and computing skills learned by students in this course are highly valued in the modern world.

The data analysis assignments are written as reports, explaining the data, the question which should be answered by the data analysis, the methodology used and the conclusion. Thus, the students practice how to write scientific reports, where the first part should be understandable for even non-experts. Graphical interpretation of the data is almost always included. The students present their findings in the classroom.

General Education: This course meets the Quantitatively Intensive (QI) requirement. This course addresses the following Expected Learning Outcomes: inquiry and analysis, quantitative literacy, information literacy, and foundations and skills for lifelong learning.

Prerequisites: Students must have passed MATH 1220 (Calculus II) or an equivalent with a “C” grade or better.

Corequisites: This is a lecture course in statistics. Students must be enrolled in the accompanying lab section in order to receive credit for this course. The lab will focus on statistical computing using R.

Tentative Course Outline: In this course, we will cover chapters 1 through 9 of Devore’s book. This will cover:

- Descriptive statistics and basic visualization
- Probability theory
- Discrete random variables and probability distributions
- Continuous random variables and probability distributions
- Joint probability distributions and random samples
- Point estimation
- Statistical intervals based on a single sample
- Tests of hypotheses based on a single sample
- Inferences based on two samples

Throughout the course, we will discuss statistical methodology and performing statistics using software, particularly using the R statistical software package.

Grading Policy: Students must pass both the lecture and lab sections of MATH 3070 in order to pass at all. A failing grade for either the lecture or lab (an E grade as defined below) will lead to an overall failure of MATH 3070.

Below describes how the final grade for MATH 3070 will be computed:

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| R Lab | 20% |
| Homework | 12% |
| Quizzes | 12% |
| First Midterm | 16% |
| Second Midterm | 16% |
| Final Exam | 24% |

Final grades will be assigned according to the following:

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| A | +93% |
| A- | 90–92% |
| B+ | 87–89% |
| B | 83–86% |
| B- | 80–82% |
| C+ | 77–79% |
| C | 73–76% |
| C- | 70–72% |
| D+ | 67–69% |
| D | 63–66% |
| D- | 60–62% |
| E | 0–59% |

Do not expect a curve to be applied.

Important Dates:

First Midterm Tuesday, September 18th 2018
Second Midterm TBD
Final Exam Tuesday, December 11th, 2018

Makeups: There will be no makeup exams, homework or quizzes under any circumstances. If you are unable to meet a deadline or attend an exam, I may make accommodations if I am notified prior to the due date or exam date in question. Decisions are made on a case-by-case basis.

Homework: Homework problems are assigned in class every Wednesday and are due the same day the following week. Each homework assignment has an equal contribution to your overall grade. Late homework will not be accepted. Assignments may be hand-written or typed. In order for you to receive credit for problems, you need to show your work. Even if you wish to use R for assignments, you still need to demonstrate that you know what it is the software is computing. If in doubt, show more work.

Quizzes: Quizzes take place roughly every Friday (except when a midterm exam is scheduled) in class and last 15 minutes. Quizzes cannot be taken at a different time for any reason unless previously arranged with me. Each quiz has an equal contribution to your overall grade.

Midterms: There will be two midterms. Midterms are not cumulative (in the sense that they cover material that was covered in a previous exam). The content of midterms roughly correspond to the material discussed in class between midterms. Partial credit on problems will be given, so be clear about the steps you took. Show your work.

Final: The final exam will be in the same classroom as the lecture. The date of the final is **Tuesday, December 11nd, 6:00-8:00PM**. The final exam will be cumulative. Partial credit on problems will be given, so be clear about the steps you took. Show your work.

Test Conduct: I will tolerate no talking during tests. All unapproved electronic devices must be silenced and put away out of sight. If I see or hear an unapproved electronic device, I may confiscate it and hold it until you leave the test. You may use an approved calculator during the test (cell phones are not approved under any circumstance). Tests are open-book and open-note. You cannot use outside books or printouts (at least not without consulting me). After you turn in your test, you may not pick it up again; submission is final.

Cheating: Anyone caught cheating will be given a failing grade in the course and reported to the proper University of Utah authorities for further penalization. There will be zero tolerance for cheating. Cheating includes (but is not limited to):

- Use of any improper electronic device (including cell phones and calculators with unacceptable features) or materials during a test
- Violation of test conduct
- Trying to look at your neighbor's work during a test
- Plagiarism (duplication of someone else's work without giving proper credit)
- Verbatim duplication of someone else's assignment (you are permitted to work together, but producing an exact duplicate of someone else's assignment is unacceptable; note that facilitating duplication, such as giving your homework to a student so he can copy your work, also counts as cheating even though you yourself are not using it to boost your grade)
- Not completing your work yourself (such as having someone else take your test)

Class Conduct: During normal class, I want all electronic devices silenced, though I will allow such devices to be used. Technology is an essential part of modern statistics so you may use technology in class so long as you are participating in the class. You are encouraged to bring a calculator; you will need it. I want you to participate in class, but please do not engage in side conversations. You are expected to be polite and conduct yourself in a professional manner. You should show me and your fellow students respect. Disruptive behavior (including violation of any of my requests mentioned above) will not be tolerated and may result in expulsion from the classroom.

Calculators: You may use calculators in class and during tests, including calculators with statistics functions (in fact, I insist you bring a calculator daily). Some calculators permitted include the Casio fx-115ES PLUS, the TI-36X Pro, the Sharp WriteView, the TI-89, and any calculator with lesser functionality than these or approved for the AP Statistics, the SAT, or the ACT exams. I recommend that if you do not know for a fact whether a calculator is approved, ask me. Otherwise, if I see you using a calculator with unacceptable functionality during a test, I may confiscate your calculator for the remainder of that test. Writing out the results of calculator output is not enough to get credit for a problem; you still must show the steps you took to reach your answer. Although calculators are important in this class, relying on your calculator alone to get through quizzes and exams will result in poor performance. You must show your work and use concepts in this class to derive answers.

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 Union Building, 581-5020 (V/TDD). CDS will work with you and me to make arrangements for accommodations. Other Policies: All University of Utah policies are in force, including the student code and dress standards. If you are an athlete, provide me all the proper documentation for any accommodations you need as soon as possible.

Students needing accommodation for University of Utah sanctioned events (such as athletics) need to give me the appropriate documentation at the beginning of the semester. If I do not receive this documentation, I am not obligated to accommodate you.

I reserve the right to make changes to this syllabus for any reason at any time. I will notify you via e-mail or Canvas when those changes are made. You are responsible for reading my messages.

Additional Resources: If you need assistance, I recommend you first go to the University of Utah Math Center (underground connecting JWB and LCB buildings) and the Tutoring Center located there. Sometimes they have statistics tutors there (check their tutor schedule) and they can provide free tutoring when available. There is a computer lab in the Math Center where tutoring takes place if you need access to a computer. You may also request a tutor from ASUU's tutoring services by visiting their office in SSB. There are online resources such as Khan Academy you may use as well. (I have compiled useful links at <http://math.utah.edu/~bown>.) If you need to see me, visit me during my office hours or e-mail me and schedule an appointment.