Syllabus
Math/Stat 3850 Foundations of Statistics
Fall 2019

Course
MATH/STAT 3850 Section 1 meets MWF 1:10-2pm in CKH 236
http://math.slu.edu/~clair/stat3850

Instructors
Dr. Bryan Clair
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Office Hours
I am frequently in the department chair office. Please check RH 103 if I'm not in RH 109.

Text
The textbook for this course is Speegle, Clair, Foundations of Statistics with R, which is freely available online. There is a link on our course web page.

Technology
We will be using the free, open source statistical software package RStudio in this course. RStudio is a modern graphical front-end to the R computer language. You are encouraged to install RStudio and R on your own computer. Software downloads, manuals, and help are available at https://www.r-project.org.

Homework
Homework will be due weekly. This will be a mix of DataCamp online work, written work and R exercises.
You will need to print results of R computations, but are welcome to write other solutions by hand. We do not accept electronically submitted homework. Your work should be neat and legible, with plenty of blank space on your pages so we have room to write comments. Staple your homework!
I encourage you to work together on homework, but write up results separately. Write your own R programs, even if you are helping each other.
I grade homework on a 10 point scale, though you cannot get less than 6 for a good faith effort handed in on time:
  10 All concepts well understood, at most a few minor mistakes.
  9 Most important concepts understood.
  8 Some conceptual issues. Important problems incorrect or missing.
  7 Lack of understanding of some key points. Many problems incorrect or missing.
  6 Serious difficulty understanding the material.
  5 Late
Late written homework is always accepted for half credit, but will not receive comments.

Exams
I give makeup exams only for severe and documented reasons.

Exam 1 Wednesday, October 2
Exam 2 Monday, November 11
Final Exam Friday, December 13, 12-1:50pm.

There will also be a few short take-home quizzes. There will be no makeup quizzes.
Grading

Grading is on a straight scale (uncurved), with $90\%, 80\%, 70\%, 60\%$ guaranteeing A, B, C, D respectively. Grading is weighted as follows:

- Homework: 30%
- Quizzes: 10%
- Exam 1: 15%
- Exam 2: 15%
- Final Exam: 30%

Course Description and Objectives

Descriptive statistics, probability distributions, random variables, expectation, independence, hypothesis testing, confidence intervals, regression and ANOVA. Applications and theory. Taught using statistical software.

Prerequisite: MATH 1520 Calculus II

At the completion of this course, students will be able to:

1. compute probabilities of an event, given a description of the experiment that defines the event.
2. use conditional probabilities; in particular, Bayes Rule and the Law of Total Probability.
3. recognize the type of random variable that an experiment describes.
4. determine whether random variables are independent, and make computations based on independence.
5. compute expected values of random variables, from the definition and from formulas.
6. find confidence intervals for means and proportions.
7. perform hypothesis testing of means and proportions.
8. perform and interpret single and multiple regression using $\texttt{R}$.
9. perform and interpret ANOVA using $\texttt{R}$.
10. write $\texttt{R}$ code which simulates an experiment in order to compute a probability.

Approximate Schedule

Week 1: R basics. Elementary probability.
Week 2: Probability, conditional probability, independence.
Week 4: Discrete RVs: geometric, binomial, Possion.
Week 5: Continuous RVs: Exponential, normal.
Week 6: Exam 1. Data manipulation with dplyr.
Week 7: Graphics with ggplot2.
Week 8: Data visualization.
Week 9: Sampling.
Week 10: Confidence intervals. Hypothesis testing.
Week 11: t-tests.
Week 12: Exam 2. Non-parametric tests. Significance and power.
Week 13: Linear regression.
Week 14: Multiple regression.
Week 15: Analysis of variance.

Academic Integrity

In this course: You are allowed to use any and all outside resources to help you complete your homework. Students who work together must write up results separately.

Exams and quizzes are open book and require computer use. The main restriction during these tests is that you must not communicate with other people, either in or outside of class. In cases when two or more students collaborate on an exam, all will be subject to penalties.
Academic Integrity: Academic integrity is honest, truthful and responsible conduct in all academic endeavors. The mission of Saint Louis University is “the pursuit of truth for the greater glory of God and for the service of humanity.” Accordingly, all acts of falsehood demean and compromise the corporate endeavors of teaching, research, health care, and community service through which SLU embodies its mission. The University strives to prepare students for lives of personal and professional integrity and therefore regards all breaches of academic integrity as matters of serious concern.

The governing University-level Academic Integrity Policy was adopted in Spring 2015, and can be accessed on the Provost’s Office website:

https://www.slu.edu/provost/policies

Additionally, each SLU college, school and center has adopted its own academic integrity policies, available on their respective websites. All SLU students are expected to know and abide by these policies, which detail definitions of violations, processes for reporting violations, sanctions, and appeals. Please direct questions about any facet of academic integrity to your faculty, the chair of the department of your academic program, or the dean/director of the college, school or center in which your program is housed.

Specific College of Arts and Sciences Academic Honesty Policies and Procedures may be found at:

http://www.slu.edu/arts-and-sciences/student-resources/academic-honesty.php

Title IX

Saint Louis University and its faculty are committed to supporting our students and seeking an environment that is free of bias, discrimination, and harassment. If you have encountered any form of sexual misconduct (e.g., sexual assault, sexual harassment, stalking, domestic or dating violence), we encourage you to report this to the University. If you speak with a faculty member about an incident that involves a Title IX matter, that faculty member must notify SLU’s Title IX coordinator (or that person’s equivalent on your campus) and share the basic facts of your experience. This is true even if you ask the faculty member not to disclose the incident. The Title IX contact will then be available to assist you in understanding all of your options and in connecting you with all possible resources on and off campus.

For most students on the St. Louis campus, the appropriate contact is Anna R. Kratky (DuBourg Hall, room 36; anna.kratky@slu.edu;314-977-3886). If you wish to speak with a confidential source, you may contact the counselors at the University Counseling Center at 314-977-TALK. To view SLU’s sexual misconduct policy, and for resources, please visit the following web addresses: https://www.slu.edu/here4you and https://www.slu.edu/general-counsel.

Disability Services

Students with a documented disability who wish to request academic accommodations must formally register their disability with the University. Once successfully registered, students also must notify their course instructor that they wish to use their approved accommodations in the course.

Please contact Disability Services to schedule an appointment to discuss accommodation requests and eligibility requirements. Most students on the St. Louis campus will contact Disability Services, located in the Student Success Center and available by email at Disability_services@slu.edu or by phone at 314.977.3484. Once approved, information about a student’s eligibility for academic accommodations will be shared with course instructors by email from Disability Services and within the instructor’s official course roster. Students who do not have a documented disability but who think they may have one also are encouraged to contact to Disability Services. Confidentiality will be observed in all inquiries.