

MSAN 601: Linear Regression Analysis (Fall 2017)

Class Time and Location: MW, 10:00 - 11:50 AM; 1:15 - 3:05PM in Howard 527

Instructor: James D. Wilson **Office:** 107B Harney Science Building **Email:** jdwilson4@usfca.edu

Office Hours: MW: 3:30 - 4:30 PM in Howard 5th floor Agora

Grader: Anshika Srivastava **Email:** asrivastava3@dons.usfca.edu

Course Overview: The focus of this course will be to provide you with the basic mathematical and computational techniques available for making informed, data-driven decisions using regression models. We will implement the models using the R programming language. We will discuss the following topics

- Distributional Theory: the Normal, t, Chi-Squared, and F distributions
- Statistical Inference: estimation, hypothesis tests, and confidence intervals
- Simple and Multiple Linear Regression
- Model Building and Variable Selection
- Outlier detection
- Model Diagnostics: outliers, multicollinearity, non-normality, autocorrelation
- Analysis of Variance (ANOVA)
- Logistic Regression
- Shrinkage Methods: the Lasso and Ridge Regression

Course Learning Outcomes: By the end of this course, students will be able to

- Formulate and apply classical simple and multiple linear regression models
- Formulate and test hypotheses and use models for both prediction and explanation
- Use R to load and manipulate data, fit regression models, and generate various outputs like ANOVA tables, confidence intervals for parameters, and diagnostic assessments
- Verify/test whether or not fitted residuals conform to the assumptions that underlie classical regression
- Identify and manage outliers and influential observations
- Assess and address multicollinearity, heteroscedasticity, autocorrelation, non-normality, model misspecification
- Communicate the results of complete and well-reasoned regression analysis

Course Website: <https://github.com/jdwilson4/Regression-Analysis>

Required Textbook: *Applied Linear Regression Models - 4th Edition* by Kutner, Nachtsheim, and Neter

What you are required to bring to class: Please bring a laptop to every class as well as a sunny disposition :)

Attendance: Attendance is required every day. It is your responsibility to catch up on any lecture material, homework, or programming lesson that you miss due to an absence and to notify me if you miss a class.

Assessment: Grades will be assigned according to the following assessment.

- **Assignments (30%):** You will be assigned computational and theoretical homework assignments to be completed and turned in on Canvas
- **Quizzes (20%):** Each week you will be given a short quiz that tests the main lessons taught in class from the previous week. These are given on Mondays at 9:00 AM
- **Final Exam (20%):** The final exam will be a comprehensive exam covering the main components of Regression analysis
- **Final Project (30%):** The final project will be a computational case study that brings together the techniques learned throughout the semester. The description for this project will be provided towards the mid point of the semester

Important Dates:

- Wednesday, August 23rd - First day of class
- Monday, September 4th - Labor Day Holiday, no class!
- Wednesday, October 11th - Last day of class!

Academic Integrity

As a Jesuit institution committed to *cura personalis* - the care and education of the whole person - USF has an obligation to embody and foster the values of honesty and integrity. USF upholds the standards of honesty and integrity from all members of the academic community. All students are expected to know and adhere to the University's Honor Code. You can find the full text of the code online at www.usfca.edu/academic_integrity. The policy covers:

- Plagiarism: intentionally or unintentionally representing the words or ideas of another person as your own; failure to properly cite references; manufacturing references.
- Working with another person when independent work is required.
- Submission of the same paper in more than one course without the specific permission of each instructor.
- Submitting a paper written by another person or obtained from the internet.
- The penalties for violation of the policy may include a failing grade on the assignment, a failing grade in the course, and/or a referral to the Academic Integrity Committee.

Students with Disabilities

If you are a student with a disability or disabling condition, or if you think you may have a disability, please contact USF Student Disability Services (SDS) at 415 422-2613 within the first week of class, or immediately upon onset of disability, to speak with a disability specialist. If you are determined eligible for reasonable accommodations, please meet with your disability specialist so they can arrange to have your accommodation letter sent to me, and we will discuss your needs for this course. For more information, please visit: <http://www.usfca.edu/sds> or call (415) 422-2613.

Behavioral Expectations

All students are expected to behave in accordance with the Student Conduct Code and other University policies (see <http://www.usfca.edu/fogcutter/>). Open discussion and disagreement is encouraged when done respectfully and in the spirit of academic discourse. There are also a variety of behaviors that, while not against a specific University policy, may create disruption in this course. Students whose behavior is disruptive or who fail to comply with the instructor may be dismissed from the class for the remainder of the class period and may need to meet with the instructor or Dean prior to returning to the next class period. If necessary, referrals may also be made to the Student Conduct process for violations of the Student Conduct Code.

Learning & Writing Center

The Learning & Writing Center provides assistance to all USF students in pursuit of academic success. Peer tutors provide regular review and practice of course materials in the subjects of Math, Science, Business, Economics, Nursing and Languages. <https://tutortrac.usfca.edu>. Students may also take advantage of writing support provided by Rhetoric and Language Department instructors and academic study skills support provided by Learning Center professional staff. For more information about these services contact the Learning & Writing Center at (415) 422-6713, email: lwc@usfca.edu or stop by our office in Cowell 215. Information can also be found on our website at www.usfca.edu/lwc.

Counseling and Psychological Services

Our diverse staff offers brief individual, couple, and group counseling to student members of our community. CAPS services are confidential and free of charge. Call 415-422-6352 for an initial consultation appointment. Having a crisis at 3 AM? We are still here for you. Telephone consultation through CAPS After Hours is available between the hours of 5:00 PM to 8:30 AM; call the above number and press 2.

Confidentiality, Mandatory Reporting, and Sexual Assault

As an instructor, one of my responsibilities is to help create a safe learning environment on our campus. I also have a mandatory reporting responsibility related to my role as a faculty member. I am required to share information regarding sexual misconduct or information about a crime that may have occurred on USF's campus with the University. Here are other resources:

- To report any sexual misconduct, students may visit Anna Bartkowski (UC 5th floor) or see many other options by visiting our website: www.usfca.edu/student_life/safer.
- Students may speak to someone confidentially, or report a sexual assault confidentially by contacting Counseling and Psychological Services at 415-422-6352.
- To find out more about reporting a sexual assault at USF, visit USF's Callisto website at: www.usfca.callistocampus.org.
- For an off-campus resource, contact San Francisco Women Against Rape (SFWAR) (415) 647-7273 (www.sfwar.org).

Student Accounts - Last day to withdraw with tuition reversal

Students who wish to have the tuition charges reversed on their student account should withdraw from the course(s) by the end of the business day on the last day to withdraw with tuition credit (census date) for the applicable course(s) in which the student is enrolled. Please note that the last day to withdraw with tuition credit may vary by course. The last day to withdraw with tuition credit (census date) listed in the Academic Calendar is applicable only to courses which meet for the standard 15-week semester. To find what the last day to withdraw with tuition credit is for a specific course, please visit the Online Class Schedule at www.usfca.edu/schedules.

Ability to Change Syllabus - I, James D. Wilson, will do my best as an instructor to abide by the guidelines set forth in this syllabus throughout the year. I do, however, have the right to change components of this syllabus at my own discretion if I deem such changes as necessary.