Applied Regression Analysis (STAT 308)

Fall 2022

LOYOLA
UNIVERSITY CHICAGO

Preparing people to lead extraordinary lives

Special Message:

THE COVID-19 PUBLIC HEALTH CRISIS has been incredibly stressful and difficult for everyone. In order to face it, we have to trust each other, come together as a community, and extend as much compassion and understanding as we possibly can. The highest priority will always be the health and well-being of our students, faculty, and staff. My goal is to facilitate your learning experience. To that end, I have done my best to design a high quality course which includes some built in flexibility to help deal with both known and unknown challenges that lie ahead. This class will follow guidelines set by Loyola University Chicago's https://www.luc.edu/returntocampus/ website. If you need any additional help or resources, or even an extension, please don't hesitate to let me know.

Course Description

Applied Regression Analysis provides students with a thorough introduction to applied regression methodology. The concept of simple linear regression will be reviewed, and multiple linear regression, transformations, indicator variables, multicollinearity, diagnostics, model building, polynomial regression, and logistic regression will be discussed. The course will focus on applications such as those from biometry and biostatistics (clinical trials, HIV studies, etc.), sports, engineering, agriculture and environmental science. Students are required to analyze real-life datasets using the R statistical software, although no previous programming experience is assumed.

When: TR 2:30 - 3:45 pm

Location: Dumbach Hall Room 236

Office Hours: Loyola Hall (Office 106)
  MW 1:00 pm - 2:30 pm
  TR 11:00 am - 12:30 pm
  Or by Appointment

Instructor

Matthew Stuart, PhD
Assistant Professor
✉ mstuart1@luc.edu
📍 Loyola Hall (Office 106)

Course Structure

- Class Time: Class will be composed of lecturing, discussions, collaborative activities, and R practice. Please come to class having done the reading, a charged computer, and ready to discuss and learn in a collaborative manner.
- Assessments: Students will complete homeworks, take (2) tests throughout the semester along with a cumulative final, and complete a semester long project.

- Group Work: One important aspect of a Jesuit education is learning to respect the rights and opinions of others. Please respect others by (1) allowing all classmates the right to voice their opinions without fear of ridicule, and (2) not making objectionable (gendered, racial or ethnic) comments, especially comments directed at a classmate. Group work and discussion are vital to this class since no one student will understand everything, please lean on each other for help and hear concepts and ideas from another perspective.

Textbook

Textbook: Applied Regression Analysis and Other Multivariable Methods 5th Edition - Kleinbaum, Kupper, Nizam, Rosenberg
   ISBN-13: 978-1285051086 ISBN-10: 1285051084

R and RStudio

WE WILL BE USING/INTRODUCING the free statistical software R. While R is the engine, we will use the free and open source IDE (Integrated Development Environment) RStudio Cloud to run it. You will be able to run RStudio Cloud anywhere you have internet connection.

RStudio Version "Spotted Waker-obin", Download the free version. https://www.rstudio.com/

   University computers have R installed on them and R support is offered through ITRS found here.

   If assistance is needed to obtain consistent use of a laptop please see Equipment Loan Program.

Asking Questions & Course Communication

Please feel free to use the discussion board on the Sakai course page to ask questions about homework, reading checks, R questions, and general course questions. (often times other students have the same questions that you do!)

Questions concerning individual grades or appointments should be addressed through email.

Tips for Success

- DEDICATE YOURSELF to being an active and engaged learner.
- WORK IN GROUPS TO learn and complete activities[1].
- ASK QUESTIONS! Ask them during class, office hours, or on the Sakai disucssion board.
- CONTRIBUTE TO a welcoming and inclusive learning environment.
- DON'T BE AFRAID to make mistakes, you learn from mistakes.

[1] Don't just copy, help each other.

Evaluation

STUDENTS WILL BE EVALUATED through (1) Homework; (2) 2 midterm exams; (3) a group project and presentation; (4) a final exam.

Final is cumulative.

Homework

Homework will typically be assigned on a weekly basis, which you will have one week to complete. These assignments will include exercises that require R to perform data analysis. For those questions, you will be required to include your code used to perform your analysis in order to receive full credit. Homework will be both assigned at due at 11:59 pm U.S. Central time on the dates outlined in the course schedule, unless otherwise specified. The total Homework grade will be calculated by the following formula:

HW Grade = 100% if HW% $\geq$ 80%

HW Grade = $\frac{5}{4}$ HW% if HW% < 80%

Tests

There will be 2 midterm exams during the semester. Missed tests may not be made up unless there is a serious reason for missing and arrangements are made prior to the test. The midterm exams will be comprised of 2 parts, one take-home exam and one in-class exam.[2]. Each portion will account for 50% of the respective exam grade (i.e. test 1 grade will be 50% take-home and 50% in-class). The final exam will be fully in-class.

[2] The take-home portion of the exam will focus on practical application of course material, and you will be expected to complete this on your own. The in-class portion of each exam will focus on conceptual knowledge of course material.

Group Project

There will be a semester-long group project to be completed in groups of 2 or 3. This project will consist of both a 10 minute presentation to be performed in front of the entire classroom as well as written paper submitted individually by each member of the group. Attendance at these presentations will be required for all students, even on days which you are not presenting. More details on the project tasks as well as rubrics for the paper and presentation will be provided in the first few weeks of the semester.

Grading

Grading Scale

93 - 100%	A
90 - 92.9%	A-
87 - 89.9%	B+
83 - 86.9%	B
80 - 82.9%	B-
77 - 79.9%	C+
73 - 76.9%	C
70 - 72.9%	C-
67 - 69.9%	D+
60 - 66.9%	D
Below 60%	F

Category	Weight
Homework	10%
Midterm Exams	20% Each
Group Paper/Presentation	25%
Final Exam	25%

Final grades will be rounded to nearest tenth of a percent. We reserve the right to alter the course grading scale. However, any alterations will be limited to those that would be beneficial to students (i.e. an upward grade curve).

Important Dates

See Loyola University Fall 2022 Academic Calendar for important information regarding final dates to add/drop courses, university holidays, and a link to the final exam schedule.

Student Academic Services

Tutoring

The www.luc.edu/tutoring embodies the mission of Loyola University Chicago by providing academic services and resources which foster development of skills and attitudes necessary to increase the knowledge and academic independence of all students. Through multiple learning services, the Tutoring Center helps to contribute towards student success and growth efforts that are made by Loyola University Chicago.

Math Club Tutoring: Check out https://www.luc.edu/math/tutoring.shtml for the math club's tutoring schedule.

Accommodations

Loyola University provides reasonable accommodations for students with disabilities. Any student requesting accommodations related to a disability or other condition is required to register with the Student Accessibility Center (SAC), located in Sullivan Center, Suite 117. Students will provide professors with an accommodation notification from SAC, preferably within the first two weeks of class. Students are encouraged to meet with their professor individually in order to discuss their accommodations. All information will remain con-

fidential. For more information or further assistance, please call 773.508.3700 or email ✉ sac@luc.edu.

Academic Integrity

Cheating is unacceptable in this class. You are expected to complete any assignment, quiz, and test on your own. Anyone caught cheating will receive a 0 for the assignment/quiz/test. If you're caught cheating the second time, you will receive an F for the course. We have to file a complaint with the University anytime a student is caught cheating. Additionally, a statement of cheating will be placed in your permanent file. For more details on Loyola's Academic Integrity Statement please see here.

Intellectual Property

All lectures, notes, slides, and other instructional materials in this course are the intellectual property of the professor. As a result, they may not be distributed or shared in any manner, either on paper or virtually without my written permission. Lectures may not be recorded without my written consent; when consent is given, those recordings may be used for review only and may not be distributed. Recognizing that your work, too, is your intellectual property, I will not share or distribute your work in any form without your written permission.

Diversity Equity and Inclusion

The diversity that students bring to this class, in all its forms, is viewed as a resource, a strength, and a benefit. It is my intent to invest in each student's success and attend to each student's learning needs, both in and out of class. It is my intent to present materials and activities that are respectful of diversity, equity and inclusion, and that students from all diverse backgrounds and perspectives be well-served by this course. Students in this course are encouraged to participate freely and share personal opinions, perspectives, and stories. There may be diverse, and perhaps contradictory ideas shared, in class. This variety is a strength of the academic community. Students are asked to show respect and treat peers in a way that validates various experiences and opinions based on a range of identities, including ability, economic class, ethnicity, faith tradition or no faith, gender identity and expression, nationality, religion, sexual orientation, veteran status, and their intersections.

Acts of bias, harassment, abuse, discrimination, relationship violence, sexual violence (i.e. sexual assault, sexual harassment, etc.), gender harassment, and stalking are not tolerated at Loyola. If you or someone you care about has

experienced any one of these crimes and/or violations of LUC Community Standards, please know that you have rights, reporting options, and other support services available to you. Please visit here for more information.

Land Acknowledgement

As we come together as a learning community, we need to acknowledge the land we live and work on by naming the Muscogee Creek, Cherokee, and Chickasaw Peoples upon whose unceded and stolen territory the university stands. Also, we should acknowledge the enslaved peoples, primarily of African descent, whose labour built much of the university. Visit LUC's Faculty Center for Ignatian Pedagogy land acknowledgement page for more information.

Campus Support Services

- ITS HelpDesk ✉ `helpdesk@luc.edu` ☎ 773-508-4487
- Library

    – Subject Librarian Greer Martin

- Student Accessibility Center
- Writing Center
- Ethics Hotline ☎ 855-603-6988
- Center for Tutoring and Academic Excellence
- Bookstore
- Financial Aid
- Wellness Center

    – Mental Health Appointment First Steps
    – For urgent, non-life threatening mental health needs ☎ 773-508-2530 **option 3**

Tentative Course Schedule

WEEK	DATE	CONTENT	ASSIGNMENT
Week 01	Aug 30 (Tues)	R basics & Chapter 3	
	Sept 1 (Thurs)	R basics & Chapter 3	**HW 1 Assigned**
Week 02	Sept 6 (Tues)	Chapter 5	
	Sept 8 (Thurs)	Chapter 5	**HW 1 Due, HW 2 Assigned**
Week 03	Sept 13 (Tues)	Chapter 5	
	Sept 15 (Thurs)	Chapter 5/6	**HW 2 Due, HW 3 Assigned**
Week 04	Sept 20 (Tues)	Chapter 6	
	Sept 22 (Thurs)	Chapter 7	**HW 3 Due, HW 4 Assigned**
Week 05	Sept 27 (Tues)	Section 14.2-14.3	
	Sept 29 (Thurs)	Section 14.2-14.3	**HW 4 Due, Take Home Exam 1 Assigned**
Week 06	Oct 4 (Tues)	Exam 1 Review	
	Oct 6 (Thurs)		**EXAM 1, Take Home Exam 1 Due**
Week 07	Oct 11 (Tues)	Fall Break (No Class)	
	Oct 13 (Thurs)	Chapter 8/Appendix B	**HW 5 Assigned**
Week 08	Oct 18 (Tues)	Appendix B/Chapter 9	
	Oct 20 (Thurs)	Chapter 9	**HW 5 Due, HW 6 Assigned**
Week 09	Oct 25 (Tues)	Chapter 11	
	Oct 27 (Thurs)	Chapter 11/12	**HW 6 Due, HW 7 Assigned**
Week 10	Nov 1 (Tues)	Chapter 12/Section 14.3	
	Nov 3 (Thurs)	Inauguration Day (No Class)	**HW 7 Due, HW 8 Assigned**
Week 11	Nov 8 (Tues)	Section 14.4/Chapter 15	
	Nov 10 (Thurs)	Chapter 15/16	**HW 8 Due, Take Home Exam 2 Assigned**
Week 12	Nov 15 (Tues)	Chapter 16/Exam 2 Review	
	Nov 17 (Thurs)		**EXAM 2, Take Home Exam 2 Due**
Week 13	Nov 22 (Tues)	Chapter 22/Group Meetings	
	Nov 24 (Thurs)	Thanksgiving Break (No Class)	
Week 14	Nov 29 (Tues)	Project Presentations	
	Dec 1 (Thurs)	Project Presentations	**Project Paper Due**
Week 15	Dec 6 (Tues)	Chapter 22	
	Dec 8 (Thurs)	Chapter 22/Final Exam Review	

Statistics may be defined as "a body of methods for making wise decisions in the face of uncertainty."   — W.A. Wallis