

EFOP 2410
Applied Regression Analysis
School of Education, University of Pittsburgh
Fall Term 2023

Tuesday 12:00 pm – 2:40 pm
5603 Wesley W Posvar Hall

Instructor: Xu Qin (xuqin@pitt.edu)

Office Hour: By appointment

Teaching Assistant: Tetsuya Yamada (tey15@pitt.edu)

Office Hour: By appointment

Course Overview:

This course offers an introduction to regression analysis. Regression is one of the most important statistical analysis tools in a data analyst's toolkit. These models allow you to assess the relationship between variables. The course blends theory and applications -- avoiding the extremes of presenting unneeded theory in isolation, or of giving application tools without the foundation needed for practical understanding. You will learn the fundamental theory behind regression and, through data examples, learn to utilize regression models to examine relationships between variables. Study of topics include model specification and assumptions, estimation and inference of model parameters, model diagnostics, and variable selection techniques, etc. The course will be predominantly lecture format, with details on how to use SPSS software for all statistical analyses.

The course will serve two purposes: a) convey sufficient knowledge and skill regarding regression techniques to enable students to apply these procedures properly in their own research, and b) lay the foundation for more advanced studies in multivariate analysis, structural equation modeling, and multilevel modeling. This course is frequently taken by students wishing to solidify and extend their quantitative and statistical data analysis skills.

Prerequisites

Statistics I (EFOP 2018) or an equivalent introductory statistics course which covers descriptive statistics, correlation analysis and simple linear regression, and statistical hypothesis testing.

Textbook:

Cohen, J., Cohen, P., West, S.G., & Aiken, L.S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences*, 3rd edition. Mahwah, NJ: LEA.

Please use this permalink for accessing the e-textbook *Applied multiple regression/correlation analysis for the behavioral sciences*: <https://www.oreilly.com/library/view/applied-multiple-regressioncorrelation/9780805822236/?ar>

Click "Institution not listed?", and then enter your Pitt email address. Once you add your email address, you will be prompted to authenticate with your Pitt credentials. Once you authenticate, you will have access to the book.

Software:

Statistical computing is an integral part of EFOP 2410. We will use SPSS, a copy of which can be obtained from the PITT download center (<http://software.pitt.edu/>). I assume that you have used SPSS to perform statistical analyses in the past. Introductory materials of SPSS are made available on Canvas in case you have not used it before. It is fine if you prefer to use other statistical software (e.g., SAS, STATA, and R) for your assignments.

Course Documents:

- **Before class: One week before the lecture date listed on the last page, slides, lab materials, and assignment for the lecture will be posted on Canvas.** To get prepared for the lecture, please read the associated chapters listed on the last page, slides, and lab materials before the lecture date.
- **In class: On the lecture date, we meet in the classroom. Please bring hard copies of the slides for you to take notes. Please also bring your laptops. However, laptops can be used only when we go over the SPSS implementation. If you are not able to attend due to a valid emergency, you should let me know beforehand. Class participation accounts for 5% of the final grade.** In each lecture, I will introduce the concepts and show how to use statistical methods to address substantive research questions by conducting analyses and interpreting the results. You are strongly encouraged to ask questions in class.
- **After class: Pre-recorded short videos of the lecture will be posted on Canvas right after the class.** The videos will help you review the key knowledge points that you may not fully grasp in class.

Collaboration and Study Groups:

Collaborative learning is central to this course and serves as a way to foster deep learning. 5 students from different disciplines are assigned to one study group. Discussions about the course materials within study groups are strongly encouraged. **In class, you will be given a chance to discuss in groups. After class, you may choose different ways to discuss with your group members.** Your group can discuss by posting your questions and comments on the Canvas group discussion board in your own group's view (click your group number on the right of your Canvas homepage). Your group can also meet in person or online. **Should there be any questions that your group cannot address, please post them on the discussion board that is visible to the whole class (see main menu on the left of your homepage). The TA and I will respond to you periodically.**

Homework Assignments:

There will be a homework assignment associated with every lecture. Assignments will assess knowledge of both theoretical principles and application methods. **Each assignment will be posted on Canvas two weeks before the due date and must be submitted by 11:59 pm on the due date listed on the last page.** This will allow you to have a chance to ask questions about the assignment in class on the due date.

- Please submit your assignment following the instruction here:
<https://community.canvaslms.com/t5/Student-Guide/How-do-I-upload-a-file-as-an-assignment-submission-in-Canvas/ta-p/274>
- Collaborations within assigned study groups are encouraged. Please understand that each student must turn in individual homework assignments, not group work. Your text should reflect your own understanding of the material. **Students who submit group homework assignments will be given zeros.** To properly acknowledge the contribution of your collaborators, please indicate on the cover page of each assignment the names of the people with whom you worked.
- Because solutions to assignments will be posted on Canvas right after the due time, **late assignment will not be accepted.** In a valid emergency appropriate accommodations will be made. It is best, if possible, to contact the instructor prior to the due date.
- If you have questions/concerns about your grades, please directly email the instructor and TA rather than leaving a comment on the Canvas grading page, because we will not get automatic notifications.

Midterm and Final Examinations:

There will be one midterm exam and one final exam. Exams will assess knowledge of both theoretical principles and application methods. Exams will take place during the regular class time on the dates listed on the last page. Each exam will be closed book, but you will be permitted to use a single two-side 8.5x11 sheet of paper that summarizes key knowledge points. The sheet will also serve as a useful resource for your future reference. If you will miss an exam, please let me know as soon as possible.

Additional Practice:

There are exercises/problems at the end of each chapter in the textbook, and you are strongly encouraged to go over them carefully. You may not need to do all of the exercises, but you should do as many of them as you can (or need).

Grading:

You will be evaluated on the basis of your class participation (5%), weekly assignments (55%), midterm exam (20%), and the final exam (20%).

Letter grades will be based on actual points earned as follows:

Point	Letter		Point	Letter
≥ 93	A		74 - < 77	C
90 - < 93	A-		70 - < 74	C-
87 - < 90	B+		67 - < 70	D+
84 - < 87	B		64 - < 67	D
80 - < 84	B-		60 - < 64	D-
77 - < 80	C+		<60	F

Academic Integrity:

Please make sure you read the university guidelines on Academic integrity (<http://www.pitt.edu/~provost/ai1.html>). Attention to this policy is particularly important in a course like EFOP 2018, in which collaboration with other students is encouraged. If, for instance, you work closely with other students during the planning, execution, or interpretation of your data analyses – a process that I encourage and fully support – you should make sure that the other students' contributions are recognized explicitly in your written account. If you have any questions about what constitutes appropriate collaboration, or how to define what constitutes your own work, please see me.

Special Accommodation:

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services, 140 William Pitt Union, (412) 648-7890/(412)383-7355 (TTY), as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

Course Outline (subject to change)

Week	Date	Topic	Reading	Assignment Due
1	08/29/2023	Review of basic statistical concepts Correlation	Chapter 2	
2	09/05/2023	Simple linear regression (I)	Chapter 2	Assignment 1
3	09/12/2023	Simple linear regression (II)	Chapter 2	Assignment 2
4	09/19/2023	Multiple linear regression (I)	Chapter 3 (3.1 – 3.4)	Assignment 3
5	09/26/2023	Multiple linear regression (II)	Chapter 3 (3.5 – 3.6)	Assignment 4
6	10/03/2023	Diagnostics (I)	Chapter 4	Assignment 5
7	10/10/2023	Diagnostics (II) Midterm review	Chapter 10 Chapter 6 (6.1, 6.2)	Assignment 6
8	10/17/2023	In-class midterm exam		
9	10/24/2023	Review of midterm exam Model building	Chapter 5 (5.3 – 5.5)	Assignment 7
10	10/31/2023	Categorical independent variables	Chapter 8 (8.1 – 8.3, 8.5)	Assignment 8
11	11/07/2023	Interaction with categorical variables	Chapter 9	Assignment 9
12	11/14/2023	Interactions among continuous variables Mediation Power analysis	Chapter 7 Chapter 3 (3.7) Chapter 5 (5.6)	Assignment 10
13	11/21/2023	No class		
14	11/28/2023	Logistic regression	Chapter 13 (13.1 – 13.2)	Assignment 11
15	12/05/2023	Final review		Assignment 12
16	12/12/2023	In-class final exam		