AMS 578 - Regression Theory

Spring 2023; 5:00 PM - 6:20 PM; Tue & Thu

Instructor Information

Instructor Hyunwook Koh, Ph.D. Email hyunwook.koh@stonybrook.edu

Office Location & Hours B521; 3:00 PM - 4:30 PM; Mon & Wed (or by appointment)

Course Information

Course Description

Regression analysis is one of the most widely used techniques for analyzing multifactor data. Its broad appeal and usefulness result from the conceptually logical process of using an equation to express the relationship between a variable of interest (the response) and a set of related predictor variables. Regression analysis is also interesting theoretically because of elegant underlying mathematics and a well-developed statistical theory. Successful use of regression requires an appreciation of both the theory and the practical problems that typically arise when the technique is employed with real-world data. This course blends both theory and application so that students will gain an understanding of the basic principles necessary to apply regression model-building techniques in a wide variety of application environments.

Teaching Mode

All classes will be held in-person (B314).

Course Materials

All the course materials (e.g., lecture notes, programming notes, assignments) can be found on **Brightspace**.

Textbook

"Introduction to Linear Regression Analysis" by D.C. Montgomery, E.A. Peck, and G.G. Vining, 5th edition; Wiley & Sons; ISBN: 978-0-470-54281-1 (Required)

"An Introduction to Statistical Learning with Applications in R" by G. James, D. Witten, T. Hastie, R. Tibshirani; Springer(Optional)

"Mathematical Statistics and Data Analysis" by J.A. Rice, 3rd edition; Duxbury Advanced Series (Optional)

"Statistical Inference" by G. Casella and R.L. Berger, 2nd edition; Duxbury Advanced Series (Optional)

Pre-requisite

AMS 572 (Data Analysis 1)

Academic Integrity

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/uaa/academicjudiciary/

School Policy on Attendance

- 1. If a student has over 20% unexcused absences, the student's final course grade will be an F.
- 2. Students should report the reason of absence to the professor in advance, or immediately after the absence.
- 3. When a student excuses his/her absence, the student must provide documentation of the reason for the absence to the professor.
- 4. The professor of the course reserves the right to excuse absences.
- 5. The professor may excuse the absence if the submitted documentation fulfills the following conditions: extreme emergences, severe medical reasons with doctor's note, very important events.

Critical incident Management

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn.

Course Evaluations

Stony Brook University values student feedback in maintaining the high-quality education it provides and is committed to the course evaluation process, which includes a mid-semester assessment as well as an end-of-the-semester assessment, giving students a chance to provide information and feedback to an instructor which allows for development and improvement of courses. Please click the following link to access the course evaluation system: http://stonybrook.campuslabs.com/courseeval/

Grading

Final grade = *f*(Attendance[5%] + Homework[5%] + Midterm [40%] + Final [50%]); ABCDF grading; 3 credits

Total score	Final grade	
94 - 100	Α	
90 - 93	A-	
87 - 89	В+	
84 - 86	В	
81 - 83	В-	

78 - 80	C+
75 - 77	С
72 - 74	C-
69 - 71	D+
66 - 68	D
61 - 65	D-
≤ 60	F

Tentative Course Schedule

No.	Date	Торіс	Homework
1	Feb 28	Introduction	TBA
2	Mar 2	Simple Linear Regression	TBA
3	Mar 7	Simple Linear Regression	TBA
4	Mar 9	Simple Linear Regression	TBA
5	Mar 14	Multiple Linear Regression	TBA
6	Mar 16	Multiple Linear Regression	TBA
7	Mar 21	Multiple Linear Regression	TBA
8	Mar 23	Model Adequacy Checking	TBA
9	Mar 28	Model Adequacy Checking	TBA
10	Mar 30	Transformation and Weighting to Correct Model Inadequacies	TBA
11	Apr 4	Transformation and Weighting to Correct Model Inadequacies	TBA
12	Apr 6	Diagnostics for Leverage and Influence	TBA
13	Apr 11	Diagnostics for Leverage and Influence	TBA
14	Apr 13	Midterm	
15	Apr 18	Polynomial Regression Models	TBA
16	Apr 20	Polynomial Regression Models	TBA
17	Apr 25	Polynomial Regression Models	TBA
18	Apr 27	Multicollinearity	TBA
19	May 2	Multicollinearity	TBA
20	May 4	Multicollinearity	TBA
21	May 9	Variable Selection and Model Building	ТВА
22	May 11	Variable Selection and Model Building	TBA
23	May 16	Variable Selection and Model Building	ТВА

No.	Date	Торіс	Homework
24	May 18	Validation of Regression Models	ТВА
25	May 23	Validation of Regression Models	ТВА
26	May 25	Introduction To Nonlinear Regression	ТВА
27	May 30	Introduction To Nonlinear Regression	ТВА
28	Jun 1	Introduction To Nonlinear Regression	ТВА
29	Jun 6	No Class (Memorial Day)	
30	Jun 8	No Class (Reading Day)	
31	Jun 15	Final	

Exam Schedule

Date	Subject
Apr 13	Midterm
Jun 15	Final