Undergraduate Course Syllabus

MAT 300: Applied Statistics II: Regression Analysis

Center: Online

Course Prerequisites

MAT 240, MAT 241, or MAT 243

Course Description

This is a second course in statistics that builds upon knowledge gained in an introduction to statistics course. Students will learn to build statistical models and implement regression analysis in real-world problems from engineering, sociology, psychology, science, and business. Topics include multiple regression models (including first-order, second-order and interaction models with quantitative and qualitative variables), regression pitfalls, and residual analysis. Students will gain experience not only in the mechanics of regression analysis (often by means of a statistical software package) but also in deciding on appropriate models, selecting inferential techniques to answer a particular question, interpreting results, and diagnosing problems.

Course Outcomes

- Construct multiple regression models, including first-order, second-order, and interaction models with both quantitative and qualitative variables
- Assess whether a multiple regression model fits the sample data
- Implement regression analysis in real-world problems from engineering, sociology, psychology, science, or business
- Implement stepwise regression for variable screening
- Identify potential problems one may encounter when conducting regression analysis
- Demonstrate how residuals may be used to detect departures from model assumptions
- Speak clearly about regression analysis in both mathematical and lay language

Required Materials

Using your learning resources is critical to your success in this course. Please purchase directly through the SNHU Online Bookstore rather than any other vendor. Purchasing directly from the bookstore ensures that you will obtain the correct materials and that the IT Service Desk, your advisor, and the instructor can provide you with support if you have problems.

A Second Course in Statistics: Regression Analysis - With CD
William Mendenhall
Prentice Hall, Inc.
8th Edition

2020
ISBN: 978-0-13-516379-5

Software Requirement

This course requires the use of Minitab.

- One week before the start of class, students enrolled in this course will be assigned a Minitab account by ITS Instructional Support. You will receive an email from Minitab Customer Support saying, "Welcome to your Minitab Statistical Software Subscription". Follow the directions in the email to get started.
- If you do not receive this email, please contact ITS Instructional Support.

Microsoft Imagine

Southern New Hampshire University students are able to obtain discounted, often free, Microsoft software for technology courses through the Microsoft Imagine program. Go to the SNHU Academic Software Center and request an account from the right panel to begin managing your software. If you have trouble downloading and installing the software, please request access to SNHU's virtual desktop (VDI) environment from your instructor.

Diversity, Equity, and Inclusion

As indicated in our core values, SNHU is committed to "embrace diversity where we encourage and respect diverse identities, ideas, and perspectives by honoring difference, amplifying belonging, engaging civilly, and breaking down barriers to bring our mission to life."

This may or will be reflected in SNHU's curriculum as we embrace and practice diversity, equity, and inclusion (DEI) to provide the most transformative experience for our students, faculty, and staff. Because topics pertaining to DEI can be sensitive, please remember that embodying and practicing diversity, equity, and inclusion is one of our core values that you will encounter throughout the academic experience. In higher education, we are expected to think and engage critically. Use a growth mindset to embrace the diverse readings, course assignments, and experiences of your peers and faculty.

For more information about DEI at SNHU, please visit our website at the Office of Diversity and Inclusion.

Instructor Availability and Response Time

Your class interaction with the instructor and your classmates will take place on a regular, ongoing basis. Your instructor will be actively engaged within the course throughout the week. You will normally communicate with your instructor in the weekly discussions or the General Questions discussion topic so that your questions and the instructor's answers benefit the entire class. You should feel free, however, to communicate with your instructor via SNHU email at any time, particularly when you want to discuss something of a personal or sensitive nature. Your instructor will generally provide a response within 24 hours. Instructors will post grades and feedback (as applicable) within seven days of an assignment's due date, or within seven days of a late submission.

Grade Distribution

Assignment Category	Number of Graded Items	Point Value per Item	Total Points
Discussions	4	35	140
Homework	6	65	390
Midterm	1	120	120
Final Project	1	350	350
			Total Course Points: 1,000

This course may also contain practice activities. The purpose of these non-graded activities is to assist you in mastering the learning outcomes in the graded activity items listed above.

University Grading System: Undergraduate

Grade	Numerical Equivalent	Points
A	93–100	4
A-	90–92	3.67
B+	87–89	3.33
B	83–86	3
B-	80–82	2.67
C+	77–79	2.33
C	73–76	2
C-	70–72	1.67
D+	67–69	1.33
D	60–66	1
F	0–59	0
I	Incomplete	
IF	Incomplete/Failure *	
IP	In Progress (past end of term)	
W	Withdrawn	

* Please refer to the policy page for information on the incomplete grade process.

Grading Guides

Specific activity directions, grading guides, posting requirements, and additional deadlines can be found in the Assignment Guidelines and Rubrics section of the course.

Weekly Assignment Schedule

All reading and assignment information can be found within each module of the course. Assignments and discussion posts during the first week of each term are due by 11:59 p.m. Eastern Time. Assignments and discussion posts for the remainder of the term are due by 11:59 p.m. of the student's local time zone.

In addition to the textbook readings that are listed, there may be additional required resources within each module.

Module	Topics and Assignments
1	Introduction and Review of Multiple Linear Regression Topic I: Linear Regression With One Predictor Topic II: General Form of the Multiple Regression Model Topic III: Constructing a First-Order Multiple Linear Regression Model *A Second Course in Statistics: Regression Analysis*: Sections 4.1–4.8 1-1 Discussion: Getting Started 1-2 Introduction to Minitab 1-3 Discussion: Module One Homework Questions 1-4 Practice Exercises 1-5 Homework: Problem Set
2	Using Models for Estimation and Prediction Topic I: Confidence Intervals and Prediction Intervals Topic II: Quantitative and Qualitative Variables *A Second Course in Statistics: Regression Analysis*: Sections 4.9, 5.1, and 5.2; Case Study 2 2-1 Discussion: Module Two Homework Questions 2-2 Practice Exercises 2-3 Homework: Problem Set 2-4 Final Project: Review
3	Additional Multiple Regression Models and Comparison of Nested Models Topic I: An Interaction Model With Quantitative Predictors Topic II: A Quadratic (Second-Order) Model With a Quantitative Predictor Topic III: A Test for Comparing Nested Models *A Second Course in Statistics: Regression Analysis*: Sections 4.10, 4.11, and 4.13; Case Study 2 3-1 Discussion: Using Quadratic Terms in Multiple Regression Models 3-2 Discussion: Module Three Homework Questions 3-3 Practice Exercises 3-4 Homework: Problem Set 3-5 Final Project: Topic & Introduction Due
4	Models With Quantitative Independent Variables Topic I: Higher-Order Models With a Single Quantitative Predictor Topic II: Higher-Order Models With More Than One Quantitative Predictor *A Second Course in Statistics: Regression Analysis*: Sections 5.3–5.5 4-1 Discussion: Module Four Questions 4-2 Practice Exercises 4-3 Midterm Exam 4-4 Final Project: Continue Work

Module	Topics and Assignments
5	Models With Qualitative Independent Variables Topic I: Multiple Regression Models With a Single Qualitative Predictor Topic II: Multiple Regression Models With Two Qualitative Predictors Topic III: Multiple Regression Models With Qualitative and Quantitative Predictors *A Second Course in Statistics: Regression Analysis*: Sections 5.7–5.10 5-1 Discussion: Qualitative Data 5-2 Discussion: Module Five Homework Questions 5-3 Practice Exercises 5-4 Homework: Problem Set 5-5 Final Project: Continue Work
6	Regression Diagnostics Topic I: Residual Analysis Topic II: Detecting Lack of Fit Topic III: Detecting Unequal Variance Topic IV: Checking the Normality Assumption *A Second Course in Statistics: Regression Analysis*: Sections 8.1–8.6; Case Studies 4 and 5 6-1 Discussion: Module Six Homework Questions 6-2 Practice Exercises 6-3 Homework: Problem Set 6-4 Final Project: Continue Work
7	Stepwise Regression Topic I: Stepwise Regression *A Second Course in Statistics: Regression Analysis*: Sections 6.1, 6.2, and 6.4; Case Study 3 7-1 Discussion: Module Seven Questions 7-2 Practice Exercises 7-3 Final Project: Submit
8	Regression Pitfalls Topic I: Observational Data and Designed Experiments Topic II: Parameter Estimability and Interpretation Topic III: Multicollinearity Topic IV: Extrapolation Topic V: Variable Transformations *A Second Course in Statistics: Regression Analysis*: Sections 7.1–7.6 8-1 Discussion: Pitfalls in Regression 8-2 Discussion: Module Eight Homework Questions 8-3 Practice Exercises 8-4 Homework: Problems Set

Course Participation

Course participation is required within the first week of the term for all online courses. *Participation* in this context is defined as completing one graded assignment during the first week of the course. Otherwise, students will be administratively removed for nonparticipation. Students who do not participate during the first week may forfeit their rights to be reinstated into the course. Students who stop attending a course after the first week and who do

not officially withdraw will receive a grade calculated based on all submitted and missed graded assignments for the course. Missed assignments will earn a grade of zero. See the course withdrawal policy and the full attendance policy for further information.

Late Assignments

Students who need extra time may submit assignments (excluding discussion board postings) up to one week after the assignment due date. Discussion board submissions will not be accepted for credit after the deadline except in extenuating circumstances.

- A penalty of 10 percent of the total value of the assignment will be applied to the grade achieved on the late assignment regardless of the day of the week on which the work is submitted.
- Students who submit assignments more than one week late will receive a grade of zero on the assignment unless they have made prior arrangements with the instructor.

Students must submit all assignments no later than 11:59 p.m. (in their own time zone) on the last day of the term. No assignments are accepted after the last day of the term unless an incomplete has been submitted. See the incomplete grades policy.

There may be times an instructor makes an exception to the late assignment policy. Instructors may accept late work, including discussion board posts, with or without prior arrangement.

- Exceptions to the late policy on these grounds are left to the instructor's discretion, including whether the late penalty is applied or waived. Students should not assume that they will be allowed to submit assignments after the due dates.
- If an instructor finds that they are unable to determine whether an exception to the late policy would be appropriate without documentation, the collection and review of student documentation should be handled through the Dispute Resolution team in order to protect the student's privacy. In these cases, students should file a Student Concern Dispute form to have the circumstances reviewed.

If a student is experiencing (or knows they will experience) a circumstance, including pregnancy, that is protected under the Americans with Disabilities Act or Title IX, they are encouraged to contact the Online Accessibility Center (OAC) as soon as possible to explore what academic accommodations might be offered. Instructors must honor all deadlines established through the OAC.

Student Handbook

Review the student handbook.

ADA/504 Compliance Statement

Southern New Hampshire University (SNHU) is dedicated to providing equal access to individuals with disabilities in accordance with Section 504 of the Rehabilitation Act of 1973 and with Title III of the Americans with Disabilities Act (ADA) of 1990, as amended by the Americans with Disabilities Act Amendments Act (ADAAA) of 2008.

SNHU prohibits unlawful discrimination on the basis of disability and takes action to prevent such discrimination by providing reasonable accommodations to eligible individuals with disabilities. The university has adopted the

ADA/504 Grievances Policy (version 1.2 effective October 16, 2017), providing for prompt and equitable resolution of complaints regarding any action prohibited by Section 504 or the ADA.

For further information on accessibility support and services, visit the Disability and Accessibility Services webpage.

Academic Integrity Policy

Southern New Hampshire University requires all students to adhere to high standards of integrity in their academic work. Activities such as plagiarism and cheating are not condoned by the university. Review the full academic integrity policy.

Copyright Policy

Southern New Hampshire University abides by the provisions of United States Copyright Act (Title 17 of the United States Code). Any person who infringes the copyright law is liable. Review the full copyright policy.

Withdrawal Policy

Review the full withdrawal policy.

Southern New Hampshire University Policies

More information about SNHU policies can be found on the policy page.