King Fahd University of Petroleum and Minerals

Department of Mathematics

STAT 510 Syllabus, Term 251 (2025-26)

Instructor: Dr. Nasir Abbas (nasirabbas@kfupm.edu.sa)

Course Title: Regression Analysis

Course Credit Hours: 3-0-3

Textbook: M.H. Kutner, C.J. Nachtsheim, J. Neter and W. Li (2005). Applied Linear Statistical Models. Fifth Edition, McGraw-Hill International.

Supplementary Books:

- Linear Regression Models - Applications in R by John P. Hoffman, Chapman & Hall/CRC (2021).
- Introduction to Linear Regression Analysis by Montgomery, Peck and Vinning, 6th edition, Wiley (2021).

Software Package: R language and R studio.

Course Objective: The main objective of course is to present linear and nonlinear regression models, explain different methods of parameters estimation and inference, demonstrate the use statistical package(s) to analyze datasets.

Course Description: Simple linear regression and multiple regressions with matrix approach. Development of linear models. Inference about model parameters. Residuals Analysis. Analysis of variance approach. Selection of the best regression equation. Using statistical packages to analyze real data sets.

Prerequisite: Graduate Standing.

Note: Cannot be taken for credit with STAT 511.

Course Learning Outcomes: Upon successful completion of the course, a student should be able to

- Develop linear and nonlinear regression models
- Perform residuals analysis and inference about model parameters
- Build models using several model building approaches
- Use statistical packages to analyze real data sets
- Use the fitted regression model for prediction/forecasting

Grading Policy:

Activity	Weight
Classwork (quizzes, assignments, attendance, bonuses, etc.)	15%
Project	20%
Midterm Exam	30%
Final Exam (Comprehensive)	35%

Academic Integrity: All KFUPM policies regarding ethics and academic honesty apply to this course.

Excuse: In case a student misses an exam (Exam I, Exam II, or the Final Exam) for a legitimate reason (such as medical emergencies), he/she must bring an official excuse from Students Affairs. Otherwise, he/she will get a score of zero in the missed exam.

Cheating and Plagiarism: Cheating or any attempt at cheating by use of illegal activities, techniques and forms of fraud will result in a grade of DN in the course along with reporting the incident to the higher university administration for further action. Cheating in exams includes (but is not restricted to):

- Looking at the papers of other students.
- Talking to other students.
- Using mobiles, smart watches or any other electronic devices.

Mobiles: The use of mobiles is *strictly banned* during class. Students are required to keep their phones off/silent and placed inside their pockets during the class timings.

Project: Project Guidelines will be uploaded to Blackboard, and guidelines for the report will also be posted there. The instructor will form project groups.

Letter Grades: The letter grades will follow a grading curve, which depends on the average of all students enrolled in the course.

Attendance Notes:

Students are expected to attend all lectures.

- If a student misses a class, he/she is responsible for any announcement made in that class.
- After being warned twice by the instructor, a DN grade will be awarded to any student who accumulates
    - 6 unexcused absences (20%), or,
    - 10 excused and unexcused absences (33%)

Use of AI Tools (like ChatGPT):

- Students are encouraged to use AI responsibly as a learning aid for understanding lecture content, practicing statistical concepts, and preparing for exams.
- However, the use of AI during quizzes and exams is *strictly prohibited* and will be treated as an academic integrity violation.

Coverage Plan

Chapter	Title
1	Linear Regression with One Predictor Variable
2	Inferences in Regression and Correlation Analysis
3	Diagnostics and Remedial Measures
4	Simultaneous Inference and Other Topics in Regression Analysis
5	Matrix Approach to Simple Linear Regression Analysis
6	Multiple Linear Regression
7	Multiple Regression II
8	Regression Models for Qualitative Predictors
9	Building the Regression Model I: Model Section and Validation
10	Building the Regression Model II: Diagnostics
11	Building the Regression Model III: Remedial Measures