

King Fahd University of Petroleum and Minerals
Department of Mathematics
STAT 302 Syllabus, Term 261 (2026-27)
Instructor: Dr. Nasir Abbas (nasirabbas@kfupm.edu.sa)

Course Title: Statistical Inference

Course Credit Hours: 3-0-3

Textbook: Mathematical Statistics with Applications, by D.D. Wackerly, W. Mendenhall and R.L. Scheaffer, 7th edition.

Software Package: R language and R studio.

Course Objective: Statistics, as a subject matter, is a set of scientific principles and techniques that are useful in reaching conclusions about populations and processes when the available information is both limited and variable; that is, statistics is the science of learning from data. The world is rapidly reaching the point where most things can be monitored or measured. The primary learning objective of this course is to present a solid undergraduate foundation in statistical theory, its relevance and importance in solving practical problems in the real world.

Course Description: Random sampling and the sampling distributions: t, chi-square, and F. Order Statistics. Methods of estimation: maximum likelihood and moments. Properties of a good estimator: unbiasedness, consistency, efficiency, sufficiency, and approximate normality. Testing of simple hypotheses, the Neyman-Pearson lemma. Testing composite hypotheses, uniformly most powerful and likelihood ratio tests. Bayesian Statistics.

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

- Recognize the concept of random sampling and the distribution of different order statistics
- Describe sampling distribution and tell how it is different from the probability distribution, and realizing the importance of the Central Limit Theorem
- Recognize the overall concepts and methods of estimation and testing hypotheses.
- Describe the Bayesian Priors, Posteriors, estimators and credible intervals
- Evaluate the goodness of a point estimator and construct confidence intervals for population parameters of any sample size.
- Perform hypothesis testing and report results of any statistical test and also understand the connection between hypothesis testing methods and confidence intervals.
- Describe the general Bayesian concepts, including prior and posterior distributions, the Bayes estimator and credible intervals for unknown parameters.

Grading Policy:

Activity	Weight
Classwork (assignments, attendance, presentations, bonuses, etc.)	15%
Quizzes	15%
Midterm Exam	30%
Final Exam (Comprehensive)	40%

Coverage Plan

Section	Title
2.12	Random Sampling
6.7	Order Statistics
7.1	Introduction to Sampling Distributions
7.2	Sampling Distributions Related to the Normal Distribution
8.1 – 8.10	Estimation
9.1 – 9.9	Properties of Point Estimators and Methods of Estimation
10.1 – 10.12	Hypothesis Testing
16.1 – 16.5	Introduction to Bayesian Methods for Inference
14.1 – 14.7	Analysis of Categorical Data

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

Excuse: In case a student misses an exam (Midterm or Final) 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.

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
 - 9 unexcused absences (20%), or,
 - 15 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.