

King Fahd University of Petroleum and Minerals
 Department of Mathematics and Statistics
STAT319: Probability and Statistics for Engineers and Scientists
 Term 221

Instructor:
Phone:
Office Hours:

Office:
E-mail:

Course Objectives: Introduce the basic concepts of probability and statistics to engineering students. Emphasis will be given on the understanding of the nature of randomness of real world phenomena; the formulation of statistical methods by using intuitive arguments, solving them and thereby making meaningful decisions.

Learning Outcomes: By completing this course, students should acquire/learn

- A thorough understanding of descriptive statistics, both graphical and numerical
- A working knowledge of sample spaces, events, and operations on events
- Elementary probability concepts
- A good understanding of random variables and their means and variances
- Basic discrete and continuous random variables
- The concept of a sampling distribution, and the central limit theorem
- Point and interval estimation of means and proportions
- Basic concepts of hypothesis testing including the hypothesis testing setup, procedure, p-values
- Correlation
- Simple and multiple linear regression, including estimation and testing of model parameters

Text: Applied Statistics and Probability for Engineers by D. Montgomery and G. Runger, 6th Edition, Wiley, 2014

Software Package: MINITAB, See STAT-319 Lab syllabus.

Grading Policy

Assessment	Date	Material	Weight
Exam 1 (18 MCQ)	Oct 12, 2022	Chapters 2, 3 + Descriptive Statistics	22.5% (90 points)
Exam 2 (18 MCQ)	Nov 16, 2022	Chapters 4, 7, 8	22.5% (90 points)
Final Exam (24 MCQ)	As per registrar website	Comprehensive	30% (120 points)
homework	Homework on Blackboard		5% (20 points)
Class Work (Quizzes, Tests etc.)	The average total grade of the quizzes of each section shall be in the interval [14, 15], i.e., [70%, 75%] of 20 points.		5% (20 points)
Lab Work (See Lab syllabus)	The average total grade of the lab of each section shall be in the interval [42, 45], i.e., [70%, 75%] of 60 points.		15% (60 points)
Total			400

Check Blackboard regularly for announcements

Schedule

WEEK	Topics
Week 1	Ch 2: Probability 2-1.1 2-1.3 Random Experiments, Sample Spaces and Events 2-2 Interpretations and Axioms of Probability 2-3 Addition Rules 2-4 Conditional Probability 2-5 Multiplication Rule
Week 2	2-6 Independence 2-7 Bayes' Theorem Ch 3: Discrete Probability Distributions 3-1 Discrete Random variables 3-2 Probability Distributions and Probability Mass Functions 3-3 Cumulative Distribution Functions
Week 3	3-4 Mean and Variance of a Discrete Random Variable 3-5 Discrete Uniform Distribution 3-6 Binomial Distribution 3-7-1 Geometric Distribution Only
Week 4	3-8 Hypergeometric Distribution 3-9 Poisson Distribution Ch 4: Continuous Probability Distributions 4-1 Continuous Random Variables 4-2 Probability Distributions and Probability Density Functions
Week 5	4-3 Cumulative Distribution Functions 4-4 Mean and Variance of a Continuous Random Variable 4-5 Continuous Uniform Distribution
Week 6	4-6 The Normal Distribution 4-7 Normal Approximation to the Binomial and Poisson Distributions
Week 7	4-8 Exponential Distribution 4-10 Weibull Distribution 4-11 Lognormal Distribution
Week 8	Ch 7: Sampling Distributions 7-1 Point Estimation 7-2 Sampling Distributions and the Central Limit Theorem
Week 9	Ch 8: Statistical Intervals for a Single Sample 8-1 Confidence Interval for the Mean of a Normal Distribution with Known Variance 8-2 Confidence Interval for the Mean of a Normal Distribution with Unknown Variance 8-4 Large Sample Confidence Interval for a Population Proportion
Week 10	Ch 9: Tests of Hypotheses for a Single Sample 9-1 Hypothesis Testing 9-2.1 Tests on the Mean of a Normal Distribution with Known Variance 9-2.3 Large-Sample Test
Week 11	9-3.1 Tests on the Mean of a Normal Distribution with Unknown Variance 9-5.1 Tests on a Population Proportion
Week 12	Ch 11: Simple Linear Regression and Correlation 11-1 Empirical Models 11-2 Simple Linear Regression 11-3 Properties of the least squares estimators 11-4 Hypothesis Tests in Simple Linear Regression
Week 13	11-5 Confidence Intervals 11-6 Prediction of New Observations 11-7 Adequacy of the Regression Model 11-8 Correlation
Week 14	Ch 12: Multiple Linear Regression 12-1 Multiple Linear Regression Model 12-2 Hypothesis Tests in Multiple Linear Regression 12-3 Confidence Intervals in Multiple Linear Regression
Week 15	12-4 Prediction of New Observations 12-5.1 Residual Analysis 12-5.2 Influential Observations 12-6 Aspect of Multiple Regression Modeling

Important Remarks:

Academic Integrity

- All KFUPM policies regarding **ethics** and **academic honesty** apply to this course.

Letter grades

- The letter grades are based on **curved grading** (a grading curve), which will depend on the average of all students taking the course.

Attendance

- Students must adhere to the attendance policy of KFUPM.
- A **DN** grade will be awarded to any student who accumulates more than 20% (9 lectures and labs) unexcused absences or more than 33% (15 lectures and labs) excused and unexcused absences of lectures and labs.
- A DN grade will be assigned to the eligible student after being warned twice by his/her instructor.
- Students are expected to attend all lecture classes.
- If a student misses a class, he is responsible for any announcement made in that class.

Exam issues

- No student will be allowed to take the exam if not having his/her **KFUPM ID or National/Iqama ID**.
- Students are not allowed to carry mobiles, smart watches, or electronic devices to the exam halls/rooms.
- Students must take the exam in the place assigned to them.
- Missing an Exam: 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 zero in the missed exam.
- Cheating or any attempt of cheating by use of illegal activities, techniques and forms of fraud will result in a grade of **F** in the course along with reporting the incident to the higher university administration for further action. Cheating in exams includes (but is not limited to):
 - looking at the papers of other students
 - talking to other students
 - **using mobiles or any other electronic devices including smart watch.**

Mobiles and Smart Watches

- Students are not allowed to use mobiles for any purpose during class time.
- Students who want to use electronic devices to take notes must take permission from their instructor.
- Violations of these rules will result in a penalty decided by the instructor.
- Academic Integrity: All KFUPM policies regarding ethics apply to this course. See the Undergraduate Bulletin.
- **Students are not allowed to carry mobile phones and smart watches to the exam halls.**

Homework (HW)

- To successfully learn statistics, students need to solve problems and analyze data. The selected assigned problems are specifically designed to help you understand the material.
- No late homework will be accepted.

Tips on how to enhance your problem-solving abilities

- Do all homework assignments on time.
- Practice (but not memorize) more problems than those in the above list.
- Solve review problems available at the end of each chapter.
- Solve the problems on your own before reading the solution or asking for help.
- If you find it difficult to handle a certain type problems, you should try more problems of the same type.
- Practicing HW problems and reviewing the class lectures will make exam problems easier to tackle.
- Try to make good use of the office hours of your instructor. Always bring partial solutions of the questions that you want to discuss with your instructor.