King Fahd University of Petroleum and Minerals
Department of Mathematics
STAT 201 Syllabus, Term 252 (2025-26)
Coordinator: Dr. Nasir Abbas (nasirabbas@kfupm.edu.sa)

Course Title: Probability and Statistics for Engineers and Scientists
Course Credit Hours: 3-1-3
Textbook: Applied Statistics and Probability for Engineers by Montgomery and Runger, 6th edition (2014)
Software Package: R language and R studio.

Course Objective: Introduce students to the key principles of probability and statistics, focusing on the role of randomness in real-world phenomena. Guide students in formulating and applying intuitive methods, such as estimation and hypothesis testing, to analyze data effectively. Help students to develop reasoning skills that help interpret data and support meaningful decision-making. Offer hands-on experience to students with statistical software to tackle practical challenges and better prepare students for advanced studies.

Course Description: Presentation and interpretation of data, elementary probability concepts, random variables and probability distributions, binomial, hypergeometric, Poisson, exponential, Weibull, normal and lognormal random variables. Estimation, hypothesis testing for mean, variance and proportion. Simple and multiple linear regression, application to real-life problems. The lab session will be devoted to problem solving using statistics software.
Prerequisite: MATH 102

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

- Discuss the concept of sampling distribution of a sample mean and proportion.
- Calculate the mean, the variance, and the probabilities for discrete and continuous distributions
- Estimate the unknown population mean and proportion using confidence interval technique and testing of hypothesis
- Summarize data using common graphical and numerical tools.
- Calculate the probabilities of operations on events based on sample space for random experiments
- Recognize the meaning of sample correlation coefficient and model real life problems using simple and multiple linear regression including estimation and testing of model parameters
- Use a statistical package to compute descriptive statistics, construct confidence intervals.

Grading Policy:

	Date	Time	Place	Material	Percentage
Exam I	15 February	TBA	TBA	Chapters 6, 2, 3	(70 points) 14 MCQ
Exam II	6 April	TBA	TBA	Chapters 4, 7, 8	(70 points) 14 MCQ
Final Exam	As per registrar website			Comprehensive	(100 points) 20 MCQ
Lab Work (See Lab syllabus)	Assessments: Midterm Exam: 10 points, 5 March Final Exam: 20 points, 7 May				(30 points)
Class Work	▪ It is based on quizzes, class tests, or other class activities determined by the instructor. ▪ The average (out of 30) of the class work of each section must be in the interval $[y-1, y+1]$, where $y = \frac{\text{Median(Exam I)\%} + \text{Median(Exam II)\%}}{20} \times 3$				(30 points)
Total					300 points

Coverage Plan

Week	Topics	Suggested Problems
Week 1 Jan. 11-15	**Ch 6: Descriptive Statistics** 6-1 Numerical Summaries of Data (mean, median, mode, variance, Standard deviation, quartiles. percentiles & IQR) 6-2 Stem-and-Leaf Diagrams 6-3 Frequency Distributions and Histograms	**Chapter # 6** 1, 2, 3, 4, 5, 6, 13, 19, 20, 21, 23, 27, 32, 34, 43, 51
Week 2 Jan. 18-22	6-4 Box Plots (Shapes of distributions and the outlier) **Ch 2: Probability** 2-1 Sample Space and Events (2.1.1 - 2.1.3) 2-2 Interpretations and Axioms of Probability 2-3 Addition Rules	**Chapter # 6** 56, 62, 88, 90(c), 91(c) **Chapter # 2** 11, 15, 20, 22, 25, 28, 29, 58, 64, 66, 67, 75, 78, 86
Week 3 Jan. 25-29	2-4 Conditional Probability 2-5 Multiplication Rule 2-6 Independence 2-7 Bayes' Theorem	**Chapter # 2** 93, 96, 100, 108, 113, 136, 137, 147, 163, 180, 183
Wek 4 Feb. 01-05	**Ch 3: Discrete Probability Distributions** 3-2 Probability Distributions and Probability Mass Functions 3-3 Cumulative Distribution Functions 3-4 Mean and Variance of a Discrete Random Variable 3-6 Binomial Distribution	**Chapter # 3** 22, 29, 33, 42, 48, 59, 60, 81, 87, 92, 94, 95, 96
Week 5 Feb.08-12	3-8 Hypergeometric Distribution 3-9 Poisson Distribution **Ch 4: Continuous Probability Distributions** 4-2 Probability Distributions and Probability Density Functions 4-3 Cumulative Distribution Functions	**Chapter # 3** 123, 125, 126, 133, 135(b), 138, 141, 150(e), 155(c), 172, 176, 178
Week 6 Feb.15-19	4-4 Mean and Variance of a Continuous Random Variable 4-6 The Normal Distribution 4-8 Exponential Distribution 4-10 Weibull Distribution	**Chapter # 4** 34, 36, 49, 54, 5-58, 5-62, 5-63, 71, 95, 98, 102, 109, 130, 134, 136
Sunday, Feb. 22, 2026; Saudi Founding Day Holiday		
Week 7 Feb. 23-26	4-11 Lognormal Distribution **Ch 7: Sampling Distribution** 7-1 Point Estimation 7-2 Sampling Distributions and Central Limit Theorem (**Example 7.1 & 7.2, only single sample case**)	**Chapter # 4** 141, 143, 175, 176 **Chapter # 7** 3, 4, 6, 7, 10, 12
Week 8 Mar.01-05	**Ch 8: Statistical Intervals for a Single Sample** 8-1 Confidence Interval for the Mean of a Normal Distribution with Known σ^2 8-1.1 Development of The Confidence Interval and Its Basic Properties 8-1.2 Choice of Sample Size 8-1.5 Large-Sample Confidence Interval for μ	**Chapter # 8** 6, 7, 16, 17, 20
Week 9 Mar. 08-12	8-2 Confidence Interval for the Mean of a Normal Distribution with Unknown σ^2 8-3 Confidence Interval on the Variance and Standard Deviation of a Normal Distribution (**only 2-sided**) 8-4 Large Sample Confidence Interval for a Population Proportion	**Chapter # 8** 26, 35, 46, 56, 60, 84, 86(c,e), 88, 97
March 15 – March 26, 2026; Eid Al-Fitr Holidays		
Week 10 Mar. 29- Apr. 02	**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 9-3.1 Tests on the Mean of a Normal Distribution with Unknown Variance	**Chapter# 9** 5, 10, 25, 27, 36, 40(a,b), 46(a,b,e), 51, 53, 55, 57, 60(a)
Week 11 Apr. 05- 09	9-4.1 Hypothesis Tests on the Variance 9-5.1 Tests on a Population Proportion **Ch 11: Simple Linear Regression and Correlation** 11-1 Empirical Models 11-2 Simple Linear Regression	**Chapter# 9** 80, 84, 85, 90(a), 92, 132, 146(a,b) **Chapter# 11** 1, 3, 18
Week 12 Apr.12-16	11-3 Properties of the least-squares estimators 11-4 Hypothesis Tests in Simple Linear Regression 11-5 Confidence Intervals 11-6 Prediction of New Observations	**Chapter# 11** 22, 23, 25, 39, 41

Week 13 Apr. 19-23	11-8 Correlation **Ch 12: Multiple Linear Regression (mainly based on R output)** 12-1 Multiple Linear Regression Model	**Chapter# 11** 52, 53(a), 75(a,b), 86(a-e) **Chapter# 12** 15
Week 14 Apr.26- 30	12-2 Hypothesis Tests in Multiple Linear Regression 12-3 Confidence Intervals in Multiple Linear Regression	**Chapter# 12** 15, 21, 22, 25, 33
Week 15 May. 03-07	12-4 Prediction of New Observations 12-5.1 Residual Analysis (Using residuals plots ONLY)	**Chapter# 12** 51, 65(a-c), 94, 103
Week 16 May 10	Review / Catching up	

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

Exam Questions: The questions of the exams are similar to the examples and exercises in the textbook.

Suggested Problems: The suggested problem numbers correspond to the International Student Edition (hard copy) available at the bookstore, and solving them will be very helpful for exam preparation

Cheating in Exams: 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.
- Using ChatGPT or any AI source.

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 a score of zero in the missed exam.

Other Exam Issues:

- No student will be allowed to take the exam if he/she does not bring his/her KFUPM ID, or National/Iqama ID, or Driver's License with him/her to the exam hall.
- Students are not allowed to have their mobiles, smart watches, or any electronic device in the exam hall. A violation of this will be considered an attempt at cheating.
- A student must sit in the seat assigned to him/her. A violation of this will be considered an attempt at cheating.

Some tips to enhance your problem-solving skills:

- Practice (but not memorize) more problems than those given in the above list.
- Solve some review exercises 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 of problem, you should try more problems of the same type.
- Try to make good use of the office hours of your instructor. Always bring your solution trials to discuss them with your instructor.

Attendance: Students are expected to attend all lectures and labs.

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

The Usage of Mobiles in Class: Students are not allowed to use mobiles for any purpose during class time. Students who want to use electronic devices to take notes must get 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 on the Registrar's website.