King Fahd University of Petroleum and Minerals
Department of Mathematics
STAT 201 Syllabus, Term 261 (2026-27)
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	TBA	TBA	TBA	Chapters 6, 2, 3	(70 points) 14 MCQ
Exam II	TBA	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, TBA Final Exam: 20 points, TBA				(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 Aug. 19 - 20	No Class	
Week 2 Aug. 23 - 27	**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, 56, 62, 88, 90(c), 91(c)
Week 3 Aug. 30 - Sep. 03	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 # 2** 11, 15, 20, 22, 25, 28, 29, 58, 64, 66, 67, 75, 78, 86, 93, 96, 100, 108, 113, 136, 137, 147, 163, 180, 183
Week 4 Sep. 06 - 10	2-4 Conditional Probability 2-5 Multiplication Rule 2-6 Independence 2-7 Bayes' Theorem	**Chapter # 3** 22, 29, 33, 42, 48, 59, 60, 81, 87, 92, 94, 95, 96, 123, 125, 126, 133, 135(b), 138, 141, 150(e), 155(c), 172, 176, 178
Week 5 Sep. 13 - 17	**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	
Week 6 Sep. 20 - 22	3-8 Hypergeometric Distribution 3-9 Poisson Distribution **Ch 4: Continuous Probability Distributions** 4-2 Probability Distributions and Probability Density Functions	**Chapter # 4** 4, 11, 18, 21, 26, 34, 36, 49, 54, 5-58, 5-62, 5-63, 71, 95, 98, 102, 109, 130, 134, 136, 141, 143, 175, 176
Sep.23, 2026 - Sep.24, 2026; National Day Holiday		
Week 7 Sep. 27 – Oct. 01	4-3 Cumulative Distribution Functions 4-4 Mean and Variance of a Continuous Random Variable 4-6 The Normal Distribution 4-8 Exponential Distribution 4-10 Weibull Distribution	
Week 8 Oct. 04 - 08	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 # 7** 3, 4, 6, 7, 10, 12
Week 9 Oct. 11 - 15	**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, 26, 35, 46, 56, 60, 84, 86(c,e), 88, 97
Week 10 Oct. 18 - 19	8-2 Confidence Interval for the Mean of a Normal Distribution with Unknown σ^2	
Oct.20, 2026 – Oct.22, 2026; Midterm Break		
Week 11 Oct. 25 - 29	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 **Ch 9: Tests of Hypotheses for a Single Sample**	**Chapter# 9** 5, 10, 25, 27, 36, 40(a,b), 46(a,b,e), 51, 53, 55, 57, 60(a), 80, 84, 85, 90(a), 92, 132, 146(a,b)

	9-1 Hypothesis Testing 9-2.1 Tests on the Mean of a Normal Distribution with Known Variance	
Week 12 Nov. 01 - 05	9-2.3 Large-Sample Test 9-3.1 Tests on the Mean of a Normal Distribution with Unknown Variance 9-4.1 Hypothesis Tests on the Variance 9-5.1 Tests on a Population Proportion	
Week 13 Nov. 08 - 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	**Chapter# 11** 1, 3, 18, 22, 23, 25, 39, 41, 52, 53(a), 75(a,b), 86(a-e)
Week 14 Nov. 15 – 19	11-4 Hypothesis Tests in Simple Linear Regression 11-5 Confidence Intervals 11-6 Prediction of New Observations 11-8 Correlation	
Nov.22, 2026 – Nov.23, 2026; Autumn Break		
Week 15 Nov. 24 - 26	**Ch 12: Multiple Linear Regression** **(mainly based on R output)** 12-1 Multiple Linear Regression Model	**Chapter# 12** 15, 21, 22, 25, 33, 51, 65(a-c), 94, 103
Week 16 Nov. 29 – Dec. 03	12-2 Hypothesis Tests in Multiple Linear Regression 12-3 Confidence Intervals in Multiple Linear Regression 12-4 Prediction of New Observations	
Week 17 Dec. 06 - 10	12-5.1 Residual Analysis (Using residuals plots ONLY) Review / Catch up	

Letter Grades: Final letter grades will be assigned according to a grading curve, which will be determined based on the overall performance of all students enrolled in the course. The exact cutoffs may change from one term to another, depending on how the scores are distributed.

Exam Questions: Exam questions will be similar in style and level of difficulty to the examples and exercises provided in the textbook.

Examination Policies: You are expected to adhere to KFUPM policies for all examinations in this course, including quizzes, major exams, midterms, and final exams. The following policies are enacted in this course during examinations:

- Students are expected to arrive at the examination hall on time with proper University ID.
- Students are seated according to the instructor's seat assignment and may request a seat change only for legitimate reasons.
- Late arrival at the exam may result in the student being denied admission. Once a student has completed the examination and left the examination hall/room, no late student will be admitted.
- Students are not permitted to leave the examination room to use the restroom during an exam, except in rare cases involving a documented medical condition (e.g., diabetes, kidney disease). Any excused restroom leave will be fully supervised by a same-gender proctor.
- Students must leave all smart devices outside the examination hall, including smartphones, smartwatches, earbuds, and unauthorized calculators. Possession of any unauthorized device will be considered a cheating attempt and will be handled accordingly.
- Cheating attempts will be reported according to KFUPM policy and will result in a DN grade in the course, along with potential further penalties upon investigation.

Use of Mobile Devices in Class: The use of mobile phones during class is strictly prohibited. Students who wish to use laptops or tablets for notetaking must first obtain permission from the instructor. Any violation will result in a penalty determined by the instructor.

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), the student must submit an official excuse approved by the Deanship of Student Affairs within **seven calendar days** of the missed exam date. Without an approved excuse, the student will receive a score of zero for the missed exam. When the excuse is accepted, the coordinator will arrange a makeup exam for the missed exam.

Class Attendance: Students are expected to arrive on time for class, consistent with expectations in professional settings. Recording attendance for another student, signing another student's attendance, or asking another student to record yours will be reported for investigation and may result in severe consequences for both students involved.
A DN grade will be given after two warnings if a student exceeds 12 unexcused absences in lectures and labs (20% of the course) or exceeds a total of 20 absences in lectures and labs, whether excused or not (one-third of the course).

Accessibility and Accommodations: Students with documented special needs, approved by the Deanship of Student Affairs, should contact the course coordinator to arrange reasonable accommodation.

Honor code: Students of this course are expected to maintain the highest level of academic integrity and ethics. A KFUPM student does not cheat or tolerate those who do. Every student is expected to submit work that is entirely their own, to properly cite all sources used, and to refrain from any form of academic misconduct.

Plagiarism: Use of another person's ideas, processes, results, or words requires appropriate credit or reference to the author. Use of Generative AI tools is subject to the instructor's authorization. Submitting the same work in more than one course without the instructor's permission is not allowed.

Academic Integrity: All KFUPM academic integrity policies apply to this course. For details, students should refer to the Undergraduate Bulletin available on the Registrar’s website.