King Fahd University of Petroleum and Minerals

Department of Mathematics

Stat 214 Syllabus, Term 242 (Academic Year 2024-2025)

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Course Code and Title: STAT-214: ACTUARIES AND BUSINESS STATISTICS

Course Credit Hours: 3-2-4

Textbook: Basic Business Statistics: Concepts and Applications, 12th edition, by Berenson, M.L., Levine, D.M., and Krehbiel, T.C., Pearson-Prentice Hall (2011).

Software Package: R language and R studio.

Course Objectives:

1. Introduce basic concepts of statistics methods to actuary students.
2. Emphasize the understanding of the nature of randomness of real-world problems. T
3. he formulation and analysis of real-world problems using well known statistical methods to make meaningful decisions.

Course Description: Descriptive Statistics: Graphical and numerical measures. Elementary Probability theory; sampling techniques; probability distributions; estimation; hypothesis testing for means and variances; index number and introductory time series analyses; simple linear regression and correlation analysis; multiple regression analysis; the chi-squared and *F* distributions and their applications; application for financial decisions; application using statistical packages.

Note: Not to be taken for credit with STAT 319.

Prerequisite: MATH 102 or MATH 106

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

1. Discuss the importance of data collection in business statistics and actuarial science.
2. Summarize data using common graphical tools as well as describing data using numerical measures
3. Determine the probabilities of event outcomes in business statistics by analyzing the sample space of random experiments.
4. Compute the mean, variance, and probabilities for both discrete and continuous distributions.

5. Use confidence intervals and hypothesis testing to estimate the unknown population mean and proportion.
6. Understand the significance of the sample correlation coefficient and apply simple and multiple linear regression to model real-life problems, including the estimation and testing of model parameters
7. Explain what is meant by a contingency (or two-way) table and use a chi-square test to test the independence of two classification criteria.

Grading Policy:

	Date	Time	Place	Material	Percentage
Exam I 14 MCQ	TBA	TBA	TBA	Chapters 2, 3, 4, 5	(70 points) 23.33%
Exam II 14 MCQ	TBA	TBA	TBA	Chapters 6, 7, 8, 9	(70 points) 23.33%
Final Exam 20 MCQ	As per registrar website			Comprehensive	(100 points) 33.33%
Online Homework	Through Blackboard				(15 points) 5%
Lab Work (See Lab syllabus)	Assessments: Midterm Exam: 7 points, Date: TBA. Final Exam: 8 points, Date TBA.				(15 points) 5%
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 has to be in the interval $[y-1, y+1]$, where $$y = \frac{\text{Median(Exam I)}\% + \text{Median(Exam II)}\%}{20} \times 3$$				(30 points) 10%
				Total	100% (300)

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.

Cheating in Exams: Cheating or any attempt of 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.

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 of cheating.
➢ A student must sit in the seat assigned to him/her. A violation of this will be considered an attempt of cheating.

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.

➢ **Attendance:** Students are expected to attend all lecture and lab classes.
➢ If a student misses a class/lab, he/she is responsible for any announcement made in that class/lab.
➢ After warned **twice** by the instructor, a **DN** grade will be awarded to any student who accumulates
  o 12 unexcused absences in lecture and lab classes. (20%)
  o 20 excused and unexcused absences in lecture and lab classes. (33.3%)

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 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 in the Registrar's website.

Coverage Plan

Week	Date (2025)	Sec	Title
1	Jan. 12-16	2.2	Organizing Categorical Data
		2.3	Organizing Numerical Data
		2.4	Visualizing Categorical Data.
		2.5	Visualizing Numerical Data.
2	Jan. 19-23	3.1	Central Tendency (Mean, Median & Mode)
		3.2	Variation and Shape.
		3.3	Exploring Numerical Data.
		3.4	Numerical Descriptive Measures for a Population.
3	Jan. 26-30	4.1	Basic probability concepts.
		4.2	Conditional Probability.
		4.3	Bayes' Theorem.
4	Feb. 02-06	5.1	Probability distribution for discrete random variable.
		5.3	Binomial distribution.
		5.4	Poisson Distribution
		5.5	Hypergeometric Distribution
5	Feb. 09-13	6.1	Continuous Random Variables (PDF, mean, Variance & percentiles) (**Extra material**)
		6.2	Normal distribution
		6.5	Exponential Distribution
6	Feb. 16- 20	7.1	Types of Sampling Methods
		7.3	Sampling Distributions.
		7.4	Sampling Distribution of the Mean
		7.5	Sampling Distribution of the Proportion
Feb. 22 & 23			**Saudi Founding Day Holiday**
7	Feb. 23-27	8.1	Confidence interval Estimate of the Mean (σ known)
		8.2	Confidence interval Estimate of the Mean (σ unknown)
		8.3	Confidence interval Estimate for the Proportion
		8.4	Determining Sample Size
8	Mar. 02-06	9.1	Fundamentals of Hypothesis-Testing Methodology
		9.2	t Test of Hypothesis for the Mean (σ Unknown)
9	Mar. 09-13	9.3	One-Tail Tests
		9.4	Z Test of Hypothesis for the Proportion
10	Mar. 16-20	10.1	Comparing the Means of Two Independent Populations
		10.2	Comparing the Means of Two Related Populations
Mar. 23 – April 3			**Eid Al-Fitr Holidays**
11	April 06-10	10.3	Comparing the Proportions of Two Independent Populations
		10.4	F Test for the Ratio of Two Variances
		12.1&12.3	Chi-square test for independence (contingency (or two-way) table)
12	April 13-17	13.1	Types of Regression Models
		13.2	Determining the Simple Linear Regression Equation

		13.3	3 Measures of Variation
13	April 20-24	13.4&3.5	Assumptions & Residual Analysis
		13.7	Inferences About the Slope and Correlation Coefficient
		13.8	Estimation of Mean Values and Prediction of Individual Values
14	April 27- May 1	14.1	Developing a Multiple Regression Model
		14.2	R2, Adjusted R2, and the Overall F Test
		14.4	Inferences Concerning the Population Regression Coefficients
15	May 04- 08	16.2	Component of Time-Series
		16.3	Smoothing an Annual Time Series
		16.4	Least-Squares Trend Fitting and Forecasting (The Linear Trend Model)
		16.8	Index Numbers
	May 11	16.8	Index Numbers (Cont.)

Suggested Practice Exercises

Sr.	Ch	Exercises #
1	2	2.5, 2.11, 2.22, 2.24, 2.27, 2.37, 2.39, 2.44
2	3	3.3, 3.4, 3.8, 3.13, 3.23, 3.28 3.30, 3.39, 3.40, 3.63
3	4	4.3, 4.8, 4.14, 4.17, 4.19, 4.23, 4.31, 4.37, 4.61
4	5	5.1, 5.3, 5.19, 5.23, 5.24, 5.30, 5.33, 5.42, 5.43
5	6	6.1, 6.5, 6.6, 6.9, 6.29, 6.33, 6.51
7	7	7.18, 7.19, 7.20, 7.21, 7.25, 7.27, 7.45
7	8	8.5, 8.9, 8.12, 8.23, 8.30, 8.32, 8.38, 8.43, 8.48
8	9	9.2, 9.6, 9.8, 9.14, 9.16, 9.18, 9.24, 9.26, 9.36, 9.40, 9.44, 9.48, 9.50, 9.54, 9.58, 9.72
9	10	10.2, 10.10, 10.12, 10.20, 10.30, 10.32, 10.36, 10.38, 10.46
10	12	12.2, 12.3, 12.6
11	13	13.1, 13.2, 13.4, 13.16, 13.26, 13.40, 13.42, 13.55, 13.56, 13.58
12	14	14.1, 14.2, 14.6, 14.10, 14.16
13	16	16.1, 16.2, 16.3, 16.4, 16.10, 16.12 (a, b), Online topic (index numbers): 16.67, 16.69

Some tips to enhance your problem-solving skills:

- Do all homework assignments on time.
- 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 problems, 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.