Course Specification

Course Title:	**Principles of Statistics and Probability**
Course Code:	**STAT 1211-2**
Program:	**Bachelor in Engineering**
Department:	**Mathematics**
College:	**Science**
Institution:	**King Khalid University**
Version:	**2**
Last Revision Date:	**25/03/2023**

Table of Contents:

A. General information about the course:

Course Identification					
1. Credit hours:	4				
2. Course type					
a.	University ☐	College ☒	Department☐	Track☐	Others☐
b.	Required ☒	Elective☐			
3. Level/year at which this course is offered:					3th level / 2nd year
4. Course general Description					
This course dealing with statistical concepts including, Collection and presentation of data either in tables or graphs, measure of central tendency, dispersion and variation and shape parameters, Correlation and regression, probability distributions.					
5. Pre-requirements for this course (if any):					
None					
6. Co- requirements for this course (if any):					
None					
7. Course Main Objective(s)					
On successful completion of this course, students should be able to: • Recognize presentation of data (grouped and ungrouped data). • Should know how to find the arithmetic mean, the coding method for computing Mean the weighted mean. The median. The mode. The geometric mean. The Harmonic mean. Quartiles, Deciles and Percentiles. • Recognize random experiment, sample space, events, and operations on the events, axioms of probability, assignment of probability, random variables and Probability distribution. Extract the mean, the variance and the standard deviation of the random variables. • Have Some special probability distributions.					

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
	Traditional classroom	--	--
	E-learning	--	--
	Hybrid • Traditional classroom • E-learning	4	100
	Distance learning	--	--

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1	Lectures	48
2	Laboratory/Studio	--
3	Field	--
4	Tutorial	??
5	Others (specify)	--

	Total	48

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Describe data graphically and in table- compute measures of centrality, dispersion and variation- Shape parameters (Skewness and Kurtosis)	K1	Lectures, up-to-date textbooks, hand-outs, develop skills in using library and other learning resources, use of the Internet	Exams, tutorials, supervision, presentations, essays, feedback on written work and homework.
1.2	Understand correlation, covariance, correlation coefficient and how these quantities relate to the independence of random variables	K2		
1.3	Compute probabilities by modeling sample spaces and applying rules of permutations and combinations, additive and multiplicative laws and conditional, probability, independence.	K3		
1.4	Understand mathematical descriptions of random variables including probability mass functions (PMFs), cumulative distribution functions (CDFs), probability distribution functions (PDFs).	K4		
2.0	Skills			
2.1	Set up and work with discrete random variables. In particular, understand the Bernoulli, binomial, geometric and Poisson distributions.	S1	Tutorials, Group working, problem-solving, discussion, feedback on written work, exam papers, critical assessment, peer assessment, self-assessment.	Exams, tutorials, supervision, presentations, feedback on written work and homework, exam papers, critical assessment, peer assessment, self-assessment.
2.2	Work with continuous random variables. In particular, know the properties of uniform, normal and exponential distributions.	S2		
2.3	Be able to calculate various moments of common random variables including at least means, variances and standard deviations.	S3		
2.4	Be able to calculate the probability density function(pdf) and cumulative distribution function (cdf) of a random variable	S4		
3.0	Values, autonomy, and responsibility			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.1	Adhere to ethical values and excellence in professional practices.	V1	Feedback, experiential learning, structured experiences in groups, self-assessment, profiling.	Critical assessment, self-assessment, Rubrics
3.2	Able to articulate awareness of and demonstrate personal characteristics and critical thinking that positively impact the learning process.	V2		
3.3	Take full responsibility for initiating, identifying, amending, and achieving aims.	V3		

C. Course Content

No	List of Topics	Contact Hours
11.	**Useful definitions in Descriptive Statistics:** Population-Sample-Variables (Qualitative and Quantitative) Frequencies, relative frequencies and percentages (for qualitative variables, ungrouped data and grouped data) Frequency distribution table, Cumulative frequencies, Cumulative relative **Frequencies**	4
12.	**Graphical Representation of Data:** Bar Graph-Pie graph- Histogram-Cumulative frequency graph, polygon graph.	4
3	**Measures of central tendency:** Mode (Qualitative variables-ungrouped data-grouped data Median (ungrouped data-grouped data) Arithmetic mean (ungrouped data-grouped data).	4
4	• Weighted Mean • Geometric and Harmonic means (ungrouped data-grouped data)	4
5	• **Measures of variation:** Variation-Standard Deviation-Mean deviation-coefficient of variation. • **Measures of position:** Quartiles-Deciles -Percentiles • **Measure of Skewness and Kurtosis**	4
6	**Correlation and Regression** • Scatter grams • Covariance -Pearson correlation coefficient • Spearsman's rank correlation coefficient • Regression line and Coefficients of regression. • Coefficient of determination	8

7	**Principles of Probability Theory** • Sample space and Events • Counting Techniques (Fundamental basics, Addition Rule, Multiplication Rule Arrangement, Permutation and Combinations) • Definition of the probability and its applications • Conditional probability • Independence of events and Bayes theorem and its applications	8
8	**Random variables** • Concept of real random variable Generality Probability of a random variable Probability density function(pdf) and Cumulative Distribution Function (cdf) Distribution Functions of Discrete Random Variables. Distribution Functions of continuous Random Variables • Quantiles for Continuous Random Variables • Moments, Expectation and Variation Moments of Random Variables Expected Value of Random Variables Variance and Standard Deviation of Random Variables	6
9	**Distributions of random variables** • Introduction • Discrete Distributions Bernoulli Distribution Binomial Distribution Geometric Distribution Poisson Distribution • Continuous distributions Uniform Distribution Normal distribution Gamma Probability Distribution	6
Total		**48**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
15.	Practical applications (solutions exercises), quizzes, and homework	Weekly	35
16.	Partial exam (mid-term exam)	7	25
17.	Final exam	13	40

* Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Work out statistics for Advanced level (Ball. A. and Buckwell, G.)
Supportive References	Elementary Statistics, A Step by Step Approach.
Electronic Materials	• Websites on the internet that are relevant to the topics of the course. • E-learning lms.kku.edu.sa
Other Learning Materials	Any book on Statistic and probability available at the Central Library.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for 25 students
Technology equipment (Projector, smart board, software)	• Data show device, Video Conference system and Smart boards • Computers loaded with modern software and connected to Internet service
Other equipment (Depending on the nature of the specialty)	Not Applicable

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer Reviewer + Students	Direct
Effectiveness of students' assessment	Peer Reviewer + Q&D Committee	Direct
Quality of learning resources	Programs & Curricula Committee + Q&D Committee	Direct
The extent to which CLOs have been achieved	Quality and Development Committee	Indirect
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	25-3-2023