



# Course Specification

## (Bachelor)

Course Title: <b>Mathematical Statistics</b>
Course Code: <b>251 Stat</b>
Program: <b>Bachelor of Science in Mathematics</b>
Department: <b>Mathematics</b>
College: <b>Science</b>
Institution: <b>Jazan University</b>
Version: <b>2023</b>
Last Revision Date: <b>3/2023</b>

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## A. General information about the course:

### 1. Course Identification

1. Credit hours: 3

### 2. Course type

A. University ☐ College ☐ Department ☒ Track ☐ Others ☐  
B. Required ☒ Elective ☐

3. Level/year at which this course is offered: Level 4 / Year 2

### 4. Course general Description

This course is designed to provide students with

- **Review:** Random Variable and Probability Distribution.
- **Bivariate probability distribution:** Two Discrete Random Variables, Two Continuous Random Variables, Covariance and Correlation, Bivariate Normal Distribution, Linear Combinations of Random Variables, Moments, and moment generating functions.
- **Sampling Distributions and the Central Limit Theorem:** Sampling Distributions, Sampling Distributions of the Means, The Chi-Square Distribution, The T Distribution, The F Distribution.
- **Functions of Random Variables:** Finding the Probability Distribution of a Function of Random Variable, The Method of Distribution Function, The Method of Transformations (bivariate), Using the Moment-Generating Functions.
- **Parameters Estimations:** Point Estimation: Properties of Estimators, The Method Maximum Likelihood Estimators, The Method of Moments, Precision of Estimation: The Standard Error, Single –Sample Confidence Interval Estimation: Confidence Interval on the Mean of Normal Distribution, Variance Known and Variance Unknown, Confidence Interval on the Variance of a Normal Distribution, Confidence Interval on a Proportion, Two Sample Confidence Interval Estimation: Confidence on the Difference Between Means of two Normal Distribution, Variance Known and Variance Unknown.
- **Hypothesis Testing: Statistical Hypotheses:** General Concepts, The Use of P-Values for Decision Making in Testing Hypotheses, Single Sample: Tests Concerning a Single Mean (Variance Known/Unknown), Two Samples: Tests on Two Means, Choice of Sample Size for Testing Means, One Sample: Test on a Single Proportion, Two Samples: Tests on Two Proportions, One- and Two-Sample Tests Concerning Variances.

5. Pre-requirements for this course (if any): 362 Stat; 100 Math

6. Co- requirements for this course (if any): None

### 7. Course Main Objective(s)

After completing this course, students should be able to:



- Compute probabilities using joint probability mass functions and joint probability density functions and determine the distribution of a general function of a random variable.
- Calculate moment generating functions and use the functions to determine moments and distributions. And understand the central limit theorem.
- Know how to compute and explain the precision with which a parameter is estimated.
- Construct confidence intervals on the mean, variance, standard deviation and population proportion.
- Test hypotheses on the mean, variance or standard deviation and population proportion.

## 2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	33	100%
2.	E-learning		
3.	Hybrid <ul style="list-style-type: none"> <li>• Traditional classroom</li> <li>• E-learning</li> </ul>		
4.	Distance learning		

## 3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	33
2.	Laboratory/Studio	0
3.	Field	0
4.	Tutorial	11
5.	Others (specify)	0
	Total	44

## 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	Distinguish information relevant to Bivariate probability distribution, Sampling Distributions, Functions of Random Variables, Parameter Estimations, and Hypothesis Testing.	K1	Lectures, Classroom discussions	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
1.2	Identify the background of Bivariate probability distribution, Sampling Distributions, Functions of Random Variables, Parameter Estimations, and Hypothesis Testing.	K2	Lectures, Classroom discussions	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.3	Explain notations and concepts required for the solution of problem in Bivariate probability distribution, Sampling Distributions, Functions of Random Variables, Parameter Estimations, and Hypothesis Testing.	K3	Lectures, Classroom discussions	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
2.0	Skills			
2.1	Apply theoretical, computational or practical aspect relevant to Bivariate probability distribution, Sampling Distributions, Functions of Random Variables, Parameter Estimations, and Hypothesis Testing.	S1	Lectures, Classroom discussions	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
2.2	Compute numerical quantities for various parameters to approximate the solution in Bivariate probability distribution, Sampling Distributions, Functions of Random Variables, Parameter Estimations, and Hypothesis Testing.	S2	Lectures, Classroom discussions	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
2.3	Apply various statistical rules, techniques and theorems in Bivariate probability distribution, Sampling Distributions, Functions of Random Variables, Parameter Estimations, and Hypothesis Testing.	S3	Lectures, Classroom discussions	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
2.4	Solve statistical problem using critical thinking in Bivariate probability distribution, Sampling Distributions, Functions of Random Variables, Parameter Estimations, and Hypothesis Testing.	S4	Lectures, Classroom discussions	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
3.0	Values, autonomy, and responsibility			
3.1	Cultivate a mathematical attitude and nurture the interest.	V1	Group and interactive discussion	Participation and presentations
3.2	Realize the importance of responsibilities through different modes of practice, competition, and related activities.	V2	Group and interactive discussion	Participation and attendances
3.3	Inculcating values and ethics in thought toward the development		Group and	Participation and attendances



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	of study habits essential for independent progress.	V3	interactive discussion	

## C. Course Content

No	List of Topics	Contact Hours
1.	<b>Introduction to Statistics</b>	3
2.	<b>Methods of representing data</b>	6
3.	<b>Measure of central tendency</b>	10.5
4.	<b>Measure of dispersion</b>	10.5
5.	<b>Correlation and Regression</b>	3
Total		33

## D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework and Quiz	3	5%
2.	Midterm Exam	6	20%
3.	Midterm Exam	10	20%
4.	Homework and Quiz	11	5%
5.	Final exam.	12	50%

\*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	Elementary Statistics: Picturing the world, Larsin, R.C. & Farber, E. 3rd Edition, Prentice Hall. (2006)
Supportive References	Elementary Statistics: A Step By Step Approach 8th Edition by Bluman, 2011 Introduction to the Statistics. Mood, A. M. & al 3 <sup>rd</sup> Edition, McGraw-Hill, (1974) Principles of statistics and probability, Dr. Adnan Albarre, & others, Alnasher & Almatabe, 3 <sup>rd</sup> Edition, 1997
Electronic Materials	Web sites dedicated to Mathematical Statistics
Other Learning Materials	Black board platform



## 2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Computer lab.
Technology equipment (projector, smart board, software)	Data show; Smart Board, Mathematics software.
Other equipment (depending on the nature of the specialty)	

## F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Peer and program leader	Indirect (Course Evaluation Survey); Indirect peer evaluation
Effectiveness of student's assessment	Students, Program assessment committee	Direct/ Indirect
Quality of learning resources	Students, Faculty members	Indirect
The extent to which CLOs have been achieved	Instructor	Direct/ Indirect

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

**Assessment Methods** (Direct, Indirect)

## G. Specification Approval Data

COUNCIL /COMMITTEE	Board Of Mathematics Department
REFERENCE NO.	2306
DATE	07/09/1444 A. H.; 29/03/2023 A. D.

