Course Specification
(Bachelor)

Course Title:	**Probability Theory**
Course Code:	**STAT 352**
Program:	**B. Sc. in Mathematics**
Department:	**Mathematics**
College:	**Science College**
Institution:	**Jazan University**
Version:	**2023**
Last Revision Date:	**2/2023**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:	**03**

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

3. Level/year at which this course is offered: Level 6/Year 2

4. Course general Description

This course is designed to provide students with

- **Introduction to Sets**: Subset, union, intersection, differences, classes of sets, permutation and combinations.
- **Principles of Probability**: Random experiment, sample space, events, probability calculation methods, definition and axioms of probability, conditional probability, independent events, dependent events, methods of counting, overall probability theory, conditional probability, Baye's theorem (simply with replacement and without replacement).
- **Random Variable**: Definition of random variable, types of random variables, probability density function, probability mass function, cumulative distribution function, relation between distribution function and density function, probability distribution function for two variables and its properties, conditional probability functions, independent variables, mathematical expectation, variance, standard deviation,
- **Probability Distributions**: Discrete probability distributions and its properties, binomial distribution, Poisson distribution, continuous probability distributions and properties, normal distribution, standard normal distribution.
- **Sampling Distribution**: Sampling distribution of means and its properties, central limit theorem, sampling distribution of sample variance and proportion, probability distribution based on different means of samples, probability distribution of sample variance, probability distribution of ratios in sample, sampling distribution of samples selected together, Chebyshev's theorem.

5. Pre-requirements for this course (if any): 251 Stat

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

7. Course Main Objective(s)

After finishing the course, the student is expected to be familiar with the following:

- Application of probability in random experiment.
- Application of probability distributions in problems with an outcome that can't be predicted.
- Application of the course in random operations in the future.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	33	100%
2.	E-learning		
3.	Hybrid • Traditional classroom • E-learning		
4.	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	**30**
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	**3**
5.	Others (specify)	
	Total	**33**

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	Distinguishing mathematical concepts relevant to basic probability, random variables, probability distributions, and sampling distribution.	K1	Lectures, Web based work, Classroom discussions	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
1.2	Identify structures and features of Mathematics problems in basic probability, random variables, probability distributions, and sampling distribution.	K2	Lectures, Web based work, Classroom discussions	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
1.3	Explain required notations and concepts in basic probability, random variables,	K3	Lectures, Web based work, Classroom discussions	Written exam (Problem solve, MCQ,

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	probability distributions, and sampling distribution.			true/false, Proof, Short answer), Quizzes, Assignments
2.0	Skills			
2.1	Apply aspects relevant to basic probability, random variables, probability distributions, and sampling distribution.	S1	Lectures, Web based work, Classroom discussions	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
2.2	Compute rates/quantities and Approximate Solutions in basic probability, random variables, probability distributions, and sampling distribution.	S2	Lectures, Web based work, Classroom discussions	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
2.3	Solve mathematical problems using critical thinking and problem solving in basic probability, random variables, probability distributions, and sampling distribution.	S3	Lectures, Web based work, 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 work and interactive discussion, web-based work	Assignments, Discussion.
3.2	Realize the importance of responsibilities through different modes of practice, competition, and related activities.	V2	Group work and interactive discussion, web-based work	Assignments, Discussion.
3.3	Inculcating values and ethics in thought, expression, and deed.	V3	Group work and interactive discussion, web-based work	Assignments, Discussion.

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction of sets, and permutation & combinations.	**6**
2.	Principles of Probability.	**7**
3	Random variable.	**7**
4	Probability Distributions.	**7**
5	Sampling distribution.	**6**
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.	First exam.	6	20%
3.	Second exam.	9	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	Ross, Sheldon. (2010): First course in probability, 8th Edition, Pearson Prentice Hall.
Supportive References	- Probability, Random Variables and Stochastic Processes A. Papoulis & S.U. Pillai. 4th Edition, Tata McGraw-Hill. (2005). - Principles of Statistics and Probability, Dr. Adnan al-Barre, & Others, Alnasher & Almatabea, 3rd Edition, 1997. - Introduction to Statistics and Probability by Dr. Fair Valleys and others, Alrashed Library, 2nd edition, 2005.
Electronic Materials	Web sites dedicated to Probability on the internet.
Other Learning Materials	Black board platform.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom equipped with projector, whiteboard, and sufficient seating arrangements.
Technology equipment (Projector, smart board, software)	Power point presentations and other hand-outs posted on the course web site.

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 students assessment	Students, Program assessment committee	Direct/ Indirect
Quality of learning resources	Instructor	Direct/Indirect
The extent to which CLOs have been achieved	Students, Faculty members	Indirect
Other		

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.**