



Course Specification

— (Bachelor)

Course Title: Statistics and Probability

Course Code: 2022107-4

Program: Bachelor in Mathematics

Department: Mathematics and Statistics Department

College: Faculty of Sciences

Institution: Taif University

Version: 1

Last Revision Date: 20/05/2023



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A. General information about the course:

1. Course Identification

1. Credit hours: 4h(4,0,0)

2. Course type

A. University College Department Track Others

B. Required Elective

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

4. Course general Description:

This course provides an elementary introduction to probability and statistics with some applications. The course includes: Descriptive statistics: describing data sets, interpret examples of methods for summarizing data sets, including common graphical tools. Demonstrate measures of central tendency, and measures of dispersion. Probability theory: Describe the random experiments, sample or outcome spaces (discrete and continuous cases), events and their algebra, combinatorics, Study and derive probability measures, conditional probability, law of total probability, Bayes' theorem, and independent events. Demonstrate random variables, their distributions, probability mass functions (discrete), probability density function (continuous), cumulative distribution function, Compute some of statistical properties of random variables (mathematical expectation, median, mode, variance, standard deviation, moments, the probability generating function, the moment generating function, the characteristic function). State and use Markov's and Chebyshev's inequalities. The other topics covered some of discrete probability distributions such as discrete uniform, Bernoulli, Binomial, negative binomial, geometric and Poisson distributions, and some of continuous probability distributions such as uniform, gamma, exponential and normal distributions.

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

Calculus I 2021204-4

6. Co-requirements for this course (if any):

None

7. Course Main Objective(s):

- Demonstrating the ability to apply fundamental concepts in data analysis, using and applying the basic concepts of probability and their properties to calculate the probabilities for different situations.
- Describing the basic concepts of random variables, computing some of statistical properties of them in discrete and continuous cases, and working with discrete and continuous distributions of random variables.



2. Teaching mode (mark all that apply)

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

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	60
2.	Laboratory/Studio	NA
3.	Field	NA
4.	Tutorial	NA
5.	Others (specify)	NA
Total		60

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	Outline the measure of central tendency and variation.	K2	<ul style="list-style-type: none"> Lectures Group discussions 	<ul style="list-style-type: none"> Quizzes Assignments
1.2	Describe the sample spaces, events for random experiments, and probability measures and their properties.	K2	<ul style="list-style-type: none"> Lectures Group discussions 	<ul style="list-style-type: none"> Exams Assignments
1.3	Recognize the basic concepts of random	K2	<ul style="list-style-type: none"> Lectures Group discussions 	<ul style="list-style-type: none"> Quizzes Assignments





Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	variables in the discrete and continuous case, and their main properties.			
2.0	Skills			
2.1	Calculate probabilities and conditional probabilities of events.	S2	<ul style="list-style-type: none"> Lectures Group discussions 	<ul style="list-style-type: none"> Exams
2.2	Evaluate statistical properties of discrete and continuous random variables.	S2	<ul style="list-style-type: none"> Lectures Group discussions Self-learning through the website 	<ul style="list-style-type: none"> Exams
2.3	Demonstrate the statistical properties of discrete and continuous probability distributions.	S2	<ul style="list-style-type: none"> Lectures Group discussions 	<ul style="list-style-type: none"> Exams
3.0	Values, autonomy, and responsibility			
3.1	Work effectively within groups and independently.	V1	<ul style="list-style-type: none"> Interactive classes Give students tasks of duties 	<ul style="list-style-type: none"> Assessment of design projects that have elements of interpersonal skills.
3.2	Show the responsibility for their own learning and continuing personal and professional development.	V2	<ul style="list-style-type: none"> Projects 	<ul style="list-style-type: none"> Oral exams

C. Course Content

No	List of Topics	Contact Hours
1.	Data Types and collection.	4
2.	Descriptive statistics (frequency tables and graphs, relative frequency tables and graphs, cumulative frequency tables and graphs, grouped data, histograms).	4
3.	Measures of central tendency (mean, median, and mode).	4
4.	Measures of dispersion (range, mean deviation, variance, and standard deviation).	4
5.	A review for sets, random experiment, sample space, events.	4
6.	Definitions and axioms of probability, some laws of probability,	4



	finite and infinite probability space.	
7.	Conditional probability, law of total probability. Bayes' theorem, independent events, and some applications.	4
8.	1st Exam. Random variables: Discrete random variable (probability mass function, cumulative distribution function). Continuous random variable (probability density function, cumulative distribution function).	4
9.	Mathematical expectation, median, mode, variance, standard deviation, moments.	4
10.	The probability generating function, the moment generating function, the characteristic function.	4
11.	Markov's inequality, Chebyshev's inequality, and some applications.	4
12.	Some of discrete probability distributions: discrete uniform, Bernoulli, and Binomial distributions.	4
13.	2nd Exam. Negative binomial, geometric, Poisson distributions, and some applications.	4
14.	Some of continuous probability distributions: uniform, gamma, and exponential distributions.	4
15.	Revision	4
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	Continuous Evaluation	10 %
2.	Assignments, report	Continuous Evaluation	10 %
3.	Midterm 1 Exam	8-9	15%
4.	Midterm 2 Exam	12-13	15%
5.	Final Exam	15-16	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	S. Ross, A First Course in Probability, 10th Edition, Pearson, 2019
Supportive References	S. Ross, Introduction to Probability and Statistics for Engineers and Scientists, 5th Edition, Elsevier Inc, 2014



Electronic Materials	Lectures available in Blackboard
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (Projector, smart board, software)	Data show, Blackboard
Other equipment (Depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Program Leader	Direct & Indirect
Effectiveness of students assessment	Faculty, Program Leader	Direct
Quality of learning resources	Students, Faculty	Indirect
The extent to which CLOs have been achieved	Faculty	Direct & Indirect
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department Council
REFERENCE NO.	4
DATE	October 2023

