



## Course Specifications

<b>Course Title:</b>	Probability and Statistics
<b>Course Code:</b>	2022107-4
<b>Program:</b>	<b>Bachelor in Mathematics.</b>
<b>Department:</b>	Mathematics and Statistics
<b>College:</b>	Faculty of Science
<b>Institution:</b>	Taif university

## Table of Contents

<b>A. Course Identification</b> .....	<b>3</b>
6. Mode of Instruction (mark all that apply) .....	3
<b>B. Course Objectives and Learning Outcomes</b> .....	<b>3</b>
1. Course Description .....	3
2. Course Main Objective.....	4
3. Course Learning Outcomes .....	4
<b>C. Course Content</b> .....	<b>4</b>
<b>D. Teaching and Assessment</b> .....	<b>5</b>
1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods .....	5
2. Assessment Tasks for Students .....	5
<b>E. Student Academic Counseling and Support</b> .....	<b>6</b>
<b>F. Learning Resources and Facilities</b> .....	<b>6</b>
1. Learning Resources .....	6
2. Facilities Required.....	6
<b>G. Course Quality Evaluation</b> .....	<b>7</b>
<b>H. Specification Approval Data</b> .....	<b>7</b>

Probability and Statistics I

## A. Course Identification

<b>1. Credit hours: 4</b>			
<b>2. Course type</b>			
a.	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input checked="" type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	Others <input type="checkbox"/>
<b>3. Level/year at which this course is offered:</b> 6th level / 2nd year			
<b>4. Pre-requisites for this course (if any):</b> Calculus I 2021204-4			
<b>5. Co-requisites for this course (if any):</b> None			

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	5Hr /Week	100
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

### 7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	50
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	<b>Total</b>	<b>50</b>

## B. Course Objectives and Learning Outcomes

### 1. Course 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 measure 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.

## 2. Course Main Objective

The student will be taught as follows:

- 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.

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
<b>1</b>	<b>Knowledge and Understanding:</b>	
1.1	Outline the measure of central tendency and variation.	K2
1.2	Describe the sample spaces, events for random experiments, and probability measures and their properties.	K2
1.3	Recognize the basic concepts of random variables in the discrete and continuous case, and their main properties.	K2
<b>2</b>	<b>Skills:</b>	
2.1	Calculate probabilities and conditional probabilities of events.	S2
2.2	Evaluate statistical properties of discrete and continuous random variables.	S2
2.3	Demonstrate the statistical properties of discrete and continuous probability distributions.	S2
<b>3</b>	<b>Values:</b>	
3.1	Work effectively within groups and independently.	V1
3.2	Show the responsibility for their own learning and continuing personal and professional development.	V2

## C. Course Content

No	List of Topics	Contact Hours
1	Data collection and descriptive statistics (frequency tables and graphs, relative frequency tables and graphs, cumulative frequency tables and graphs, grouped data, histograms, and stem and leaf plots).	5
2	Measures of central tendency (mean, median, and mode). Measures of dispersion (range, mean deviation, variance, and standard deviation).	5
3	A review for sets theory and combinatorial analysis, definition of sampling (with and without replacement). Random experiment, sample space, events.	5
4	Definitions and axioms of probability, some laws of probability, finite and infinite probability space, Conditional probability, law of total probability. Bayes' theorem.	5
5	Independent events, and some applications. Random variables: Discrete random variable (probability mass function, cumulative distribution function). Continuous random variable (probability density function, cumulative distribution function).	5
6	<b>Midterm exam,</b> Mathematical expectation, median, mode, variance, standard deviation, moments. The probability generating function, the moment generating function, the characteristic function.	5
7	Markov's inequality, Chebyshev's inequality, and some applications using R project.	5
8	Some of discrete probability distributions: discrete uniform, Bernoulli, and Binomial distributions. An application using R project.	5

9	Negative binomial, geometric, Poisson distributions, and some applications. An application using R project.	5
10	Some of continuous probability distributions: uniform, gamma, and exponential distributions. An applications using R project.	5
<b>Total</b>		<b>50</b>

#### D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge and Understanding:</b>		
1.1	Outline the measure of central tendency and variation.	<ul style="list-style-type: none"> <li>Lectures</li> <li>Group discussions</li> </ul>	<ul style="list-style-type: none"> <li>Quizzes</li> <li>Assignments</li> </ul>
1.2	Describe the sample spaces, events for random experiments, and probability measures and their properties.	<ul style="list-style-type: none"> <li>Lectures</li> <li>Group discussions</li> </ul>	<ul style="list-style-type: none"> <li>Exams</li> <li>Assignments</li> </ul>
1.3	Recognize the basic concepts of random variables in the discrete and continuous case, and their main properties.	<ul style="list-style-type: none"> <li>Lectures</li> <li>Group discussions</li> </ul>	<ul style="list-style-type: none"> <li>Quizzes</li> <li>Assignments</li> </ul>
<b>2.0</b>	<b>Skills:</b>		
2.1	Calculate probabilities and conditional probabilities of events.	<ul style="list-style-type: none"> <li>Lectures</li> <li>Group discussions</li> </ul>	<ul style="list-style-type: none"> <li>Exams</li> </ul>
2.2	Evaluate statistical properties of discrete and continuous random variables.	<ul style="list-style-type: none"> <li>Lectures</li> <li>Group discussions</li> <li>Self-learning through the website</li> </ul>	<ul style="list-style-type: none"> <li>Exams</li> </ul>
2.3	Demonstrate the statistical properties of discrete and continuous probability distributions.	<ul style="list-style-type: none"> <li>Lectures</li> <li>Group discussions</li> </ul>	<ul style="list-style-type: none"> <li>Exams</li> </ul>
<b>3.0</b>	<b>Values:</b>		
3.1	Work effectively within groups and independently.	Interactive classes. Give students tasks of duties.	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.	Projects	Oral exams

### 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quizzes + Home works	Continues	10 %
2	Midterm exam	5 <sup>th</sup> -6 <sup>th</sup>	30 %
3	Class Work (Homework- report- class test....)	8 <sup>th</sup>	10 %
4	Final exam	11 <sup>th</sup>	50 %

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

6 hours per week (as defined in the teaching schedule of the faculty member) for academic advice and consultations.

Teaching staff is also available using Blackboard web site and Taif University “Edugate” System.

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	S. Ross, A First Course in Probability, 10th Edition, Pearson, 2019
<b>Essential References Materials</b>	S. Ross, Introduction to Probability and Statistics for Engineers and Scientists, 5th Edition, Elsevier Inc, 2014
<b>Electronic Materials</b>	<a href="http://people.cas.uab.edu/~pjung/teaching_files/ProbabilityForActuaries.pdf">http://people.cas.uab.edu/~pjung/teaching_files/ProbabilityForActuaries.pdf</a>
<b>Other Learning Materials</b>	<a href="http://www.math.louisville.edu/~pksaho01/teaching/Math662TB-09S.pdf">http://www.math.louisville.edu/~pksaho01/teaching/Math662TB-09S.pdf</a> - R project.

### 2. Facilities Required

<b>Item</b>	<b>Resources</b>
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<b>Lecture halls, containing white boards, and electronic monitors - The seats fit the number of students - Laboratories equipped with suitable numbers of computers</b>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	<b>R software (Mathematica software)</b>
<b>Other Resources</b> (Specify, e.g., if specific laboratory equipment is required, list requirements or attach a list)	<b>Wi-Fi internet connections</b>

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Indirect
Quality of learning resources	Peer Reviewer Students	Direct Indirect
Extent of achieving the course learning outcomes	Peer Reviewer Students	Direct Indirect

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

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

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

<b>Council / Committee</b>	Department of Mathematics and Statistics
<b>Reference No.</b>	11
<b>Date</b>	12-7-1443 H

قسم الرياضيات والإحصاء  
Mathematics and Statistics  
Department

