Faculty: Science
Department: Mathematics **Program: Mathematics**

Course Plan

First: Course Information

Course Name:	***Probability Theory***			***Course No.* 0301334**	
Credit Hours:	***3 hrs***	***Theoretical***	***3***	***Practical***	***0***
Prerequisite:*Calculus 3, Statistics and Probability*	***030133 4***	***Class Number: 1***		***Lecture Time:***	
Level in JNQF	***7***				
Course Nature:	☐ ***Mandatory Faculty Requirement*** ☐ ***Mandatory University Requirement*** ☐ ***Optional Specialty Requirement*** ☐***Optional University Requirement*** ☐ ***Ancillary Course*** ☑***Mandatory Specialization requirement***				
Type of Education:	☑ **Fully Direct (Fully Face-to-Face Education)** ☐ **Integrated Education (2 Face-to-Face + 1 Asynchronous)** ☐ **Electronic Education Fully (1 Asynchronous + 2 Synchronous)**				

Third: Short Description of the Course

Axioms of probability, conditional probability, distributions of random variables; mathematical expectation, moment generating function; some special types of distributions (discrete and continuous); joint distributions; covariance and independence, correlation, conditional distributions; conditional expectation; functions of random variables (distribution function method, moment generating function method, and the Jacobian transformation method); limiting distributions.

Fourth: Course objectives

The aim of this course is to explain the fundamental concepts in the probability theory including the theoretical background and the random variables with their applications in several well-known distributions. The joint distributions are discussed in this course with the relative terms used along with conditional

Fifth: Learning Outcomes

Level descriptor according to (JNQF)	*CILOs Code*	*CILOs* If any CILO will not be assessed in the course, mark NA.	*Associated PILOs Code* *Choose one PILO for each CILO**	*Assessment method*** *Choose at least two methods*	*Scores out of 100* State the total score identified for each CILO	*Minimum acceptable Score/percentage (%)* *The percentage should not be less than 50% ****
Knowledge	**K1**	Understand the main ideas of probability set function and conditional probability, random variable and its probability distribution and characterize the distribution by its probability density function and the distribution function.	P. K1	First Exam Second Exam Final exam Assignment	30	15 (50%)
	K2	Understand the definitions and the properties of some special discrete and continuous distributions.	P. K1	First Exam Second Exam Final exam	30	15 (50%)
Skills	**S1**	Prove some important properties of probability set functions, and the main properties of the basic random variables.	P. S1	First Exam Final exam	15	7.5 (50%)
	S2	Derive a joint distribution and its properties.	P. S2	Assignment Final Exam	15	7.5 (50%)
Competencies	**C1**	Construct the probability model for random experiments.	P. C4	Assignment First exam	4	2 (50%)
	C2	Use the properties of distributions to find moments and probability distribution of functions of random variables.	P. C4	Second exam Final exam	6	3 (50%)

*Refer to document (CC-2023-02) and page 2 in document (CC-2023-01)
** Refer to document (CC-2023-05)
****80% of the students** must achieve the minimum acceptable percentage or higher for each CILO

Sixth: Learning Source

Designated Book:	Mathematical Statistics with Applications	
Authors: Mendenhall , William,Scheaffer , Fichard L.,Wackerly , Dennis D	***Print:*** 7th edition	***Year: 2008***
Additional Sources: Website:	Introduction to Probability and Mathematical Statistics, Lee J. Bain and Max Engelhardt, Second edition, Duxbury, 1992.	
Teaching Type:	☑ ***Classroom*** ☐ ***Laboratory*** ☐ ***Workshop*** ☐ **MS Teams** ☑ **Moodle**	

Seventh: Course Structure

	Covered CILOs	Topics	Teaching Procedures*	Teaching Methods**	References***
	K1 , S1	Preliminary concepts in probability	Face-to-face	Lecture	20-85
	K1 , S1	Preliminary concepts in probability	Face-to-face	Lecture	20-85
	K1 , S1	Probability set functions	Face-to-face	Lecture	20-85
	K1 , S1	Some properties of probability	Face-to-face	Lecture	20-85
	K1 , S1	Conditional probability and Bayes rule	Face-to-face	Lecture	20-85
	K1 , S1	Counting techniques	Face-to-face	Lecture	20-85
	K1 , S1	Discrete Random Variables	Face-to-face	Lecture	86-156
	K1 , S1	Discrete Random Variables	Face-to-face	Lecture	86-156
	K1 , S1	Continuous Random Variables	Face-to-face	Lecture	157-222
	K1 , C1	Continuous	Face-to-face	Lecture	157-222

		Random Variables			
	K2 , C1	Some properties of expected values	Face-to-face	Lecture	86-156
	K2 , C1	Moment generating functions	Face-to-face	Lecture	86-156
	K2 , C1	Binomial distribution	Face-to-face	Lecture	86-156
	K2 , C1	Poisson distribution	Face-to-face	Lecture	86-156
	K2 , C1	Other discrete distributions	Face-to-face	Lecture	86-156
	K2 , C1	Uniform distribution	Face-to-face	Lecture	157-222
	الامتحان الأول				
	K2 , C2	Normal distribution	Face-to-face	Lecture	157-222
	K2 , C2	Gamma-type distributions	Face-to-face	Lecture	157-222
	K2 , C2	Beta distribution	Face-to-face	Lecture	157-222
	K2 , C2	Other continuous distributions	Face-to-face	Lecture	157-222
	K2, S1, C2	Gamma-type distributions	Face-to-face	Lecture	157-222
	K2, S1, C2	Joint discrete distributions	Face-to-face	Lecture	223-295
	K2, S1, C2	Joint continuous distributions	Face-to-face	Lecture	223-295
	K2, S1, C2	Independent random variables	Face-to-face	Lecture	223-295
	K2, S1, C2	Conditional Distributions	Face-to-face	Lecture	223-295
	K2, S1, C2	Conditional Distributions	Face-to-face	Lecture	223-295
	الامتحان الثاني				
	K2, S2, C2	Random samples	Face-to-face	Lecture	223-295
	S2, C3	Properties of expected values	Face-to-face	Lecture	223-295
	S2, C3	Properties of expected	Face-to-face	Lecture	223-295

		values			
	S2, C3	The covariance	Face-to-face	Lecture	223-295
	S2, C3	The covariance	Face-to-face	Lecture	223-295
	S2, C3	Joint moment-generating functions	Face-to-face	Lecture	223-295
	S2, C3	Functions of random variables	Face-to-face	Lecture	296-345
	S2, C3	The CDF technique	Face-to-face	Lecture	296-345
	K2, S3	Transformation methods	Face-to-face	Lecture	296-345
	K2, S3	Transformation methods	Face-to-face	Lecture	296-345
	K2, S3	MGF method	Face-to-face	Lecture	296-345
	K2,, S3	MGF method	Face-to-face	Lecture	296-345
	K2, S3	MGF method	Face-to-face	Lecture	296-345
	K2, S3	Revision	Face-to-face	Lecture	
	Final Exams				

Education procedures: (Direct, synchronous, asynchronous). * * Refer to document (CC-2023-04) ***Reference: Pages of the book, number of the chapter, recorded lecture, video….)

Eighth: Assessment methods

Methods	Fully Electronic Education	Integrated Teaching	Direct Teaching	Specific Course Output to be measured					
				K1	K2	S1	S2	C1	C2
First Exam			20	8	4	6		2	
Second Exam			20	6	10				4
Final Exam			50	10	16	9	13		2
Assignments			10	6			2	2	
Total out of 100			100	30	30	15	15	4	6

* Refer to document (CC-2023-03)

Ninth: Course Policies

- Meeting the deadline for the lecture.
- Commitment to interaction and participation.
- Assignments will be given through a platform (Moodle).
- University regulations for attendance and absence from lectures and examinations are in force.
- Academic Integrity: According to university regulations and instructions, fraud or moral impersonation is unacceptable and punishable.