Course Specification
(Bachelor)

Course Title:	Theory of Statistics
Course Code:	2023101-3
Program:	Bachelor in Mathematics.
Department:	Department of Mathematics and Statistics
College:	College of Science
Institution:	Taif university
Version:	1
Last Revision Date:	20/05/2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3 h)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 5/ Third year)					
4. Course general Description:					
This course covers some topics in statistics. These topics are multivariate random variables, conditional distributions, mixed moments, correlation coefficient, conditional mixed moments, independence of random variables, distributions of functions of random variables, distribution function method, transformation method, moment generating function method, some concepts of statistical inference.					
5. Pre-requirements for this course (if any)**:**					
Statistics and Probability (2022107-4)					
6. Co-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					
1- Describe the joint, marginal and conditional probability functions. **2- Recognize method of calculating probabilities from the bivariate distributions.** **3- Explain methods of finding the distribution of a function of random variables.** **4- Apply statistical techniques of estimation of an unknown parameter and the properties of the good estimator.**					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	**3Hr /Week**	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**	45
2.	**Laboratory/Studio**	NA
3.	**Field**	NA
4.	**Tutorial**	NA
5.	**Others (specify)**	NA
Total		45

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	Describe the joint, marginal and conditional probability functions.	**K_1**	• Lectures • Group discussions	• Quizzes • Assignments
1.2	Recognize method of calculating probabilities from the bivariate distributions.	**K_1**	• Lectures • Group discussions	• Exams • Assignments
2.0	**Skills**			
2.1	Explain methods of finding the distribution of a function of random variables.	**S_1**	• Interactive classes • Group discussions	• Quizzes • Assignments
2.2	Apply statistical techniques of estimation of an unknown parameter and the properties of the good estimator.	**S_3**	• Lectures • Group discussions	• Exams • Quizzes
3.0	**Values, autonomy, and responsibility**			
3.1	Show the responsibility for their own learning and continuing personal and professional development	**V_2**	• Interactive classes. • Give students tasks of duties.	• Assessment of design projects that have elements of interpersonal skills.

C. Course Content

No	List of Topics	Contact Hours
1.	Bivariate random variables, joint probability mass functions (jpmf)), marginal pmf's, computing probabilities from jpmf.	3
2.	Joint cumulative distribution functions for discrete bivariate random variables (jcdf), marginal cdf's, computing probabilities from Jcdf.	3
3.	Conditional probability and distribution functions for discrete bivariate random variables, conditional probabilities.	3
4.	Joint probability functions for continuous bivariate random variables (joint probability density functions (jpdf)), marginal pdf's, computing probabilities from jpdf.	3
5.	Joint cumulative distribution functions for continuous bivariate random variables (jcdf), marginal cdf's, computing probabilities from jcdf.	3
6.	Conditional Probability and Distribution Functions for Continuous Multivariate Random Variables.	3
7.	Conditional probabilities, mixed Moments, Correlation coefficient, Conditional mixed moments – Independence of random variables.	3
8.	Bivariate normal distribution, 1 st Midterm Exam.	3
9.	Distributions of functions of random variables, distribution function method.	3
10.	Transformation method, moment generating function method.	3
11.	Statistical inference concepts (Population – Sample – Sample Mean – Sample Variance – Statistic – Estimator).	3
12.	Estimation methods, method of moments, maximum likelihood method.	3
13.	Properties of the good estimator (Unbiasedness - sufficiency) 2nd Mid Term Exam.	3
14.	Cramer-Rao inequality, Efficiency of an Estimator.	3
15.	Revisions	3
	Total	45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	Continues	10 %
2.	Home works	Continues	10 %
3.	Mid term exam 1	8 -9	15 %
4.	Mid term exam 2	12 -13	15 %

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
5.	Final	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	J. L. Devore and K. N. Berk, Modern Mathematical Statistics with Applications, 2012, 2nd Ed., Springer.
Supportive References	Robert Bartoszyński and Magdalena Niewiadomska Bugaj, Probability and Statistical Inference,(2007), 2nd Ed.
Electronic Materials	drive.google.com/uc?export=download&id=1WtruYh-IRFk69o3hBnXSpOjUANil5qLE
Other Learning Materials	R tutorial

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture halls, containing white boards, and electronic monitors - The seats fit the number of students - Laboratories equipped with suitable numbers of computers
Technology equipment (Projector, smart board, software)	R software
Other equipment (Depending on the nature of the specialty)	Wi-Fi internet connections

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching		
Effectiveness of Students assessment	Students	Direct Indirect
Quality of learning resources	Peer Reviewer Students	Direct Indirect
The extent to which CLOs have been achieved	Peer Reviewer	Direct Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department of Mathematics and Statistics council
REFERENCE NO.	4
DATE	October 2023

قسم الرياضيات والإحصاء
Mathematics and Statistics Department
TU
جامعة الطائف
TAIF UNIVERSITY