اعتماد
NCAAA

T4

2020

Course Specifications

Course Title:	Theory of Statistics
Course Code:	2023101-3
Program:	**Bachelor in Mathematics.**
Department:	Department of Mathematics and Statistics
College:	Faculty of science
Institution:	Taif university

Table of Contents

A. Course Identification

1. Credit hours:3	

2. Course type

a. University ☐　College ☐　Department ☑　Others ☐

b. Required ☑　Elective ☐

3. Level/year at which this course is offered: 8th level, 3th year

4. Pre-requisites for this course (if any)**:**

Statistics and Probability (2022107-4)

5. Co-requisites for this course (if any)**:**

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)	
	Total	50

B. Course Objectives and Learning Outcomes

1. Course Description

This course will provide topics contains:

Multivariate random variables(Joint Probability Functions For Discrete Multivariate Random Variables and Continuous Multivariate Random Variables), Conditional Probabilities -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 (Population – Sample – Sample Mean – Sample Variance – Statistic – Estimator), Properties Of The Good Estimator(Unbiasedness - sufficiency – constancy), Comparison Between Two Estimators , Cramer-Rao Inequality –

Efficiency of an Estimator – Efficient Estimator, Some methods of point estimation (Method of Moments - Maximum Likelihood Method), the basic concept of hypothesis testing.

2. Course Main Objective

The student will be taught as follows:

1. Learning the basic concepts of multivariate distributions.
    1. 2- Introducing the basic concepts of statistical inference. Introducing the concepts and importance of operations research;
    2. Describing basic optimization models and methods for operations research.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding:**	
1.1	Describe the joint, marginal and conditional probability functions.	K1
1.2	Recognize method of calculating probabilities from the bivariate distributions.	K1
2	**Skills:**	
2.1	Explain methods of finding the distribution of a function of random variables.	S1
2.2	Apply the use of computers for finding needed information.	S3
3	**Values:**	
3.1	Show the responsibility for their own learning and continuing personal and professional development.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Joint Probability Functions for Discrete Multivariate Random Variables (Joint Probability Mass Functions (pmf)) - Marginal pmf's- How to Compute Probabilities from Joint pmf- Joint Cumulative Distribution Functions for Discrete Multivariate Random Variables (Joint cdf)	5
2	Marginal cdf's - How to Compute Probabilities from Joint cdf- Conditional Probability and Distribution Functions for Discrete Multivariate Random Variables	5
3	Conditional Probabilities- Joint Probability Functions for Continuous Multivariate Random Variables (Joint Probability Density Functions (pdf)) - Marginal pdf's - How to Compute Probabilities from Joint pdf	5
4	Joint Cumulative Distribution Functions for Continuous Multivariate Random Variables (Joint cdf) - Marginal cdf's - How to Compute Probabilities from Joint cdf	5
5	Conditional Probability and Distribution Functions for Continuous Multivariate Random Variables, Conditional Probabilities -Mixed Moments	5
6	**Midterm exam,** Correlation Coefficient - Conditional Mixed Moments – Independence of Random Variables- Distributions of Functions of Random Variables – Distribution Function Method	5
7	Transformation Method- Moment Generating Function Method- Statistical Inference Concepts (Population – Sample – Sample Mean – Sample Variance – Statistic – Estimator)	5
8	Estimation Methods – Method of Moments - Maximum Likelihood Method- Properties of The Good Estimator (Unbiasedness - sufficiency)	5
9	Cramer-Rao Inequality – Efficiency of an Estimator	5
10	Basic concept of hypothetical testing	5
Total		50

D. Teaching and Assessment

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

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding:**		
1.1	Describe the joint, marginal and conditional probability functions.	• Lectures • Group discussions	• Quizzes • Assignments
1.2	Recognize method of calculating probabilities from the bivariate distributions.	• Lectures • Group discussions	• Exams • Assignments
2.0	**Skills:**		
2.1	Explain methods of finding the distribution of a function of random variables.	• Interactive classes • Group discussions	• Quizzes • Assignments
2.2	Apply the use of computers for finding needed information.	• Lectures • Group discussions	• Exams • Quizzes
3.0	**Values:**		
3.1	<u>Show</u> the responsibility for their own learning and continuing personal and professional development.	Interactive classes. Give students tasks of duties.	Assessment of design projects that have elements of interpersonal skills.

2. Assessment Tasks for Students

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

Required Textbooks	**J. L. Devore and K. N. Berk, Modern Mathematical Statistics with Applications, 2012, 2nd Ed., Springer.**
Essential References Materials	**Robert Bartoszyǹski 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. Facilities Required

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

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

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

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