



Course Specification

— (Postgraduate)

Course Title: Theory of statistics (1)

Course Code: 202590-3

Program: M.Sc. in Statistics

Department: Mathematics and Statistics

College: Science

Institution: Taif University

Version: 2023

Last Revision Date: 7/4/1445



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A. General information about the course:

1. Course Identification:

1. Credit hours: (3)

2. Course type

A. University College Department Track

B. Required Elective

3. Level/year at which this course is offered: (First level/ First year.)

4. Course general Description:

This course contains some very important topics in statistics. These topics are: Continuous and discrete probability distributions – Multivariate distributions - Sampling distributions - Central limit theorem – Estimation theory - Point Estimation - Properties of estimator - Exponential family - Uniformly Minimum Variance Unbiased Estimator - Cramer-Rao inequality - Fisher's information - Rao-Blackwell theorem - Sufficiency and completeness - Lehmann-Sheffe theorem - Interval estimation in case of one or two samples.

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

None

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

None

7. Course Main Objective(s):

1. Determine probabilities using the univariate and multivariate probability functions.
2. Determine the probability functions of some sample statistics.
3. Understand the central limit theory, Estimation theory(Point and Interval).
4. Understand the properties of the estimators, Cramer-Rao inequality, Fisher's information, Rao-Blackwell theorem and Lehmann-Sheffe theorem

2. Teaching Mode: (mark all that apply)





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

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	Recognize the fundamentals of estimation theory(Point and Interval).	K1	Lectures, discussion group	Exams, Quizzes, Assignments
1.2	Outline the central limit, Rao-Blackwell and Lehmann-Sheffe theorems	K1	Lectures, discussion group	Exams, Quizzes, Assignments
1.3	Outline statistical properties of the estimators.	K2	Lectures, discussion group	Exams, Quizzes, Assignments
1.4	Describe Exponential family, methods of	K3	Lectures, discussion group	Exams, Quizzes, Assignments



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	estimation.			
2.0	Skills			
2.1	Apply the studied methods to find the probabilities from univariate and multivariate distributions.	S2	Lectures, group discussion	Exams, Quizzes, Assignments, Report
2.2	Evaluate, and compare between estimators.	S4	Lectures, group discussion	Exams, Quizzes, Assignments, Report
3.0	Values, autonomy, and responsibility			
3.1	Participate effectively within groups and independently.	V1	Collaborative Learning Self-learning	Scientific activity
3.2	Express mathematical and statistical ideas orally and in writing	V4	Collaborative Learning Self-learning	Scientific activity

C. Course Content:

No	List of Topics	Contact Hours
1.	Continuous and discrete probability distributions, Exponential family, Multivariate distributions.	9
2.	Sampling distributions, Central limit theorem.	9
3.	Estimation theory, Point Estimation, Properties of estimators.	9
4.	Cramer-Rao inequality, Uniformly Minimum Variance Unbiased Estimators, Fisher's information, Rao-Blackwell theorem.	9
5.	Interval estimation in case of one sample, Interval estimation in case of two samples.	9
Total		45

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
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No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes + Homeworks+ oral presentation +written test+ group project	Continues	30%
2.	Final exam	16 th	70%

*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	
Other Learning Materials	Blackboard system

2. Educational and Research Facilities and Equipment Required:

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		

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

Assessment Methods (Direct, Indirect)





G. Specification Approval Data:

COUNCIL /COMMITTEE	Department of Mathematics and Statistics
REFERENCE NO.	4
DATE	7/4/1445

قسم الرياضيات والإحصاء
Mathematics and Statistics
Department

