T-104
2022

Course Specification

Course Specification

| Course Title: | **Mathematical Statistics** |

| Course Code: | **323STAT-3** |

| Program: | **B.Sc. Mathematics** |

| Department: | **Mathematics** |

| College: | **Arts and Sciences** |

| Institution: | **Najran University** |

| **Version:** | **2022** |

| **Last Revision Date:** | **10-09-2023** |

Table of Contents:

A. General information about the course:

Course Identification	
1. Credit hours:	**3**

2. Course type

a.	University ☐	College ☐	Department ☒	Track☐	Others☐
b.	Required ☒	Elective☐			

3. Level/year at which this course is offered:	: **6/3**

4. Course general Description:

This course introduce, the concept of random sampling distribution, and its related definitions are dealt with, with a focus on sampling from normal population, law of large numbers, central limit theorem, with a comprehensive study of sampling distributions (χ^2, t, F), and then a comprehensive study of the estimation theory and testing hypotheses. The content is presented in a presentation that includes basic definitions and the derivation of relevant theorems.

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

Probability Theory (322Stat-3)

6. Co- requirements for this course (if any):   None

7. Course Main Objective(s):

Studying the random sampling concepts, the law of large numbers, the central limit theorem with sampling distributions, and providing students with the mathematical ability to prove theorems, while clarifying the concept of statistical inference through estimation theory and hypothesis testing.

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	3	100%
2.	E-learning		
3.	Hybrid • Traditional classroom • E-learning		
4.	Distance learning		

2. 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	**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	Define the basic concepts and scientific facts, in statistical inference, sampling distributions, point estimation, interval estimation and tests of hypothesis	K1	• Lecture • Cooperative learning • Problem solving	• Assignments • Quizzes • Midterm • Final Exam
1.2				
2.0	**Skills**			
2.1	Employ mathematical knowledge to derive all theorems in random sampling distributions	S2		
2.2	Apply the random sampling distributions, law of large numbers and central limit theorem for solving different problems		• Lecture • Cooperative learning • Problem solving	• Assignments • Quizzes • Midterm • Final Exam
2.3	Solve different problems in Estimation theory (point estimation, properties of estimators, confidence interval estimation).	S3		
2.4	Solve different problems in testing hypotheses to the mean and variance of the population.			
…				
3.0	**Values, autonomy, and responsibility**			
3.1				
..				
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C. Course Content

No	List of Topics	Contact Hours
1.	Sampling distributions (Concept of sampling distribution, Sampling	10

	from normal population, Parameter and Statistic, Random Sampling, Sampling distribution of the Sample mean and Sample variance, Chebyshev`s inequality, Law of large numbers , Central limit theorem).	
2.	Probability sampling distributions (Chi–square distribution, t– distribution and F–distribution).	10
3.	Estimation theory (Estimation concept, Properties of estimators, Point estimation, The moments method, The likelihood estimators method, Precision of estimation, The standard error, Single sample confidence interval estimation, Tow sample confidence interval estimation).	15
4.	Hypothesis testing (general concepts for testing statistical hypotheses, testing statistical hypotheses in one sample and in two samples for the mean and variance of the population).	10

Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	First Exam	7	20%
2.	Assignments & Quizzes	During classes	10%
3.	Second Exam	13	20%
4.	Final Exam	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	- Kandethody M. Ramachandran and Chris P. Tsokos, Mathematical Statistics with Applications Copyright © 2009, Elsevier Inc.
Supportive References	- Prasanna Sahoo, Louisville, Probability and mathematical statistics, KY 40292 USA, 2013. - Robet V. Hogg Joeseph Mckean Allen T., Introduction to

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	Mathematical Statistics , Craig Seventh edition, 2014.
Electronic Materials	Electronic materials available on the internet.
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 30 seats.
Technology equipment (projector, smart board, software)	- Blackboard Platform - SPSS Program, R Software - Projector
Other equipment (depending on the nature of the specialty)	N/A

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Student Questionnaire (Indirect)
Effectiveness of students assessment	Peer Reviewer	Rubrics (Indirect)
Quality of learning resources		
The extent to which CLOs have been achieved	Faculty	Direct
Other		

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

G. Specification Approval Data

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	