

Course Syllabus

offered by Department of Mathematics
with effect from Semester A 2022/23

Part I Course Overview

Course Title: Advanced Mathematical Statistics

Course Code: MA8026

Course Duration: 1 semester

Credit Units: 3 CUs

Level: R8

Medium of Instruction: English

Medium of Assessment: English

Prerequisites:
(Course Code and Title) Nil

Precursors:
(Course Code and Title) Nil

Equivalent Courses:
(Course Code and Title) Nil

Exclusive Courses:
(Course Code and Title) Nil

Part II Course Details

1. Abstract

This course aims to provide students with a solid foundation of the basic concepts, principles, and methods of mathematical statistics. Topics include probability models of data, principles of data reduction, and main theory and methodology for point estimation, hypothesis testing and interval estimation. It also aims to provide students with a rigorous introduction of Bayesian analysis and main results of statistical decision theory. Particular focus will be on the understanding of key ideas and methods of mathematical statistics, and classical theory of statistical inference. It also aims to introduce modern development of statistics.

2. Course Intended Learning Outcomes (CILOs)

No.	CILOs [#]	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	A2	A3
1.	Understand the foundational concepts of mathematical statistics including data and models, statistic and its sampling distribution.	20%	✓	✓	
2.	Understand and implement key methods of mathematical statistics such as point estimation, hypothesis testing, interval estimation and Bayesian analysis.	40%	✓	✓	✓
3.	Derive the classical asymptotic theory for statistical inferences	40%	✓	✓	
...					
		100%			

A1: *Attitude*

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: *Ability*

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.

A3: *Accomplishments*

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

3. Teaching and Learning Activities (TLAs)

TLA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3	4			
Teaching	Learning through teaching is primarily based on lectures.	✓	✓	✓				3 hours/week
Assignments	Including exercises on theory and application.	✓	✓	✓				
...								

4. Assessment Tasks/Activities (ATs)

Assessment Tasks/Activities	CILO No.						Weighting*	Remarks
	1	2	3	4				
Continuous Assessment: <u>50</u> %								
Assignments	✓	✓	✓				20%	
Midterm	✓	✓	✓				30%	
Examination: <u>50</u> % (duration: 3 hours, if applicable)								
							100%	

5. Assessment Rubrics

Applicable to students admitted in Semester A 2022/23 and thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-,C+,C)	Failure (F)
1. Assignments	Ability in problem solving	High	Significant	Basic	Not even reaching marginal levels
2. Midterm	Problem solving based on comprehensive understanding	High	Significant	Basic	Not even reaching marginal levels
3. Examination	Problem solving based on comprehensive understanding	High	Significant	Basic	Not even reaching marginal levels

Applicable to students admitted before Semester A 2022/23

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Assignments	Ability in problem solving	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Midterm	Problem solving based on comprehensive understanding	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Examination	Problem solving based on comprehensive understanding	High	Significant	Moderate	Basic	Not even reaching marginal levels

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

Probability theory and distributions; Principles of data reduction; Point estimation; Hypothesis testing; Interval estimation; Bayesian analysis

2. Reading List

2.1 Compulsory Readings

1.	Shao, J., Mathematical Statistics, 2nd ed., Springer, 2003.
2.	
3.	
...	

2.2 Additional Readings

1.	Casella, G. and Berger, R. L., Statistical Inference, 2nd Edition. Duxbury Press, 2002.
2.	Lehmann, E. L. and Romano, J. P., Testing Statistical Hypotheses, 3rd ed., Springer, 2005.
3.	Lehmann, E. L. and Casella, G., Theory of Point Estimation, 2nd ed., Springer, 1998.
4.	