MA2506: PROBABILITY AND STATISTICS

Effective Term
Semester A 2025/26

Part I Course Overview

Course Title
Probability and Statistics

Subject Code
MA - Mathematics

Course Number
2506

Academic Unit
Mathematics (MA)

College/School
College of Science (SI)

Course Duration
One Semester

Credit Units
4

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Grade B or above in MA1201 Calculus & Basic Linear Algebra II and subject to approval from MA must be obtained; or
Grade C- or above in MA1301 Enhanced Calculus & Linear Algebra II; or
Grade C- or above in both MA1508 Calculus and MA1503 Linear Algebra with Applications

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
MA2172 Applied Statistics for Sciences & Engineering
MA2177 Engineering Mathematics and Statistics
MA2510 Probability and Statistics

Part II Course Details

Abstract

This course introduces probability theory and statistical inference. It will help students learn the theoretical basis and practical applications of probability distributions, and understand the theory of statistical inference as developed from the basis of probability. It trains students in thinking and analyzing problems from a probabilistic and statistical point of view.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	explain concepts at high levels and implement basic operations in probability and statistics.	15	x		x
2	apply the methods of hypothesis testing and parametric estimation for some statistical problems.	25		x	
3	create and formulate mathematical models using probability and statistics.	40		x	
4	apply statistical and computational methods to a range of problems in science and engineering involving probability and statistics.	20	x	x	x

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 real-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.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Learning through teaching is primarily based on lectures.	1, 2, 3, 4	40 hours in total
2	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	1	4 hours
3	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	2	4 hours

4	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	3	2 hours
5	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	4	2 hours
6	Assignments	Learning through take-home assignments helps students understand the theoretical basis and identify practical applications of probability and statistics, and develop the ability of analyzing problems from a probabilistic and statistical point of view.	1, 2, 3, 4	after-class
7	Online applications	Learning through online examples for applications helps students design and construct probabilistic and statistical models, and apply to some problems in science and engineering.	3, 4	after-class
8	Math Help Centre	Learning activities in Math Help Centre provides students extra help.	1, 2	after-class

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Test (Midterm Exam)	1, 3, 4	20	Questions are designed for the part of probability theory to see how well the students have learned the basic concepts, fundamental theory and recognized the applications of probability.	No

2	Hand-in assignments	1, 2, 3, 4	10	These are skills based assessment to enable students to demonstrate the basic concepts and fundamental theory of probability and statistics, and identify the applications.	Yes

Continuous Assessment (%)

30

Examination (%)

70

Examination Duration (Hours)

3

Minimum Examination Passing Requirement (%)

30

Additional Information for ATs

30% Coursework 70% Examination (Duration: 3 hours, at the end of the semester) For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

Assessment Rubrics (AR)

Assessment Task

1. Test

Criterion

ABILITY to APPLY and EXPLAIN the basic concepts and methodology of probability and statistics

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

2. Hand-in assignments

Criterion
CAPACITY for LEARNING to understand the principles of probability and statistics

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task
3. Formative take-home assignments

Criterion
CAPACITY for SELF-DIRECTED LEARNING to understand and apply different probability and statistics methods

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task
4. Examination

Criterion
ABILITY to DEVELOP models through probability and statistics and SOLVE problems with different methods

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

Probability. Sample Space. Discrete and Continuous Random Variables. Discrete and Continuous Probability Distributions. Central Limit Theorem. Chebyshev's Theorem. Mathematical Expectation and Variances. Moment Generating Functions. Estimation of Parameters. Hypothesis Testing for one and two samples.

Reading List

Compulsory Readings

	Title
1	Probability and Statistics for Engineers and Scientists, by Walpole, Myers, Myers and Ye, 8th Ed., Pearson International Edition, 2007.

Additional Readings

	Title
1	Probability and Statistics for Engineers and Scientists, by Devore, 8th Ed., Cengage International Edition, 2012.