

MA4535: APPLIED PROBABILITY

Effective Term

Semester A 2022/23

Part I Course Overview

Course Title

Applied Probability

Subject Code

MA - Mathematics

Course Number

4535

Academic Unit

Mathematics (MA)

College/School

College of Science (SI)

Course Duration

One Semester

Credit Units

3

Level

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

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

MA2506 Probability and Statistics, or
MA2510 Probability and Statistics

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

MA3160 Probability & Stochastic Processes

Part II Course Details

Abstract

This course introduces fundamental concepts of stochastic processes and their applications in a range of problems. It develops students' ability of applying the probability concept to various stochastic models and analyzing queueing situations from a probabilistic point of view.

Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1 explain at high level concepts from probability and stochastic processes.	15	x		
2 identify appropriate estimators for random variables and compute variabilities.	15		x	
3 formulate real-life phenomena in terms of stochastic processes.	15			x
4 explain basic properties of Markov chains and their applications in modeling queueing systems.	25	x	x	
5 analyze probability and stochastic models mathematically.	15		x	x
6 the combination of CILOs 1-5	15	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.

Teaching and Learning Activities (TLAs)

TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1 Lectures	Learning through teaching is primarily based on lectures.	1, 2, 3, 4, 5, 6	39 hours in total
2 Take-home Assignments	Learning through take-home assignments helps students understand probability theory, stochastic processes, queueing systems and their applications in modeling real-life situations.	1, 2, 3, 4, 5	after-class

Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Test	1, 2, 3	15	Questions are designed for the first part of the course to see how well the students have learned basic concepts of probability and stochastic processes.
2	Hand-in assignments	1, 2, 3, 4, 5	15	These are skills based assessment to help students understand concepts of probability, stochastic processes, Markov chains and some applications in queueing systems.
3	Formative take-home assignments	1, 2, 3, 4, 5	0	The assignments provide students chances to demonstrate their achievements in applying concepts of probability and stochastic processes learned from this course.

Continuous Assessment (%)

30

Examination (%)

70

Examination Duration (Hours)

3

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 in problem solving

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

Understanding of concepts and applications

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

Study attitude

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

Comprehensive ability in independent problem solving

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**

Bayes' formula, random variable, Poisson process, exponential distribution, Markov chain, random walk, M/M/1 and M/M/s queues.

Reading List**Compulsory Readings**

Title	
1	Nil

Additional Readings

Title	
1	Nil