

MA2177: ENGINEERING MATHEMATICS AND STATISTICS

Effective Term

Semester A 2024/25

Part I Course Overview

Course Title

Engineering Mathematics and Statistics

Subject Code

MA - Mathematics

Course Number

2177

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

MA1201 Calculus and Basic Linear Algebra II / MA1301 Enhanced Calculus and Linear Algebra II; or equivalent

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

MA2506 Probability and Statistics

MA2510 Probability and Statistics

MA2172 Applied Statistics for Science and Engineering

MA2181 Mathematical Methods for Engineering

Part II Course Details

Abstract

This course aims to develop a basic understanding of a range of mathematics tools with emphasis on engineering applications in order to support later courses in mechanical and electronic themes. It is intended for students to solve some statistical problems and ordinary differential equations by analytical methods. Fourier series and Laplace transforms are also introduced. The course will help students develop skills and the ability to think quantitatively and analyse problems critically.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	explain at high levels concepts from differential equations, probability and statistics.	10	x		
2	implement basic operations in Fourier series, Laplace transforms and probability theory.	20		x	
3	solve some differential equations, explicitly or by series and transforms.	30		x	
4	perform statistical computations.	30		x	
5	develop statistical models or mathematical models through differential equations and probability theory, and perform computations for some applications.	10	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, 5	39 hours in total
2	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	2	2 hours
3	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	3	2 hours

4	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	4	2 hours
5	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	5	1 hour
6	Take-home assignments	Learning through take-home assignments helps students understand basic concepts and techniques of ordinary differential equations, transforms, statistics, and some engineering applications.	1, 2, 3, 4, 5	after-class
7	Online applications	Learning through online examples for applications helps students apply statistical and computational methods to some problems in engineering applications.	5	after-class
8	Math Help Centre	Learning activities in Math Help Centre provides students extra help.	2, 3, 4, 5	after-class

Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Quizzes/Test/Midterm	2, 3	18	Questions are designed for the first part of the course to see how well the students have learned the basic concepts, and techniques of ordinary differential equations and transforms, probability theory and some applications.
2	Formative Take-home Assignments	1, 2, 3, 4, 5	12	The assignments provide students chances to demonstrate their achievements on ordinary differential equations, transforms, and statistics and their applications learned in 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. Quizzes/Test/Midterm

Criterion

Ability to apply the methodology and procedure for solving some ordinary differential equations and statistical problems.

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. Formative take-home assignments

Criterion

Ability to apply the methodology and procedure for solving some ordinary differential equations and statistical problems.

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. Examination

Criterion

Ability to apply the methodology and procedure for solving some ordinary differential equations and statistical problems.

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

Ordinary differential equations. Fourier series. Laplace transforms. Random variables. Probability. Distributions. Data and sample description. Estimation of parameters. Test of hypothesis. Simple linear regression.

Reading List

Compulsory Readings

Title	
1	For further detailed information, please refer to https://www.cityu.edu.hk/ma/programmes/undergraduate/non-BSCM-students/topics-recommended-readings-servicing-courses#heading12

Additional Readings

Title	
1	Nil