MA2507: COMPUTING MATHEMATICS LABORATORY

Effective Term
Semester A 2026/27

Part I Course Overview

Course Title
Computing Mathematics Laboratory

Subject Code
MA - Mathematics
Course Number
2507

Academic Unit
Mathematics (MA)

College/School
College of Science (SI)

Course Duration
One Semester

Credit Units
1

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

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract

This course aims to provide a computer laboratory type training for students on using analytical, numerical and statistical software tools. It develops students' ability to apply computing softwares as problem solving tools and to approach the solution of problems via computing mathematical techniques.

Artificial Intelligence (AI) will be introduced in two functional aspects:

1. AI-Assisted Mathematical Learning: Utilizing interactive AI dialogues to explore unfamiliar mathematical concepts, complemented by critical evaluation and rigorous verification of AI outputs.
2. AI-Assisted MATLAB Programming: Utilizing AI tools for initial logic prototyping, algorithm structure optimization, and debugging.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Students will learn how to manipulate mathematical and statistical software packages including MATLAB and MAPLE.			x	
2	Students will learn how to implement basic commands of MATLAB in algebraic and arithmetic computations.			x	
3	Students will learn how to design, interpret, refine, and optimize programs in MATLAB programming language, utilizing AI tools for code prototyping, algorithmic design, and debugging.			x	
4	Students will learn how to approach more complicated problems in algebra and calculus with the aid of MAPLE.			x	
5	Students will learn how to construct and apply numerical methods algorithmically.				x
6	Students will learn how to leverage interactive AI tools to explore new mathematical concepts, while applying critical thinking to rigorously evaluate and verify AI-assisted mathematical reasoning.		x	x	
7	the combination of CILOs 1-6		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	Students will learn by lectures on core numerical methods, complemented by strategies for prompt-driven math exploration and AI-assisted programming best practices.	1, 2, 3, 4, 5, 6, 7	14 hours in total
2	Laboratory sessions	Students will learn through laboratory sessions which is primarily based on interactive problem solving and question/ answer sessions allowing instant feedback.	1, 4	4 hours
3	Laboratory Sessions - Programming	Students will learn through laboratory sessions based on interactive problem solving, utilizing AI as a tool to translate mathematical logic into MATLAB code, refactor algorithms, and resolve syntax errors.	2, 3, 6	6 hours
4	Laboratory Sessions - Numerical Concepts	Students will learn through laboratory sessions focusing on numerical methods, using interactive AI dialogues to probe new mathematical concepts and validate theoretical outputs.	5, 6	2 hours
5	In-class exercise	Students will learn through in-class exercises which helps students practise computing and programming skills introduced in lectures.	1, 2, 3	6 hours in total
6	Take-home Assignments	Students perform computations and program numerical methods focusing on independent problem-solving and code implementation, with option to consult AI for basic conceptual or technical guidance.	1, 2, 3, 4, 5, 6	after-class

7	Project	Students apply numerical and computational techniques to a sophisticated problem, integrating AI assistance for rapid prototyping and concept exploration, backed by team analysis and numerical verification.	1, 2, 3, 4, 5, 6	after-class

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	In-class exercises	1, 2, 3	10	These exercises provide hand-on computer practice to familiarize students with computing and programming techniques.	Yes
2	Quizzes/Test/ Midterm	1, 2, 3, 4, 5	50	Questions are designed to enable students to demonstrate manipulating skills of using software packages to perform calculations, to write commands and to analyze programs of numerical methods.	No
3	Hand-in Assignments	1, 2, 3, 4, 5	30	These are skills based assessment to see how well the students have learned basic concepts of MATLAB programming and applied MAPLE as problem solving tools.	Yes

4	Project	1, 2, 3, 4, 5	10	Students are assessed on their ability in applying numerical and computational methods to solve mathematical problems, as well as on the presentation of numerical results with analysis.	Yes

Continuous Assessment (%)
100

Examination (%)
0

Additional Information for ATs
100% coursework

Assessment Rubrics (AR)

Assessment Task
1. In-class exercises

Criterion
Ability to manipulate computing and programming techniques via hands-on computer practice.

Excellent (A+, A, A-)
Can always manipulate computing and programming techniques via hands-on computer practice.

Good (B+, B, B-)
Can usually manipulate computing and programming techniques via hands-on computer practice.

Fair (C+, C, C-)
Can sometimes manipulate computing and programming techniques via hands-on computer practice.

Marginal (D)
Can rarely manipulate computing and programming techniques via hands-on computer practice.

Failure (F)
Cannot manipulate computing nor programming techniques via hands-on computer practice.

Assessment Task
2. Quizzes/Test/Midterm

Criterion
Ability to demonstrate manipulating skills of using software packages to perform calculations, to write commands and to analyze programs of numerical methods.

Excellent (A+, A, A-)

Can always demonstrate manipulating skills of using software packages to perform calculations, to write commands and to analyze programs of numerical methods.

Good (B+, B, B-)

Can usually demonstrate manipulating skills of using software packages to perform calculations, to write commands and to analyze programs of numerical methods.

Fair (C+, C, C-)

Can sometimes demonstrate manipulating skills of using software packages to perform calculations, to write commands and to analyze programs of numerical methods.

Marginal (D)

Can rarely demonstrate manipulating skills of using software packages to perform calculations, to write commands and to analyze programs of numerical methods.

Failure (F)

Cannot demonstrate manipulating skills of using software packages to perform calculations, nor to write commands nor analyze programs of numerical methods.

Assessment Task

3. Hand-in Assignments

Criterion

Capacity to use basic concepts of MATLAB programming as primary problem-solving tools to correctly complete computational tasks.

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. Project

Criterion

Ability to apply numerical and computational methods to solve mathematical problems, showing proficiency in leveraging AI for conceptual prototyping while delivering analytical reports.

Excellent (A+, A, A-)

Can always show their ability in applying numerical and computational methods to solve mathematical problems, as well as on the presentation of numerical results with analysis.

Good (B+, B, B-)

Can usually show their ability in applying numerical and computational methods to solve mathematical problems, as well as on the presentation of numerical results with analysis.

Fair (C+, C, C-)

Can sometimes show their ability in applying numerical and computational methods to solve mathematical problems, as well as on the presentation of numerical results with analysis.

Marginal (D)

Can rarely show their ability in applying numerical and computational methods to solve mathematical problems, as well as on the presentation of numerical results with analysis.

Failure (F)

Cannot show their ability in applying numerical nor computational methods to solve mathematical problems, nor on the presentation of numerical results with analysis.

Part III Other Information

Keyword Syllabus

MATLAB and Numerical Computation. Python and Applications.

Reading List

Compulsory Readings

	Title
1	Text(s): Stephen J. Chapman, "Essentials of MATLAB® programming", Thomson Nelson, 2006.
2	D. Beazley & B. K. Jones, “Python Cookbook”, O’ Reilly, 2013