MA2507: COMPUTING MATHEMATICS LABORATORY

Effective Term
Semester A 2022/23

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.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	manipulate mathematical and statistical software packages including MATLAB and MAPLE.			x	
2	implement basic commands of MATLAB in algebraic and arithmetic computations.			x	
3	design and interpret programs in MATLAB programming language.			x	
4	approach more complicated problems in algebra and calculus with the aid of MAPLE.			x	
5	construct and apply numerical methods algorithmically.				x
6	the combination of CILOs 1-5				

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	14 hours in total
2	Laboratory sessions	Learning through laboratory sessions is primarily based on interactive problem solving and question/ answer sessions allowing instant feedback.	1, 4	4 hours

3	Laboratory sessions	Learning through laboratory sessions is primarily based on interactive problem solving and question/ answer sessions allowing instant feedback.	2, 3	6 hours
4	Laboratory sessions	Learning through laboratory sessions is primarily based on interactive problem solving and question/ answer sessions allowing instant feedback.	5	2 hours
5	In-class exercise	Learning through in-class exercises helps students practise computing and programming skills introduced in lectures.	1, 2, 3	6 hours in total
6	Take home assignments	Learning through take-home assignments requires students to perform mathematical computations with software packages and to solve numerical problems by writing programs.	1, 2, 3, 4, 5	after-class
7	Project	Learning through project helps students apply numerical and computational techniques to solve a more sophisticated mathematical problem and to analyze its solution. It also helps students to communicate and collaborate effectively in the team.	1, 2, 3, 4, 5	after-class

Assessment Tasks / Activities (ATs)

	ATs	**CILO No.**	**Weighting (%)**	**Remarks (e.g. Parameter for GenAI use)**
1	In-class exercises	1, 2, 3	10	These exercises provide hand-on computer practice to familiarize students with computing and programming techniques.

2	Test	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.
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.
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.

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-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task
2. Test

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-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task
3. Hand-in assignments

Criterion
Capacity to use basic concepts of MATLAB programming and applied MAPLE as problem solving tools

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

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

MATLAB and Numerical Computation. Python and Applications.

Reading List

Compulsory Readings

	Title
1	Text(s): Stephen J. Chapman, "Essentials of MATLAB(r) programming", Thomson Nelson, 2006.

Additional Readings

	Title
1	D. Beazley & B. K. Jones, “Python Cookbook”, O’ Reilly, 2013