MA3523: INTRODUCTION TO ABSTRACT ALGEBRA

Effective Term
Semester A 2025/26

Part I Course Overview

Course Title
Introduction to Abstract Algebra

Subject Code
MA - Mathematics
Course Number
3523

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
MA2503 Linear Algebra

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract

The purpose of this course is to teach undergraduate student the fundamental concepts in abstract algebra, which are matrix operations, groups, vector spaces and linear transformations. The connection between matrix and group will be illustrated and practiced.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Fluent in matrix operations.	10	x	x	
2	Explain the concept of group, subgroup and homomorphism between groups.	30	x	x	x
3	Explain vector spaces in abstract field.	15	x	x	
4	Solve linear transformations in terms of matrix operations.	15	x	x	
5	Explain deeper theories of group, for example, the Sylow Theorem, generators and relations, and apply to matrix operations.	30	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	Lecture	Learning through teaching is primarily based on lectures	1, 2, 3, 4, 5	39 hours in total
2	Take-home assignments	Learning through take-home assignments helps students understand basic concepts and theories of group, vector space with abstract field, and linear transformations.	1, 2, 3, 4, 5	after-class

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Quizzes/Test/ Midterm	1, 2, 3	30	Questions are designed for the first part of the course to see how well students have learned the concepts and theories of matrix operations and group.	No
2	Formative take-home assignments	1, 2, 3, 4, 5	20	The assignments provide students chances to demonstrate their achievements on abstract algebra learned in this course.	Yes

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Minimum Examination Passing Requirement (%)

30

Additional Information for ATs

50% Continuous Assessment(s) 50% Examination (Duration: 2 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 and EXPLAIN the basic concepts and methodology of abstract algebra

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
CAPACITY for LEARNING to understand the principles of abstract algebra

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 DERIVE mathematical proofs in abstract algebra

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

Permutation matrix, group, subgroup, homomorphism, quotient group, abstract field, the characteristic polynomial, rotation, operations on subsets, the Sylow Theorem, generators and relations.

Reading List

Compulsory Readings

	Title
1	"Algebra" by Michael Artin, Pearson (2rd edition), 2010.

Additional Readings

	Title
1	Nil