

# MA3524: ANALYSIS

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## Effective Term

Semester A 2022/23

## Part I Course Overview

### Course Title

Analysis

### Subject Code

MA - Mathematics

### Course Number

3524

### Academic Unit

Mathematics (MA)

### College/School

College of Science (SI)

### Course Duration

One Semester

### Credit Units

4

### Level

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

### Medium of Instruction

English

### Medium of Assessment

English

### Prerequisites

MA2508 Multi-variable Calculus

### Precursors

Nil

### Equivalent Courses

Nil

### Exclusive Courses

MA3526 Analysis

## Part II Course Details

### Abstract

This course gives rigorous analysis on the real line and higher dimensional Euclidean spaces. It trains students to prove mathematical theorems rigorously.

### Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1 explain rigorously concepts of limit and continuity.	40	x	x	x
2 recognize basic properties of metric space.	20	x	x	
3 understand the concepts of uniform continuity and uniform convergence.	30	x	x	x
4 the combination of CILOs 1-3.	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.

### Teaching and Learning Activities (TLAs)

TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1 Lecture	Learning through teaching is primarily based on lectures.	1, 2, 3, 4	39 hours in total
2 Take-home assignments	Learning through take-home assignments helps students understand basic concepts and techniques of analysis.	1, 2, 3, 4	after-class
3 Math Help Centre	Learning activities in Math Help Centre provides students extra help.	1, 2, 3, 4	after-class

**Assessment Tasks / Activities (ATs)**

ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)	
1	Mid Term Test	1, 2	15	Questions are designed for the first part of the course to see how well students have learned concepts about limit, continuity and sets.
2	Hand-in assignments	1, 2, 3, 4	10	These are skills based assessment to help students understand basic concepts and techniques of analysis.
3	Quiz	1, 2, 3, 4	5	The assignments provide students chances to demonstrate their achievements on analysis learned in this course.

**Continuous Assessment (%)**

30

**Examination (%)**

70

**Examination Duration (Hours)**

2

**Additional Information for ATs**

30% Coursework

70% 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. Test

**Criterion**

ABILITY to APPLY and EXPLAIN the basic concepts and methodology of 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

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**Assessment Task**

2. Hand-in assignments

**Criterion**

CAPACITY for LEARNING to understand the principles of 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

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**Assessment Task**

3. Examination

**Criterion**

ABILITY to DERIVE mathematical proofs in 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

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**Assessment Task**

4. Formative take-home assignments

**Criterion**

CAPACITY for LEARNING to understand the principles of 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

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## Part III Other Information

### Keyword Syllabus

Limit, continuity, least upper bound axiom, open and closed sets, compactness, connectedness, differentiation, uniform convergence and generalization to higher dimensions.

### Reading List

#### Compulsory Readings

Title	
1	"Understanding Analysis" by Stephen Abbott, 2010.

#### Additional Readings

Title	
1	Nil