

Course Syllabus

offered by Department of Mathematics
with effect from Semester A 2022/23

Part I Course Overview

Course Title: **Methods for Applied Mathematics**

Course Code: **MA8011**

Course Duration: **One semester**

Credit Units: **3**

Level: **R8**

Medium of Instruction: **English**

Medium of Assessment: **English**

Prerequisites: **Nil**
(Course Code and Title)

Precursors: **Nil**
(Course Code and Title)

Equivalent Courses: **Nil**
(Course Code and Title)

Exclusive Courses: **Nil**
(Course Code and Title)

Part II Course Details

1. Abstract

This course includes two topics: real analysis and differential geometry. It will help students to develop a logical and systematic understanding of the core material of real analysis and differential geometry.

2. Course Intended Learning Outcomes (CILOs)

No.	CILOs [#]	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	A2	A3
1.	develop a systematic understanding of elementary properties of measures	10%	√	√	√
2.	develop a systematic understanding of simple functions and apply them to integration	10%	√	√	√
3.	develop a logical and systematic understanding of positive Borel measure	20%	√	√	√
4.	apply the approximations by continuous functions	10%	√	√	
5.	explain basic properties of curves including their curvature and torsion	10%	√	√	
6.	develop a systematic understanding of the tangent plane and the first fundamental form of surfaces; the concept of local charts is included	20%	√	√	√
7.	develop a systematic understanding of the Gauss map and its fundamental properties	20%	√	√	√
...					
		100%			

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 self-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.

3. Teaching and Learning Activities (TLAs)

TLA	Brief Description	CILO No.							Hours/week (if applicable)
		1	2	3	4	5	6	7	
Lectures	Learning through teaching is primarily based on lectures	√	√	√	√	√	√	√	40 hours in total
Assignments	Learning through take-home assignments helps students understand basic mathematical	√	√	√	√	√	√	√	after-class

	concepts and fundamental theory of this course, and develop the ability of proving mathematical statements rigorously.								
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4. Assessment Tasks/Activities (ATs)

Assessment Tasks/Activities	CILO No.							Weighting *	Remarks
	1	2	3	4	5	6	7		
Continuous Assessment: 30%									
Test	√	√	√	√				20%	
Hand-in assignments	√	√	√	√	√	√	√	10%	
Examination: 70% (duration: 2 hours)									
								100%	

5. Assessment Rubrics

Applicable to students admitted in Semester A 2022/23 and thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-,C+,C)	Failure (F)
1. Test	Ability to prove mathematical statements rigorously	High	Significant	Basic	Not even reaching marginal levels
2. Hand-in Assignments	Demonstration of the understanding of the basic materials	High	Significant	Basic	Not even reaching marginal levels
3. Examination	Demonstration of skills and versatility in this course	High	Significant	Basic	Not even reaching marginal levels

Applicable to students admitted before Semester A 2022/23

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Test	Ability to prove mathematical statements rigorously	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Hand-in Assignments	Demonstration of the understanding of the basic materials	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Examination	Demonstration of skills and versatility in this course	High	Significant	Moderate	Basic	Not even reaching marginal levels

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

σ -algebra, topological space, metm's space, measurable sets, Borel sets, the Riesz representation Theorem, tangent plane, the first fundamental form, Gauss map, the second fundamental form.

2. Reading List

2.1 Compulsory Readings

1.	"Real and Complex Analysis" by Walter Rudin
2.	"Differential Geometry of Curves and Surfaces" by Manfredo P. Do Carmo
3.	
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2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

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2.	
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