

Lecture Plan		
Name of the College: Government College of Arts, Science and Commerce, Sanquelim-Goa		
Name of Faculty: Samrudhi Uday Vaigankar	Subject: Mathematics	
Paper code: MAT-5000, Real Analysis	Program: M.Sc.	Division: -
Academic year: 2025-26	Semester: I	Total Lectures: 38
Course Objectives:		
1. To cultivate the ability to understand and construct rigorous mathematical proofs. 2. Developing procedural fluency in solving standard and structured problems in real analysis.		
Expected Course Outcome:		
1) Display familiarity and knowledge of Real Analysis and associated concepts 2) Demonstrate proofs to establish truths related to Real Analysis and associated concepts 3) Choose the appropriate procedures and modify then if needed to solve method-based problems in Real Analysis 4) Analyze and solve unseen problems in Real Analysis and invent mathematically precise arguments to justify their solutions.		
Student Learning Outcome: Student will be able to		
1) Display familiarity and knowledge of Real Analysis and associated concepts 2) Demonstrate proofs to establish truths related to Real Analysis and associated concepts		

Month	Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books
August	04/08/2025	09/08/2025	4	Metric Spaces, Euclidean Spaces, Open balls and Open sets in $\mathbb{R}^n$, Structure of open sets in $\mathbb{R}^1$, Adherent points and Accumulation points			Tom M. Apostol, Mathematical Analysis
	11/08/2025	16/08/2025	4	Closed sets, Perfect sets, Every non-empty perfect set of $\mathbb{R}^n$ is uncountable, Bolzano- Weierstrass Theorem			Tom M. Apostol, Mathematical Analysis
	18/08/2025	23/08/2025	4	Cantor Intersection Theorem, Lindelöf Covering Theorem, The Heine-Borel Covering Theorem, Compactness in $\mathbb{R}^n$			Tom M. Apostol, Mathematical Analysis
	25/08/2025	30/08/2025	0 Chaturthi Break 26/08/25 To 01/09/25				Tom M. Apostol, Mathematical Analysis
September	02/09/2025	06/09/2025	4	Compactness in metric spaces, Connected sets in metric spaces, Connected subsets of $\mathbb{R}$, Cantor set- construction and basic properties, Cantor set and ternary expansion.			Tom M. Apostol, Mathematical Analysis

	08/09/2025	13/09/2025	4	Convergent sequences in a Metric space, Cauchy sequences and Complete metric spaces, Limit inferior and Limit superior of a sequence, Limit of a Function- (Real valued, complex valued, vector valued functions)			Tom M. Apostol, Mathematical Analysis
	15/09/2025	20/09/2025	4	Continuous Functions, Continuity and Compactness, Continuity and Connectedness, Bolzano's Theorem and Intermediate value Theorem			Tom M. Apostol, Mathematical Analysis
	22/09/2025	27/09/2025	4	Uniform Continuity, Uniform Continuity and Compactness, Discontinuities of Real valued functions, Monotonic Functions			
September October	29/09/2025	04/10/2025	2 Gandhi Jayanti / Dussehra	Infinite limits and Limits at infinity, Derivatives and Continuity, Algebra of Derivatives and Chain rule (Statements only)			Tom M. Apostol, Mathematical Analysis
October	06/10/2025	11/10/2025	4	One sided derivatives and Infinite Derivatives, Functions with non-zero derivatives, Zero derivatives and Local extrema, Rolle's Theorem, Mean value Theorems and consequences			Tom M. Apostol, Mathematical Analysis
	13/10/2025	18/10/2025	4	Intermediate value Theorem for Derivatives, Taylor's Formula with Remainder, Derivatives of Vector			Tom M. Apostol, Mathematical Analysis

				valued Functions and Complex valued Functions, Derivatives of Higher Order, L'Hospital's Rules with proof.			
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*** Assessment Rubrics**

Component	Max Marks
ISA 1	15
MPE	30
ISA 2	15
Practical	Nil
Project	Nil
Semester End Exam	40