Course Syllabus
Gyanmanjari science college
Semester-1 (M.Sc.)

Subject: Real Analysis-MSCMA11501

Type of course: Major

Prerequisite: Outer measure, Measurable sets, Lebesgue measure,

Rationale: Real analysis serves as the theoretical foundation of calculus. It aims to provide a rigorous framework for the concepts introduced in calculus, such as limits, derivatives, and integrals. By establishing a solid mathematical basis.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P	C	Theory Marks		Practical Marks		CA	
				ESE	MSE	V	P	ALA	
4	0	0	4	60	30	10	00	50	150

Legends: CI-Classroom Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1.	**Assignment:** Unit wise assignments will be given and students will prepare assignments and upload to Moodle.	10
2.	**Quiz :** Faculty will assign Unit wise 10 MCQS and students need to solve mcqs and select the right answer in Moodle.	10
3.	**Puzzle :** Various problems based on series, geometry, clock, calendar, etc.will be assigned to the students. Students need to submit Mathematical logic and Solution via moodle.	10
4.	**Analysis :** Faculty will assign scientific pictures and students will analyze and prepare a report in 100 words and upload it to Moodle.	10
5.	**Concept mapping :** Faculty will assign real time project / problem that Students map their Idea, Solution for real time project / problem and upload it to Moodle	10
Total		50

Course Content:

Unit No.	Course content	Hrs	% Weightage
1.	**Chapter-1:** ➢ Algebra of sets and -algebra of sets, ➢ Smallest algebra of sets and -algebra of sets generated by a given collection of subsets, Borel sets, Concept of measure. ➢ Outer measure , Outer measure of an interval and outer measure of a set. ➢ Properties of outer measure.	15	25
2.	**Chapter-2:** ➢ Measurable sets and Lebesgue measure. ➢ Properties of Lebesgue measure. ➢ Non measurable set	15	25
3.	**Chapter-3:** ➢ Measurable functions, Sum, difference, product and limit of measurable functions. ➢ Characteristic functions and simple functions. ➢ Borel measurable functions.	15	25
4.	**Chapter-4:** ➢ Riemann integral, Integral of simple functions. ➢ Lebesgue integral of bounded function. ➢ Properties of Lebesgue integral of bounded function.	15	25

Suggested Specification table with Marks (Theory) : 60

Distribution of Theory Marks **(Revised Bloom's Taxonomy)**						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	10%	40%	20%	10%	20%	0

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course the students should be able to:	
CO1	Understand Basic operations form the foundation of set theory .
CO2	Know The various properties of the Lebesgue measure.
CO3	Solve Random variables in probabilistic contexts.
CO4	Learn Riemann integral to solve real-world problems.

Instructional Method :

The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods by black board, may also use any tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in the laboratory.

Reference Books:

[1] "Principles of Mathematical Analysis" by Walter Rudin
[2] "Real Analysis" by Royden and Fitzpatrick
[3] "Introduction to Real Analysis" by Bartle and Sherbert