MATH-342 Real Analysis-II

Credit Hours: 3-0

Prerequisites: MATH-242 Real Analysis-I

Course Objectives: This is the second rigorous course in analysis is a continuation of MATH- 242. This course rigorously develops differentiation and integration theory in $R^{n,}$ Sequences and series and their convergence, improper integrals and Riemann–Stieltjes integrals.

Core Contents: The Riemann Integral, Improper integrals, Sequences and series of Functions,Infinite sets and Lebesgue Integral

Detailed Course Contents: Differentiation and Integration: Integrability, Interability of monotone and continuous functions, Basic properties of integrable functions, First Fundamental theorem of Calculus, existence and uniqueness of antiderivatives, the logarithem and exponentialfunctions.

Sequences and series of functions: Pointwise and uniform convergence, Criteria for uniform convergence, continuity and uniform convergence, power series and analytic functions

Improper Integrals: Basic definitions, Comparison theorems, The gamma functions, Absoluteand conditional convergence.

Infinite sets and Lebesgue Integral: Infinite sets, Sets of measure zero, Measure zero and Riemann integrability, Lebesgue integrals.

Continuous functions on Plane: Norms and distance in plane, Convergence of sequence, Continuous functions, Limit and continuity.

Course outcomes: Students are expected:

- To understand rigorously developed fundamental ideas of differentiation and integration
- To understand basic theory of infinite series and power series
- To understand Leibniz rule and its applications.
- To understand the Riemann Integral and their applications

Text Book: Arthur Mattuck, Introduction to Analysis, 1999 Prentice Hall, New Jersey

Reference Books:

1. R. L. Brabenec: Introduction to Real Analysis, 1997, PWS Publishing Co.
2. E. D. Gaughan: Introduction to Analysis (5th edition), 1997, Brooks/Cole.
3. R. G. Bartle and D. R. Sherbert: Introduction to Real Analysis (3rd edition), 1999, JohnWiley & Sons.

Weekly Breakdown		
Week	***Section***	***Topics***
1	18.1,18.2, 18.3, 18.4	Introduction; Partitions, Integrability, Integrabilty of monotone and continuous functions, Basic properties of integrable functions
2	19.1, 19.2, 19.3	Refinement of partitions, Definition of the Riemann integral, Riemann sums.
3	19.4,19.5, 19.6	Basic properties of integrals, the interval addition property, piecewise continuous and monotone functions
4	20.1, 20.2,20.3	The first fundamental theorem of calculus, Existence and uniqueness of antiderivatives, Other relations between derivatives and integrals.
5	20.4, 20.6	The logarithm and exponential functions, Growth rate of functions
6	21.1,21.2	Improper integrals, Basic definitions, Comparison theorems
7	21.4	Absolute and conditional convergence
8	22.1	Point wise and uniform convergence,
9	**Mid Semester Exam**	
10	22.2	criteria for uniform convergence
11	22.3,	Continuity and uniform convergence,
12	22.4,22.5	Integration and differentiation term by term
13	23.1, 23.2	Infinite sets, Sets of measure zero, Lebesgue integration
14	24.1, 24.2	Norms and distances in plane, convergence of sequences,
15	24.3,24.4	Functions on R2, Continuous functions
16	24.5,24.6	Limits and continuity, compact sets in R2
17		Review
18	**End Semester Exam**	