MTH6022 : Analysis II

Programme: M.Sc. (Mathematics) Year:2018-19 Semester: Even

Course : Core Credits : 04 Hours : 40

Course Context and Overview (100 words): The course will exhibit Lebesgue's theory of integration in which integrals can be assigned to a huge range of functions on the real line. The theory will be developed in such a way that it can be easily extended to a wider framework, but measures other than Lebesgue's will only be lightly touched.

Prerequisites Courses: Analysis I

Course outcomes (COs):

On completion of this course, the students will have the ability to:
CO 1. Demonstrate understanding of the basic concepts underlying the definition of the general Lebesgue integral.
CO 2. Prove the basic results of measure theory and integration theory.
CO 3. Demonstrate understanding of the statement and proofs of the fundamental integral convergence theorems, and their applications.
CO 4. Demonstrate skills in communicating mathematics orally and in writing.

Course Topics:

Topics	Lecture Hours	
UNIT – I		
1.1 Introduction, Lebesgue outer measure, measurable sets	5	10
1.2 Countable additivity, non-measurable set, cantor sets	5	
UNIT – II		
2.1 Measurable functions	3	5
2.2 Littlewood's Three Principles	2	
UNIT – III		
1.1 The Riemann Integrals, The Lebesgue Integrals	7	
1.2 Countable additivity and continuity of integration	3	15
1.3 Product measure, Fubini's theorem, Differentiation and integration	4	
UNIT – IV		
The Lp spaces, completeness and separability	5	
The Riesz Representation of dual	2	10
Fourier series: Definition of Fourier series, formulation of convergence problems, The L2 theory of Fourier series, convergence of Fourier series.	3	

Textbook references (IEEE format):

Text Book:

H.L. Royden, Real Analysis, 3rd ed., Macmillan, 1988.

References:

Walter Rudin, Real and complex analysis, McGraw-Hill, New York, 1966

P.R. Halmos, Measure Theory, Graduate Text in Mathematics, Springer-Verlag, 1979.

de Barra, G., Measure theory and integration, revised edition of the 1981 original, Horwood Publishing Series, Mathematics and Its Applications, Horwood Publishing Limited, Chichester, 2003.

Additional Resources (NPTEL, MIT Video Lectures, Web resources etc.): NPTEL, MIT Video Lectures.

Evaluation Methods:

Item	Weightage
Quiz	20%
Midterm	30%
Final Examination	50%

Course Instructors' name: Dr. Pratibha Garg