BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI- HYDERABAD CAMPUS
FIRST SEMESTER 2019-2020
Course Handout (Part II)

01-08-2019

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No.   : **MATH F214**
Course Title   : **Elementary Real Analysis**
Instructor in charge : **MANISH KUMAR**
Instructors   : **Manish Kumar, N. Kishore Kumar**

1. Scope and objective of the Course:

The objective of this course is to train the students with the basic tools of modern mathematical analysis, train them in the art of logical, deductive & constructive thinking and thus equip them with enough background for courses which involve deeper mathematical analysis. Real analysis is needed in several science & engineering disciplines, in the study of dynamical systems, which are solutions of differential equations, theoretical study of differential equations, the concept of fractal & fractal dimension is usually studied in metric spaces. Riemann integral is basic integral on which advance theory of integration is developed. Integration theory is needed in the study of theoretical & numerical solution of partial differential equations.

2. Course Description: Countable and uncountable sets; real numbers, metric spaces, continuous and uniformly continuous maps in metric spaces, connectedness, completeness and compactness in a metric space, Numerical sequences and series, Riemann integral & Riemann Stieltjes Integral, Convergence & uniform convergence of sequence of functions, Approximation of continuous function, functions of several variables, derivative of function of several variables, inverse function theorem.

3. Text Book:

W. Rudin, Principles of Mathematical Analysis, McGraw, Hill 3rd edition, 1976.

4. Reference Books:

1. Apostal: Mathematical Analysis, Addision Wesley,1983.
2. R.G. Bartle and D.R. Sherbert, Introduction to Real Analysis, 4th Edition, John Wiley.
3. Kenneth Ross: Elementary Analysis, Springer International Edition 2000.

5. Course Plan:

Lecture No.	Learning objectives	Topics to be covered	Chapter in the Text Book
1-3	Representation of real numbers	Ordered field, Construction of real numbers, the set of real numbers as ordered field, extended real numbers	Chapter 1, Sec: 1.1 to 1.23
4-6	Difference between countable & uncountable set	Finite, Countable & uncountable sets	Chapter 2, Sec : 2.1 to 2.14
7-10	Generalization of concept of	Metric spaces, compact sets, different	Chapter 2, Sec: 2.15

	distance to abstract sets	Definition of compact sets, Cantor Intersection theorem, Contraction Principle	to 2.47
11-15	Convergence of Sequence and series of real numbers	Sequence and infinite series	Chapter: 3
16-21	Generalization of concept of limit & continuity to metric spaces	Continuous & uniformly continuous functions& their properties	Chapter 4
22-29	Integration with respect to a function	Riemann Stieltjes integral & properties	Chapter 6
30-37	Distinguish between uniform & pointwise convergence of sequence of functions. Functions not differentiable but continuous	Point & uniform convergence of functions & related properties of integrability & differentiability	Chapter 7
38-42	How continuity & differentiability have generalization for function of several variables	Linear Transformations, Differentiation of functions of several variables	Chapter 9 sec: 9.1 to 9.15

6. **Evaluation Scheme:**

Components	Duration	Weightage	Date & Time	Nature of Component
Quizzes (5)*	------	20%	To be announced in the class	Closed Book
Mid Sem	90 min.	35%	30/9, 11.00 -- 12.30 PM	Open Book
Comprehensive Exam	3 hrs.	45%	4/12 AN	Closed Book

* Best four will be considered for grading.

7. Chamber consultation hour: To be announced in the class.

8. Notices: Notices concerning this course will be displayed on the CMS Notice Board only.

9. Make up: Make-up will be given only for very genuine cases and prior permission has to be obtained from the I/C.

10. Academic Honesty and Integrity Policy:
Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

INSTRUCTOR-IN-CHARGE
MATH F214