



IIT Mandi

Proposal for a New Course

Course number : IC-112
Course Name : Calculus
Credit Distribution : 1.5-0.5-0-2
Intended for : B. Tech. 1st Year
Prerequisite : Consent of the faculty member
Mutual Exclusion : (None)

1. Preamble:

This course is an introduction to basic concept of Analysis. The course starts with discussion of real number system. This is an important part of the foundation of Mathematical Analysis. Next we will cover elementary calculus (Limit, continuity and differentiability) in single variable. The concepts of limit, continuity and differentiability will be then extended to functions of several variables. Several other important topics like partial derivatives, Tangent and Normal Plane, finding extrema of functions of two variables will also be covered. Finally the course deals with the idea of sequence, series and their convergence.

2. Course Modules with quantitative lecture hours:

Unit 1: Elementary calculus: Real number system, Zeno's Paradox, Limit Continuity and Differentiability of single variables, Uniform continuity, Taylor series, Partial Derivatives. [6 Lectures]

Unit 2: Functions of Several Variables: Limit, Continuity and differentiability of functions of two variables. Euler's Theorem, Tangent plane and Normal, Change of variables, Chain rule. Jacobians, Taylor's Theorem for Two Variables, Extrema of Functions of Two variables, Lagrange's method of undetermined multipliers. [8 Lectures]

Unit 3: Infinite Series: Achelles' and Tortoise Problem, Sequences, Convergence of Infinite Series of Real Numbers, Comparison Test, Ratio Test, Root Test, Raabe's test, Logarithmic test, Demorgan's test, Sequence and series of functions: Uniform convergence and related tests. [7 Lectures]

3. Text books:

1. Thomas and Finney, Calculus and Analytical Geometry, 9th Edition, Addison and Wesley Publishing Company, 1996
2. W. Rudin, Principles of Mathematical Analysis.

4. References:

1. *E. Kreyszig, Advanced Engineering Mathematics, 10th Edition.*
2. *J. E. Marsden, A. J. Tromba and A. Weinstein, Basic Multivariable Calculus, Springer, 1993.*
3. *Apostol, Mathematical Analysis, 2nd Edition.*

5. Similarity with the existing courses:

(Similarity content is declared as per the number of lecture hours on similar topics)

S. No.		Course Code	Similarity Content	Approx. % of Content
1.				

6. Justification of new course proposal if cumulative similarity content is >30%:

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