Mathematics: Analysis

Course Description

Analysis is one of the essential basic subjects of mathematics. Originally developed to be able to formulate and solve problems of classical mechanics mathematically, in its present rigorous form it has become indispensable in numerous applications in the natural sciences and technology. This module aims to introduce the basic hand tools of differential and integral calculus and to explain their mutual interrelations. In addition, differential calculus is generalized to multidimensional spaces.

Contents

1. Sequences and Series
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   2. Convergence of Infinite Series
   3. Power Series
2. Functions and Reverse Functions
   1. Continuous Functions
   2. Exponential and Logarithm Function
   3. Trigonometric Functions and their Inverse Functions
3. Differential Calculus
   1. Derivatives and Higher Derivatives
   2. Curve Discussion
   3. Rules (Chain Rule, Product Rule, Quotient Rule ...)
   4. Taylor Rows
4. Integral Calculus
   1. The Riemann Integral
   2. Specific and Indefinite Integrals
   3. The Fundamental Theorem of Differential and Integral Calculus
   4. Volumes and Shells of Rotary Bodies
   5. Paths and Lengths
5. Differential Calculus in the Rn
   1. Partial Derivation
   2. Total Derivation
   3. Gradients of Vector-Valued Functions and Matrices