

Mathematics 275

Calculus For Engineers and Scientists

Calendar Description: H(3-1T-1.5)

Calculus of functions of one real variable; derivative and Riemann integral; Mean Value Theorem; the Fundamental Theorem of Calculus; techniques of integration; Applications; Improper integrals; Power series, Taylor series.

Prerequisite(s): A grade of 70 per cent or higher in Pure Mathematics 30 or Mathematics 30-1; and credit in Mathematics 31. Alternatively, admission to the Faculty of Engineering including credit in either Pure Mathematics 30 or Mathematics 30-1; and Mathematics 31.

Antirequisite(s): Credit for more than one of Mathematics 249 or 251 or 265 or 275 or 281 or Applied Mathematics 217 will not be allowed.

Syllabus

<u>Topics</u>	<u>Number of Hours</u>
Differentiation	11.5
Applications of differentiation	10
Integration: techniques and applications, Improper integrals	11.5
Infinite series, power series and Taylor series	4
TOTAL HOURS	37

See accompanying page for a detailed breakdown of instructional hours.

1. Differentiation and Applications :	
Review of limits and continuity (Done in Labs)	0.0 Hour
The derivative and tangent line	1.5 Hours
Differentiation Rules.	2.5 Hours
Higher Derivatives / Mean value Theorem	0.5 Hour
Implicit Differentiation.	0.5 Hour
Derivatives of Trigonometric Functions.	1.5 Hours
Derivative of Logarithmic and Exponential functions	2 Hours
The Inverse Trigonometric Functions.	2 Hours
Hyperbolic Functions.	1 Hour
Indeterminate Forms.	2 Hours
Vertical and Horizontal Asymptotes	1 Hour
Increasing and decreasing functions	1 Hour
Concavity and Inflection Points	1 Hour
Local Extrema	1 Hour
Extreme Value Problems.	2 Hours
Related Rates.	2 Hours
2. Integration and Applications	
Antiderivatives and initial value problems	1 Hour
Definite Integrals and properties / Fundamental Theorems.	1.5 Hours
Techniques of integration (All six)	7 Hours
Improper Integrals	1 Hour
Area of Plane Regions	1 Hour
3. Infinite Series	
Power series	2 Hours
Taylor Polynomials and Taylor 's Formula	1 Hour
Taylor and Maclaurin Series	1 Hour

Total: 37 Hours

Course Outcomes

Upon Successful Completion of the Course, Students will be able to:

1. Adapt to the language and notion of calculus.
2. Develop an understanding of the key concepts of calculus and use it to compute Limits, Derivatives, and Integrals of appropriate real valued functions of a single real variable.
3. Perform calculus techniques to solve a wide variety of practical problems.
4. Analyze appropriate real-world problems in interdisciplinary fields.
5. Explore the relationship between key calculus concepts and its geometric representation for an enhanced interpretation of certain physical or natural Property.

6. Recognize that not only the technology can be used to achieve some desired results; but also it has limitations.

2016:08:11 Effective: Fall 2014

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Calendar description change Fall 2014