



Mathematics 251

Calculus I

Functions and graphs, transcendental functions. Limits, derivatives, and integrals of exponential, logarithmic and trigonometric functions. Fundamental theorem of calculus. Applications.

Course Hours: H(3-1T-1)

Prerequisite(s): A grade of 70 per cent or higher in Pure Mathematics 30 and a grade of 50 per cent or higher in Mathematics 31. (Alternatives to Pure Mathematics 30 are presented in the paragraph titled Mathematics Diagnostic Test in the Program section of this Calendar).

Antirequisite(s): Credit for more than one of [Mathematics 249](#), [251](#), [281](#), or [Applied Mathematics 217](#) will not be allowed.

Notes: This course provides the basic techniques of differential calculus as motivated by various applications. Students performing sufficiently well in a placement test may be advised to transfer directly to [Mathematics 253](#).

Syllabus

Topics

- Equations of lines
- Inequalities, signs of factored expressions
- Functions including the definitions and properties of absolute value, power, polynomial, rational, trigonometric, exponential, and logarithmic functions
- Composition of functions
- Definitions and calculational methods for limits
- Horizontal and vertical asymptotes
- Continuity, Intermediate value theorem
- Derivative, definition and geometrical interpretation
- Derivative as rate of change; velocity and acceleration
- Rules of differentiation, differentiation formulas for power, trigonometric, exponential and logarithmic functions
- Chain rule, Implicit differentiation
- Linear approximation to a differentiable function
- Maxima and minima; extreme value theorem; mean value theorem
- Increasing and decreasing functions. Concavity
- First derivative test; second derivative test
- Curve sketching
- Applied maximum - minimum problems
- Antiderivatives; integration formulas
- Area, Definite integral
- Fundamental theorem of calculus
- Integration by substitution

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2005:08:01

Prerequisite change: 2009:07:01

EC:jml