

Mathematics 265

Calculus I

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

Limits, derivatives, and integrals; the calculus of exponential, logarithmic, trigonometric and inverse trigonometric functions. Applications including curve sketching, optimization, exponential growth and decay, Taylor polynomials. Fundamental theorem of calculus. Improper integrals. Introduction to partial differentiation.

Prerequisite(s): A grade of 70 per cent or higher in Mathematics 30-1 or Pure Mathematics 30; and a grade of 50 per cent or higher in Mathematics 31. (Alternatives to Pure Mathematics 30 are presented in C.1 Mathematics Diagnostic Test in the Academic Regulations section of this Calendar).

Antirequisite(s): Credit for more than one of Mathematics 249, 251, 265, 275, 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 267.

Syllabus

Topics

| <u>Topics</u> | <u>Number of Hours</u> |
|---|-------------------------------|
| Review of Limits, Continuity, Derivatives and Integrals | 6 |
| Derivative and Applications | 22 |
| Integration and applications, Improper integrals | 8 |
| TOTAL HOURS | 36 |

See accompanying page for a detailed breakdown of instructional hours.

Detailed breakdown of instructional hours

Math 265 University Calculus I

| | Hours |
|---|-------|
| LIMITS AND CONTINUITY | |
| Review of power, trigonometric, exponential and logarithmic functions | (1) |
| Review of limits. Squeeze Theorem | (1) |
| Infinite limits and vertical asymptotes | (1) |
| Continuity, Intermediate Value Theorem | (1) |
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| THE DERIVATIVE AND APPLICATIONS | |
| Review of derivatives, the differentiation formulas and rules, implicit differentiation | (1) |
| Differentiability, tangent line and linearization | (1.5) |
| Mean Value Theorem, Taylor's Theorem, Error in linear approximation | (2.5) |
| Inverse functions and their derivatives | (2) |
| Inverse trigonometric functions and their derivatives | (2) |
| Limit of sequences, Newton's method | (1) |
| Indeterminate forms and l'Hôpital's rule | (2) |
| Limits at infinity, horizontal asymptote, end behavior | (2) |
| Intervals of increase and decrease, critical points, local extrema, First derivative test | (1) |
| Concavity, points of inflection, Second derivative test | (1) |
| Curve Sketching | (2) |
| Absolute extrema | (1) |
| Optimization Problems | (2) |
| Rate of change in natural and social sciences | (0.5) |
| Exponential growth, decay, continuously compounded interest, the limit of $(1 + r/n)^n$ | (1.5) |
| | |
| INTEGRATION | |
| Review of antiderivatives, indefinite integrals and the substitution method | (1) |
| Area, Riemann sum and the definite integral | (1) |
| Properties of the definite integral | (1) |
| Fundamental theorem of Calculus | (1.5) |
| Substitution rule for definite integrals | (1.5) |
| Improper integrals | (3) |

Total = (36)