



Mathematics 249

Introductory Calculus

(see Course Descriptions for the applicable academic year: <http://www.ucalgary.ca/pubs/calendar/>)

*Syllabus*

**Topics**

	<b><u>Number of Hours</u></b>
Pre-Calculus Review and Functions	10
Limits	6
The derivative and differentiation	13
Applications of differentiation	10.5
Integration	7.5
Optional topics: Taylor polynomials, Partial differentiation (Time permitting)	2
<b>TOTAL HOURS</b>	<b>47-49</b>

# MATH 249 Introductory Calculus

TOPICS	Hours
<b>PRE-CALCULUS REVIEW</b>	
Inequalities, signs of factored expressions, absolute value	(1.5)
Coordinate geometry – distance, lines, circles, parabolas	(1)
Trigonometry	(1)
Functions – representations, domain, combinations, inverse functions	(2)
Functions – definitions and properties of absolute value, power, polynomial, rational, trigonometric functions	(1)
Exponential and logarithmic functions	(2)
Inverse trigonometric functions	(1.5)
<b>LIMITS</b>	
Limit: Concept, numerical and graphical, one-sided limits, infinite limits, vertical asymptotes	(1.5)
Calculating limits: Limit laws, Squeeze Theorem, limit of $\sin(x)/x$	(1.5)
Continuity, Intermediate Value Theorem	(1.5)
Limits at infinity, horizontal asymptote	(1.5)
<b>THE DERIVATIVE AND DIFFERENTIATION</b>	
Derivatives: definition, geometric interpretation and rate of change	(1)
Derivative as a function	(0.5)
Formulas and rules of differentiation, power, trigonometric, inverse trigonometric, exponential and logarithmic functions, the chain rule and the differentiation rule for inverse functions, implicit differentiation	(7)
Rate of change in natural and social sciences, velocity, acceleration; Exponential growth and decay	(1.5)
Related rates	(1.5)
Linear approximations	(1.5)
Taylor polynomials (optional)*	(0.5)*
<b>APPLICATIONS OF DIFFERENTIATION</b>	
Maxima and minima, extreme value theorem	(1.5)
Rolle's theorem, Mean value theorem	(1.5)
Increasing and decreasing functions, concavity, first derivative test, second derivative test	(1.5)
Indeterminate forms and l'Hôpital's rule, the limit of $(1 + r/x)^x$ at infinity	(1.5)
Curve Sketching	(1)
Optimization Problems	(2)
Newton's method	(0.5)
Partial differentiation, the chain rule (optional)*	(1.5)*
Antiderivatives	(1)
<b>INTEGRATION</b>	
Area, Riemann sum and the definite integral	(1)
Properties of the definite integral	(1)
Fundamental theorem of Calculus	(1.5)

Substitution rule	(1)
Improper integrals	(2)
Area between curves	(1)

Total = (47)

T

o  
t  
a  
l

=

(  
4  
7  
)