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Department of Mathematics

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MATH 226: Calculus I, 4 semester units

Prerequisites Satisfactory completion of ELM requirement, acceptable score on the department's Calculus readiness test (instructions will be provided after enrollment), and one of the following: MATH 109 or equivalent with a grade of C or better; passing a high school calculus class or trigonometry-based class with a grade of B or better.

Bulletin Description The first semester of Calculus: limits, continuity, derivatives, rules of differentiation, applications of differentiation, optimization, L'Hospital's Rule, curve sketching, integration, the Fundamental Theorem of Calculus.

Course Objectives MATH 226 is the first semester of calculus for science and math majors. This is not a business calculus course.

Students entering Calculus I should have a firm grasp of algebra and trigonometry. They should be able to graph elementary algebraic and transcendental functions and their inverses. Students should also be able to solve inequalities and equations involving exponential, logarithmic and trigonometric functions. The main objective of Calculus I is for students to learn the basics of the calculus of functions of one variable. They will study transcendental functions, limits, differentiation and an introduction to the Riemann integral, culminating with the Fundamental Theorem of Calculus. They will also apply these ideas to a wide range of problems that include the equations of motion, related rates, curve sketching and optimization. The students should be able to interpret the concepts of Calculus algebraically, graphically and verbally. More generally, the students will improve their ability to think critically, to analyze a problem and solve it using a wide array of tools. These skills will be invaluable to them in whatever path they choose to follow, be it as a mathematics major or in pursuit of a career in one of the other sciences. Upon successful completion of the course, students should be able to:

- evaluate a variety of limits, including limits at infinity, one-sided limits, and limits of indeterminate forms. Students should also be able to identify discontinuities in functions presented algebraically or graphically
- apply the definition of derivative to calculate and estimate derivatives from formulas, graphs, or data
- differentiate sums, products and quotients of composite polynomial, trigonometric, exponential, and logarithmic functions
- discuss the conceptual relations among derivatives, rates of change, and tangent lines in the context of an applied example

- use asymptotes, first and second derivatives to graph functions
- solve applied problems using calculus and justify answers
- estimate a definite integral with a Riemann sum
- evaluate a simple definite integral using the Fundamental Theorem of Calculus

Evaluation of Students Students will be evaluated on their ability to devise, organize and present complete solutions to problems. While instructors may design their own methods of evaluating student performance these methods must include in-class examinations (exceptions may be made when the course is delivered on-line), frequent homework assignments and a final exam.

Course Outline

Topics	Number of Weeks	Sections in Text
Limits, Derivatives, and Rates of Change	3	1.3, 1.4, 1.6-1.8, 2.1
Rules of Differentiation	4	2.2-2.11
Applications of Differentiation	4	2.12*, 2.13, 3.1-3.7, 3.8*
Integration	3	4.1-4.5

*Optional Sections

The class is usually offered in the summer as well. The summer covers the same content at a higher pace.

Textbooks & Software University Calculus Elements with Early Transcendentals, by Hass, Weir, and Thomas