

## Math 111: Principles of Calculus

This is a terminal calculus course designed for students who need a basic understanding of the principles of the calculus. Course material includes basic properties of functions, followed by the differentiation and integration of functions. Some manipulative skills will be required, but this course is not intended to prepare the student for more advanced work in calculus.

3 credits: 2 lectures and 2 recitation sections per week.

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**Rationale:** If Notre Dame is to have a mathematics requirement for everyone and if it intends to admit a certain number of very weak students, there is a need for a course which takes these students and tries to accomplish two aims. The first is that they should see something of the beauty and power of mathematics in everyday use, and secondly they should be encouraged to develop their skills at an appropriate rate. The proposed course does this by requiring four hours a week with the instructor from these students, and by utilizing examples whose non-mathematical principles are easy to understand. The extra hour per week will enable the instructor to cover a standard one semester calculus curriculum.

This class will be listed in DART as for "First Year of Students Only" and the Department intends to teach but one section with limited enrollment.

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**Textbook:** *Calculus and Its Applications*, Sixth Edition  
Goldstein, Lay and Schneider

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### Sample Syllabus:

Sections 0.1 – 0.6

Sections 1.1 – 1.8

Sections 2.1 – 2.3 & 2.7

Sections 3.1 & 3.2

Sections 4.1 – 4.5

Sections 5.2 & 5.3

Sections 6.1 – 6.3

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- 0.2 Some Important Functions, 22
- 0.3 The Algebra of Functions, 31
- 0.4 Zeros of Functions–The Quadratic Formula and Factoring, 37
- 0.5 Exponents and Power Functions, 46
- 0.6 Functions and Graphs in Applications, 55
  
- 1 THE DERIVATIVE, 71**
- 1.1 The Slope of a Straight Line, 72
- 1.2 The Slope of a Curve at a Point, 84
- 1.3 The Derivative, 92
- 1.4 Limits and the Derivative, 103
- 1.5 Differentiability and Continuity, 114
- 1.6 Some Rules for Differentiation, 121
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- 1.8 The Derivative as a Rate of Change, 134
  
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- 2.1 Describing Graphs of Functions, 158
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- 2.3 Curve Sketching (Introduction), 189
- 2.7 Applications of Calculus to Business and Economics, 230
  
- 3 TECHNIQUES OF DIFFERENTIATION, 249**
- 3.1 The Product and Quotient Rules, 249
- 3.2 The Chain Rule and the General Power Rule, 261
  
- 4 THE EXPONENTIAL AND NATURAL LOGARITHM FUNCTIONS, 287**
- 4.1 Exponential Functions, 288
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- 4.3 Differentiation of Exponential Functions, 299
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- 5 APPLICATIONS OF THE EXPONENTIAL AND NATURAL LOGARITHM FUNCTIONS, 325**
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- 5.3 Applications of the Natural Logarithm Function to Economics, 347
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- 6.1 Antidifferentiation, 374

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