

MATH 272X Syllabus

Prepared by Kat Gustafson, Fall 2007

Text: Greenwell, *Calculus for the Life Sciences*, first edition

Topics: The derivative and integration with an emphasis on natural science applications and conceptual understanding.

* optional, time permitting.

** may require more than one class period.

Chapter R: Algebra Reference

Chapter 1: Functions

Chapter 2: Exponential, Logarithmic and Trigonometric Functions

Topics from Chapter R through Chapter 2 are covered in the first two weeks of classes as a comprehensive review. However, time does not permit a thorough examination of each topic, so it is primarily up to the individual student to review the material with the appropriate amount of thoroughness. In order gauge students' preparation for the course, as well as give each student a feeling for his or her level of preparedness, a thirty minute quiz on algebra, functions and trigonometry is given on the first day of class. From the results, some students may then be advised to take Math 107 or Math 108.

Chapter 3: The Derivative

- 3.1 Limits
- 3.2 Continuity
- 3.3 Rates of Change
- 3.4** Definition of the Derivative
- 3.5 Graphical Differentiation

Chapter 4: Calculating the Derivative

- 4.1 Techniques for Finding Derivatives
- 4.2 Derivatives of Products and Quotients
- 4.3 The Chain Rule
- 4.4 Derivatives of Exponential Functions
- 4.5 Derivatives of Logarithmic Functions
- 4.6 Derivatives of Trigonometric Functions

Chapter 5: Graphs and the Derivative

- 5.1 Increasing and Decreasing Functions
- 5.2 Relative Extrema
- 5.3 Higher Derivatives, Concavity and the Second Derivative
- 5.4 Curve Sketching

Chapter 6: Applications of the Derivative

- 6.1 Absolute Extrema
- 6.2 Applications of Extrema
- 6.3 Implicit Differentiation
- 6.4 Related Rates
- 6.5 Differentials: Linear Approximation

Chapter 7: Integration

- 7.1 Antiderivatives
- 7.2 Substitution
- 7.3 Area and the Definite Integral
- 7.4 The Fundamental Theorem of Calculus
- 7.5 Integrals of Trigonometric Functions
- 7.6 Area Between Two Curves

Chapter 8: Further Techniques and Applications of Integrals

- 8.1 Numerical Integration
- 8.2* Integration by Parts
- 8.3* Volume and Average Value
- 8.4* Improper Integrals

The final exam is comprehensive and covers all the non-optional sections listed above. The criteria upon which the Math 272 finals are evaluated by the Core Assessment Committee are listed below.

1. Students master problem-solving skills.
2. Students learn to manipulate abstract symbols.
3. Students learn a broad spectrum of mathematical applications:
 - a) Limits and continuity
 - b) Differentiation and integration – calculations
 - c) Maximization/minimization problems
 - d) Analysis of functions of one variable and their graphs
 - e) Applications of integrals and derivatives
 - f) Differentiation and integration – concepts
 - knowing how derivatives and integrals are related to graphs
 - having the ability to discern whether differentiation or integration is involved
 - understanding how a derivative and an integral relates to the original function
4. Students have mastered the prerequisite material for the course.

To that end, a question is chosen from the final exam representing each of these nine criteria and sub-criteria. It has often been the case in the past that one exam question served to cover more than one criterion. It is not our intention to create conditions leading to inordinately long or redundant final exams for the purpose of meeting Core Assessment Committee demands. However, Math 272 instructors should be aware of the criteria while preparing their final exams.