

Instructor: Dr. S. Wu

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Office: 541 Lake Hall

Office Hours: Tu, Th & Fri: 1:40 --- 2:40 pm, and other time by appointment.

Required Materials:

Text: *Calculus: Concepts & Contexts* --- Volume 1 by James Stewart

ISBN: 978-1-4266-3240-2

Calculator: scientific graphing calculator (recommend TI83 or higher)

Course Objectives:

To assist students in overcoming deficiencies in pre-calculus mathematics without losing ground in the MTH U241 sequence.

To have students understand the concept of the derivative and to enable students to display that understanding through a variety of applications; to have students understand the concept of the integral and to introduce integration techniques. Specific and measurable manifestations of your understanding that will be tested during the semester include your ability to:

- Parameterize curves in the plane and motion along a straight line.
- Describe velocities as rates of change analytically, graphically and numerically.
- Analyze more general rates of change, including acceleration.
- Apply the definition of the derivative to algebraically and analytically derive instantaneous rates of change as limits of average rates of change.
- Visualize and interpret derivatives via slopes of tangent lines to graphs.
- Derive, memorize, and apply the rules for differentiation to calculate derivatives of given functions, including polynomials, exponential and logarithmic functions, trigonometric and inverse trigonometric functions, and combinations of such functions by using the product rule, the quotient rule, and the chain rule.
- Sketch graphs of functions by analyzing the first and second derivatives.
- Model, by using derivatives, physical problems involving rates of change, including velocity and acceleration problems, exponential growth and decay, and simple oscillations.
- Solve, via derivatives, optimization problems (maximum-minimum problems) which arise in a wide variety of situations involving physics, engineering, and economics.
- Calculate the linearization of a function.
- Approximate changes using differentials.
- Estimate roots of equations using Newton's method.
- Calculate antiderivatives of algebraic, trigonometric, and transcendental functions.
- Calculate antiderivatives using substitution.
- Approximate definite integrals using finite sums.

Course Policies:

(1) Homework will be assigned at each class and discussed in the next class if needed. You are expected to keep up with the homework in order to perform well on the quizzes and exams. You are strongly encouraged to come for help if needed.

(2) There will be weekly quizzes, a one-hour midterm, and a two-hour cumulative departmental final exam. There will be no make-up quizzes, but your lowest quiz grade will be dropped. There will be no make-up for the midterm except extreme circumstances with an official verification. No student will be granted a special final exam unless it is due to a Registrar-created conflict. Your course grade will be determined as follows:

Weekly quizzes --- 40% ; Midterm --- 20%; Final Exam --- 40%

(3) It is University policy that no grade, including an incomplete, can be changed after one year. Exceptions must be authorized by the Academic Standing Committee.

(4) It is essential that you attend class regularly. The easiest way for you to learn the material and to know what material has been covered is to come to class each day. Students are responsible for finding out what materials have been covered or what announcements have been made on days that they miss class.

(5) In addition to the my office hours, you may receive extra help for the course from Engineering tutors at 222 Snell Engineering and from tutoring center at 540B Nightingale Hall. Please seek help as soon as you experience any difficulty; do not wait until just before an exam.

(6) If you have concerns/problems about the course that cannot be resolved by discussing with me, you may contact Professor S. Jekel (Undergraduate Advisor) 525LA, x5639, jekel@neu.edu.

(7) All items above are intended as a guide but may be changed due to circumstances.

Schedule of Topics (Tentative):

Chapter 1 Functions and Models

Week 1 (9/9 -- 9/11)

§1.1 Representing Functions

Page 21: #1,2,9,25,27,29,43,45,47,57,59

Lines (Linear Functions) --- Review

Handout

§1.4 Graphing Calculators

Page 51: #2,6,17,21,22

Week 2 (9/14 -- 9/18)

§1.5 Exponential Functions

Page 59: #1,3,4,7,9,13,21,23,29(a)(b)(c),31(a)(b)(c)

§1.6 Inverse Functions and Logarithm

Page 69: #3-11(odd),15,17,21,23,25,35,37,41,49,51,59

Trigonometric Functions --- Review

Page A25: #11,12,13,14,15,17,21,23,27

Week 3 (9/21 -- 9/25)

§1.7 Parametric Curves

Page 76: #1,5-7,9-11,14,17,18,31

Chapter 2 Limits and Derivatives

§2.2 The Limit of a Function

Page 102: #3,5,13,15,21

§2.3 Calculating Limits Using the Limit Laws

Page 111: #1-17(odd),18-20,24,29,31,37,47

Week 4 (9/28 -- 10/2)

§2.4 Continuity

Page 121: #3,15,17,27,33,41,43

§2.5 Limits Involving Infinity

Page 132: #3,15,16,22-26,37,39,41

§2.6 Derivatives and Rates of Change

Page 142: #3(a)(b),5,7,9(a)(b),10(a)(b),11(a),16(a)(b),
#18,19,21,23,27-35(odd),39,43(a)(b),45

Week 5 (10/5 -- 10/9)

§2.7 The Derivative as a Function

Page 155: #3,19,21,25,27,35,37,45

§2.8 What Does f' Say about f ?

Page 162: #1-3,12,19,21,27

Chapter 3 Differentiation Rules

§3.1 Derivatives of Polynomials and Exponential Functions

Page 181: #3-29(odd),41,42,45,54,61

§3.2 The Product and Quotient Rules

Page 188: #3,6,7,10,11-17(odd),25,29,31,33(a),39,
#41-43,48,54,58(a)

Week 6 (10/13 -- 10/16) (10/12: Columbus Day)

§3.3 Derivatives of Trigonometric Functions

Page 195: #1,3,4,6,7,9,10,23(a),27,30,41

§3.4 The Chain Rule

Page 205: #1-29(odd),41,51-53,70

§3.5 Implicit Differentiation

Page 214: #3-9(odd),17,18,23,24,48(a)

Week 7 (10/19 -- 10/23)

§3.6 Inverse Trigonometric Functions and Their Derivatives

Page 220: #1,3,9,17-21,23,25,27

§3.7 Derivatives of Logarithmic Functions
Midterm Exam Review

Page 226: #2-5,7-13(odd),17,21,33,36-39,41

Week 8 (10/26 -- 10/30)

***** Midterm *****

§3.8 Rates of Change in the Natural and Social Sciences

Page 237: #1,5,7,10,13,16,23

§3.9 Linear Approximations and Differentials

Page 245: #5,7,9,23,25,27,28,29

Week 9 (11/2 -- 11/6)

Chapter 4 Applications of Differentiation

§4.1 Related Rates

Page 260: #1.3.4.5.7.9.11.15.19.31

§4.2 Maximum and Minimum Values

Page 268: #3,9,23,25,27,37, 41-47(odd)

§4.3 Derivatives and the Shapes of Curves

Page 280: #6,7,9,13,19,21,23,29,33,41

§4.4 Graphing with Calculus and Calculators

Page 288: #1,11,23

Week 10 (11/9 -- 11/13) (11/11: Veterans' Day)

§4.5 Indeterminate Forms and l'Hospital's Rule

Page 296: #1,5-13(odd),17,19,25,31

§4.6 Optimization Problems

Page 305: #3,5,6,11,12,14,18

§4.7 Newton's Method

Page 315: #3,5,7,9,15

Week 11 (11/16 -- 11/19)

§4.8 Antiderivatives

Page 321: #1-17(odd),25-27,37,42,43,49

Chapter 5 Integrals

§5.1 Areas and Distances

Page 341: #3,5,17,19

§5.2 The Definite Integral

Page 353: #3,11,17,19,27,31,34,37,41,43,44,51

Week 12 (11/23 -- 11/24) (11/25—11/27: Thanksgiving recess)

§5.3 Evaluating Definite Integrals

Page 363: #1-17(odd),22,23,31,40,59,61,65

Week 13 (11/30 -- 12/4)

§5.4 The Fundamental Theorem of Calculus

Page 372: #3,7-13(odd),14,17,22

§5.5 The Substitution Rule

Page 381: #1-15(odd),19,21,22,32,35,47,51,55

Final Exam Review

Week 14 (12/7 -- 12/9)

Final Exam Review