

MTH U241H – Calculus I Honors, Fall 2004

Instructor: Maxim Braverman
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Required Materials:

Text: Calculus by Johnston and Mathews, Addison Wesley publisher, with an access code to the web-based package *MyMathLab*. If you purchased a new book, bundled with it is the access code and information. Students who purchase a used text may purchase *MyMathLab* separately, but the combined cost may come to more than the new text price.

Calculator: scientific, graphing calculator (recommended: TI83, 85, or 86.)

Course Web Page:

<http://www.math.neu.edu/braverman/teaching.html#U241H>

Various supplemental course materials and course announcements are located here.

Additional resources on the Web:

You should go to

<http://students.pearsoned.com>

and register for *MyMathLab*. You will need the access code and the following information:

Course ID: braverman80114

Course Name: MTH U241 H

Course Objectives:

Calculus is our principal tool for the quantitative understanding of all processes of continuous change. Because change is a most fundamental and universal aspect of existence, it is hard to overstate the importance of calculus.

The topics considered in the course include differentiation and integration of functions of one variable, especially polynomial, exponential, and trigonometric functions and their inverses. We study vectors and vector-valued functions with an eye on their use in modeling a variety of physical processes. Proficiency with the rules of differentiation is an important goal. We also begin the study of integration and its connection with differentiation. We are concerned that students understand what the subject is good for; this often requires understanding its underlying principles.

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 and circle.
- Use functions and derivatives to model physical processes.
- Describe velocities as rates of change analytically, graphically and numerically, and...
- 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, learn, and use the rules of 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 physical problems with differential equations and vector-valued functions.
- 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 and use it to approximate changes in the value of the function.
- Calculate antiderivatives of algebraic and transcendental functions.
- Calculate antiderivatives using substitution

Homework, quizzes, and tests:

Web-based homeworks will be assigned daily. You can try the problem as many times as you need. The *MyMathLab* software will inform you whether your solution is right or wrong. If you fail a problem several times *MyMathLab* will give you a solution and suggest a similar problem. It does not matter for your grade how many attempts you made before getting to a correct answer. You will get a full credit if you solve all the suggested problems by the deadline.

There will be a weekly quiz during Thursday’s class, and a 65-minute midterm exams. **There are no make-ups on missed quizzes.** If the quiz is missed because of a legitimate reason and the substantiating paperwork is submitted, then the grade on the final exam will replace the zero grade for the missed quiz.

Grading:

Quizzes:	20%
Midterm:	30%
Final Exam:	40%
Web-based Homework:	10%

Cheating Policy:

Cheating is an insult to honest students - it will not be tolerated. The University’s cheating policy and related disciplinary actions are detailed in the Student Handbook; the Handbook also includes a description of what is considered cheating by the University. All incidents of cheating will be reported to the Office of Judicial Affairs.

Attendance:

It is expected that you will attend every class. The course moves very fast. It is possible to fall behind in a single day. If you miss class for any reason, make an immediate attempt to contact another student to discuss what you missed and how to catch up. Inform the instructor.

You must attend the final exam. **Do not expect that you will be allowed to take the exam at any time** other than when it is regularly scheduled, except in the case of a Registrar-created conflict, such as two exams scheduled at the same time. If you miss the final exam, it will count as a 0 and you will fail the course.

Calculus Help and Tutoring:

In addition to the Instructor's office hours, you may receive extra help for the course from Engineering tutors in 222 Snell Engineering, tutoring by appointment (sign up in the Media Center in the library), and from tutoring center at 102 Cahners Hall. Please seek help as soon as you experience any difficulty; do not wait until just before an exam.

If you purchase a new text, bundled with it is access information about *MyMathLab*, a web-based package, designed by the text publisher, which offers various kinds of assistance including a fairly elaborate practice problem generator and a number you can call to ask for math help. Students who purchase a used text may purchase *MyMathLab* separately, but the combined cost may come to more than the new text price. You should retain the packet and record your login name and password because we will continue to use this text next semester and your next instructor may make use of this package.

Use of calculator:

Although we will use graphing calculators in the course, there will be certain quizzes or exams or parts of exams in which all electronic gear (including calculators, cell phones, PalmPilots, etc.) are excluded. In that case, such devices may not be left in the open, even in a closed or turned-off mode. It is likely that at least part of the final exam will be conducted on this basis. Failure to comply with instructions about this will be considered a form of academic dishonesty.

Other remarks:

You should always turn off your cell phone when entering any class as a courtesy to everyone else.

You are responsible for finding out what materials have been covered or what announcements have been made. Saying that you missed class the day an important announcement was made is not an excuse.

Additional Contacts:

If you have concerns about the course that cannot be resolved by discussing with your instructor, contact

the course coordinator, Professor Robert Case, 439 LA, x3587, case@neu.edu
or, if that is not sufficient,

the Vice-Chairman of the Mathematics Department, Professor Don King, 447 LA, x5679, donking@neu.edu

Schedule of Topics and Homework Assignments

Note: The topics are precise. The assignments are only approximations and come as an addition to the main web-based homework assignment.

Rates of Change, Limits, and the Derivative

Week 1 (9/8 – 9/9)

§1.1 Functions 6,7,8,15,17,23,26,27,28

§1.2 Composition of Functions 1,2,4,8,9,12,28-33,40

§1.3 Slope as Rate of Change 1,2,4,5,7,10,11,12,14,15,16,20

Week 2 (9/13 – 9/16)

§1.4 Calculating Rates of Change 2,3,5,7,9,12,13,16

§1.5 Limits 3,4,7,8,13,14,21

§1.7 The Derivative 11,18,19

Finding the Derivatives

Week 3 (9/20 – 9/23)

- §2.1 Derivatives of Polynomials 1-8,17
- §2.2 Derivatives of Products and Quotients 1-7,9,11,13,14,21,22
- §2.3 Differentiating Compositions 1-13, 16,17,33
- Week 4 (9/27 – 9/30)
 - §2.4 Implicit Differentiation 1,5,11,17
 - §2.5 Trigonometric Functions 1-7,13,15,16,17,21,25,27,45
 - §2.6 Exponential Functions 1,2,4,5,12,15-21,22,25,26,30,31,33,40-44,60
- Week 5 (10/4 – 10/7)
 - §2.7 Logarithms 1,4,5,7,15-24,26,46,51
 - §2.8 Inverse Functions 1,3,4,5,7,10,11,12
 - §2.9 Inverse Trigonometric Functions 1,2,6,11,15,17,18,20,33,35

Motion, Vectors, and Parametric Equations

- Week 6 (10/11 – 10/14) (10/11 is Columbus Day)
 - §3.1 Motion along a Line 1,3,5,9,11,13,19,21
 - §3.2 Vectors 1,3,7,11,15,17,23,25,29,30,31,33,35,39,41,51
- Week 7 (10/18 – 10/21)
 - §3.3 Parametric Equations 1,3,13,15,17,19
- Review and **Midterm exam**
- Week 8 (10/25 – 10/28)
 - §3.4 Velocity and Tangent Vectors 3,5,7,13,45,47
 - §3.6 Projectile Motion, Uniform Circular Velocity 1,3,9,11,17,21,23

Applications of Derivatives

- Week 9 (11/1 – 11/4)
 - §4.1 The Tangent Line Approximation 1,3,5,8,9,11,13
 - §4.3 Increasing-/Decreasing; Concavity 3,12,20,27,29,31,35,47
- Week 10 (11/8 – 11/11) (11/11: Veteran's Day)
 - §4.4 Horizontal/Vertical Asymptotes 1,3,4,5,9,11,17,19,21,27,29,30,31,35,41
 - §4.5 Tools for Optimization 7,9,11,19,23,25,29,39
 - §4.6 Optimization Problems 1,3,9,11,19,23,29
- Week 11 (11/15 – 11/18)
 - §4.7 Related Rates 1,3,7,9,11,17,25

The Integral

§5.1 Summation Notation 1,5,13,17,19,21,23,29,33,41,42

§5.2 The Definite Integral 1,3,5,9,15,18,19

Week 12 (11/22 – 11/24) (11/25: Thanksgiving Day)

§5.3 The Fundamental Theorem of Calculus 1-31(odd),35-45(odd)

Week 13 (11/29 – 12/2)

§5.4 The Indefinite Integral 1-21(odd)

§5.5 Integration by substitution 1,3,5,9,10,41.

Week 14 (12/6 – 12/8)

Review

Week 15 (12/10 – 12/17)

Final Exam 12/17/2004 10:30 AM