

Northeastern University  
Syllabus for MATH 1241 Section 05  
Fall 2009

<b><u>INSTRUCTOR:</u></b>	<b>Dr. Matior Rahman</b>
<b><u>OFFICE:</u></b>	<b>540-A Nightingale</b>
<b><u>OFFICE HOURS:</u></b>	<b>Tuesdays: 10:30 AM – 1:30 PM</b>
<b><u>OFFICE TELEPHONE:</u></b>	<b>617-373-5530</b>
<b><u>EMAIL ADDRESS:</u></b>	<b><a href="mailto:ma.rahman@neu.edu">ma.rahman@neu.edu</a></b>
<b><u>CLASS MEETING TIMES:</u></b>	<b>10:30-11:35 AM (Mon, Wed, Thurs)</b>
<b><u>TEXTBOOK:</u></b>	<b>Hughes-Hallett et al, Applied Calculus, 3rd ed. (2006) ISBN #10:0-471-68121-0, John Wiley and Sons</b>
<b><u>CIASSPAC (Class Packet):</u></b>	<b>(With worksheets and some past exams) will be available next week from Reprographics Copy Center (behind the Bookstore)</b>
<b><u>GRAPHING CALCULATOR:</u></b>	<b>A Graphing Calculator is required for this course. Recommended Calculator is TI-83 or higher</b>

**PREREQUISITES:** Knowledge of basic algebra at the level of MTHU121, including an introduction to functions and their graphs. A placement quiz will be given at the start of the course: you can use the result to gauge your preparation.

Differential Calculus is the study of rate of change, and its uses.

Integral Calculus is the study of amount given the rate of flow.

**GOALS:** To develop *graphical, numerical, and algorithmic* understanding of

- The basic ideas of differential calculus, including Average and instantaneous rates of change, Definition of the derivative of a function at a point, the Derivative function.
- Basic functions – such as polynomial, exponential, logarithmic, trigonometric, using the graphing calculator as a tool.
- Applying calculus to optimize functions (max and min), to motion problems, mathematical models of physical/biological processes.
- The basic ideas of integral calculus: accumulated change, amount from flow, area under a curve (introduction).
- Students completing the course should be able to recognize and use the concepts and methods of calculus when they occur in their disciplines.

**PLAN:** We will focus quickly on the concepts of average rate, instantaneous rate, and derivative function in Sections 1.3, 2.1-2.3. We will then broaden the types of functions studied (1.5-1.10) as we extend the differential calculus in Chapter 3, and apply the concepts in Chapters 4. We introduce integral calculus in Chapter 5, and study differential equations (Chapter 10). Integral calculus is studied in detail in the sequel course, Math 1242.

**CLASS RULE:** Cell phones, portable computers, etc. should be off while in class; if there is some emergency needing an exception, please let me know in advance.

**HOMEWORK:** I will sometimes collect weekly Homework at the beginning of the class and mark it done/not done, possibly +/- . I will collect some of the worksheets as homework.

**EXTRA CREDIT HW GRADE:** At the start of the Final Exam, you may pass in your collected HW (either separately, or in a notebook), and I will assign an extra credit HW grade and pass back at the end of the Exam.

**READING ASSIGNMENTS:** You will be asked to read chapters in advance of our class discussion of them. Please prepare questions for discussion.

**GROUP ASSIGNMENTS:** I will assign (and reassign) work groups of about 3 persons; your group will be responsible for certain classwork and certain homework assignments.

**QUIZZES & EXAMS:** I plan to give **four Quizzes** and **two one-hour Exams**, with approximate dates as follows:

**Quizzes:** September 21<sup>st</sup>, October 14<sup>th</sup>, November 12<sup>th</sup>, and December 3<sup>rd</sup>

**One-hour Exams:** October 22<sup>nd</sup> and November 19<sup>th</sup>

**Final Exam:** Day and Time TBA

**PREPARATION OUTSIDE OF CLASS:** The student's individual study and preparation outside of class are extremely important.

**EXTRA HELP:** For help outside of class time, you can come to my office during my office hours.

**GRADING:** Your grade in the course will be determined as follows:

**Homework:** 5%

**Quizzes:** 15%

**Exam 1:** 20%

**Exam 2:** 20%

**Final Exam:** 40% or 50% if it helps your grade (with proportional change in the other components)

**ATTENDANCE POLICY:** Your regular attendance is expected, and is needed by others when we work in groups. It is your responsibility to know assignments and other class information including any changes to the syllabus the instructor may make as they are announced in class. Students are responsible for all information given, even when they are absent (you may ask other students or consult class notes, or send e-mail).

**Unexcused Absences** beyond four will lead to a W or F in the course, or to a deduction of 0.5% each from the course grade, at the discretion of the instructor. Attendance will be taken normally by sign up sheet, collected at about five minutes past the hour; persons arriving more than 5 minutes late may be marked late, which will be counted as a half absence for the policy. Regarding lateness, please feel free to come to the class in any case, and let me know if there is a problem beyond your control. If you need to leave early, I appreciate being told at the start of class, if possible.

**If you have any issues related to the course, resolve first with the instructor i.e. with me and if it still remains unresolved please contact the course coordinator, Professor Anthony Iarrobino, 526 Nightingale, x 5524, [a.iarrobino@neu.edu](mailto:a.iarrobino@neu.edu)**

**FREE TUTORING:** Mathematics Tutorial Center, 540B Nightingale (x2328). All tutoring is done on a first come first served basis. Students must come in person to schedule appointments.

**ACADEMIC HONESTY:** It is fine to work together doing homework (studies have shown this can be particularly helpful in learning math), provided such assistance is acknowledged specifically in any work passed in, and that you understand what you pass in. Collaboration on quizzes and exams is not allowed, unless I make a specific exemption for a quiz, announced in advance.

**STUDENT CODE OF CONDUCT:** See <http://www.northeastern.edu/osccr/academichonesty.html> or Student Handbook." Essential to the mission of Northeastern University is the commitment to the principles of intellectual honesty and integrity. Academic integrity is important for two reasons. First, independent and original scholarship ensures that students derive the most from their educational experience and the pursuit of knowledge. Second, academic dishonesty violates the most fundamental values of an intellectual community and depreciates the achievements of the entire University community. Accordingly, Northeastern University views academic dishonesty as one of the most serious offenses that a student can commit while in college."The website/handbook goes on to detail examples. In MATH 1241, academic dishonesty on a quiz or exam, or assignment leads to a zero on the quiz or exam or assignment, that cannot be made up, as well as a letter detailing the incident to the Office of Student Conduct and Conflict Resolution. The minimum penalty for a finding of academic dishonesty by the student Judicial Hearing Board includes one year disciplinary probation.

**INCOMPLETE GRADE:** It requires a written understanding (contract) between the Instructor and student with details about what material will be made up and how. Incompletes are normally appropriate only for a student who is doing well, but becomes ill, or has a family emergency late in the semester.

## **OVERALL SYLLABUS**

Following is an overall syllabus, intended as a guide. Specific assignments will be made from this syllabus and also from the Class Packet. NOTE: R&OL = Read and Outline section: please write several pages, with questions. Note: \* for Optional

### **1. Functions; introduction to slopes and rates:**

§1.1 Functions, (review). p. 4 #2,5,8,9,11,15,22,23.

§1.2 Linear functions p. 11 #2,7,9,15,20-21,24,26-29. WS #1A, 1B

§1.3 Average rate of change p. 19 #5-8,11-15,22-25,27-28,30-32. WS #2A

§1.5 Exponential functions p. 38 #1-4,6,9,11-15,17-21,25-28.

§1.6 Logarithm p. 43 #11,12,21,27,31,33,35,37,41.

§1.7 Exponential growth/decay. p. 50 #1-13,17-19,21-23,24,27,29.

§1.8 Composites, shifts p. 55 #1,3-5,8-10,11,13-16,17-22,27-29,30,35,36.

§1.9\* Proportion, polynomials p. 61 #1-6,13-14,17,19-21,23,25,27-28,33,36,40-41.

§1.10 Periodic, trig functions p. 68 #1-5,8,12,13,15,17-18,19-22,28,34.

Chapter 1 Review: p. 71 #1,6,9,12,15-17,31-32,,35-38,39,40,,55,57,61-68,71,74-75.

Compound Interest and e: Read p. 86-90. p. 90 #1,2,4,5,8,9,12,13.

## **2. Rate of change and derivative.**

§2.1 Instantaneous rate p. 103 #1-4,6-9,11,13-17,19,21,23,26. WS #2A,2B.

§2.2 Derivative function p. 109 #1-8,9-12,,13,,15,19-26,27,29,30.

§2.3 Interpreting the derivative p. 116 #1-7,9-13,15,18,23,25,27-30,31-35,37.

§2.4 Second derivative p. 122 #1-7,8-9,10-12,15-16,23,26,28.

Chapter 2 Review p. 130 #-4,6,8-13,14,15-17,27-30,32-33.

§2 Limits & derivative R&OL p.135-139. p.139 #1-2,5-8 (which f?),19-22,25-31,33.

## **3. Derivative Formulas**

§3.1 Power rule p. 147 #5-7,9-19,23,27,40,43-45,47-48,51,59.

§3.2 Exponentials and Logarithm p. 152 Odd #1-21,23-25,27,,31,33-35,36.

§3.3 Chain rule p. 157 #Odd #1-33,35-36,42,44-47,49-52,53-56. WS #3A,B

§3.4 Product, quotient rule p. 161 Odd #3-31,Even 8-18,39,41,43,45.

§3.5 Trig functions p. 165 Odd #1-19,22,23,26.

Chapter 3 Review: p. 166 #1-38,47-49, 54-57,58-63,67-69,71-75..

Deriving the rules\* p.170-172. p. 172 #4-7.

Practice p. 173 Student choice!

## **4. Using the derivative**

§4.1 Local maxima and minima p. 180 #1-5,7,8-10,14-18,20-22,23,27-29.

§4.2 Inflection points p. 186 #1-6,8,9-10,11-15 (use SDT),26,27-31,33.

§4.3 Global max-min p. 191 #1-3,5-9,,14-16,17-20,28-30,31-39,41,43-44,45-47.

Applied Max-Min handout with problems. Also WS #4C-E, Also, MM1-3.

§4.4\* Max-min in profit/cost p. 199 #4,16-17,20-22.

§4.7 Logistic growth p. 219 #1,2,6,7,9,10,13,14,16.

§4.8 Surge function and drug concentration p. 225 #1-4,6,9.

Chapter 4 Review: p. 227 #1-4,7-10,11-14,15-19,39-40,41-42,47-48;52\*, p.233 Proj. 2\*

## **Integral Calculus (basic ideas, some applications)**

§5.1 Accumulated Change: p. 240 #1-7,9,11,12,14,-17,20.

§5.2 Definite integral. p. 247 #1-8,10,11,16-17,29.

§5.3. Definite integral as area. p. 253 #1-11,16-17,19-21,25,30. (area vs. signed area)

§5.4. Interpretations of the definite Integral: p. 258 #1,3-7,10-14,17,18,23,25-31,38.

§5.5 Fundamental Theorem: p. 265 #11-13

Chapter 5 Review p. 266 #1-4,9-10 (use Fund Thm),16-19,21-23,28, 33-34,38,40.

**Special topics: further applications, differential equations**

§7.1 Antiderivative: p. 303 Odd #1-18,22,Odd #25-47,53,54,63,65.

*Motion*: position, velocity, acceleration WS #4A,4B, A1-A3

§7.3 Finding definite integrals: p. 289 #1-10,25,27,28,32,33,35,36,39; opt: 45-47.

§10.1 Differential equations as models p. 400 #1,3,5,6,7,9,12,14-18.

§10.2 Solutions of a differential equation p. 404 #1-3,5,7,10,11,13-15,22.

§10.4 Exponential growth, decay p. 416 #1,5,7,9,10,11,13,14,15,18. WS #5.

§10.5 Modeling with DE p. 424 #1,3,13,16-18,20a,21,23,26,28.

Chapter 10 Review p. 436 # 1,5,6,15,19,21,24,25,28a,29,23,27. p. 415 Proj 1\*,2\*.

§10 Theory \*: Separation of Variables p. 441-444, #1-3,10-12,13,16,17,19.

HELP: is available from Office Hours; Tutoring is available free at the Math Center in 540B Nightingale (up to several hours/week).

See [http://www.math.neu.edu/undergrad/math\\_tutoring.html](http://www.math.neu.edu/undergrad/math_tutoring.html) for more information.