

MATH 1241 Fall 09 - Syllabus for Calculus I

Instructor: Anandam Banerjee
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Time: M, W, Th 4-35 PM to 5-40 PM
Place: RB 109
Course Key: 10229
Office Hours: Mon 9-30 to 10-30 AM
Tue 3-30 to 4-30 PM
Wed 2 to 4 PM
or by appointment.

Text: Hughes-Hallett et al, Applied Calculus, 3rd ed., 2006 (green cover)
ISBN #10;0-471-68121-0, John Wiley & Sons, Chapters 1-5, part of 7,10.

Class packet: Math 1241 Fall09 (available at NU Reprographics about Sept 16).

Graphing Calculator: You will need access to a graphing calculator equivalent to TI-82, TI-83, **TI-85**, or TI-86 (latter three are best). Some functions on the TI-89 or 92 or other calculator (symbolic differentiation/integration) are not allowed on quizzes or exams.

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.

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.

Grading:

- One Midterm (one hour exam): 20% (18%)
- Quizzes (5 quizzes): 40% (32%)
- Final Exam: 40% (50%)

(The higher of the two options will be considered.)

The dates of midterms and quizzes will be announced one week before the exams.

NO Make-up Exam of ANY kind will be given. The best 5 out of 6 quizzes will be counted.

Final Exam: Two hours, required of all. Date and time TBA. Contact The Registrar in first 2 weeks of class if you have a conflict, or 3 finals in one day. All students without legitimate conflicts (approved by the instructor) will take the final exam at the scheduled time. Do not make travel plans that conflict with the final exam.

Attendance Policy: Your regular attendance is expected. 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. 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.

Talk to someone else: If you have a concern about the course or the instructor that is not or cannot be resolved by speaking with the instructor, the next step is to speak with the course coordinator.

1. Course Coordinator: Prof. A. Iarrobino, 526 NI, x5524, 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. Tutoring begins about September 22. Usual hours: M Tu Wed 9:15 AM-8PM, Thurs 9:15 AM-4PM, Fri 9:15 AM-12:45 PM.

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.

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

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 (Sections 1.5 - 1.10) as we extend the differential calculus in Chapter 3, and apply the concepts in Chapters 4, 10. We introduce integral calculus in Chapter 5, and study differential equations (Chapter 10). Integral calculus is studied in detail in the sequel course, MTH 1242.

Following is an overall syllabus, intended as a guide. Your instructor will make specific assignments from this syllabus and also from the Class Pac. Note: * for Optional.

NOTE: R&OL=Read and Outline section: please write several pages, with questions.

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.
Behavior at infinity*: Read p. 92-94. p. 95 #3,6,7,11,13,15-16,19-20,25,28. (GC)

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 for more information.

Note: A comparison of Math 1241 (former U141) with other NU calculus courses is given at <http://www.math.neu.edu/~iarrobino/MathU141HP.htm>