

MATH U141 Fall 07 - Syllabus for Calculus I

Instructor: Shih-Wei Yang

Contact Info: 537NI, x5674, yang.s@neu.edu

Office Hours: Wed., Thu. 10:30 AM - 12:00 AM

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 U141 Fall06 (available at NU Reprographics about Sept 8).

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

1. 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.
2. Basic functions – such as polynomial, exponential, logarithmic, trigonometric, using the graphing calculator as a tool.
3. Applying calculus to optimize functions (max and min), to motion problems, mathematical models of physical/biological processes.
4. The basic ideas of integral calculus: accumulated change, amount from flow, area under a curve (introduction).
5. Students completing the course should be able to recognize and use the concepts and methods of calculus when they occur in their disciplines.

Grading:

- Two Midterm (one hour exam): 40% (36%)
- Quizzes (3-4 quizzes): 20% (14%)
- Final Exam: 40% (50%)

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

Final Exam: Two hours, required of all, Dec. 13 at 10:30 AM. 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.**

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. If the course coordinator does not settle the matter, please contact the undergraduate director.

- Course Coordinator: Prof. A. Iarrobino, 526 NI, x5524, a.iarrobino@neu.edu
- Undergraduate Director: Prof. A. Martsinkovsky, 471 LA, x5510, alexmart@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 17. Usual hours:
Mon.-Wed. 10:00 AM - 9:00PM,
Thu. 10:00 AM - 6:00PM,
Fri. 10:00 AM - 1:00 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, 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.

Incomplete grade: 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.

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 U142.

Following is an overall syllabus, intended as a guide. I will make specific assignments from this syllabus and also from the Class Packet. 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.
Behavior at infinity* p. 95 # 3, 6, 7, 11, 13, 15-16, 19-20, 25, 28.

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 # 1-4, 6, 8-13, 14, 15-17, 27-30, 32-33.
§2 Limits & derivative Read 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, 7, 9, 10, 13, 14-19.

§4.8* A model for drug concentration p. 225 #1-4, 6-9, 10.

Chapter 4 Review p. 227 # 1-4, 6, 7-10, 11-14, 15-19, 21, 38-39, 40, 41-42, 47-48, 50-53.

p.233 # 2*

5. Integral Calculus (basic ideas, some applications)

§5.1 Accumulated Change p. 240 # 1-7, 8-11, 14-18, 20.

§5.2 Definite integral. p. 247 # 1-7, 8-9, 10-13, 15-17. WS# 6A,B.

§5.3. Integral and area. p. 253 # 2 (use R-sum), 3-11, 16, 19-22, 23-30 (Use §7.1).

§5.4. Using the integral. p. 258 # 1-7, 8-9 (use §7.1 or calculator integral), 10-11, 12-13 (use §7.1), 14-16, 23-24, 25-28, 29-33.

§5.5 Fundamental Theorem p. 264 # 11-13. WS #7A,B.

Chapter 5 Review p. 266 # 1-8, 16-19 (use §7.1), 21-23, 25-26, 28-29, 35, 38, 40-41, 42-44.

§7.1 Antiderivative p. 303 Odd # 1-31, Odd # 33-49, 63-66.

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

§7.3 Finding definite integrals: p. 312 # 1-12, 26-33, 39, 42-43, 44-45.

6. Differential Equations

§10.1 Differential equations as models p. 400 # 1-11, 14-15.

§10.2 Solutions of a differential equation p. 404 # 1-5, 7-10, 12, 13-21, 22.

§10.3* Slope fields p. 410 # 1-5, 7, 8, 10-11.

§10.4 Exponential growth, decay p. 416 # 1-3, 9-16, 17-18. WS #5.

§10.5 Modeling with DE p. 424 # 1-5, 13, 16-18, 25-26, 28.

Chapter 10 Review p. 436, # 1, 2, 9-11, 20-21, 25-29, 34-35.

p. 438 Proj . 1*, 2*.

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

HELP: is available from my office hours; also free tutoring at the Math Tutoring Center in 540B NI (Hours: M,Tu,W 10am–9pm, Th 10am–6pm, F 10am–1 pm).