Math 2141: Advanced Calculus 1

Basic Information

Instructor: Luke Rogers
Instructor's Office Hours: Thursdays 3-4pm and Fridays 10-11am in MSB 414.
Lectures: Tuesdays and Thursdays, 12:30-1:45pm in MSB 411, and Fridays 12-12:50pm in MSB 415.
Textbook: Calculus Volume 1: One-Variable Calculus with an Introduction to Linear Algebra (2nd Ed.) by Thomas Apostol.
Grading Scheme: Homework and class participation 30%, Midterm 30%, Final 40%.

What is expected of you

This is a difficult class. It requires quite a lot of work from you, most of which will occur outside the classroom. My main expectations are that

- You read the material before each class. This includes attempting to understand the concepts and trying the problems on your own.
- You complete your homework
- You ask questions in class and actively participate in learning.
- You come to see me at my office hours if you are having difficulties with the material, are bored, want more (or less) work, would like to know more about the topics, or have any questions about the class. In my experience, the students who do this are the ones who do well in the class.

Syllabus

Our goal is to cover most of the material in the first 7 chapters of the text. You are expected to read the material before class. To do so, you should refer to the following table

Week	Day	Ch.	Topics
8/31 – 9/4	1	0	1.1, 1.2, 1.3, 1.5, 2.1, 2.2 – Introduction and history, set theory
	2	0	2.3, 2.4, 3.1, 3.2, 3.4 – Set theory, axioms for the reals
	3	0	3.6, 3.7, 3.8, 3.9, 3.10 – Supremum, infimum
9/7 – 9/11	4	0	4 – Induction
	5	0	4.6, 4.8 – Summation, absolute values, triangle inequality
	6	1	1.1, 1.2, 1.4, 1.6 – Functions, area as a function
9/14 – 9/18	7	1	1.6, 1.8, 1,9, 1.10, 1.12-14 – Area, intervals, partitions, step functions
	8	1	1.16-23 – Upper and lower sums, monotonic functions
	9	1	1.24, 1.25, 1.27 – Properties of the integral

9/22 – 9/26	10	**2**	2.1, 2.2, 2.3, 2.5-7 – Applications, trigonometric functions
	11	**2**	2.9, 2.10 – Polar coordinates
	12	**2**	2.12, 2.14, 2.16, 2.18 – Other applications
9/28 – 10/2	13	**2**	Indefinite integrals, Review
	14	**3**	3.1, 3.2, 3.3 – Continuity
	15	**3**	3.4, 3.5 – Limit theorems
10/5 – 9	16	**3**	3.7, 3.9, 3.10 – Bolzano and intermediate value theorems
	17	**3**	3.12, 3.13, 3.14 – Inverse functions
	18	**3**	3.16, 3.17, 3.18 – Extreme value, small-span, integrability
10/12 – 16	19	**3**	3.19 – Mean Value theorem
	20	**4**	4.1-5 – Derivative, examples, algebra of derivatives
	21	**4**	4.7, 4.8, 4.10 – Slopes, notations, chain rule
10/19 – 23	22	**4**	4.11, 4.13, 4.14 – Mean value, extreme values
	23	**4**	4.16, 4.17, 4.18 – Curve sketching
	24	**4**	4.20 – Worked examples. Review
10/26 – 30	25		MIDTERM EXAM – Chapters 1 – 3. Assumed Knowledge Sheet is here. Practice Midterm 1 is here. Practice Midterm 2 is here
	26	**5**	5.1 – Fundamental Theorem of Calculus
	27	**5**	5.2, 5.3, 5.4 – Primitive functions and second Fundamental Theorem of Calculus
11/2 – 6	28	**5**	5.6, 5.7 – Substitution
	29	**5**	5.9 - Integration by parts
	30	**5**	Problems
11/9 – 13	31	**6**	6.1 – 6.4 – Natural logarithm
	32	**6**	6.5 – 6.8, 6.10 – Properties of logarithm
	33	**6**	6.12 – 6.15 – Exponentials
11/16 – 20	34	**6**	6.16, 6.18 – Differentiation and integration
	35	**6**	6.20, 6.21 – Derivatives of inverse functions
	36	**6**	6.23, 6.24 – Partial fractions
11/23 – 27			THANKSGIVING
			THANKSGIVING
			THANKSGIVING
11/30 –12/4	37	**7**	7.1, 7.2, 7.3 – Taylor polynomials
	38	**7**	7.5, 7.6, 7.7 – Taylor's formula
	39	**7**	7.9, 7.10, 7.12 – L'Hopital's rule

12/7 – 11	40	7	7.13, 7.14, 7.15 – Infinite limits
	41		Extra topics
	42		Extra topics

Exams and Grading

Your grade in the course will be determined by your performance on a midterm exam, a final exam, and your lecture grade. The lecture grade consists primarily of homework but may be affected by class participation.

- One Midterm Exam on October 27th, held in class. Assumed Knowledge Sheet is here. Practice Midterm 1 is here. Practice Midterm 2 is here
- One Final Exam on December 17th from 10:30am-12:30pm in MSB 411. Assumed Knowledge Sheet is here. Practice Exam 1 is here.

If you cannot attend an exam for a legitimate reason (or if you have a medical situation that requires extended-time exams), please contact me TWO WEEKS in advance (if possible) with appropriate documentation, so that we can make alternative arrangements.

Midterm 1	30.00%
Final	40.00%
Homework and class participation	30.00%
Total	100.00%

Exams will be taken without the aid of your textbook. The use of calculators is not allowed during exams.

Attendance

You are expected to attend class regularly. Besides being nearly essential for developing your understanding of the material, your regular attendance in class is good for the morale of the class and is indicative of your interest in the subject and your engagement in the course. You are responsible for the material discussed in class and in the assigned reading in the text.

Homework

Most of what you learn in this course will be the result of working exercises that are designed to reinforce key concepts, develop skills, and test your understanding of the material. There will be textbook exercises due at the end of every week on lecture material. Some of the exercises are straightforward, others are very complex. In general homework is due every Friday. **Late homework will not be accepted.** Although it should be attempted daily, it will only be collected once every week,

on **Fridays, in class.** The first assignment is due on Friday, Sept. 4th.

You are encouraged to talk with your classmates about the homework. If you have difficulties, do not waste time --- get help! Please come to office hours!

Due Date	Problems Due
09/04/09	• Page 8 : Problem 2
09/11/09	• Page 21 : Problem 1, just prove Theorem I.22 using anything that appears before this theorem. • Page 28 : Problems 1,3,4,6. • Pages 35-36 : Problems 1(b),(c), 2 and 10.
09/18/09	• Page 40 : Problem 8 • Page 43 : Problem 1(h),(i),(j), 2. • Page 56 : Problem 6. • Page 70 : 1(d),(e),(f), 2, 4(b), 11.
09/25/09	• Page 83: 8, 19, 20, 25 • Page 94: 3, 10, 14, 17 • Page 104: 5, 8, 20, 21
10/02/09	• Page 111: 1, 5, 10, 14 • Page 114: 4, 10, 13, 16 • Page119: 12 • Page 124: 8, 14, 19
10/09/09	• Page 138: 3, 10, 14, 16, 20, 22 • Page 142: 6, 14, 20 • Page 145: 3, 5
10/16/09	• Page 149: 2, 5 • Page 155: 2, 4, 6 • Page 167: 5, 6, 12, 14, 15
10/23/09	No homework due, because you are supposed to be studying for the exam on Tuesday. Do check out the assumed knowledge sheet and Practice Midterm 1 and Practice Midterm 2 . It wouldn't hurt to take a little look at next week's homework as well.
	• Page 167: 17, 27, 36 • Page 173: 5, 7, 10, 15

10/30/09	• Page 179: 4, 21, 24, 30 • Page 186: 1, 2, 7, 8
11/06/09	• Page 191: 4, 10, 12 • Page 194: 13, 22, 26 • Page 208: 3, 11, 16, 28
11/13/09	• Page 216: 3, 11, 12, 23, 26 • Page 220: 5, 7, 12, 13, 21 • Page 223: 8, 21 • Page 236: 2, 3 ,5
11/20/09	• Page 236: 14, 15, 18, 24 • Page 242: 1 • Page 248: 9, 10, 11, 14, 17, 28, 29, 38, 41
11/27/09	None – Thanksgiving Break
12/04/09	• Page 251: 20, 23 • Page 256: 16, 26, 33, 41, 47 • Page 267: 5, 16, 24, 29, 36
12/11/09	• Page 278: 5, 6, 10 • Page 284: 3, 4, 9 • Page 291: 9, 14, 19 • Page 295: 5, 6, 14

Academic Integrity

The University of Connecticut expects that its students will adhere to a high level of integrity in their academic work. You may find information about the academic integrity policy as it pertains to students at http://www.community.uconn.edu/academic_integrity_students_faq.html

University Services

- Counseling and Mental Health Services: 486-4705
- Alcohol and Other Drugs Services: 486-9431
- Dean of Students Office 486-3428