

PMATH 333 – Fall 2020
Introduction to Real Analysis

Instructor: Blake Madill
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Class Website: Learn/Piazza
Office Hour: Thursday, 8PM - 9PM
(MS Teams)

List of Topics: The real numbers, normed vector spaces, topology of normed vector spaces (open and closed sets, completeness, compactness, connectedness), Bolzano-Weierstrass theorem, Heine-Borel theorem, functions from $U \subseteq \mathbb{R}^n$ to $\mathbb{R}^m$, uniform continuity, pointwise and uniform convergence of sequences of functions, theory of multivariable differentiation and integration.

Evaluations: The final grade will be calculated by the following grading scheme:

Assignments (x3)	20%
Quizzes (Best 8 of 11)	25%
Tests (x3)	45%
Participation	10%

Textbook: While I will aim to make the lecture notes self-contained, you may find the following text useful for practice problems and missed notes.

(1) *Introduction to Analysis*. Wade.

Modules: On or before each Monday, the module videos will be posted for the entire week. You will be expected to watch these videos carefully and completely throughout the week.

Assignments: There will be 3 assignments. These dates are subject to change. Late assignments will receive a grade of 0.

Assignments will be submitted through Crowdmark and will be due on the below dates at 9:00 AM ET.

Assignment 1	Wednesday, Sept. 23
Assignment 2	Wednesday, Oct. 28
Assignment 3	Wednesday, Nov. 25

Tests: There will be 3 tests. Each test will be the length of a 90 minute test and can be written anywhere within a **24 hour window**. The tests will be submitted through Crowdmark.

	Posted	Due by
Test 1	Wednesday, Sept. 30 @ 9 AM	Thursday, Oct. 1 @ 9 AM
Test 2	Wednesday, Nov. 4 @ 9 AM	Thursday, Nov. 5 @ 9 AM
Test 3	Wednesday, Dec. 2 @ 9 AM	Thursday, Dec. 3 @ 9 AM

Quizzes: The purpose of each quiz is to ensure you have watched and digested the weekly lectures. The quizzes will generally be more conceptual than the assignments. Each quiz will be posted along with the relevant modules. You will have until 12:00 PM (noon, ET) on the following Sunday to submit your solutions to LEARN. **Quizzes must be done independently without external resources. You may, however, use the lecture videos and your own personal notes.**

Quiz 1	Sunday, Sept. 13
Quiz 2	Sunday, Sept. 20
Quiz 3	Sunday, Sept. 27
Quiz 4	Sunday, Oct. 4
Quiz 5	Sunday, Oct. 18
Quiz 6	Sunday, Oct. 25
Quiz 7	Sunday Nov. 1
Quiz 8	Sunday, Nov. 8
Quiz 9	Sunday Nov. 15
Quiz 10	Sunday, Nov. 22
Quiz 11	Sunday, Nov. 29

Participation: You will be expected to be **both** asking and answering meaningful questions on Piazza each week, for an average of **two contributions per week**. Note that **you may not edit other student's questions/replies, but you may post your own similar response separately**. It is ok for there to be multiple answers for one question. I will leave you several exercises throughout the term to help you come up with ways to participate. In particular, solutions will not be given for quizzes, and so you will be expected to share your solutions after the due date.

Teaching Assistants: The TAs will be in charge of the grading *and regrading* of your assignments. Their contact information is as follows:

- Robert, r23harri@uwaterloo.ca
- Anton, ailiashe@uwaterloo.ca
- Luke, lrmaclea@uwaterloo.ca
- Zhihao, z458zhan@uwaterloo.ca

Academic integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check the Office of Academic Integrity for more information.]

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4. When in doubt, please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity to avoid committing an academic offence, and to take responsibility for his/her actions. [Check the Office of Academic Integrity for more information.] A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about ?rules? for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate associate dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline. For typical penalties, check Guidelines for the Assessment of Penalties.

Appeals: A decision made or penalty imposed under Policy 70, Student Petitions and Grievances (other than a petition) or Policy 71, Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72, Student Appeals.

Note for students with disabilities: AccessAbility Services, located in Needles Hall, Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with AccessAbility Services at the beginning of each academic term.

Course Schedule

Week #	Week of	Topics and sections covered	Info
1	Sept 7	Real Numbers 1	
2	Sept 14	Real Numbers 2	
3	Sept 21	Normed Vector Spaces	A1
4	Sept 28	Topology I	T1
5	Oct 5	Topology II	
	Oct 12	Reading Week	
6	Oct 19	Continuity	
7	Oct 26	Function Spaces	A2
8	Nov 2	Differentiation I	T2
9	Nov 9	Differentiation II	
10	Nov 16	Integration I	
11	Nov 23	Integration II	A3
12	Nov 30	TBA	T3

Note: This schedule is subject to change at any time.