

Introduction to Analysis (MA 302)

(Spring 2021)

- Instructor:** Dr. Xizhong Zheng
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Webpage: <https://www.arcadia.edu/profile/xizhong-zheng>
- Office Hours:** Monday and Wednesday 4:00 – 5:00pm
or by appointment.
- Textbook:** “*Introduction to Real Analysis* ” 3rd Edition (ISBN 0-471-32148-4)
by Robert G. Bartle and Donald R. Sherbert, Wiley, 1999.
- Lecture:** MWF 11:00–12:05, (<https://arcadia.zoom.us/j/95232147657>)
- Prerequisite:** Calculus III.

Help: Outside-of-class help is available from me during office hours or by appointment. Please send me email to make appointment.

Objectives: The objective of this course is to introduce students to the proof-techniques of mathematics. The students will gain a deeper understanding of the results of Calculus I and II through study of the fundamental theorems and through the construction of proofs of related results. Mathematicians value clear and concise writing. The student will improve his/her mathematical writing by listening to the instructor’s critiques, by studying the examples of good writing which appear in the text, in supplementary readings, and are presented in class, and by completing the assigned problems. Each student will be judged on his/her logical reasoning as expressed in writing. The ability to listen, to reason, and to write and speak clearly and concisely is more valued in this course than the ability to respond quickly.

Grading: The grades will be based on two one-hour exams (worth 100 points each), a final exam (worth 200 points), and quizzes and written assignments (worth 100 points). Homework will be regularly assigned and may be done with other students except when the instructor indicates that it will be collected and graded; then it must be solely the work of the individual student. Part of exam may be “take-home” and so will also follow these guidelines. There will normally one quiz or graded assignment each week. Later papers will not be accepted. You should assume there is a quiz each Friday.
Grades will be based on 500 points.

Quizzes or graded homework	100 points
2 one-hour exams	200 points
Final exam	200 points
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Total possible	500 points

A final course grade in letter will be assigned at the end of the term according to total scores you earned, but it will be no harder than 90% - A, 80% - B, 70% - C, 60% - D

Class attendance: It is your responsibility to attend classes regularly. Should you have to miss a non-exam class meeting, it is your responsibility to find out what has been covered in that day and make up the work. Make-up exams will be given only in cases of illness, emergency or official off-campus university presentation. Please email me in all these cases.

Honesty: Students are expected to follow principles of academic honesty. The first violation these principles will result in a zero on that quiz or exam. The second violation will result in an F for the course.

Student-Athletes: Student-Athletes should identify themselves the first class and then present a team schedule. Absences for games/meets (but not practices) will be treated with exactly the same policies as other excused absences.

Title IX Statement: Arcadia University is committed to providing a learning, living, and working environment that is free from discrimination. The University has an Interim Policy Prohibiting Sexual Harassment and Sexual Misconduct detailing our commitment to preventing and addressing such behavior. I understand the impact that sexual harassment and sexual misconduct can have and am committed to doing my part to foster an environment that is safe and equitable.

Please know that all faculty on campus are mandatory reporters. This means that if you disclose an experience of sexual harassment or sexual misconduct to me outside of a classroom discussion, a writing assignment, or a University-approved research project, I must share what you reported to me with Arcadia's Title IX Coordinator. This does not mean that you will have to pursue an investigation or go through a grievance process. Even if you do not choose these options, the Title IX Office can provide supportive measures and other resources to you.

If you or someone you know has experienced sexual harassment or sexual misconduct, please know that you are not alone. If you would like to speak to someone confidentially, confidential resources are provided on the Office of Equity and Civil Rights website.

Introduction to Analysis, 2021S, Assignments

Chapter 1 Preliminaries	Preliminaries
1.1 Sets and Functions	1,2,5,6,9,13,15,20
1.2 Mathematical Induction	1, 2, 4, 6, 8, 13, 16, 18
1.3 Finite and Infinite Sets	1, 2b, 3, 7, 9, 10, 11, 12
Chapter 2 The Real Numbers	The Real Numbers
2.1 Algebraic and Order Properties of Reals	1ab, 2ab, 3ab, 6, 13, 16ab, 20, 23
2.2 Absolute Value and Real Line	1, 4, 5, 6ab, 8ab, 9, 12ab, 15
2.3 Completeness of Real Numbers	1, 2, 5, 6, 8, 9, 11, 12
2.4 Applications of the Supremum Property	1, 2, 4b, 6, 7, 9, 12, 13, 14
2.5 Intervals	3, 4, 5, 6, 7, 8, 10, 11
Chapter 3 Sequences and Series	Sequences and Series
3.1 Sequences and Their Limits	1, 2ac, 3bd, 5bd, 6ac, 8, 10, 13, 14, 15
3.2 Limit Theorems	1, 3, 5, 7, 9, 10, 11, 12, 13,
3.3 Monotone Sequences	1, 2, 4, 5, 7, 9, 10
3.4 Bolzano-Weierstrass Theorem	1, 2, 3, 5, 6, 9, 12
3.5 The Cauchy Criterion	1, 2, 3, 5, 7, 9, 10
3.6 Properly Divergent Sequences	1, 2, 3, 5, 8, 9
3.7 Introduction to Infinite Series	1, 2, 3ab, 4, 7, 9, 12, 13, 14ab
Chapter 4 Limits	Limits
4.1 Limits of Functions	1, 3, 6, 8, 9, 10bd, 11ac, 14
4.2 Limit Theorems	1, 2, 4, 5, 9, 11, 12
4.3 Extended Limit Concept	2, 3, 5, 8, 9, , 12, 13
Chapter 5 Continuous Functions	Continuous Functions
5.1 Continuous Functions	1, 3, 4ab, 5, 7, 11, 12, 13
5.2 Combinations of Continuous Functions	1, 3, 5, 6, 10, 12, 13
5.3 Continuous Functions on Intervals	1, 3, 5, 6, 7, 8, 10, 13, 15
5.4 Uniform Continuity	1, 2, 3, 6, 7, 8, 11, 12, 17
Chapter 6 Differentiation	Differentiation
6.1 The Derivatives	1ab, 2, 4, 5, 9, 11, 13, 15
6.2 The Mean Value Theorem	2ab, 3ab, 6, 7, 9, 10, 12, 13, 17
6.3 L'Hospital's Rules	1, 4, 6, 8, 10
6.4 Taylor's Theorem	1, 4, 5, 11, 17, 19
Chapter 7 The Riemann Integral	Differential Equations
7.1 The Riemann Integral	1ac, 2ac, 6, 9, 10, 13, 16
7.2 Riemann Integrable Functions	1, 2, 7, 8, 11, 12, 15, 18
7.3 The Fundamental Theorem	2, 3, 5, 7, 9, 16ac, 18ac
7.4 Approximate Integration	1, 4, 6, 8, 18
Chapter 11 Basic Topology	Introduction to Topology
11.1 Open and Closed Sets of Reals	1, 3, 5, 7, 10, 13
11.2 Compact Sets	1, 3, 5, 7, 10, 15
11.3 Continuous Functions	1, 3, 4, 8, 9
11.4 Metric Spaces	1, 3, 6, 7, 10

Tentative Schedule of Real Analysis (Spring 2021)

class number	date	section	class number	date	section
1	01/25(M)	Appendix A	23	03/22(M)	5.2
2	01/27(W)	1.1	24	03/24(W)	5.3
3	01/29(F)	1.2	25	03/26(F)	5.4
4	02/01(M)	1.3	26	03/29(M)	5.5
5	02/03(W)	2.1	27	03/31(W)	5.6
6	02/05(F)	2.2 Q1		04/02(F)	WellnessDay
7	02/08(M)	2.3	28	04/05(M)	6.1 Q4
8	02/10(W)	2.4	29	04/07(W)	6.2
9	02/12(F)	2.5	30	04/09(F)	6.3
	02/15(M)	WellnessDay	31	04/12(M)	6.4
10	02/17(W)	3.1	32	04/14(W)	7.1
11	02/19(F)	3.2 Q2	33	04/16(F)	7.2 Q5
12	02/22(M)	3.3	34	04/19(M)	7.3
13	02/24(W)	3.4	35	04/21(W)	7.4
14	02/26(F)	3.5	36	04/23(F)	review
15	03/01(M)	3.6	37	04/26(M)	Test 2
16	03/03(W)	3.7	38	04/28(W)	11.1
17	03/05(F)	review	39	04/30(F)	11.2-3
18	03/08(M)	Test 1	40	05/03(M)	11.4
19	03/10(W)	4.1	41	05/05(W)	Review
20	03/12(F)	4.2		07/07(F)	ThesisDay
21	03/15(M)	4.3		05/10(M)	ReadingDay
	03/16 to 18	SpringBreak	FinalExam	05/17 9:00am	
22	03/19(F)	5.1 Q3			