Real Analysis

MATH 105A SUMMER 2022

Instructor Info

Suzana Milea

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Office Hrs: TBA

McHenry 4144

Course Info

Prerequisite(s): MATH 22 or MATH 23B and either MATH 100 or CMPS 101. Prerequisite(s) waived for non-UCSC students.

Tuesday & Thursday

09:00AM-11:05AM

Remote Instruction (access Zoom through Canvas)
Note. Lecture recordings will be uploaded to Yuja.

Discussion Sections

Sections info will be updated. Attendance is not required, but highly recommended.

TBA

TBA

TA Info

Max Su

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Office Hrs: TBA

Overview

The basic concepts of one-variable calculus are treated rigorously. Set theory, the real number system, numerical sequences and series, continuity, differentiation.

Textbook

Understanding Analysis, Stephen Abbott, 2nd edition, Springer, 2015.

`https://www.math.ucdavis.edu/~babson/MAT127B/abbott-second-edition.pdf`

Grading Scheme

20%	Class Participation
30%	Homework
20%	Midterm Exam –> Tuesday Jul 26 (Chapters 1,2,3)
30%	Final Exam –> Thursday Aug 25 (cumulative)

Grades will follow the standard scale: A: 100% to 94.0%; A-: < 94.0% to 90.0%; B+: < 90.0% to 87.0%; B: < 87.0 % to 84.0%; B-: < 84.0 % to 80.0%; C+: < 80.0 % to 77.0%; C: < 77.0 % to 74.0%; C-: < 74.0 % to 70.0%; D+: < 70.0 % to 67.0%; D: < 67.0 % to 64.0%; D-: < 64.0 % to 61.0%; F: < 61.0 % to 0.0%.

Class Communication

Ed (or 'Ed discussion') is an online threaded discussion platform that supports document and image upload, math equations, embedded video, runnable code snippets, and image annotation. Discussion board posts can be categorized, private, or even anonymous. Student responses can be 'endorsed' and instructor feedback provided. This tool is integrated in Canvas.

Course announcements will be made via Ed Discussion and NOT Canvas. Ed Discussion will be used for all communication and questions outside of lectures and office hours. Contributions to the learning of your peers will be duly noted and may result in a grade bump. If you have a question regarding homework, concepts, logistics, or anything the whole class might benefit from - post it on Ed. If your question is of a sensitive or personal nature, please send me an email. Include "MATH 105A" in the subject line.

Exams

Cheating will not be tolerated. There are no make-up exams given. If you miss the midterm exam, your score on the final will count for both the missed midterm and the final. You need to take the final when it is scheduled.

In extreme circumstances, such as in the case of a medical emergency, you can make arrangements before the end of the course in order to receive an Incomplete. The notation I may be assigned, at the discretion of the faculty teaching the course, when your work for a course is of passing quality but for which some specific required work has not been completed.

Homework

You will be able to see the assignments and due dates in Canvas and Gradescope.

Think of the homework as your opportunity to learn the material and expect to spend MANY hours doing homework. If you look up the solutions, you will not learn the material well enough to do well on the tests.

Gradescope

Assignments must be submitted via Gradescope. You don't need an extra account for Gradescope - it is integrated in Canvas. See the instructional video on how to submit an assignment. When you submit your files, you will be prompted to select, for each specified problem, the pages on which the associated work/solution are located. You are required to accurately identify the pages associated to each problem. If you fail to do so, you may lose credit for each problem for which the pages are not correctly identified. It is your responsibility to make sure your submission is legible and easy to read. If you submit work that is difficult or impossible to read, you will not receive credit for it, and you will not be allowed to resubmit.

Late Work Policy

Late submissions of weekly assignments are only accepted, at my sole discretion, in extreme circumstances, such as in the case of a medical emergency. Extreme circumstances must be brought to my attention as soon as possible and before the due date of the assignment.

Accommodations for Students with Disabilities

UC Santa Cruz is committed to creating an academic environment that supports its diverse student body. If you are a student with a disability who requires accommodations to achieve equal access in this course, please submit your Accommodation Authorization Letter from the Disability Resource Center (DRC) to me privately during my office hours or by appointment, preferably within the first two weeks of the quarter. At that time, I would also like us to discuss ways we can ensure your full participation in the course. I encourage all students who may benefit from learning more about DRC services to contact DRC by phone at 831-459-2089 or by email at drc@ucsc.edu.

Academic Integrity

The Mathematics Department has a zero tolerance policy towards any incident of academic dishonesty. If cheating occurs, consequences within the context of the course may range from getting zero on a particular assignment, to failing the course. In addition to these sanctions, every case of academic dishonesty is referred to the students' college Provost, who sets in motion an official disciplinary process. Cheating in any part of the course may lead to failing the course and suspension or dismissal from the university.

What is cheating? In short, it is presenting someone else's work as your own. Examples include, but are not limited to, letting someone else do your homework assignment for you, copying another student's midterm or final exam, allowing your own work to be copied, or in any way facilitating the cheating of others. Although you may discuss problems with fellow students, your collaboration must be at the level of ideas only. Legitimate collaboration ends when you "lend", "borrow", or "trade" written solutions to problems, or in any way share in the act of writing your answers.

For the full policy and disciplinary procedures on academic dishonesty, students and instructors should refer to the Academic Integrity page at the Division of Undergraduate Education: https://ue.ucsc.edu/academic-misconduct.html.

Title IX

The Title IX Office is committed to fostering a campus climate in which members of our community are protected from all forms of sex discrimination, including sexual harassment, sexual violence, and gender-based harassment and discrimination. Title IX is a neutral office committed to safety, fairness, trauma-informed practices, and due process. Title IX prohibits gender discrimination, including sexual harassment, domestic and dating violence, sexual assault, and stalking. If you have experienced sexual harassment or sexual violence, you can receive confidential support and advocacy at the Campus Advocacy Resources Education (CARE) Office by calling (831) 502-2273. In addition, Counseling Psychological Services (CAPS) can provide confidential, counseling support, (831) 459-2628. You can also report gender discrimination directly to the University's Title IX Office, (831) 459-2462. Reports to law enforcement can be made to UCPD, (831) 459-2231 ext. 1. For emergencies call 911.

Student Conduct and Community Standards

The UC Santa Cruz community includes students, staff, faculty, and others who have a vested interest in the University. As members of an academic community, integrity, accountability and mutual respect are vital pillars of being part of this community. The Principles of Community further illustrate the values and expectations set forth for being a part of this community. See https://deanofstudents.ucsc.edu/student-conduct/index.html.

Tentative Course Outline (06/20/22 - 08/26/22)

I plan to cover all of chapters 1 through 6 of Abbott's book.

TOPIC/READING		
(Tu) Jun 21	1.1 Discussion: The Irrationality of $\sqrt{2}$	& 1.2 Some Preliminaries
(Th) Jun 23	1.3 The Axiom of Completeness	& 1.4 Consequences of Completeness
(Tu) Jun 28	1.5 Cardinality	& 1.6 Cantor's Theorem
(Th) Jun 30	2.1 Discussion: Rearrangements of Infinite Series	& 2.2 The Limit of a Sequence
(Tu) Jul 5	2.3 The Algebraic and Order Limit Theorems	& 2.4 The Monotone Convergence Theorem and a First Look at Infinite Series
(Th) Jul 7	2.5 Subsequences and the Bolzano–Weierstrass Thm.	& 2.6 The Cauchy Criterion
(Tu) Jul 12	2.7 Properties of Infinite Series	& 2.8 Double Summations and Products of Infinite Series
(Th) Jul 14	3.1 Discussion: The Cantor Set	& 3.2 Open and Closed Sets
(Tu) Jul 19	3.3 Compact Sets	& 3.4 Perfect Sets and Connected Sets
(Th) Jul 21	3.5 Baire's Theorem	& 4.1 Discussion: Examples of Dirichlet and Thomae
(Tu) Jul 26	MIDTERM	The midterm covers Ch.1,2,3.
(Th) Jul 28	4.2 Functional Limits	& 4.3 Continuous Functions
(Tu) Aug 2	4.4 Continuous Functions on Compact Sets	& 4.5 The Intermediate Value Theorem
(Th) Aug 4	4.6 Sets of Discontinuity	& 5.1 Discussion: Are Derivatives Continuous?
(Tu) Aug 9	5.2 Derivatives and the Intermediate Value Property	& 5.3 The Mean Value Theorems
(Th) Aug 11	5.4 A Continuous Nowhere-Differentiable Function	& 6.1 Discussion: The Power of Power Series
(Tu) Aug 16	6.2 Uniform Convergence of a Sequence of Functions	& 6.3 Uniform Convergence and Differentiation
(Th) Aug 18	6.4 Series of Functions	& 6.5 Power Series
(Tu) Aug 23	6.6 Taylor Series	& 6.7 The Weierstrass Approximation Theorem
(Th) Aug 25	FINAL EXAM	The final exam is cumulative.

*Make sure to check the assigned problems and the homework due dates in Gradescope.