

REAL ANALYSIS 1 MWF 10-10:50AM FALL 2022 SH 309

Instructor:	Jonathan White, jwhite@coe.edu
Chair:	Gavin Cross, gcross@coe.edu
Web Page:	public.coe.edu/~jwhite/
Office:	Stuart 316
Office Hours:	(Zoom link on web page) 9-9:50am M-F and by appointment
Office Phone:	399-8280
Texts:	<i>A Friendly Introduction to Analysis, Single and Multivariable</i> , 2 nd Edition, by Witold Kosmala, Prentice-Hall; <i>A Tour of the Calculus</i> , by David Berlinski.
Problem Sets:	Problem Sets will be given throughout the term to supplement class work. Combined these will be worth 200 points.
Math Culture Points:	Math Culture Points will constitute 100 points. These will be earned through participation in various activities outside of class, as detailed elsewhere.
Exams:	There will be two exams during the course of the semester, administered during class time. The dates of these are indicated in the schedule on the back side of this sheet. These exams will be worth 100 points each. The final exam will be held during finals week at the date and time indicated on the back side of this sheet. The final will be worth 200 points.
Grading:	Grading will approximately follow a $[92.0\%, \infty) \mapsto A$, $[90\%, 92\%) \mapsto A-$, $[87\%, 90\%) \mapsto B+$, $[82\%, 87\%) \mapsto B$, $[80\%, 82\%) \mapsto B-$, $[77\%, 80\%) \mapsto C+$, $[72\%, 77\%) \mapsto C$, $[70\%, 72\%) \mapsto C-$, $[67\%, 70\%) \mapsto D+$, $[62\%, 67\%) \mapsto D$, $[60\%, 62\%) \mapsto D-$, $(-\infty, 60\%) \mapsto F$ scale. Current grade information will be available online via Moodle.
Late Work:	For the sake of fairness to those who follow the schedule, makeups for exams will be allowed only under extenuating circumstances, with documentation and advance notice when humanly possible. Problem Sets lose 20% of the points possible for each day or portion of a day late.

“And what are these fluxions? The velocities of evanescent increments. And what are these same evanescent increments? They are neither finite quantities, nor quantities infinitely small, nor yet nothing. May we not call them ghosts of departed quantities?”

-Bishop George Berkeley, 1685-1753

Real Analysis is in many ways a dramatically different course than anything which precedes it in the mathematics curriculum. In some regards, students finally get a chance to see the sorts of things that professional mathematicians deal with -- but at the same time, many of these underpinnings are beneath notice once they've been properly laid. The simplest thing that can safely be said is that there are genuinely troubling issues left unaddressed by the undergraduate calculus sequence, and they must be dealt with before moving on.

It is also important to note at this point that the demands on students become qualitatively different in this course than in its prerequisites. Learning strategies which have succeeded in previous classes will not necessarily suffice at this level. If at some point these challenges or frustrations get too bad, I strongly encourage you to see me for extra explanation -- don't wait until you're overwhelmed. I'm here to help.

Tentative Schedule

	8/24 §1.7-8 Real Numbers & Their Properties	8/26 §1.9 Review
8/29 §2.1 Convergence	8/31 §2.2 Limit Theorems	9/2 §2.3 Infinite Limits
9/5 No Class – Labor Day	9/7 §2.4 Monotone Sequences	9/9 §2.5 Cauchy Sequences
9/12 §2.5 Cauchy Sequences	9/14 §2.6 Subsequences	9/16 §2.7 Review
9/19 §3.1 Limit at Infinity	9/21 §3.2 Limit at a Real Number	9/23 §3.3 One-Sided Limits
9/26 §3.4 Review	9/28 Exam 1	9/30 §4.1 Continuity
10/3 §4.1 Continuity	10/5 §4.2 Discontinuity	10/7 §4.3 Properties of Continuous Functions
10/10 No Class – Fall Break	10/12 §4.3 Properties of Continuous Functions	10/14 §4.4 Uniform Continuity
10/17 §4.5 Review	10/19 §4.6 Compactness	10/21 §5.1 Derivatives
10/24 §5.2 Properties of Differentiable Func.	10/26 §5.3 Mean Value Theorems	10/28 §5.4 Higher Derivatives
10/31 §5.5 L'Hôpital's Rules	11/2 §5.6 Review	11/4 Exam 2
11/7 §6.1 Riemann Integrals	11/9 §6.1 Riemann Integrals	11/11 §6.2 Integrable Functions
11/14 §6.2 Integrable Functions	11/16 §6.3 Properties of Riemann Integrals	11/18 §6.4 Integration and Differentiation
No Class – Thanksgiving		
11/23 §6.5 Improper Integrals	11/30 Dedekind Cuts	12/2 Final Review
Final Exam – 8am Wednesday, 12/7		

Any students with disabilities which might affect their performance in this class should contact me as soon as possible to arrange accommodations.

The faculty has adopted a policy on academic integrity. It is your responsibility to understand and follow it.

Diversity, in all its forms, is valuable.

Learning Outcomes

By the end of this class each student should be able to demonstrate:

- understanding of the real numbers as a set with axiomatically developed properties.
- rigorous understanding of limits of sequences of real numbers and the standard associated theorems.
- rigorous understanding of limits of real functions and the standard associated theorems.
- rigorous understanding of continuity of real functions and the standard associated theorems.
- rigorous understanding of derivatives of real functions and the standard associated theorems.
- rigorous understanding of Riemann integrals of real functions and the standard associated theorems.

The Provost has mandated that the material below this line appear on all syllabi:

College-wide Policies:

Mission Statement:

Coe College is a national, residential liberal arts college offering a broad array of programs in the arts, sciences, and professions. Our mission is to prepare students for meaningful lives and fulfilling careers in a diverse, interconnected world. Coe's success will be judged by the success of our graduates.

Academic Integrity

At Coe College, we expect academic integrity of all members of our community. Academic integrity assumes honesty about the nature of one's work in all situations. Such honesty is at the heart of the educational enterprise and is a precondition for intellectual growth. Academic dishonesty is the willful attempt to misrepresent one's work, cheat, plagiarize, or impede other students' academic progress. Academic dishonesty interferes with the mission of the College and will be treated with the utmost seriousness as a violation of community standards. Please refer to the Coe College Academic Catalog for complete information regarding Academic Integrity:

www.coe.edu/academics/academic-resources/provosts-office/academic-integrity-policy

FERPA

Students should be aware of their rights regarding the privacy of their educational records. Detailed information about your rights can be found under the FERPA (Family Educational Rights and Privacy Act of 1974) section in the Academic Catalog and online here:

<https://www.coe.edu/academics/academic-resources/registrar/ferpa>

In line with FERPA restrictions, students should be aware that an instructor cannot publicly post grades by student name, institutional student identification number, or social security number without first having obtained students' written permission. The Definition of a Course Credit & Expected Workload One course credit at Coe College constitutes 180 hours' worth of student work over the course of the term. "The Department of Education has defined one hour to be 50 minutes, so 150 60-minute hours is equivalent to 180 50-minute hours." This figure includes both the time spent in class and out of class completing course work. In other words, students are expected to devote a considerable amount of time outside of class to this course. For courses that meet in a standard MWF or T-Th slot, students should be expected to work seven hours a week outside of the three hours in class.

Requesting Academic Accommodations

Coe College is committed to creating a learning environment that meets the needs of its diverse student body. If you anticipate or experience any barriers to learning in this course, please visit my office hours to discuss these concerns with me. If you have a medical, physical, psychological, or learning need documented by a healthcare provider, or experience an unforeseen obstacle during the semester, you can make an appointment with Melanie Ostmo, Accessibility Services Coordinator, to request an official accommodation under the Americans with Disabilities Act. You can find more information about the Accessibility Services Office by visiting the Learning Commons website or by emailing accessibility@coe.edu. If you have already been approved for accommodations through Accessibility Services, please meet with me so we can develop a plan for your success together.

Reporting of Sexual Assault or Misconduct

As an instructor, one of my responsibilities is to help create a safe learning environment on our campus. I also have a mandatory reporting responsibility related to my role as a faculty member. It is my goal that you feel able to share information related to your life experiences in classroom discussions, in your written work, and in any one-on-one meetings. I will keep the information you share with me private to the greatest extent possible. However, I am required to share information regarding sexual misconduct or students who may be in danger to themselves or to others. Students may speak to someone confidentially by contacting Student Life at 319-399-8843 or emailing titleix@coe.edu, Safety, and Security at 319-399-8888, Emily Barnard (college counselor) at 319-399-8843, or visit Coe's Title IX website for more information.