REAL ANALYSIS 1 MWF 10:00-10:50AM FALL 2018 STUART 309

Instructor:	Jonathan White
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Web Page:	public.coe.edu/~jwhite/
Office:	Stuart 316
Office Hours:	MWF 9:20-9:50am, 3:00-3:30pm, and by appointment
Office Phone:	399-8280
Home Phone:	362-3350 (between 7am and 10pm)
Texts:	*A Friendly Introduction to Analysis, Single and Multivariable*, 2nd Edition, by Witold Kosmala, Prentice-Hall; *A Tour of the Calculus*, 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 $[92.0\%, \infty) \to$ A, $[90\%, 92\%) \to$ A–, $[87\%, 90\%) \to$ B+, $[82\%, 87\%) \to$ B, $[80\%, 82\%) \to$ B–, $[77\%, 80\%) \to$ C+, $[72\%, 77\%) \to$ C, $[70\%, 72\%) \to$ C–, $[67\%, 70\%) \to$ D+, $[62\%, 67\%) \to$ D, $[60\%, 62\%) \to$ D–, $(-\infty, 60\%) \to$ F scale. Current grade information will be available online via Moodle.

"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.

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Tentative Schedule

	Wednesday 8/22 §1.7-8 Real Numbers & Their Properties	Friday 8/24 §1.9 Review
Monday 8/27 §2.1 Convergence	Wednesday 8/29 §2.2 Limit Theorems	Friday 8/31 §2.3 Infinite Limits
Monday 9/3 No Class – Labor Day	Wednesday 9/5 §2.4 Monotone Sequences	Friday 9/7 §2.5 Cauchy Sequences
Monday 9/10 §2.5 Cauchy Sequences	Wednesday 9/12 §2.6 Subsequences	Friday 9/14 §2.7 Review
Monday 9/17 §3.1 Limit at Infinity	Wednesday 9/19 §3.2 Limit at a Real Number	Friday 9/21 §3.3 One-Sided Limits
Monday 9/24 §3.4 Review	Wednesday 9/26 **Exam 1**	Friday 9/28 §4.1 Continuity
Monday 10/1 §4.1 Continuity	Wednesday 10/3 §4.2 Discontinuity	Friday 10/5 §4.3 Properties of Continuous Functions
Monday 10/8 §4.3 Properties of Continuous Functions	Wednesday 10/10 §4.4 Uniform Continuity	Friday 10/12 No Class – Fall Break
Monday 10/15 §4.5 Review	Wednesday 10/17 §4.6 Compactness	Friday 10/19 §5.1 Derivatives
Monday 10/22 §5.2 Properties of Differentiable Func.	Wednesday 10/24 §5.3 Mean Value Theorems	Friday 10/26 §5.4 Higher Derivatives
Monday 10/29 §5.5 L'Hôpital's Rules	Wednesday 10/31 §5.6 Review	Friday 11/2 **Exam 2**
Monday 11/5 §6.1 Riemann Integrals	Wednesday 11/7 §6.1 Riemann Integrals	Friday 11/9 §6.2 Integrable Functions
Monday 11/12 §6.2 Integrable Functions	Wednesday 11/14 §6.3 Properties of Riemann Integrals	Friday 11/16 §6.4 Integration and Differentiation
Monday 11/19 No Class – Thanksgiving	Wednesday 11/21 No Class – Thanksgiving	Friday 11/23 No Class – Thanksgiving
Monday 11/26 §6.4 Integration and Differentiation	Wednesday 11/28 §6.5 Improper Integrals	Friday 11/30 §6.6 Special Functions
Monday 12/3 §6.7 Review	Wednesday 12/5 Dedekind Cuts	Friday 12/7 Final Review
Final Exam – 8am Wednesday, 12/12		

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.

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Math Culture Points

A portion of the grade for this course will take the form of Math Culture Points. These will be earned through activities outside of class including, but not necessarily limited to, those listed below:

Activity	Points	Maximum
Colloquium Attendance	5	–
Colloquium Presentation	5-15	2
Conference Attendance Iowa Section of the MAA (10/5/18-10/6/18) Midwest Sports Analytics Meeting (11/17/18)	5-15	2
Mathematics Competition Participation Iowa Mathematical Modeling Competition (?) Putnam Competition (12/1/18)	15	2
Math Culture Reading Specific readings will be posted, typically around 6 each semester Selected readings from Berlinski's *Tour* Any article from *Math Horizons* With approval, any relevant article from *Math Magazine*, *CMJ*, etc.	5	 – 10 3 3
Math Club Activities (when appropriate) Movies, Math Club portion of the Playground of Science, Speakers, Workshops, etc.	5	--
Other Appropriate Coe or Outreach Activities Chess Club Meeting Job Shadowing in any relevant field Other Volunteer Outreach (Garfield, McKinnley, etc. – talk to Jon for information!)	 5 10 5	 2 1 4

You should plan to spread your participation throughout the semester. In each case above, credit assumes both full participation and posting a brief summary/response on Moodle **in a timely manner**. These reflections should generally be between 100 and 300 words, and include both a brief summary and your personal thoughts on the event, and **must be submitted within one week of the event**, or within the specified time window for other activities. Up to three units of credit may be submitted after normal deadlines in the "Math Culture – Late" category on Moodle, but otherwise exceptions will not be made without serious extenuating circumstances.

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:

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 pre-condition 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 or this weblink 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: www.coe.edu/academics/academic-resources/registrar/ferpa

? In line with FERPA restrictions, students should be aware that their instructor cannot publicly post grades by student name, institutional student identification number, or social security number without first having obtained students' written permission.

Students with Disabilities

? If you have a hidden or visible disability which may require classroom or test accommodations I encourage you to visit my office during Office Hours or email to schedule an appointment at a mutually suitable time so we can discuss ways to support your learning.

? Coe College, in compliance with equal access laws, will make reasonable accommodations for persons with documented disabilities. Students are required to meet with Kim Pierson, the Accessibility Services Coordinator to verify disability. The Accessibility Services Office is located in the Learning Commons on the lower level of Stewart Memorial Library. This office is responsible for coordinating accommodations and services for students with disabilities. Please call 319-399-8844 or x8844 to schedule an appointment. For details on Coe's Accessibility Services, see: www.coe.edu/application/files/4615/3140/6378/disability-handbook.pdf

? Reporting of Sexual 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 seek to keep 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 Development at 319-399-8843 or Safety and Security at 319-399-8888.

? The Definition of a Course Credit, Expected Workload and Grade Basis:

? One course credit at Coe College constitutes 150 hours' (This is a 60 minute hour) worth of student work over the course of the term. This figure includes both the time spent in class and the time spent 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 M-W-F or T-Th slot, students should be expected to work nine hours a week outside of the three hours in class.

You must also explain in the syllabus students how final grades with be determined in the course.