

## REAL ANALYSIS 1 MWF 10:00-10:50AM FALL 2010 STUART 309

- Instructor: Jonathan White
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- Web Page: [public.coe.edu/~jwhite/](http://public.coe.edu/~jwhite/)
- Office: Stuart 316
- Office Hours: MTW 3:00-3:50pm and by appointment
- Office Phone: 399-8280
- Home Phone: 362-3350 (between 7am and 10pm)
- Text: *A Friendly Introduction to Analysis, Single and Multivariable*, 2<sup>nd</sup> 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 50 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 90% A, 80% B, 70% C, 60% D scale.

*“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

Monday, August 30 <sup>th</sup> §1.7 Real Numbers	Wednesday, September 1 <sup>st</sup> §1.8 Properties of Real Numbers	Friday, September 3 <sup>rd</sup> §1.9 Review
Monday, September 6 <sup>th</sup> No Class – Labor Day	Wednesday, September 8 <sup>th</sup> §2.1 Convergence	Friday, September 10 <sup>th</sup> §2.2 Limit Theorems
Monday, September 13 <sup>th</sup> §2.3 Infinite	Wednesday, September 15 <sup>th</sup> §2.4 Monotone Sequences	Friday, September 17 <sup>th</sup> §2.5 Cauchy Sequences
Monday, September 20 <sup>th</sup> §2.5 Cauchy Sequences	Wednesday, September 22 <sup>nd</sup> §2.6 Subsequences	Friday, September 24 <sup>th</sup> §2.7 Review
Monday, September 27 <sup>th</sup> §3.1 Limit at Infinity	Wednesday, September 29 <sup>th</sup> §3.2 Limit at a Real Number	Friday, October 1 <sup>st</sup> §3.2 Limit at a Real Number
Monday, October 4 <sup>th</sup> §3.3 One-Sided Limits	Wednesday, October 6 <sup>th</sup> §3.4 Review	Friday, October 8 <sup>th</sup> <b>Exam 1</b>
Monday, October 11 <sup>th</sup> §4.1 Continuity	Wednesday, October 13 <sup>th</sup> §4.2 Discontinuity	Friday, October 15 <sup>th</sup> §4.3 Properties of Continuous Functions
Monday, October 18 <sup>th</sup> §4.3 Properties of Continuous Functions	Wednesday, October 20 <sup>th</sup> §4.4 Uniform Continuity	Friday, October 22 <sup>nd</sup> No Class – Fall Break
Monday, October 25 <sup>th</sup> §4.5 Review	Wednesday, October 27 <sup>th</sup> §4.6 Compactness	Friday, October 29 <sup>th</sup> §5.1 Derivatives
Monday, November 1 <sup>st</sup> §5.2 Properties of Differentiable Func.	Wednesday, November 3 <sup>rd</sup> §5.3 Mean Value Theorems	Friday, November 5 <sup>th</sup> §5.4 Higher Derivatives
Monday, November 8 <sup>th</sup> §5.5 L'Hôpital's Rules	Wednesday, November 10 <sup>th</sup> §5.6 Review	Friday, November 12 <sup>th</sup> <b>Exam 2</b>
Monday, November 15 <sup>th</sup> §6.1 Riemann Integrals	Wednesday, November 17 <sup>th</sup> §6.1 Riemann Integrals	Friday, November 19 <sup>th</sup> §6.2 Integrable Functions
Monday, November 22 <sup>nd</sup> §6.2 Integrable Functions	Wednesday, November 24 <sup>th</sup> No Class – Thanksgiving Break	Friday, November 26 <sup>th</sup> No Class – Thanksgiving Break
Monday, November 29 <sup>th</sup> §6.3 Properties of Riemann Integrals	Wednesday, December 1 <sup>st</sup> §6.4 Integration and Differentiation	Friday, December 3 <sup>rd</sup> §6.4 Integration and Differentiation
Monday, December 6 <sup>th</sup> §6.5 Improper Integrals	Wednesday, December 8 <sup>th</sup> §6.7 Review	Friday, December 10 <sup>th</sup> Dedekind Cuts
Monday, December 13 <sup>th</sup> Final Review		
<b>Final Exam – 8am on Friday, December 17<sup>th</sup></b>		

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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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:

<b>Activity</b>	<b>Points</b>	<b>Maximum</b>
Colloquium Attendance	5	–
Colloquium Presentation	5-15	2
Conference Attendance Iowa Section of the MAA (October 22 <sup>nd</sup> -23 <sup>rd</sup> )	5-15	2
Mathematics Competition Participation Iowa Mathematical Modeling Competition (October 9 <sup>th</sup> -10 <sup>th</sup> ) Putnam Competition (December 4 <sup>th</sup> )	10	2
Math Culture Reading Some weeks specific readings will be posted on the course web page Selected readings from Berlinski's <i>Tour</i> With approval, any relevant column on MAA.org With approval, any relevant article from <i>Math Horizons</i> , <i>CMJ</i> , etc.	5	– 5 3 3
Math Club Activities (when appropriate) Movies, Speakers, Game Nights, math portion of Playground of Science, etc.	5	3
Volunteer Math Outreach Working with students at Polk Elementary, etc.	5	2

Generally Math Culture Points can be earned for at most two activities in any given week, so you should plan to spread your participation throughout the semester. In each case above, credit assumes both full participation and submitting a brief summary/response via email. These reflections should generally be between 100 and 300 words, and include both a brief summary and your personal thoughts on the event.

