Math 246 Instructor Syllabus 2012-2013

Text: *Modeling the Dynamics of Life: Calculus and Probability for Life Scientists, 3rd ed, by Frederick Adler*
(students may have a custom paperback, abbreviated version of the book)

Course Goals: A student successfully completing the course should, in a general sense, have…

- ✓ facility with the computation of first and second derivatives and the interpretation thereof,
- ✓ knowledge of the difference between functions on discrete and continuous domains and the practical implications of each,
- ✓ repeated exposure to applications in population, reproduction, drug concentration, vascular function, gas exchange, selection, and food intake using all the learning outcomes.

The student can model the mathematical topics described among the learning outcomes in words, then solve or simplify the relevant equations and/or expressions, and finally write a summary statement of the solution.

Learning Outcomes: A successful student can…

- ✓ compute and interpret limits at finite values and to infinity,
- ✓ evaluate the continuity of a function on an interval,
- ✓ determine when it is appropriate to use L'Hôpital's Rule and compute it in those instances,
- ✓ compute and interpret first and second derivatives for polynomial, logarithmic, exponential, and trigonometric functions,
- ✓ use product, quotient, and chain rules to compute derivatives,
- ✓ use graphical, numerical, and algebraic means to identify equilibria of discrete systems and classify their stability,
- ✓ find and interpret extrema of continuous and discrete functions,
- ✓ use the Mean Value Theorem, Intermediate Value Theorem, and Extreme Value Theorem to draw conclusions about extrema and roots of continuous functions.

Additional Notes:

- The course deals with both continuous and discrete functions, something our regular calculus sequence does not. This is the primary way in which the course differs from math 251.

- Students in this course are exclusively human physiology, biology, geological science, and environmental science majors. The fact that there are applications to biology included in homework and on tests is critical to the success of this course. It's worth letting them know while you aren't a mathematical biologist (or are you?), you are there as a facilitator of mathematical applications that hopefully have relevance for them.

- Consider a hybrid assignment of homework: Some WebWork problems and some hand-in problems. Paper markers are available to grade the hand-in work.

- 3.9 is a great section to cover optionally, if there is time.

- Lecture handouts available from Mike Price by request.

WEEK	SECTIONS TO COVER	Notes
1	2.1, 2.2, 2.3	**2.1:** Derivative concepts before formal limits is always a little risky **2.2:** Stress the scientific notion of a limit
2	2.4, 2.5, 2.6	
3	2.7, 2.8, 2.9	
(Winter) *Martin Luther King Jr. Day Monday*		
4	2.10 *Review for Midterm* *Midterm 1 (Chapter 2)*	
5	1.5, 1.6, 1.9	**1.5:** You can do Chapter 1 first, but that will change the exam schedule
6	1.10, 1.11, 3.1	
7	3.1, 3.2, 3.3	**3.3:** This section covers standard optimization, but also from a discrete system perspective
8	3.3, 3.4 *Review for Midterm*, *Midterm 2*	**3.4:** Avoid detailed proofs of MVT, IVT, EVT if you can stomach it. The time is better spent on good conceptual understanding of the theorems and how they can be carefully applied.
9	3.5, 3.6	
(Fall) *Thanksgiving holiday Thursday/Friday.*		
10		
Catch-up, review		
(Spring) *Memorial Day holiday Monday*		
11	**Final exam during scheduled time (registrar.uoregon.edu/common/cals/finalscal.htm)**	

Other Important Dates (http://registrar.uoregon.edu/calendars/academic#fall2010):

Monday of 2nd week	Last day to drop without a "W" (but only 75% tuition refund)
Wednesday of 2nd week	Last day to add a class
Sunday after 7th week	Last day to drop --- period!