

# **Math 107 Instructor Syllabus      2011-2012**

**Text:** *A Mathematical View of Our World* (or the custom edition *University Math III*), by Parks, Musser, et al

**Calculator:** A four-function calculator is probably enough for this class, but you might recommend a scientific one just for ease of computation. Most of the calculation required is arithmetic.

**Course Goals:** Gain facility with several applications of mathematics in "real world" context including shapes in nature, voting and elections, fair division, apportionment, and networks. Be able to use and describe the significance of the golden ratio in context. Write terms in a given recursive sequence and interpret in context. Use and compare the relative merits of a variety of voting systems, including noting that no perfect system exists. Use fair division principles to proportionally divide continuous and discrete quantities among a group; use envy-free methods and note when a division is proportional and/or envy-free. Use and compare the relative merits of a variety of apportionment systems, including noting that no perfect system exists. Explore graph theory to examine classical problems including the existence of Euler paths and circuits, Hamiltonian paths and circuits, and the Traveling Salesman Problem using approximation algorithms. Examine scheduling methods and digraphs in order to optimize workflow.

Execute basic arithmetic with fidelity to the order of operations.

Use formulas that will be provided on assessments; student learning focuses on using such formulas appropriately and to a larger degree the conceptual framework around the topics in question. Consequently, many exam questions contain instructions such as "Describe", "Explain", and "Discuss", in addition to simply "Compute".

## **Notes:**

- *The course is extremely modular, moreso even than Math 105 and 106. There's no particular reason you can't give three, equally-weighted exams without a cumulative final in this course.*
- *I let students have a note card on their exams too. I'm not so concerned with them memorizing the names of voting or apportionment methods, I'd like to see them applied and interpreted successfully.*
- *Consider having homework due twice per week, it works out to almost exactly one section per turn-in that way.*

## **WEEK    SECTIONS TO COVER**

## **Notes**

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<b>1</b>	2.3, 3.1	<b>2.3</b> Students have a hard time with the difference between the <i>index</i> of a term and the <i>value</i> of the term.
	<i>Review Quiz in Thurs disc.</i>	<b>3.1</b> They usually do pretty well with these, calculations in particular.
<b>2</b>	3.2, 3.3	<b>3.2</b> Note the interesting cases of ties with respect to violating the criteria
<b>3</b>	4.1, 4.2	<b>4.1</b> This section (and chapter as a whole) is a bear. Lots of detailed process, some of which is easy to rationalize. I didn't do the last diminisher method when I taught it and there was still plenty to keep track of. <b>4.2</b> I didn't do the adjusted winner method.
<i>(Winter) Martin Luther King Jr. Day Monday</i>		
<b>4</b>	4.3, 5.1	<b>4.3</b> Another large process to tackle. Make sure you can ask questions about intermediate steps: one three-person envy-free division is an enormous question on its own.

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<b>5</b>	5.2 <i>Review for Midterm</i> <i>Midterm Exam 1</i>	1 <sup>st</sup> midterm (2.3, Chapters 3, 4)
<b>6</b>	5.3, 6.1	<b>5.3</b> Make sure you've got some apportionments chosen ahead of time to illustrate the paradoxes, winging an example is not likely to work well.
<b>7</b>	6.2, 6.3	
<b>8</b>	7.1 <i>Review for Midterm</i> <i>Midterm Exam 2</i>	<b>7.1</b> 2 <sup>nd</sup> midterm (Chapters 5, 6)
<b>9</b>	7.2, 7.3	<b>7.2</b>

(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](http://registrar.uoregon.edu/common/cals/finalscal.htm))**

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

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

- **Lecture handouts available from Mike Price upon request**