Math 106 Instructor Syllabus   2012-2013

Text: *Mathematics: A Practical Odyssey* by Johnson and Mowry, seventh edition <u>or</u>
University Math I and II (custom edition available at the bookstore)

Calculator: A scientific calculator should be required for the class. Having trigonometric functions on the calculator is useful in Chapter 8, the finance in Chapter 5 benefits greatly from a calculator that has a read-out display and parentheses, and the calculations in Chapter 10 also need require exp/log functions on a calculator.

Course Goals: A student successfully completing the course should, in a general sense, have…
- ✓ an enriched understanding of the geometric relationships among two- and three-dimensional objects,
- ✓ some historical applications of geometry and trigonometry in solving right triangle triangles,
- ✓ skill at evaluating the impact of financial decisions including interest-bearing investments and loans, and
- ✓ a familiarity with exponential growth and logarithmic models in nature and finance.

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 perimeter and area of common, and combinations of common, two-dimensional figures,
- ✓ compute the volume and surface area of common three-dimensional figures,
- ✓ use similar triangles to find unknown sides lengths of triangles,
- ✓ use the Pythagorean Theorem to find an unknown side length of a right triangle,
- ✓ determine and interpret the significance of the foci of ellipses and hyperbolas in context,
- ✓ compare the results of simple and compound interest investments,
- ✓ find the unknown payment, interest rate, or length of investment of an interest-bearing lump sum- or annuity-funded account,
- ✓ find the unknown payment or loan amount of a simple interest amortized loan,
- ✓ describe the difference between a nominal loan rate and the APR,
- ✓ find the unknown payment or loan amount of a payout annuity, without or without COLA,
- ✓ use basic properties of exponents and logarithms to simplify exponential and logarithmic expressions,
- ✓ solve exponential equations, including in an applied context, using logarithms,
- ✓ solve logarithmic equations, including in an applied context, using exponentials,
- ✓ develop exponential models, including growth or decay, from two data points,
- ✓ make predictions of output and compute average rate of change in an exponential model,
- ✓ calculate and interpret exponential decay models that use half-life,
- ✓ compute and interpret earthquake intensity and Richter magnitude of an earthquake,
- ✓ compute and interpret intensity of sound and the decibel scale,
- ✓ 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".

WEEK	SECTIONS TO COVER	Notes
1 *Review Quiz in Thurs disc.*	8.1, 8.2	
2	8.4, 8.5	**8.4:** Two-column proofs are among the most insipid topics in high school geometry; I'd recommend ignoring them and focusing on applied computation using similar figures and the Pythagorean Theorem. **8.5**: Applications in right triangle trigonometry are probably the most valuable and interesting topics in this chapter.
3	8.7, 5.1	**8.7:** Focus on interesting applications (trajectories of cosmic bodies, whispering galleries, reflectors, etc.) and try not to get tempted into doing more in-depth analysis of conic sections in general (e.g. oriented off-axis, centered at (c,d), or even competing the square really)
(Winter) *Martin Luther King Jr. Day Monday*		
4 *Review for Exam* *Exam 1*	5.2 1st exam (Chapter 8)	
5	5.3, 5.4	**5.4:** There is some financial jargon here that is worth learning (assuming you don't already know it). Read the section and exercises carefully so you can use the terminology correctly. Also, make sure at least one of your amortization schedule examples continues through to the end since there is some subtlety in the final payment.
6	5.4, 5.5	**5.5:** There's a limited amount that can be accomplished without a graphing calculator. Assuming you haven't made one a requirement for the course, stick to questions that qualitatively compare nominal rate and APR, or are like Example 3.
7 *Review for Exam* *Exam 2*	5.6 2nd exam (Chapter 5)	
8	10.0A, 10.0B, 10.1	**10.1:** Revisit finance here in solving for the length of time required to achieved some result with a lump sum investment or annuity.
9	10.2, 10.3	**10.2:** You can reinforce finance here independently if you discuss the implications of a negative interest rate.
(Fall) *Thanksgiving holiday Thursday/Friday.*		
10 *Review for Exam*	*Catch-up, review*	This week is most responsibly dedicated to (1) finishing up course content, if necessary, (2) doing targeted in-class review, and/or (3) administering a third, non-cumulative exam.

Exam 3	3rd exam (Chapters 5, 10)

(Spring) *Memorial Day holiday Monday*

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11   Final exam during scheduled time (or see note)
(http://registrar.uoregon.edu/calendars/final_exam#2012-2013)

Additional Notes:

- The course is modular, with geometry/trigonometry and exponential models distinct from the main narrative of the course: finance. It would be reasonable to give three separate "chapter" exams, and if you plan it carefully, administer the third non-cumulative exam on the last day of class as opposed to during the scheduled final exam time. <u>Do this only if the exam is non-cumulative and if the exam is identified on your syllabus as being given during week 10</u>. It is against UO policy to administer a final exam under any guise during week 10.

- I let students have a note card on their exams. I'm not so concerned with them memorizing the formulas for volume, annuities and loans; 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.

- The remainder of Chapter 8: 8.3, 8.6, 8.8 – 8.10 are all optional sections. Don't add more than three of these sections to your course content.

- This course is well-suited to including a financial project as part of the course grade. Consider devising your own, or contacting Mike Price for information about projects used in the recent past.

- Lecture handouts available from Mike Price upon request.

Other Important Dates (http://registrar.uoregon.edu/calendars/academic#fall2012):

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!