Math 110, Spring 2016
Wharton Calculus

Prof: Renato Ghini Bettiol

TA: Vadim Pigrish

Textbook

- Thomas: *Calculus Early Transcendentals* Second Custom Edition for U. Penn), Pearson 2014, cover art: Godzilla. Important: obtain new from bookstore with valid access code to My Math Lab.

- Selected lecture videos, linked from my website.

Course content

Please read the more detailed description in your syllabus.

I Using stuff you already know.
- Pre-calculus: functions, graphing, exponents and logarithms, limits and continuity;
- Calculus: linear approximation, optimization, chain rule, FTC, applications.

II Taylor polynomials and series.

III Differential equations.

IV Introduction to multivariable calculus.

Meta-content

- **Number sense**
- **Verbal skills**

- Problem-solving heuristics
- Estimating and bounding
- Word problems, applications, use of units
- Orders of growth
- Functions and relationships
- Syntax, grammar, free and bound variables

Active learning: Come prepared to participate.

Comparison with Math 104: problems from recent final

- Compute
$$\int_0^{1/2} \frac{\arcsin(x)}{\sqrt{1-x^2}}\, dx\,.$$
- Find the area of the region between the curves $x = 4 - y^2$ and $x = -3y$.
- Find the value of $\int_0^1 \ln(1+x^2)\, dx$.
- An ant travels in the plane on a curve satisfying
$$\frac{dy}{dx} = \sqrt{4x^2 + 2x - \frac{3}{4}}$$
when measured in inches. If the ant begins at the point $(1, 1)$ and stops when the x-coordinate reaches 2, what total number of inches does the ant travel?

Math 110: Oriented toward applications

Some final exam problems:

- Describe how $\ln x$ changes when x increases by 50%.
- Suppose you wish to maximize the utility function $xy + 2x$ on the region $2x + y \leq 30$ in the first quadrant. Find the maximum value and the point (x, y) at which the maximum occurs.
- Write a differential equation corresponding to the following word problem. **Do not** solve the differential equation. **Do** give interpretations and units of all variables and constants. Money is deposited in a bank account, earning interest continuously at the rate of 6% per year...

Why active learning?

Mostly we have to spend class time on math, not pedagogy, so we have made you a video on this topic. For now, some short "sound bite" reasons:

- Value added
- Broader learning goals
- Studies show greater retention

Everything you learn, you should be able to:

- Explain
- Remember
- Apply
- and even . . . Generalize

Student responsibilities

- Pre-requisite knowledge: High school calculus at least at the level of AB Calculus, or Math 103 at Penn.
- Obtain the course materials ASAP.
- Get the exam times on your schedule now and let us know of any conflicts by next Tuesday (see next slide).
- Come to class and to recitations.
- Do the pre-class reading.
- Complete individual assignments on time.
- Work well with group-mates.

Exam times

Midterm #1:	Thursday Feb 11	8:00-9:30AM at DRL 4C2
Midterm #2:	Thursday Mar 24	8:00-9:30AM at DRL 4C2
Midterm #3:	Thursday Apr 21	8:00-9:30AM at DRL 4C2
Final exam:	Thursday May 5	12:00-2:00PM

Weekly work flow

Sunday night (11:59PM): reading and pre-lesson homework due.

Monday classes: intro activities, Q & A.
    Tuesday recitations: concept explication, Q & A, quiz.
Weds. in class: problem set due from week ending 5 days prior
Wednesday classes: group work, problem-solving activities.
    Thursday recitations: activities, tutorials, etc.
Friday classes: wrap-up, student presentations, discussion.

Assessment criteria

Attendance / participation	10%
Quizzes	10%
Homework	30%
Midterm I	10%
Midterm II	10%
Midterm III	10%
Final	20%

$$
\begin{aligned}
90.0 - 91.9 &= A^- \\
80.0 - 81.9 &= B^- \\
70.0 - 71.9 &= C^-
\end{aligned}
$$

Another quote from course evals...

> *Decent course; weighted too heavily on homework sets and attendance that did not help for tests.*

There is a part of what we teach that can't be captured on tests. We can't ask you to be creative or go much beyond plug and chug on a timed exam.

But we need to teach you these things!

Part of the homework gives you practice on stuff that will occur on tests, but the other part is about longer problems, taking what you've learned, putting it together, and following through on a multi-step analysis.

This part of the homework is an end goal, it is not test prep.

Assessment criteria

In other words: you earn nearly half your grade by showing up and doing what you're supposed to. (N.B.: The problem sets will often be difficult.)

There should be no major surprises at the time of the final course grade.

To facilitate student cooperation, the course is not curved. On the exams, if performance is uniformly low I will curve the score for that exam.

Policies

Quizzes cannot be **made up**, but may be **excused** for a legitimate reason (illness, Penn sponsored activities, etc.).

For attendance in class, you get four free absences. In other words, 38 or more times present out of 42 is equal to 100% (you can't get more than 100% on attendance).

If you come in after roll is taken, you will be given half credit for that day's attendance, provided you check in with the TA.

Classes missed for a legitimate reason may be made up by submitting worked solutions to the worksheet corresponding to that class day.

Academic integrity

Homework assignments may be done collaboratively. All the work that you turn in, however, must be handwritten by you, or typed in by you.

Exams are strictly individual and subject to the usual rules.

Miscellaneous stuff

We will skip around in the book. A lot. There's no way around that. This book is written for Math 103–104–114, as are most decent calculus books.

Especially at the beginning, when reviewing AB calculus and pre-calculus while tying it into applications and more advanced topics, we will have to take what looks like a very chaotic tour through Chapters 1–5 and parts of 7 and 8.

That's why there are course notes (written by Professor Pemantle). Treat them as a second text. Reading them is an important part of the pre-homework. We can't enforce compliance with this, but it's really a good idea!

Course websites

www.math.upenn.edu/~rbettiol/teaching110.html

www.math.upenn.edu/ugrad/calc/m110