Calculus III - Math 253.
Syllabus and guidelines 2009-2010
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Text: *Calculus, Early Transcendentals, 6e edition*, Stewart. We will cover roughly chapters 8.1-8.2, either 8.3 or 8.4 or 8.5, 10.1-10.4 and 11.

There are roughly two sections to the course. First, arc length and areas of surfaces of revolution and some other applications of integrals, parametric curves, polar coordinates and applications to finding arc length and area (in other words, applications of integration to arc length and area in 3-space).

Second, sequences, series (and convergence tests), Taylor polynomials (and Taylor's remainder theorem), Taylor series, and power series (in other words, approximation).

Goals of Course: The primary goal of the course is to bring students to a point where they can *use* Taylor's theorem in a reasonably effective way; at least on standard Taylor polynomial approximations like those for $\sin(x)$, $\cos(x)$, e^x and $\log(x)$.

This means they need to be able to compute the Taylor polynomials, and then (this is the difficult part) *use Taylor's theorem to estimate the error!*. This appears as section 11.11 in the textbook, which comes quite close to the end of the term, and is the hardest topic on the syllabus. If you don't keep the class moving, you'll end up doing 11.11 on the last day of class, and the students won't understand it. For this reason you may prefer to rearrange the material and do chapter 11 first, and then do the material from chapters 8 and 10 afterwards.

A list of intermediate goals is to understand what sequences and series are, convergence of sequences and series (especially how to use the standard convergence tests like comparison and ratio and how to find the radius of convergence of a power series). It is also good to cover how to approximate the sum of a series in the (common) situation that you can't compute it exactly. (See page 701 and 712 for examples.) If you are using WebWork or some other computerized grading system, problems about approximating sums make much better questions than problems about "which convergence test do you use?"

A secondary goal (unrelated) is to familiarize the student with working in two or three dimensions (this includes parametric equations, polar coordinates, arc-length and surface area).

Approximate Schedule

Week 1	8.1, 8.2	Week 6	11.4, 11.5.
Week 2	8.3, Appendices B,C, 10.1	Week 7	11.6,11.7.
Week 3	10.2-10.4.	Week 8	11.8, 11.9 (exam 2).
Week 4	10.4, 11.1, (exam 1).	Week 9	11.10, 11.11.
Week 5	11.2-11.3.	Week 10	11.12.

Remark: I've put 8.3 in the schedule, but you should feel free to substitute 8.4 or 8.5 for 8.3 depending on what seems like it would be most fun.

The included material in the appendices may be review, especially appendix B. You may choose to integrate that material with 10.1 (and integrate appendix C with 10.2). That is, it goes with 10.1-10.2, though not necessarily in precisely the order I have written it.

Be wary of falling behind. If you haven't started 11.1 by week 9, you won't be able to ask good homework questions on finding approximations using Taylor's theorem. Ideally, there should be at least two homeworks where you can ask such questions. (So perhaps see my remark about doing Chapter 11 first.)