Calculus III – Math 253

SYLLABUS

Instructor: Alexander Kleshchev; office: Deady 309,
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Class meets: MoTuWeTh 3:00-3:50, Fenton 105.

Office hours: MoTh 2:00-2:50 (or by appointment), Deady 309.

Text: *Single Variable Calculus, Early Transcendentals*, Stewart, 6e Edition. We will cover roughly chapters 8.1-8.2, either 8.3 or 8.4 or 8.5, 10.1-10.4 and 11.

Exams: There will be 2 midterms on Wednesdays of week 4 and week 8. There will be a two hour final exam at the time scheduled by the registrar's final exam calendar.

Quizzes: We will have quizzes on Wednesdays the first 15 minutes of class time (except for the days of midterms).

Homework: There will be weekly homework assignments, due on Wednesday. We will usually devote Tuesdays to answering homework questions.

Grades: Each midterm will count as 20% of your grade, the total homework will count as 20% of your grade, the total quizzes will count as 10%, and the final exam will count for 30%.

The students are expected to have a working knowledge of Math 251 and 252. This class will be much easier if you spend some time in advance refreshing your memory about differentiation.

You might want to study the relevant part of the text *before* the related lecture. This will make lectures easier to understand and give you a chance to ask questions that come up reading the text.

Doing the homework seriously is the most important thing you can do to succeed in this course. Start early, and do some every day. You may work together on homework, as long as the work you do is really your own.

Please do ask questions about the homework, or any other aspect of the course, in class. I will always be happy to spend the first few minutes of class dealing with homework questions, or questions from previous lectures, so come prepared! In order to ask questions effectively, make notes to yourself as you review lectures (and discover points that

are unclear to you), as you study the text (and notice things that you are not sure you understand), and as you work on homework and come to problems you have trouble with.

Course Goals

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).

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.)