CALCULUS III (SPRING 2013)

1. Nuts and bolts

Course Schedule: Tue/Thu, 11:40am–12:55pm (Section 6) or 2:40pm–3:55pm (Section 7) in 312 Math.

Instructor: Anand Deopurkar (anandrd@math.columbia.edu).

Office Hours: Tuesday and Thursday, 1pm–2:30pm or by appointment, in 413 Math.

TAs: Fan Zhou (zhou35@gmail.com), Peter Chang Yup Kim (ck2513@columbia.edu)

Help Room: Milbank 333 on the Barnard campus. Monday to Thursday, 10am–10pm; Friday, 11am–4pm. See http://www.math.columbia.edu/department/milbankhelp.shtml for the staffing schedule.

Textbook: Stewart, *Calculus, Early Transcendentals*, 7th edition. If you already have a copy of the 6th edition, you may use it, but be sure to turn in the correct homework problems. WebAssign is *not* required, but useful for practice problems.

Website: http://math.columbia.edu/~anandrd/calc3sp13

2. Course Description

The goal of the course is to understand the geometry of two and three dimensional spaces and learn to do calculus on them. We will learn about functions of several variables, their rates of change in different directions (partial derivatives), and applications of these ideas to optimization problems, to problems in physics, and to other natural/social sciences. We will cover the material corresponding (roughly) to Chapter 12, 13, and 14 of the textbook.

3. Grading

The final grade will be assigned based on the following:

- Homework (20%)
- Better midterm (25%)
- Worse midterm (15%)
- Final (40%).

For example, if you get 80% on the homework, 70% on the first midterm, 90% on the second midterm and 85% on the final, then your final score (percent) is

$$80 \times 20\%(\text{Homework}) + 90 \times 25\%(\text{Better midterm}) + 70 \times 15\%(\text{Worse midterm}) + 85 \times 40\%(\text{Final}) = 83.$$

4. Homework

Homework will be an essential component of the course. It will be assigned on the course webpage on Tuesdays and will be due the following Tuesday in the mailbox on the 4th floor of the Math building *before class begins*. Graded homework will be handed back in a week. I will not accept late homework under any circumstances. To compensate, I will drop the two lowest homework scores.

To get full credit, you must write clear explanations. As a rule of thumb, write as if you are explaining your solution to your fellow students in class.

Collaboration: You are allowed to work in groups on the homework problems, but you should write-up the solutions by yourself. Also, you must write the names of your collaborators at the top of your write-up. This will have no bearing on your grade; it is a matter of fairness and academic honesty.

5. Exams

The two midterms will be held during class time. There will be no make-ups. There will be no excuses for missing the midterms, except a health or family emergency of considerable gravity, justified by a letter from the dean. In this case, the score of the other midterm will be substituted for the score of the missed midterm.

Calculators will neither be necessary nor allowed on the midterms and the final.

6. Syllabus

The following is the day-by-day plan of how the course will proceed, subject to small changes depending on the mood of the class. You will get much more out of the lecture if you read the relevant section of the book beforehand.

Date	**Topic**	**Reading**
Jan 22	Introduction, coordinate systems	12.1
Jan 24	Vectors, dot product	12.2, 12.3
Jan 29	Complex numbers	Appendix H
Jan 31	Complex numbers (contirued)	Appendix H
Feb 5	Cross product	12.4
Feb 7	Equations of lines	12.5
Feb 12	Equations of planes	12.5
Feb 14	Equations of quadric surfaces	12.6
Feb 19	Review	
Feb 21	*Midterm I*	
Feb 26	Vector valued functions	13.1
Feb 28	Parametric space curves	13.1
Mar 5	Calculus of vector valued functions	13.2
	Last day to drop the course for most schools.	
Mar 7	Arc length and curvature	13.3
Mar 12	Velocity and acceleration	13.4
Mar 14	Applications	
Mar 18–22	*Spring break*	
Mar 26	Review	
Mar 28	*Midterm II*	
Apr 2	Functions of several variables	14.1
Apr 4	Limits and continuity	14.2
Apr 9	Partial derivatives	14.3
Apr 11	Tangent planes and linear approximations	14.4
Apr 16	The chain rule	14.5
Apr 18	Directional derivatives and the gradient	14.6
Apr 23	Maxima and minima	14.7
Apr 25	Optimization	14.7
Apr 30	Constrained optimization - Lagrange multipliers	14.8
May 2	Review	