Mathematics 234 – Calculus III

Instructor:
Andreas Seeger
Office: 613 Van Vleck Hall,
E-Mail: seeger@math.wisc.edu.
Office Phone: (608) 262-2932, Home phone: (608) 277-9664.
Web Page: http://www.math.wisc.edu/∼seeger/234.html

Teaching Assistant:
E. Alec Johnson
Office: 816 Van Vleck Hall,
E-Mail: ejohnson@math.wisc.edu.
Office Phone: (608) 262-3546, Home phone: (608) 277-9664.
Web-Page http://www.math.wisc.edu/∼ejohnson/234/index.html

Lectures and Discussions: Mo-We-Fr, 7:45-8:35, B115 Van Vleck.
Discussions Tu 7:45 (VV B115) or 3:30 (VV B325).

Text: Weir, Hass & Giordano: Thomas' Calculus, 11^{th} Edition, Addison Wesley, Non-ET version, including differential equations. ISBN: Old style, 0-321-49069-X; New style, 9780321490698.

Office hours: A.S. can usually be reached MWF 9:00-10:50 am in his office. Talk to me immediately after class to set up a time. You can also make an appointment at a different time.

Alec Johnson's office hours will be announced in discussion.

Exams: There will be three midterm tests in class. The first midterm will be on Wednesday, September 24. Other dates will be announced later.

There will be a two-hour evening final exam given on Friday, December 19, at 7:25 p.m. The final exam will cover all the material, but with an emphasis on the last chapter.

You must take the final exam at this time scheduled by the university. In particular, I cannot reschedule exams because of travel arrangements. If you cannot take an exam on the given day due to an emergency or a legitimate conflict, you need to discuss it with me as soon as possible.

Grading: Final $\approx 25\%$, Midterms $\approx 50\%$. Homework and discussion grade $\approx 25\%$.

Calculators and note sheets will **not** be allowed during exams.

Homework:

(i) I will assign many practice problems from the book (relevant problems for chapter 13 are already included below). It is strongly recommended that you work them out right away after the material is covered in class. If you have difficulties, ask questions in the next class (or office hours). Bring those papers to the discussion on Tuesday – Alec will usually check whether you have done them, and this is counted for your grade. Exam problems will be very similar.

(ii) I will occasionally assign homework problems to be handed in (sometimes I may formulate them myself and sometimes I will choose problems from the book). These assignments will be graded by a student grader (to be assigned to this class).

The homework sets need to be written up properly; we will talk about this. This is an important component of your grade.
Extra Credit: Occasionally I may give some more challenging problems as an extra credit opportunity.

General comments: In order to pass this class, or better, do well, you will have to *regularly* study and review the material. *As a minimum you need to do the assigned practice problems.* I also strongly recommend that you regularly read ahead, and come to class *prepared with questions.* For a calculus lecture, this is a fairly small class. Take advantage of it!

Come to class (Yes, I know, it is early). Be warned that lectures may frequently differ from the book in emphasis and structure. You are responsible for both lecture and book material unless otherwise stated in class. However, lecture material is deemed more important.

Topics and Problems

The problems are from the sets beginning on pages P.X

Vector Valued Functions.

13.1. Vector functions and space curves, velocity and acceleration
Problems P.916: 3,5,9,11,13,17,19,23,29, 31,33,35,37,45.
P.927: 3, 13.
13.3 Arclength and the unit tangent vector
Problems P.935: 1,5,9,11,17a-d.
13.4 Curvature and the unit normal vector
Problems P.942: 1,3,5,7,9,11.
13.5 Torsion and the unit binormal vector
Problems P.949: 1,3,9,11,13,17,19.
13.6 Applications (if time permits): Motion in space, planetary motion.
TBA

Differential calculus in several variables

14.1. Functions of several variables
14.2. Limits and continuity
14.3. Partial derivatives
14.4. The Chain Rule, Implicit derivatives.
14.5. Directional derivatives and the gradient
14.6. Tangent planes and the differential
14.7. Extreme values and saddle points
14.8. Lagrange multipliers
14.10. Taylor's formula in two (or more) variables

Multiple integrals

15.1. Double integrals
15.2. Areas, moments and centers of mass
15.3. Double integrals in polar coordinates
15.4. Triple and iterated integrals
15.5. Masses and Moments in three dimensions
15.6. Triple integrals in spherical and cylindrical coordinates

15.7. Substitutions in multiple integrals.

Vector analysis

16.1. Line integrals
16.2. Vector Fields, Work, Flux and Circulation
16.3. Path independence, Potential Functions and Conservative Fields
16.4. Green's theorem in the plane
16.5. Surface area and surface integrals
16.6. Parametrized surfaces
16.7. Stokes' theorem
16.8. The divergence theorem