

SYLLABUS FOR MAC 2312, CALCULUS II
Revised December, 2005; Coordinator: Steve Hudson

Textbook: *Calculus, Early Transcendentals* - Eighth Edition, by Anton, Bivens and Davis. The Single Variable Edition contains all the relevant chapters for this course.

Schedule of Topics: The schedule below is based on a course that meets 100 minutes twice a week. It assumes about 24 class periods for lectures, with the others used for review and exams (the norm is 3 exams plus a final). The course covers about 32 sections of the textbook (so cover 1.3 sections per lecture).

Transition notes and other remarks: This text and course outline become effective in Spring 2006. (for Calculus I, it was Fall 2005). See also the policy sheet for the Calculus sequence (1995). The instructor can decide whether to allow non-graphing calculators on exams, but should require the students to know, for example, the basic trig values. Students entering MAC 2312 are required to have a C in MAC 2311, which goes from Ch 1.8 through Ch 6.3, omitting Ch 5.6.

Chapter 6 Integration

Sections 4-9: about 4 or 5 lectures.

There is usually no time for review, so start with 6.4 and establish a good pace. Cover Riemann Sums, and the definitions of the integral and of the logarithm function in detail. To 'Cover', generally means to include in the lectures, homework and exams. Include plenty of practice with the Fundamental Theorem of Calculus (if you explain formula (2) of 6.1 carefully, then a rigorous proof is optional).

Chapter 7: Applications of Integration

Sections 1-3 and most of 4-7, about 4 lectures.

Ideally, the student should learn to convert new word problems into integrals via Riemann sums. Justify the disk, washer and shell methods to firm up the idea of integration. You may omit a few topics from sections 4-7 according to time constraints and taste. But at least explain the arc length formula (7.4) and a few non-geometric applications (eg 7.7).

Chapter 8: Techniques of Integration.

Omit section 6 only: 5 or 6 lectures

You can spend a few minutes on the idea integral tables. It is difficult to test students on these without violating Policy #2 from our August 1995 memo, which forbids formula sheets. So, the instructor can make an exception to this policy - also for the reduction formulas and 8.7 error estimates.

Require lots of student practice work in this chapter, but don't get bogged down in class. Cover most of the methods in 8.7, with the error estimates, and word problems involving data from tables. In a short semester, you may omit/reduce time on reduction formulas, applications, and the longer problems from sections 3-5.

Chapter 10: Infinite Series.

Sections 1-10, 7 or 8 lectures.

Cover all sections carefully with emphasis on the idea of convergence and the use of Taylor series. Usually (if time permits) cover several proofs of convergence tests and error estimates for Taylor series. Students should know the McLaurin series of the basic functions such as $1/(1-x)$, e^x , $\sin(x)$ and to be able to find others by substitution, multiplication, differentiation and so on. Include plenty of practice with the interval of convergence. Use power series to approximate functions and integrals, to compute limits, and perhaps to solve an ODE.

Chapter 11: Polar Coordinates, Parametric Equations, Area

Sections 1-3: 2 lectures.

Students should probably already know most of 11.1 (and Ch 1.8) but review these if time permits. Cover graphing and families of curves (11.1) at least. Memorization of formulas in 11.1, and most topics in

11.2 are left up to the instructor. In a normal term, include 11.2 - equations (1) and (7), and Theorem 1, but possibly omit polar arc length. Definitely cover the area formula and its 'proof' in 11.3, with non-trivial examples; this is needed in MAC 2313.

Final remarks: Some instructors have trouble finishing this syllabus (compared to MAC 2311, for example). But this course is a pre-requisite for many other courses, so don't leave anything out, unless you are sure it is optional. Differential Equations requires skills from Chs 8 and 10; Multi-variable Calculus also requires Ch 11; Linear Algebra (etc) requires some familiarity with proofs; courses outside mathematics assume a practical knowledge of all these sections.