

Math 252A – Accelerated Calculus II (3)

Course Description: Integration techniques and applications, series and approximations, differential equations, introduction to vectors.

Prerequisite: A grade of C or better in Math 251 or a grade of B or better in Math 241 and consent.

Corequisite: Math 242L

Text: *Calculus, Early Vectors* by James Stewart, Brooks/Cole Publishing Company, 1999.

Math 242L: Ideally, the students of any given section of Math 252 will be in the same Math 242L section, and the Math 252 instructor will work with the TA for the corresponding Math 242L section. It is recommended that the assignments and grades for Math 252 and Math 242L be combined.

Week 1–2, Inverse Functions: Inverse functions (4.2), logarithms and exponentials (6.6), exponential growth and decay (4.5), differentiation rules and applications for logarithm and exponential functions (4.1) and (4.4), inverse trigonometric functions (4.6), and l’Hospital’s rule (4.8). The section on hyperbolic functions (4.7) can be cut short.

Week 3–5, Techniques of Integration. Integration by parts (8.1), trigonometric integrals (8.2), trigonometric substitution (8.3), rational functions and partial fractions (8.4), rationalizing substitutions (8.5), strategy for integration (8.6), and improper integrals (8.9).

It is not necessary to cover all the techniques of integration in Sections 8.2–8.4 in detail, but the students should gain some facility at integration. Section 8.7 (use to integral tables and computer algebra systems) and Section 8.8 (numerical methods) can be delegated to Math 242L.

Week 6–9, Infinite sequences and series. Convergence of infinite sequences and series, power series, Taylor and MacLaurin series (Chapter 10). The book’s treatment of the remainder estimate for Taylor series is brief and should be expanded.

Week 10–12, Differential equations. First order separable and linear differential equations (9.1 and 9.2) and second order linear differential equations with constant coefficients (15.1–15.3). It is desirable to cover series solutions of differential equations (15.4).

Additional topics. As time allows, curve length (9.3, parametrized curves from 1.3 were discussed, but possibly cut short, in the first semester of calculus), area of surfaces of revolution (9.4), moments and centers of mass (9.5). If these topics are covered, then they should be covered in the first half of the semester as applications of integration. Advanced planning on the part of the instructor is required to decide how much time to devote to these topics. In the context of differential equations, one can spend some time on systems of first order differential equations (e.g., predator/prey models or competing species). In this context one can work with direction fields and reinforce vector concepts. Approximate solutions can be obtained using Euler's method during the lab.