

Summer 2014

Syllabus for Math 242 – Calculus II

Instructor: John Robertson

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

Prerequisite: A grade of C or better in Math 241 or 251A, or a grade of B or better in Math 215.

Text: *University Calculus (Alternate Edition)* by: Haas, Weir, Thomas, Pearson-Addison Wesley.

Approximate Timeline:

Week 1–3, Transcendental Functions: Inverse functions and their derivatives (7.1), natural logarithms (7.2), exponential functions (7.3), inverse trigonometric functions (7.4), exponential growth and separable differential equations (7.5), indeterminate forms and L'Hôpital's Rule (7.6), hyperbolic functions (7.7, optional).

Week 4–7, Techniques of Integration. Integration by parts (8.1), trigonometric integrals (8.2), trigonometric substitution (8.3), integration of rational functions by partial fractions (8.4), improper integrals (8.7). Numerical integration (8.6) and the use of a computer algebra system (8.5) can be covered during the lab. The text book may be supplemented with some examples of rationalizing substitutions, including the Weierstraß substitutions.

Week 8–12, Infinite sequences and series. Sequences (9.1), infinite series (9.2), the integral test (9.3), comparison test (9.4), ratio and root test (9.5), alternating series, absolute and conditional convergence (9.6), power series (9.7), Taylor and Maclaurin series (9.8), convergence of Taylor series (9.9), the binomial series (9.10).

Week 13–15, Differential equations. First order differential equations: Solutions, slope fields, and Picard's Theorem (16.1), first order linear equations (16.2). The instructor may expand this with some exact equations. Second order linear homogeneous (17.1) and inhomogeneous (optional, 17.2) differential equations. As time allows, some power series solutions can be discussed (17.5).

Course objective: Upon successful completion of Math 242 the student will have an understanding of the above listed topics, be able to solve routine problems, and be able to apply the ideas.

Program objectives: This is the second course of our calculus sequence for STEM (Science, Technology, Engineering, Mathematics) majors. As these courses are introductory, the approach is more computational than theoretical, and that more so in Math 242 than in Math 252A. Mathematics is the basic language for STEM fields. Understanding the language, the basic ideas and results, and the computational techniques of calculus is prerequisite to any advanced learning in a STEM field.