Spring 2019

SYLLABUS FOR MATH 252A – ACCELERATED CALCULUS II

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

Prerequisite for Math 252A: Math 251A; AP Calculus AB score of 4 or 5 and con- sent; or a grade of A in Math 241 and consent.

Text: *Calculus Eighth Edition* by James Stewart.

Format: This four credit class meets for 150 minutes of lecture and 50 minute of recitation/lab per week.

Final Exam: The final exam will cover all topics listed below.

Course objectives: A successful Math 252A student will have an indepth understanding of the topics, be able to solve routine and challenging problems, and be able to apply the ideas creatively.

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. 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.

Approximate Timeline:
Weeks 1–2, Transcendental Functions.
Instructor should cover sections 6.2*-6.4*, rather than 6.2-6.4

(1) inverse functions (6.1)
(2) the natural logarithmic function (6.2*)
(3) the natural exponential function (6.3*)
(4) general logarithmic and exponential functions (6.4*)
(5) exponential growth and decay (6.5)
(6) inverse trigonometric functions (6.6)
(7) hyperbolic functions (6.7, optional)
(8) indeterminate forms and l'Hôpital's Rule (6.8)

Weeks 3–6, Techniques of Integration.

(1) integration by parts (7.1)
(2) trigonometric integrals (7.2)
(3) trigonometric substitution (7.3)
(4) integration of rational functions by partial fractions (7.4)
(5) strategy for integration (7.5)
(6) approximate integration (7.7)
(7) improper integrals (7.8).

Week 7–11, Infinite sequences and series

(1) sequences (11.1)
(2) series (11.2)
(3) the integral test and estimates of sums (11.3)
(4) comparison tests (11.4)
(5) alternating series (11.5)
(6) absolute convergence and the ratio and root tests (11.6)
(7) strategy for testing series (11.7)
(8) power series (11.8)
(9) representation of functions as power series (11.9)
(10) Taylor and Maclaurin series (11.10)
(11) applications of Taylor polynomials (11.11, application to physics is optional).

Week 12–14, Differential equations

(1) modeling with differential equations (9.1)
(2) direction fields and Euler's method (9.2)
(3) separable equations (9.3)
(4) models for population growth (9.4, optional)
(5) linear equations (9.5)

Week 15: Polar coordinates

(1) curves defined by parametric equations (10.1)
(2) calculus with parametric curves (10.2)
(3) polar coordinates (10.3)
(4) areas and lengths in polar coordinates (10.4)