Advanced Calculus

Text:	Stewart, James. (1999) *Calculus, Fourth Edition*. Brooks/Cole Publishing Company: a division of International Thomson Publishing Company (ITP): Pacific Grove, CA.

Supplemental Materials:	TI-84 Graphing Calculator (overhead model) Munem, M.A. and D.J. Foulis. (1984) *Calculus with Analytic Geometry*. Worth Publishers, Inc.: New York, NY.

Course Description:	The purpose of this course is to provide an advanced level calculus course including the study of the concepts of limits, derivatives, continuity, antiderivatives, integration, and the application of these concepts. It is, therefore, a study of both differential and integral calculus. The course uses problem situations, physical models, and appropriate technology to investigate concepts and relationships. Problem-solving situations provide all students an environment that promotes communication, engages student reasoning, and fosters connections within mathematics, to other disciplines, and to the real world. Students will use physical models to represent, explore, and develop abstract concepts. The use of appropriate technology will help students apply mathematics in an increasingly technological world. Students will be challenged through critical thinking models which will enable them to practice skills which will be needed for higher education acquisition.

Methods of Evaluation:	Students can be evaluated through tests, quizzes, labs, homework assignments, semester exams, and/or any other form of evaluation instrument the instructor finds applicable to the course.

Pace of Instruction:	First Semester:	Sections 1.1-4.6
	Second Semester:	Sections 4.7-8.7

Course Objectives:	At the end of this course students should be able to recognize and work with the following: 1. Inequalities and interval notation. 2. Functions including domain, range, intercepts, symmetry, asymptotes, zeros, odd and even, increase and decrease, composite, inverses, and trigonometric. 3. Manual and calculator graphs of families of functions including horizontal and vertical shifts, and appropriate graphing calculator viewing windows. 4. Limits including one-sided limits, infinite limits, limits that don't exist, and the epsilon-delta precise definition of a limit.

	5. Continuity and discontinuity. 6. Theorems including the Intermediate Value Theorem, Extreme Value Theorem, Rolle's Theorem, Mean Value Theorem, and Total Change Theorem. 7. Definitions of derivative including slope of a tangent line, instantaneous rate of change of a function, and instantaneous velocity. 8. Differentiability. 9. Methods for taking the derivative, both symbolically and numerically, including the Chain Rule and Implicit Differentiation. 10. Graphical interpretation of functions and their resulting derivatives. 11. A variety of applications of the derivative including rates of change in the natural and social sciences, curve sketching, optimization problems, and related rates. 12. Differential Equations with general and particular solutions. 13. Critical numbers, relative and absolute extrema, concavity, first and second derivative tests, and their associated graphs. 14. Definitions of the definite integral including limits of Reimann sums and the area under a curve. 15. Fundamental Theorem of Calculus. 16. Methods on integrating, both definite and indefinite, including substitution of variables and change of limits. 17. Trapezoidal Rule. 18. A variety of applications of the definite integral including area under a curve, area between curves, and volumes of revolving solids. 19. Average value of a function. 20. Exponential functions and their derivatives and inverses. 21. Logarithmic functions and their derivatives and inverses. 22. Logarithmic differentiation. 23. Derivatives of trigonometric and inverse trigonometric functions. 24. Integration of trigonometric functions and integrals that yield inverse trigonometric functions. 25. Methods of evaluating limits of indeterminate forms, including l'Hopital's Rule. 26. Integration by parts. 27. Strategies for integration of trigonometric products. 28. Integration using tables. 29. Hyperbolic functions, their inverses, and the derivatives of them and their inverses (if time permits).