CAL POLY

MATH 143 Calculus III

September 2011

1. Catalog Description

MATH 141, 142, 143 Calculus I, II, III (4) (4) (4) **GE B1**
(Also listed as HNRS 141, 142, 143)

Limits, continuity, differentiation, integration. Techniques of integration, applications to physics, transcendental functions. Infinite sequences and series, vector algebra, curves. 4 lectures. **MATH 141** prerequisite: Completion of ELM requirement and passing score on appropriate Mathematics Placement Examination, or MATH 118 and MATH 119 or equivalent. **MATH 142** prerequisite: MATH 141 with a grade of C- or better or consent of instructor. **MATH 143** prerequisite: MATH 142.

2. Required Background or Experience

Math 142.

3. Learning Objectives

The student should:
a. Understand parametric equations and polar coordinates, and their applications.
b. Understand vector algebra and elementary differential vector calculus.
c. Be able to test infinite series for convergence.
d. Be able to calculate power series and Taylor series.

4. Text and References

James Stewart, Multivariable Calculus, 6th edition, Thomson Brooks/Cole, 2008.

Note: We use a "Custom Edition" of the Stewart text. It differs from the standard edition only in the inclusion of supplementary homework problems at the e d f each chapter. Solutions to the supplementary problems are not included in the standard solutions manuals.

5. Minimum Student Materials

Paper, pencils and notebook.

6. Minimum University Facilities

Classroom with ample chalkboard space for class use.

7. Content and Method

The sections listed below are considered to be the core of the course. It is estimated that about 30 lectures will be needed to cover them. Quarters vary from 38 to 41 lectures. Possible uses for any remaining lectures include:

1. Covering more sections
2. Covering some sections in more depth
3. Computer labs

4. Group projects/class presentations

It is also possible to free up more class time by assigning some sections as reading assignments.

Comments accompanying some of the sections are intended to give some guidance to new instructors as well as to suggest possible ways in which class time might be saved without losing important content.

Chapter		No. of Lectures
CHAPTER 11 - **Parametric Equations and Polar Coordinates**		6
11.1	Curves Defined by Parametric Equations	
11.2	Calculus with Parametric Curves	
11.3	Polar Coordinates	
11.4	Areas and Lengths in Polar Coordinates	
CHAPTER 12- **Infinite Sequences and Series**		13

The goal of the chapter is to develop Taylor Series.

12.1	Sequences	
12.2	Series	
12.3	The Integral Test and Estimates of Sums (estimates may be skipped)	
12.4	The Comparison Tests (may only cover the limit comparison tests)	
12.5	Alternating Series	
12.6	Absolute Convergence and the Ratio and Root Tests	
12.7	Strategy for Testing Series	
12.8	Power Series	
12.9	Representations of Functions as Power Series	
12.10	Taylor and Maclaurin Series	
12.11	Applications of Taylor Polynomials	
CHAPTER 13 - **Vectors and the Geometry of Space**		6
13.1	Three Dimensional Coordinate Systems	
13.2	Vectors	
13.3	The Dot Product	
13.4	The Cross Product	
13.5	Equations of Lines and Planes (symmetric representation of lines may be skipped)	
CHAPTER 14 - **Vector Functions**		5
14.1	Vector Functions and Space Curves	
14.2	Derivatives and Integrals of Vector Functions	
14.3	Arc Length and Curvature	
14.4	Motion in Space: Velocity and Acceleration	
	Total	30

Method

Largely lecture with chalkboard illustration of the discussion along with supervised work and individual conferences.

8. Methods of Assessment

The primary methods of assessment are examinations, quizzes and homework. A comprehensive final examination is required. Students are expected to show their work, and are graded on the correctness of their answers as well as their understanding of the concepts and techniques.