Capital Community College
Course Outline
Calculus II

SECTION I

SUBJECT AREA & COURSE NUMBER: MAT* G256
COURSE TITLE: Calculus II
COURSE CATALOG DESCRIPTION: This course deals with constructing antiderivatives, techniques of integration, approximating definite integrals, applications of definite integrals, polar coordinates, parametric equations, indeterminate forms, improper integrals, sequences, infinite series, tests for convergence, Taylor series and differential equations. This course will require use of a graphing calculator and may include use of a computer software package.
LECTURE HOURS PER WEEK: 4 **CREDIT HOURS:** 4
PREREQUISITE(S): MAT* G254

SECTION II

A. SCOPE:
Objectives of Calculus II are to enable the student to: (1) Develop a deeper understanding of the central concepts of calculus: limit, continuity, derivative, integral, and Fundamental Theorem of Calculus. (2) Construct antiderivatives numerically, graphically, and algebraically. (3) Find antiderivatives using methods involving substitution, integration by parts, partial fractions, and integral tables. (4) Understand the concept of differential equation and solve basic differential equations graphically, numerically, and algebraically. (5) Use methods of calculus to formulate and solve problems involving geometry (e.g. volume, arc length), physical science (e.g. work, equations of motion, force and pressure, nuclear decay, flow rates), life sciences (e.g. physiological models, population models, spread of disease). (6) Work with improper integrals and polar coordinates. (7) Determine whether a given sequence or series converges and to represent functions with series. (8) Establish meaningful connections between calculus and the real world through laboratory projects.

B. REQUIRED WORK: Determined by the instructor as described in the course syllabus

C. ATTENDANCE AND PARTICIPATION: Students are expected to attend each class, arrive on time, take exams at the scheduled times, and participate in the in-class learning process. (Specific instructor policies are included on the course syllabus)

D. METHODS OF INSTRUCTION: The methods of instruction are determined by each instructor and may include but are not limited to lecture, lecture/discussion, small group collaborative learning, experiment/exploration, distance learning, student presentations, use of technologies such as audio-visual materials, computer, language laboratory, and calculator.

E. OBJECTIVE, OUTCOMES, ASSESSMENT

The following objectives and outcomes represent the department's core requirements for student achievement.

LEARNING OBJECTIVES	LEARNING OUTCOMES	ASSESSMENT METHODS
To demonstrate an understanding of:	**Student will:**	**As measured by:**
Constructing a function	a) Construct antiderivatives graphically, algebraically, and numerically. b) Determine the change in a quantity from its rate.	Written in-class quizzes, tests, and examinations; out-of-class projects, written reports; portfolios; homework assignments
Definite Integral and the Fundamental Theorem of Calculus	a) Evaluate an Integral using the Fundamental Theorem of Calculus. b) Approximate an Integral using the trapezoidal Rule and Simpson's Rule.	
Indefinite Integrals	a) Determine Indefinite Integrals by the usual "Methods of Integration", from "slope fields", and using the Definite Integral.	
Improper integrals	a) Evaluate improper integrals. b) Test improper integrals for convergence.	
Applications of the Definite Integral	a) Calculate volume, arc length, work, force, present and future value.	
Sequences and Series of constant terms	a) Prove and apply theorems about limits of sequences. b) Apply the definitions of the limit of a sequence and of a series. c) Prove and apply "Tests for convergence".	
Sequence and series with variable terms	a) Determine the Taylor Series of a function. b) Prove whether a Taylor series converges and find its interval of convergence. c) Determine whether the Taylor Series of a function represents the function. d) Determine the Fourier Series of a periodic function.	
Parametric equations and polar coordinates	a) Parametrize a curve. b) Find slope of the tangent to a parametric curve. c) Graph a polar curve. d) Calculate slope of the tangent to a polar curve. e) Find area and arc length for a polar curve.	
Mathematical Model	a) Represent a "real world" situation by a function. b) Approximate the function by an appropriate series c) Use the series to explore the real world situation.	

Note 1: The foregoing table of learning outcomes should not be considered exhaustive; other learning outcomes may also support the objectives. The list is not intended to limit the learning outcomes that can be used to support the objectives.
Note 2: The order in which the learning outcomes are addressed and the relative emphasis given to each will vary from instructor to instructor.
Note 3: There is no expectation that an instructor will employ all the assessment methods or any particular subset of them. Also, the particular list of assessment methods is not exhaustive. Other methods that measure the learning outcomes may be used.
Note 4: It is important to recognize that courses are not delivered in a social vacuum. Any bona fide assessment of a course must take account of out-of-class life demands on students that adversely impact academic success.

F. TEXTS AND MATERIALS: A text selected by the Mathematics Section of the Science and Mathematics Department with content and presentation that support the Learning Objectives and Outcomes given in Part E above.

G. INFORMATION TECHNOLOGY: Graphing calculator and DERIVE™ (a computer algebra system)