SUFFOLK COUNTY COMMUNITY COLLEGE
COLLEGE-WIDE COURSE SYLLABUS
MAT142 (formerly MA88)

I. COURSE TITLE:
Calculus with Analytic Geometry II

II. CATALOG DESCRIPTION:
Study of techniques of integration; trapezoidal rule and Simpson's rule; application of integration; polar coordinates; indeterminate forms; L'Hopital's rule; improper integrals; Taylor's formula and infinite series. (5 contact hrs.) Prerequisite: C or better in MAT141.

A-E-G / 4 cr. hrs.

III. COURSE GOALS:
A. Introduce the main computational techniques of integral calculus.
B. Use those techniques to solve applied problems.
C. Introduce techniques of infinite series.
D. This course satisfies the SUNY general education requirement for mathematics.

IV. COURSE OBJECTIVES:
Upon successful completion of this course, students will be able to:
A. Find antiderivatives by applying the following integration techniques: substitution (chain rule applications and trigonometric antiderivatives), integration by parts, trigonometric substitutions, and partial fractions.
B. Apply calculus techniques to polar coordinate graphs; find the area of regions enclosed by polar curves.
C. Apply L'Hopital's rule to indeterminant forms.
D. Determine the convergence or divergence of improper integrals and their applications.
E. Determine the convergence/divergence of sequences, infinite series; find the interval of convergence of a power series.
F. Use Taylor, Maclaurin, and binomial series to obtain power series representations of functions and to approximate function values.
G. Find approximations to the definite integral using left sum, right suns, midpoint sums, the trapezoidal rule, and Simpson's rule. Give appropriate bounds on the error of such approximations. Find the numerical value of the definite integral using technology.
H. Use the above objectives in applications involving areas, volumes, arch length, and growth and decay models.
I. Solve first order differential equations numerically (Euler's method), graphically, and symbolically (variables separable only).

V. Topics Outline with Timeline

Topics	Approximate Time (Including Examinations)
A. Techniques of Integration 1. application of all antiderivative formula learned including trig, inverse trig, and exponential/log forms 2. integration by parts 3. integration by trigonometric substitution 4. integration of rational functions by partial fractions 5. integration by tables 6. volumes and arc length	5 weeks
B. Techniques of Numerical Integration 1. Riemann approximations review (left, right, midpoint) 2. use of Trapizoidal Rule and Simpson's Rule for approximations of definite integrals. Error bounds.	3 weeks
C. Indeterminate Forms, Improper Integrals 1. the indeterminate forms and L'Hopital's Rule 2. improper integrals	1 ½ weeks
D. Infinite Series 1. sequences a. definition b. limit of a sequence c. monotonic and bounded sequences 2. infinite series of constant terms a. definition b. definition of a convergent infinite series and a divergent infinite series. Geometric series c. theorems determining convergence and divergence of infinite series 3. application of the comparison test, the integral test, the alternating series test, and the ratio test 4. approximations to sums of convergent series to within given error bounds 5. conditional and absolute convergence 6. power series a. definition b. radius and interval of convergence of a power series 7. Taylor series a. using the definition of Taylor series of Maclaurin series to write an expansion for certain functions of f(x) at x = a b. approximations using Taylor series and Maclaurin series c. differentiation and integration of power series	3 ½ weeks

E. Differential Equations 1. basic concepts, definitions of D.E.'s and I.V.P.'s 2. interpretation of graphical solutions 3. solution approximation numerically (e.g., Euler's Method) 4. symbolic solution (variables separable)	1 week
F. The Polar Coordinate System 1. conversions between polar coordinate system and rectangular system 2. graphs of equations in polar coordinates 3. use of dy/dx, dy/dt, dx/dt in analysis of polar functions 4. finding the area of a region in polar coordinates	1 week

VI. Evaluation of Student Performance:
To be determined by the instructor

VII. Programs that require this course:
Computer Science/AS
Engineering Science/AS
Liberal Arts and Sciences: Adolescence Education/Biology Emphasis/AA
Liberal Arts and Sciences: Adolescence Education/Mathematics Emhasis/AA
Liberal Arts and Sciences: Mathematics Emphasis/AA
Liberal Arts and Sciences: Science Emhasis-Biology Option/AS
Liberal Arts and Sciences: Science Emphasis-Chemistry Option/AS
Liberal Arts and Sciences: Science Emphasis-Environmental Science/Forestry Option/AS
Liberal Arts and Sciences: Science Emphasis-Earth and Space Science Option/AS
Liberal Arts and Sciences: Science Emphasis-Physics Option/AS
Liberal Arts and Sciences: Science Emphasis-Biotechnology Option/AS

VIII. Courses that require this course as a prerequisite:
EEE118, EEE232, EEE233, MAT203, MAT204, MAT206, PHY230, PHY130 (corequisite)

IX. Supporting Information:
Mathematics tutoring services, as well as video and computer aids, are provided for all students through the Math Learning Center (Ammerman Campus, Riverhead 235), the Center for Academic Excellence (Grant Campus, Health, Sports and Education Center 129), and the Academic Skills Center (Eastern Campus, Orient 213).