PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

CALCULUS I
MTH 1410

Class Hours: 4.0 **Credit Hours: 4.0**

Laboratory Hours: 0.0 **Date Revised: Fall 1998**

Catalog Course Description:

Single variable calculus for students majoring in science, mathematics, engineering, and computer science. Limits and differentiation of polynomial, rational, trigonometric, exponential and logarithmic functions and their applications.

Entry Level Standards:

A thorough knowledge of algebraic and trigonometric functions is necessary for entrance to this course. ACT score of at least 26 is recommended.

Prerequisites:

Two years of algebra, one year of geometry, and trigonometry in high school, plus satisfactory placement scores; or MTH 1020

Textbook(s) and Other Reference Materials Basic to the Course:

Textbook:
Stewart, James. *Calculus: Concepts and Contexts*. Brooks/Cole Publishing Co., 1997.
References:
Dick and Patton. *Calculus*. PWS Publishing Co., 1995.
Johnston, Elgin H. And Jerold C. Mathews. *Calculus for Engineering and the Sciences.* Harper Collins College Publishers, 1996.
Hughes-Hallet, Andrew Gleason et al. *Calculus*. John Wiley & Sons, Inc., 1994.
Ostebee and Zorn. *Calculus from Graphical, Numerical and Symbolic Points of View*. Saunders College Publishing, 1997.
Swokowski, Olinick, Pence. *Calculus and Analytic Geometry*. PWS Publishing Co., 1994.
Technology Requirement:
A graphing calculator is required.

I. Week/Unit/Topic Basis:

Included in the topics listed below are projects. The text has a variety of laboratory, writing, and discovery projects which students may be asked to complete either individually or in groups. Some instructors may use other projects. The selection, timing, and the manner of presentation of the projects is to be determined by the instructor.

Week	Topic
1	Introduction, four ways to represent a function, types of functions, transformations and

	operations with functions, parametric curves, exponential, inverse, and logarithm functions, modeling and curve fitting
2	Tangent and velocity problems, limits of functions
3	Computations of limits, continuity, limits involving infinity
4	Rates of change. project, review, exam 1
5	Derivatives and linear approximations
6	Antiderivatives, graphing, extracting information about the function f from the derivatives of the function. Project, review, exam 2
7	Differentiation of polynomial and exponential functions, product and quotient rules, rates of change
8	Derivatives of trig functions, chain rule
9	Implicit differentiation, derivatives of logarithmic functions, linear approximations and differentials
10	Linear approximations, differentials. Review, project, exam 3
11	Related rates, optimization of a function on a closed interval
12	First and second derivative tests to locate extrema, increasing/decreasing test, test for concavity, graphing, L'Hopitals's rule
13	Applied optimization problems
14	Newton?s method, Antiderivatives, introduction to differential equations, direction fields (4.9 is optional.)
15	Project, review, exam 4
16	Final Exam

II. Course Objectives*:

A. Become familiar with all descriptive aspects of a function. III

B. Understand the concept of and be able to evaluate a limit of a function. III

C. Be able to calculate derivatives of algebraic and transcendental functions. III

D. Learn how to pose real and technical problems mathematically. II, III, IV

E Learn how to apply limits and derivatives to solve real and technical problems. III, IV

F. Learn how to interpret and communicate mathematical problems and their solutions into clearly written English. I, V

*Roman numerals after course objectives reference goals of the Math department.

III. Instructional Processes*:

Students will:

1. Use graphing calculator and/or computer software. *Technological Literacy Outcome*

2. Actively explore real world problems through projects such as B'ezier curves to aid in computer aided design. *Numerical Literacy Outcome, Active Learning Strategy, Transitional Strategy*

3. Translate analytical information into graphical representations. *Communication Outcome, Problem Solving and Decision Making Outcome, Technological Literacy Outcome*

4. Use multiple approaches such as physical, numerical, graphical, symbolic and verbal to solve application problems in physics, biology, engineering, and computer science. *Transitional Strategy, Numerical Literacy Outcome*

5. Learn to use the tools of calculus to study the phenomenon of change between different variables. *Problem Solving and Decision Making Outcome, Technological Literacy Outcome, Communication Outcome, Numerical Literacy Outcome*

*Strategies and outcomes listed after instructional processes reference Pellissippi State□s goals for strengthening general education knowledge and skills, connecting coursework to experiences beyond the classroom, and encouraging students to take active and responsible roles in the educational process.

IV. Expectations for Student Performance*:

Upon successful completion of this course, the student should be able to:

1. Determine what a function is and work comfortably with functional notation. A

2. Evaluate limits and derivatives of algebraic and transcendental functions using analytic, numerical and graphing techniques. Evaluate the derivative of a function using the (limit) definition. B, C

3. Graph a function using the concepts of symmetry, domain, shifting and stretching, along with information gathered from limits, the function's derivative and the aid of a graphing calculator and/or computer software. A, E

4. Recognize a continuous function. Classify the different types of discontinuities using analytical and graphing means. B

5. Use derivatives to solve problems such as distance - velocity - acceleration, related rate and optimization problems. E

6. Read and interpret graphs, limits and derivatives which are used in applied settings and communicate that analysis in writing. F

7. Work with technology and special projects involving real world data which enhances the conceptual understanding and usefulness of mathematics. D, F

*Letters after performance expectations reference the course objectives listed above.

V. Evaluation:

A. Testing Procedures:

Students are evaluated on the basis of tests, projects, homework, quizzes, and a comprehensive final exam. A minimum of four major tests are recommended.

B. Laboratory Expectations: None

C. Field Work: None

D. Other Evaluation Methods: None

E. Grading Scale:

93% - 100%	A
88 - 92	B+
83 - 87	B
78 - 82	C+
70 - 77	C
60 - 69	D
Below 60	F

VI. Policies:

A. Attendance Policy:

Pellissippi State Technical Community College expects students to attend all scheduled instructional activities. As a minimum, students in all courses must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. Individual departments/programs/disciplines, with the approval of the vice president of Academic and Student Affairs, may have requirements that are more stringent.

B. Academic Dishonesty:

Individual instructors must distribute their policy on academic dishonesty during the first week of class.