PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE  
MASTER SYLLABUS  

CALCULUS I W/PRECALCULUS: PART I  
MATH 1735 (formerly MATH 1390)  

Class Hours: 5.0  Credit Hours: 5.0  
Laboratory Hours: 0.0  Date Revised: Fall 03  

Catalog Course Description:  
Single variable calculus for students majoring in science, mathematics, engineering, and computer science. Limits and differentiation of polynomial, rational, trigonometric functions and their applications along with a review of algebraic and trigonometric functions. Topics for review include systems of equations and inequalities, maximization, trigonometric definitions, graphs, equations, and identities.  

Entry Level Standards:  
Students must be able to read at the college level.  

Prerequisites:  
High school algebra I and algebra II and geometry and precalculus and ACT math score of at least 19; or DSPM 0850 and geometry with instructor recommendation  

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

Textbook:  
References:  

Personal Equipment:  
A graphing calculator is required for this course. A symbolic manipulator such as the TI-89 or TI-92 is not permitted.  

I. Week/Unit/Topic Basis:  

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Coordinate plane, graphs of equations, lines, complex numbers, other equations, linear and nonlinear inequalities</td>
</tr>
<tr>
<td>2</td>
<td>Absolute Value, Review, Test 1, functions, ways to represent a function</td>
</tr>
</tbody>
</table>
3. Graphs of functions, variation, average rate of change, shifting, reflecting and stretching graphs, extreme values of functions, combination of functions

4. Inverse functions, Review, Test 2, tangent and velocity problems, the limit of a function

5. Simplifying functions, Limit laws, continuity, polynomial functions and their graphs, dividing polynomials

6. Real zeros of polynomials, Fundamental Theorem of Algebra, Rational functions, limits involving infinity, Review

7. Test 3, Rates of Change, derivatives, the derivative as a function

8. Linear approximation, what does $f$ say about $f'$, Review, Test 4

9. Negative and Rational exponents, derivatives of polynomials, the product and quotient rules, rates of change in natural and social sciences

10. Rates of change in natural and social sciences, the chain rule, implicit differentiation, Review, Test 5

11. Radians and degrees, right triangle trigonometry, trigonometric functions of any angle, the Law of Sines

12. The Law of Sines, the Law of Cosines, Review, Test 6, the unit circle, trigonometric functions of real numbers

13. Trigonometric graphs, derivatives of trigonometric functions, the Chain Rule with trigonometric functions

14. Trigonometric identities, addition and subtraction formulas, double-angle, half-angle, and product-sum formulas, inverse trigonometric functions, derivatives of inverse trigonometric functions

15. Solving trigonometric equations, review, Test 7, final exam review

16. Final Exam

II. Course Objectives*:

A. Master the algebraic, geometric, and trigonometric manipulation skills necessary for success in the engineering technologies and transfer programs. VI. 2,3

B. Use and interpret function notation and concepts. VI.2,3

C. Interpret algebraic and trigonometric graphs. VI.1,2,3

D. Use the elementary trigonometric functions in solving right and oblique triangle problems. VI.2,3,5

E. Translate verbal situations into an algebraic or trigonometric equation by using appropriate problem-solving techniques. VI.2,3

F. Use elementary trigonometric identities to solve equations. VI.2,3,5

G. Fit data by modeling. VI.1,2,3,4
H. Become familiar with all descriptive aspects of a function. VI.3
I. Understand the concept of and be able to evaluate a limit of a function. VI.3
J. Calculate derivatives of algebraic and transcendental functions. VI.3

*Roman numerals after course objectives reference goals of the university parallel program.

III. Instructional Processes*:

Students will:

1. Work in teams to solve problems involving modeling. Communication Outcome, Numerical Literacy Outcome, Active Learning Strategy, Problem Solving and Decision Making Outcome

2. Employ graphics calculators and/or computer software as tools for solving trigonometric equations. Technological Literacy Outcome

3. Analyze real life problems such as: using trigonometry to find the pitch of roof and measure the height of objects etc. used in architecture and engineering. Problem Solving and Decision Making Outcome, Numerical Literacy Outcome, Transitional Strategy

4. Practice personal integrity by being punctual, dependable and cooperative. Personal Development Outcome

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

6. Use multiple approaches such as physical, numerical, graphical, symbolic and verbal to solve application problems in physics, biology, engineering, and computer science. Communication Outcome, Problem Solving and Decision Making Outcome, Numerical Literacy Outcome

7. Use the tools of calculus to study the phenomenon of change between different variables. Problem Solving and Decision Making Outcome, Technological Literacy 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. Compute areas and volumes of simple geometric figures and solids. A

2. Solve elementary algebraic equations and literal formulas. A

3. Translate verbal situations into algebraic or trigonometric equations by using appropriate problem-solving techniques. F
4. Interpret, graph, and manipulate polynomial and rational functions. B, C, F
5. Solve equations algebraically, numerically and graphically. B, C
6. Define and use the six trigonometric ratios. D
7. Apply the trigonometric ratios to right triangle problems from geometry and technology. D
8. Model data mathematically. J
9. Solve fractional and quadratic equations and applications. A
10. Determine trigonometric and inverse trigonometric functional values for any angle measured in degrees in radians. A, B, D
11. Apply radian measure to geometry and technology. E, F
12. Use law of sines and cosines to solve oblique triangles. A, E, F
13. Sketch sine and cosine graphs, noting the amplitude, period, and horizontal displacement. A, C
14. Simplify rational and fractional exponent expressions and convert to radical equivalent. A
15. Solve radical equations. A
16. Prove trigonometric identities by using the fundamental and double-angle identities. A
17. Solve conditional trigonometric equations by using identities. A
18. Determine what a function is and work comfortably with functional notation. A
19. Evaluate limits and derivatives of algebraic and transcendental functions using analytical, numerical and graphical techniques. Evaluate the derivative of a function using the (limit) definition. B, C
20. Recognize a continuous function. Classify the different types of discontinuities using analytical and graphing means. B

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

V. Evaluation:

A. Testing Procedures:

Students are evaluated primarily on the basis of tests, quizzes, and homework. A minimum of 5 major tests is recommended.

B. Laboratory Expectations:

N/A

C. Field Work:

N/A
D. Other Evaluation Methods:

N/A

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.

B. Academic Dishonesty:

Individual instructors must distribute their policies on academic dishonesty and calculator use during the first week of classes.