PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

CALCULUS I
MATH 1910

Class Hours: 4.0    Credit Hours: 4.0
Laboratory Hours: 0.0    Date Revised: Spring 07

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 MATH 1730

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


References:
Osteebe and Zorn. Calculus from Graphical, Numerical and Symbolic Points of View.

Technology Requirement:
A graphing calculator is required. Symbolic calculators are not permitted.

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. Instructors may use other projects. The selection, timing, and the manner of presentation of the projects are to be determined by the instructor.

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tr>
<td>1</td>
<td>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</td>
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Tangent and velocity problems, limits of functions

Computations of limits, continuity, limits involving infinity

Rates of change. Project, Review, Exam 1

Derivatives and linear approximations

Antiderivatives, graphing, extracting information about the function $f$ from the derivatives of the function. Project, Review, Exam 2

Differentiation of polynomial and exponential functions, product and quotient rules, rates of change

Derivatives of trigonometric functions, chain rule

Implicit differentiation, derivatives of logarithmic functions, linear approximations and differentials

Linear approximations, differentials. Review, Project, Exam 3

Related rates, optimization of a function on a closed interval

First and second derivative tests to locate extrema, increasing/decreasing test, test for concavity, graphing, L'Hopital's Rule


Antiderivatives, introduction to differential equations, direction fields (4.9 is optional.) Review. Exam 4.

Final Exam

II. Course Objectives*:

A. Become familiar with all descriptive aspects of a function. VI. 1-6

B. Understand the concept of and be able to evaluate a limit of a function. VI. 1-6

C. Be able to calculate derivatives of algebraic and transcendental functions. VI. 1-6

D. Pose real and technical problems mathematically. VI. 1-6

E. Apply limits and derivatives to solve real and technical problems. VI. 1-6

F. Interpret and communicate mathematical problems and their solutions into clearly written English. VI. 1-6

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

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. *Mathematics Outcome*

3. Translate analytical information into graphical representations. *Mathematics 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. . . Mathematics Outcome*

5. Use the tools of calculus to study the phenomenon of change between different variables. *Mathematics Outcome*

*Strategies and outcomes listed after instructional processes reference TBR 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 graphical 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. In addition to other possible disciplinary sanctions that may be imposed as a result of academic misconduct, the instructor has the authority to assign either (1) an F or a zero for the assignment or (2) an F for the course.

C. Accommodations for Disabilities:

If you need accommodations because of a disability, if you have emergency medical information to share, or if you need special arrangements in case the building must be evacuated, please inform the instructor immediately. Please see the instructor privately after class or in his/her office. Students must present a current accommodation plan from a staff member in Services for Students with Disabilities (SSWD) in order to receive accommodations in this course. Services for Students with Disabilities may be contacted by going to Goins 127 or 131 or by phone: 694-6751 (Voice/TTY) or 539-7153.

D. Cell Phones:

Cell Phones are to be either turned off or put on vibrate mode. Instructor discretion as to penalty.

*Posted: March 15, 2007*