PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

BASIC CALCULUS AND MODELING
MATH 1830

Class Hours: 4.0 Credit Hours: 4.0
Laboratory Hours: 0.0 Revised: Fall 05

Catalog Course Description:

Topics include differentiation and integration of polynomial, rational, exponential, and logarithmic functions and methods of numerical integration. Topics from business modeling, such as economic applications and case studies, will be explored with computer simulations, computer labs, or calculators. A graphing calculator is required.

Entry Level Standards:

Students must be able to read, write, and speak at college level.

Prerequisites:

High school algebra I, algebra II and precalculus and satisfactory placement scores; or MATH 1130; or MATH 1710; or MATH 1730

Textbook(s) and Other Course Materials:

Textbook:

References:

Personal Equipment:
A graphing calculator is required. The TI-83 or TI-83 Plus is recommended.

I. Week/Unit/Topic Basis:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Linear Functions and Average Rate of Change. Quadratic Functions and Average Rate of Change. Operations on Functions.</td>
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<tr>
<td>2</td>
<td>Rational, Radical, and Power Functions. Modeling Data with Functions. Limits.</td>
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<tr>
<td>3</td>
<td>Limits and Asymptotes. Problem Solving: Rates of Change. The Derivative.</td>
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<td>5</td>
<td>Derivatives of Products and Quotients. Continuity and Nondifferentiability Marginal Analysis.</td>
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II. Course Objectives*

A. Use derivatives to analyze behavior of functions. VI.1, 3, 5, 6
B. Compute derivatives of algebraic, logarithmic, and exponential functions. VI. 1, 3, 5
C. Calculate integrals of algebraic, logarithmic, and exponential functions. VI.1, 3, 5
D. Use differentiation and/or integration to solve applications from business, economics, social and life science. VI.1, 2, 3, 4, 5, 6
E. Use calculus concepts to interpret, communicate, and report business application problems and their solutions in a clear and concise manner. VI.1, 2, 3, 4, 5, 6

*Roman numerals after course objectives reference TBR's general education goals.

III. Instructional Processes*

Students will:

1. Engage in collaborative activities to discuss and model business and economic applications by transforming data in tables into models and graphs and using the acquired information to determine maximum profit and revenue using strategies learned in calculus. Mathematics Outcome, Active Learning Strategy, Transitional Strategy

2. Express ideas using the language and notation of mathematics. Mathematics Outcome

3. Use critical thinking skills to: interpret and apply rules such as the average of the Left and Right Sum Method to solve real-life problems such as finding the area of a pond. Technological Literacy Outcome, Active Learning Strategy, Transitional Strategy

4. Use calculators to optimize functions and to approximate numerical derivatives and definite integrals. Mathematics Outcome, Technological Literacy Outcome

5. Use multiple approaches – graphical, symbolic, and verbal – to solve various problems involving differentiation and integration problems. Mathematics Outcome, Technological Literacy Outcome

*Strategies and outcomes listed after instructional processes reference TBR's goals for strengthening general
education knowledge and skills, connecting course work to experiences beyond the classroom, and
couraging 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. Calculate the limit of an algebraic function.  B
2. Recognize a continuous function.  A
3. Calculate the derivative of an algebraic function by the delta process.  B
4. Calculate the derivative of polynomials, products, quotients, powers, and implicit
   functions using delta-derived rules.  B
5. Use derivatives to solve application problems such as problems involving distance,
   velocity, and acceleration; and maximum-minimum problems.  B, D, E
6. Sketch curves using information obtained from the derivatives of a function.  B
7. Find the derivatives of exponential and logarithmic functions.  B
8. Integrate polynomial, power, logarithmic, and exponential functions and use this
   knowledge to evaluate definite and indefinite integrals.  C, D
9. Use derivatives to solve business/economic and life/physical sciences application
   problems.  B, D, E
10. Use integration to solve application problems that occur in business/economic and
    life/physical sciences.  C, D, E
11. Work with technology and applicable case studies/projects that involve real-world data
to enhance the conceptual understanding and usefulness of calculus and to provide
    training in an area that both business and industry are now demanding.  D, E

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

V. Evaluation:

A. Testing Procedures:  87.5% of grade

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

B. Laboratory Expectations:  12.5% of grade

   Instructor discretion on case studies, lab and/or section projects

C. Field Work:

   None

D. Other Evaluation Methods:

   None

E. Grading Scale:

   93 - 100     A
68  -       72      B+
63  -       67      B
58  -       62      C+
50  -       57      C
40     -       49      D
Below 40           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:

Cheating, including but not limited to unauthorized assistance from material, people, or devices when taking a test, quiz, or examination; writing papers or reports; solving problems; or completing academic assignments.

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 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. Other Policies:

Make-up work: Instructor discretion about make-up tests and/or assignments.

Cell phones: Cell phones are to be either turned off or put on vibration mode while in class. Instructor discretion as to penalty.