

PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE  
MASTER SYLLABUS

**PRECALCULUS I**  
**MTH 1020**

**Class Hours: 5.0**

**Credit Hours: 5.0**

**Laboratory Hours: 0.0**

**Date Revised: Fall  
1999**

**Catalog Course Description:**

Review of algebraic, trigonometric, logarithmic, and exponential functions. Topics include systems of equations and inequalities, maximization; trigonometric definitions, graphs, equations, and identities; exponential and logarithmic functions and complex numbers.

**Entry Level Standards:**

Students must be able to read at the college level.

**Prerequisites:**

Two years of high school algebra and ACT score of at least 19; or DSM 0840; or equivalent math placement score.

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

Required:

Larson, Hosteller and Edwards. *Precalculus Functions and Graphs*. Second Edition. Houghton Mifflin Company, Boston, Massachusetts, 1997.

References:

Swoskowski, Cole. *Algebra and Trigonometry with Analytic Geometry*. Eighth Edition. PWS Kent, Boston, Massachusetts, 1990.

Personal Equipment:

A graphics 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:**

| <b>Week</b> | <b>Topic</b>   |
|-------------|--|
| 1           | The Cartesian plane, graphs and graphing utilities, lines in the plane, solving equations algebraically, numerically and graphically. Solving inequalities algebraically and graphically. Systems of two equations in two variables solved graphically and algebraically. P.1 - P.5, 7.1 - 7.2 |
| 2           | Functions and graphs of functions. 1.1 - 1.2   |
| 3           | Shifting, reflecting and stretching graphs, combinations of functions and inverse functions. 1.3 - 1.5   |
| 4           | Exploring data. 1.6  |

- 5 Quadratic functions, higher degree polynomials, real zeros of polynomials and complex numbers. 2.1 - 2.4
- 6 The fundamental theorem of algebra, rational functions and graphs of rational functions. 2.5 - 2.7
- 7 Exponential and logarithmic functions. 3.1 - 3.3
- 8 Logarithmic equations and exponential equations. 3.4 - 3.5
- 9 Exploring data and nonlinear models. 3.6
- 10 Radians and degrees, trigonometric functions and the unit circle, right triangle trigonometry and trig functions of any angle. 4.1 - 4.4
- 11 Graphs of trigonometric functions and inverse trigonometric functions, applications and models. 4.5 - 4.8
- 12 Using and verifying trigonometric identities. 5.1 - 5.2
- 13 Verifying trigonometric identities, solving trigonometric equations, sum and difference formulas, multiple angle and product-to-sum formulas. 5.2 - 5.5
- 14 The law of sines and the law of cosines. 6.1 - 6.2
- 15 Vectors and DeMoivre's Theorem. 6.3, 6.5
- 16 Final Exam

## II. Course Objectives\*:

- A. Demonstrate mastery of the algebraic, geometric, and trigonometric manipulation skills necessary for success in the engineering technologies and transfer programs. II, III
- B. Use and interpret function notation and concepts. II, III
- C. Interpret algebraic and trigonometric graphs. I, II, III
- D. Use the elementary trigonometric functions in solving right and oblique triangle problems. II, III, V
- E. Apply triangle laws to the solution of vector problems. II, III, V
- F. Translate verbal situations into an algebraic or trigonometric equation by using appropriate problem-solving techniques. II, III
- G. Solve and apply exponential and logarithmic equations. II, III, IV, V
- H. Demonstrate mastery of complex number arithmetic and equation solving. III, V
- I. Use elementary trigonometric identities to solve equations. II, III, V
- J. Fit data by modeling. I, II, III, IV

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

## 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, using exponential growth to find the best rate of increase in financial problems and studying population growth in diverse populations, and using exponential decay to find the rate of decay for various radio active substances used in science and engineering. *Problem Solving and Decision Making Outcome, Numerical Literacy Outcome, Transitional Strategy, Cultural Diversity and Social Adaptation Outcome*
4. Practice personal integrity by being punctual, dependable and cooperative. *Personal Development 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 linear equations. 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. Add vectors geometrically and algebraically. A, D, E
13. Use law of sines and cosines to solve oblique triangles. A, E, F
14. Sketch sine and cosine graphs, noting the amplitude, period, and horizontal displacement.

A, C

15. Simplify rational and fractional exponent expressions and convert to radical equivalent. A
16. Convert from exponential to logarithmic form and vice versa. A
17. Solve exponential and logarithmic equations and work problems. F, G
18. Manipulate and convert between polar and rectangular forms of complex numbers. H
19. Solve equations involving complex numbers. H
20. Solve radical equations. A
21. Prove trigonometric identities by using the fundamental and double-angle identities. A
22. Solve conditional trigonometric equations by using identities. I

\*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:

As assigned by instructor

##### C. Field Work:

As assigned by instructor

##### D. Other Evaluation Methods:

As assigned by instructor

##### 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 policies on academic dishonesty and calculator use during the first week of classes.