Precalculus for students in university parallel/transfer programs of science, mathematics, engineering or computer science. This course prepares students for Calculus I. 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:

High school algebra I and algebra II and ACT math score of at least 19; or DSPM 0850 or equivalent math placement score

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

Textbook:

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:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Brief review of algebra topics, readiness test and introduction to functions. Chapter P and section 1.2</td>
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<tr>
<td>2</td>
<td>Graphs of functions, linear functions, slope and average rate of change. 1.2 – 1.5</td>
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<td>3</td>
<td>Transformations on functions, coordinate geometry (distance, midpoint, circles) and modeling with functions. 1.6, 1.9, 1.10</td>
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<td>4</td>
<td>Test 1, Complex numbers, quadratic functions and polynomial functions. 2.1 – 2.3</td>
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<td>5</td>
<td>Long and synthetic division, zeros of polynomials, rational functions, inequalities involving polynomials and rational functions. 2.4 – 2.7</td>
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<tr>
<td>6</td>
<td>Variation, Test 2, Composition of functions, inverse functions 2.8, 1.7, 1.8</td>
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<tr>
<td>7</td>
<td>Exponential and logarithmic functions, properties and equations. 3.1 – 3.4</td>
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</table>
Applications and modeling with exponential and logarithmic functions, Test 3

Angle measure, right triangle trigonometry, law of sines. 4.1, 4.3, 6.1

Law of cosines and vectors. 6.2, 6.6

Test 4, Unit circle, trigonometric values of any angle, graphs of trig functions. 4.2, 4.4, 4.5

Inverse trig functions, periodic modeling, Test 5. 4.6, 4.7

Identities, angle sum/difference and miscellaneous formulas. 5.1 – 5.3

Trigonometric equations, DeMoivre’s Theorem, Test 6. 5.4, 5.5, 6.5

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. 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. Apply triangle laws to the solution of vector problems. VI.2,3,5

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

G. Solve and apply exponential and logarithmic equations. VI.2,3,4,5

H. Demonstrate mastery of complex number arithmetic and equation solving. VI.3,4

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

J. Fit data by modeling. VI.1,2,3,4

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

III. Instructional Processes*

Students will:

1. Work in teams to solve problems involving modeling. Communication Outcome, Mathematics Outcome, Active Learning Strategy

2. Employ graphics calculators and/or computer software as tools for solving algebraic, exponential, logarithmic and trigonometric equations. Mathematics Outcome, Technological Literacy Outcome

3. Analyze real life problems such as: 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 radioactive substances used in science and engineering. *Communications Outcome, Mathematics Outcome, Transitional Strategies, Active Learning Strategies*

4. Use algorithmic processes to solve problems from the physical world, using topics such as right triangle applications, graphs of sine and cosine functions, and the laws of sines and cosines. *Transitional Strategy, Mathematics Outcome, Active Learning Strategy*

5. Work, either individually or in a group setting, to demonstrate problem solving from an occupational field using trigonometry. Examples could include engineering students researching and solving problems involving real-world usage of complex (imaginary) numbers or physical science majors researching and solving vector problems using trigonometric functions. Solutions must be mathematically correct and be clear and correct in terms of the related occupational field. *Transitional Strategy, Active Learning Strategy, Mathematics Outcome*

6. Use a graphing calculator to view and analyze trigonometric functions that, because of factors such as very large or very small numbers or numerically and algebraically challenging combinations of terms, would be very difficult or impossible to graph and understand without the technology. *Mathematics Outcome, Transitional Strategy, Technological Literacy Outcome*

*Strategies and outcomes listed after instructional processes reference TBR’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 an algebraic or trigonometric equation by using appropriate problem-solving techniques.  F
4. Interpret, graph, and manipulate polynomial and rational functions.  B, C, F
5. Solve equations algebraically, trigonometrically, 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 date 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 and 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. 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.

Posted: January 17, 2007