

PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

PRECALCULUS A
MTH 1010

Class Hours: 3.0

Credit Hours: 3.0

Laboratory Hours: 0.0

**Date Revised: Fall
1999**

Catalog Course Description:

Precalculus for students who are not majoring in science, mathematics, engineering, or computer science. Topics include linear, polynomial, rational, exponential, and logarithmic functions, and their graphs and applications; linear and nonlinear regression models.

Entry Level Standards:

Students must be able to read at the college level.

Prerequisites:

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

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

Required:

Hornsby, John and Margaret L. Lial, *A Graphical Approach to College Algebra*, 2nd ed. Addison-Wesley, Reading, MA, 1999.

References:

Bittinger, Marvin L., Judith A Beecher, David Ellenbogen, and Judith A. Penna, *College Algebra: Graphs and Models*. Addison-Wesley, Reading, MA, 1997.

Blitzer, Robert, *College Algebra*. Prentice-Hall, Upper Saddle River, NJ, 1998.

Larson, Roland E., Robert P. Hostetler, and Anne V. Hodgkins, *College Algebra: Concepts and Models*. D.C. Heath and Company, Lexington, MA 1999.

Sullivan, Michael and Michael Sullivan, III, *College Algebra: Graphing and Data Analysis*. Prentice Hall, Upper Saddle River, NJ, 1998.

Technology Requirement:

A graphing calculator is required; the TI-83 is preferred. A symbolic manipulator such as the TI-89 or TI-92 is not permitted.

I. Week/Unit/Topic Basis:

Included in the topics listed below are projects which students may be asked to complete individually or in groups. Some instructors may use other projects, and the selection, timing, and manner of presentation of the projects is to be determined by the instructor.

Week	Topic
1	Introduction, Exponents and Polynomials, R.1; Factoring, R.2; Rational Expressions, R.3

- 2 Negative and Rational Exponents, R.4; Radicals, R.5; Relations and Functions, 1.2; Linear Functions, 1.3
- 3 Equation of Lines, 1.4; Analytic and Graphical Solution of Linear Equations, 1.5; Solution of Linear Inequalities, 1.6; Linear Models and Regression, 1.7
- 4 Applications of Linear Functions, 1.8; Linear Modeling Project; Review
- 5 Exam 1; Graphs of Relations and Functions, 2.1; Vertical and Horizontal Shifts of Graphs of Functions, 2.2; Stretching, Shrinking, and Reflecting Graphs of Functions, 2.3
- 6 Absolute Value Functions and Inequalities, 2.4; Piecewise-defined Functions, 2.5; Applications of Operations on Functions and Composition of Functions, 2.6
- 7 Quadratic Functions and Their Graphs, 3.2; Solution of Quadratic Functions and Inequalities, 3.3; Applications of Quadratic Functions and Models, 3.4.
- 8 Modeling Project; Review, Exam 2
- 9 Higher Degree Polynomial Functions and their Graphs, 3.5; Real Zeros of Polynomial Functions, 3.7; Solution of Polynomial Equations, and Their Applications, 3.8; Polynomial Modeling Project
- 10 Graphs of Rational Functions, 4.1; Rational Equations and Applications, 4.2; Graphs of Root Functions, 4.3
- 11 Root Equations and Applications, 4.4; Inverse Functions, 4.5; Rational Modeling Project
- 12 Review; Exam3; Exponential Functions, 5.1
- 13 Logarithms and Their Properties, 5.2; Logarithmic Functions, 5.3; Exponential and Logarithmic Equations, 5.4
- 14 Applications and Modeling with Exponential and Logarithmic Functions, 5.5; Logarithmic or Exponential Project
- 15 Review; Exam 4; Review for Final Exam
- 16 Final Exam

II. Course Objectives*:

- A. Find appropriate regression equations to model real data. I, II, IV, V
- B. Demonstrate mastery in the use of a graphing utility to solve problems and to check solutions. I, IV
- C. Construct and analyze graphs. I, IV
- D. Construct mathematical models to solve applications. II, III, V
- E. Interpret and apply functional notation and concepts. III, V
- F. Analyze and explore linear and quadratic equations and their applications. II, III, IV, V

G. Solve equations and check solutions analytically. III, IV

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

III. Instructional Processes*:

Students will:

1. Use a graphing utility to analyze properties of functions and solve equations. *Technological Literacy Outcome, Numerical Literacy Outcome, Active Learning Strategy*
2. Engage in collaborative activities, e.g. modeling projects, group work, and/or other activities which use mathematics to solve real world applications. *Problem Solving and Decision Making Outcome, Numerical Literacy Outcome, Communication Outcome, Transitional Strategy, Active Learning Strategy*
3. Demonstrate personal integrity and ethical behavior by being punctual, dependable, considerate, and cooperative. *Personal Development Outcome*
4. Use multiple approaches-physical, symbolic, graphical and verbal-to solve application problems in business, finance, and the sciences. *Numerical Literacy Outcome, Transitional Strategy*

*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. Determine the slope of a line and explain its meaning. A, C, F
2. Determine the equations of horizontal and vertical lines. C, F
3. Determine the equations of parallel and perpendicular lines. C, F
4. Determine equations of lines using the point-slope equation. F
5. Determine if a relation is a function. C, E
6. Work with functional notation; find and simplify the difference quotient for a polynomial function of degree 1, 2, or 3. E
7. Make careful graphs of functions by hand: linear, absolute value, piecewise, quadratic, radical, rational, exponential, and logarithmic. C
8. Find suitable windows to create comprehensive graphs of functions on a graphing utility; linear, absolute value, piecewise, quadratic, polynomial, radical, rational, exponential, and logarithmic. B
9. Find the real zeros of functions analytically and graphically. B, C, E
10. Analytically and graphically analyze graphs of linear, absolute value, piecewise, quadratic, polynomial, rational, radical exponential, and logarithmic functions: determine domain, range, intercepts, extrema, increasing/decreasing intervals, continuity, end behavior, and asymptotes. B, C

11. Use linear, piecewise, quadratic, polynomial, rational, exponential and logarithmic models to solve applications. D
12. Use transformations to build new functions from basic functions; determine domain and range of new functions. B, C, E
13. Use regression on a graphing utility to find linear, quadratic, cubic, quartic, exponential, and logarithmic models and use them to make meaningful predictions. A, B, D
14. Use the quadratic formula to get exact solutions to quadratic equations. F
15. Use the discriminant to determine number and nature of roots of a quadratic equation. F
16. Optimize quadratic functions. B, F
17. Make a reasonable sketch of a polynomial function based on its degree, leading coefficient, and zeroes. C
18. Determine the real zeros and their multiplicities for a polynomial function. E
19. Write a polynomial function given its real zeros and their multiplicities. E
20. Find the equations of the horizontal and vertical asymptotes of rational functions. C
21. Solve linear inequalities analytically and graphically. B, C
22. Use the zeros of a function and its graphs to solve related inequalities. B, C
23. Solve applications using direct and/or inverse variation. D
24. Determine if a function is one-to-one and find formulas for inverses of one-to-one functions. E
25. Use the graph of a one-to-one function to draw the graph of its inverse function. C
26. Convert between exponential and logarithmic notation. E
27. Find common and natural logarithms on a graphing utility. B
28. Use the change of base formula to evaluate logarithms. B
29. Use the properties of logarithms to rewrite and simplify expressions. E
30. Solve equations analytically: linear, absolute value, quadratic, rational, radical, special polynomials, exponential, and logarithmic. G
31. Solve equations on a graphing utility using the intersection of graphs method. B
32. Solve exponential growth and decay applications. B, D

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

V. Evaluation:

A. Testing Procedures:

Students are evaluated primarily on the basis of tests, projects, homework, quizzes, and a

comprehensive final exam. A minimum of four major exams 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:

Regular attendance is essential for the successful completion of this course, and absences will be recorded daily. Mississippi 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:

Academic dishonesty in any form is prohibited and will be dealt with severely. Penalties range for an F or a zero for the specific project or examination to automatic failure for the course for all students involved. Individual instructors must distribute their policy on academic dishonesty during the first week of class.