Class Hours: 3.0       Credit Hours: 3.0
Laboratory Hours: 0.0   Date Revised: Spring 03

Catalog Course Description:
College algebra for students who are not in university parallel/transfer programs of science, mathematics, engineering or computer science. Topics include linear, polynomial, rational, exponential and logarithmic functions, their graphs and applications; linear, and nonlinear regression models.

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:


Technology Requirement:
A non-symbolic graphing calculator is required; the TI-83 or TI-83 Plus is preferred.

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.

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction and Review; Rectangular Coordinates, Graphing Utilities 1.1; Introduction to Graphing Equations, 1.2; Solving Equations Using Graphing Utility, Linear Equations, 1.3</td>
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</table>
II. Course Objectives*:

A. Find appropriate regression equations to model real data using statistical analysis. VI.1-5

B. Master the use of a graphing utility to solve problems and to check solutions. VI.1-5

C. Construct and analyze graphs of linear, quadratic, polynomial, rational, radical, exponential, and logarithmic functions. VI.1-5

D. Construct appropriate mathematical models to solve applications. VI.1-5

E. Interpret and apply functional notation and concepts. VI.1-5

F. Analyze and explore linear, quadratic, polynomial, piecewise, rational, radical, exponential, and logarithmic functions and their applications. VI.1-5

G. Solve and check the solutions of linear, absolute value, piecewise, quadratic, polynomial, rational, radical, exponential and logarithmic equations analytically. VI.1-5

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

III. Instructional Processes*:
Students will:

1. Use a graphing utility to analyze properties of functions, solve equations, and check solutions. *Technological Literacy Outcome, Numerical Literacy Outcome, Active Learning Strategy*

2. Engage in collaborative activities, e.g. modeling projects, group work, and/or other activities that 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 numerically, graphically and analytically. A, C, F

2. Determine the equations of horizontal and vertical lines numerically, graphically and analytically. C, F

3. Determine the equations of parallel and perpendicular lines numerically, graphically and analytically. 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 one, two, or three. E

7. Sketch 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


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 statistical 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, quadratic, polynomial, and rational inequalities analytically and graphically. B, C

22. Use the zeros of a function and its graphs to solve related inequalities. B, C

23. Determine if a function is one-to-one and find formulas for inverses of one-to-one functions. E

24. Use the graph of a one-to-one function to draw the graph of its inverse function. C

25. Convert between exponential and logarithmic notation. E

26. Find common and natural logarithms on a graphing utility. B

27. Use the change of base formula to evaluate logarithms. B

28. Use the properties of logarithms to rewrite and simplify expressions. E

29. Solve equations analytically: linear, absolute value, quadratic, rational, radical, special polynomials, exponential, and logarithmic. G

30. Solve equations on a graphing utility using the intersection of graphs method. B

31. Solve exponential growth and decay applications analytically using statistical regression or algebraic methods. 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:

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>93-100%</td>
<td>A</td>
</tr>
<tr>
<td>88-92</td>
<td>B+</td>
</tr>
<tr>
<td>83-87</td>
<td>B</td>
</tr>
<tr>
<td>78-82</td>
<td>C+</td>
</tr>
<tr>
<td>70-77</td>
<td>C</td>
</tr>
<tr>
<td>60-69</td>
<td>D</td>
</tr>
<tr>
<td>Below 60</td>
<td>F</td>
</tr>
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VI. Policies:

A. Attendance Policy:

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

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.