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:

Two years of high school algebra and ACT math score of at least 19; or DSPM0890 or equivalent math placement score.

Textbook(s) and Other Course Materials:

**Textbook:**

**References:**

**Supplements:**
MyMathLab or MathXL.

**Technology Requirement:**
A non-symbolic graphing calculator is required; the TI-84 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. The selection, timing and manner of presentation of the projects is to be determined by the instructor.
Week | Topic
---|---
1 | Numbers, Data, and Problem Solving 1.1; Visualizing and Graphing Data 1.2; Functions and Their Representations 1.3; Types of Functions 1.4
2 | Functions and Their Rates of Change 1.5; Linear Functions and Models 2.1; Equations of Lines 2.2
3 | Linear Equations 2.3; Linear Inequalities 2.4
4 | Chapter 1, 2 Test; Quadratic Functions and Models 3.1
5 | Factoring R.4, R.6; Quadratic Equations and Problem Solving 3.2
6 | Difference Quotient 1.5; Chapter 3 Test
7 | Combining Functions 5.1; Inverse Functions and Their Representations 5.2
8 | Review of Exponents; Exponential Functions and Models 5.3
9 | Logarithmic Functions and Models 5.4; Properties of Logarithms 5.5
10 | Exponential and Logarithmic Equations 5.6
11 | Chapter 5 Test; More Nonlinear Functions and Their Graphs 4.1; Polynomial Functions and Models 4.2
12 | Real Zeros of Polynomial Functions 4.4; Regression
13 | Rational Expressions R.5; Rational Functions and Models 4.6
14 | Chapter 4 Test; Review for Exam
15 | Final Exam

II. Course Objectives*:

A. Find appropriate regression equations to model real data using statistical analysis. VI.1-6
B. Master the use of a graphing utility to solve problems and to check solutions. VI.1-6
C. Construct and analyze graphs of linear, quadratic, polynomial, rational, radical, exponential and logarithmic functions. VI.1-6
D. Construct appropriate mathematical models to solve applications. VI.1-6
E. Interpret and apply functional notation and concepts. VI.1-6
F. Analyze and explore linear, quadratic, polynomial, piecewise, rational, radical, exponential and logarithmic functions and their applications. VI.1-6
G. Solve and check the solutions of linear, absolute value, piecewise, quadratic, polynomial, rational, radical, exponential and logarithmic equations analytically, numerically and graphically. VI.1-6
H. Solve and check variation application problems. VI.1-6
Roman numerals after course objectives reference TBR's general education goals.

III. Instructional Processes:

Students will:

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

3. 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 TBR's goals for strengthening general education knowledge and skills, connecting course work 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 or slope-intercept equations. 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 the roots of a quadratic equation. F

16. Optimize quadratic functions. B, F

17. Make a reasonable sketch of a polynomial function based on an analysis of its degree, leading coefficient, zeros and end behavior. 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 graph to solve related inequalities. B, C

23. Solve direct, indirect, and joint variation problems and applications. B, C

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 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>Grade</th>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93-100%</td>
<td></td>
</tr>
<tr>
<td>B+</td>
<td>88-92</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>83-87</td>
<td></td>
</tr>
<tr>
<td>C+</td>
<td>78-82</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>70-77</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>60-69</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Below 60</td>
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</tbody>
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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% 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 Learning, 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 a zero for the assignment of (2) an F for the course.

C. Accommodations for disabilities:

Students who need accommodations because of a disability, have emergency medical information to share, or need special arrangements in case the building must be evacuated should inform the instructor immediately, privately after class or in her or his 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 134 or 126 or by phone: 694-6751(Voice/TTY) or 539-7153. More information is available at www.pstcc.edu/departments/swd/.

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