MATH 180 – TRIGONOMETRY | 3 CREDITS

SYLLABUS

CATALOG DESCRIPTION

Instructs the student in the knowledge of triangles, radian and degree measure, trigonometric function, trigonometric identities, properties, inverse trigonometric functions, polar coordinates, vectors. Prepares the student to utilize trigonometry in the analysis of calculus.

Prerequisites: A grade of "C" or better in MATH 115 or Accuplacer score of 104-120.

Semester Offered: Fall, Spring and Summer

Common Student Learning Outcomes

Upon successful completion of San Juan College programs and degrees, the student will demonstrate competency in…

BROAD AND SPECIALIZED LEARNING

Students will actively and independently acquire, apply, and adapt skills and knowledge with an awareness of global contexts.

CRITICAL THINKING

Students will think analytically and creatively to explore ideas, make connections, draw conclusions and solve problems.

CULTURAL AND CIVIC ENGAGEMENT

Students will act purposefully, reflectively, and ethically in diverse and complex environments.

EFFECTIVE COMMUNICATION

Students will exchange ideas and information with clarity in multiple contexts.

INFORMATION LITERACY

Students will be able to recognize when information is needed and have the ability to locate, evaluate, and use it effectively.

INTEGRATING TECHNOLOGIES

Students will demonstrate fluency in the application and use of technologies in multiple contexts.

Student work from this class may be randomly selected and used anonymously for assessment of course, program, and/or institutional learning outcomes. For more information, please refer to the Dean of the appropriate School.

General Learning Outcomes

Upon successful completion of the course, the student will be able to…

1. Angles and triangles.
2. Right triangle ratios and trigonometry.
3. Trigonometric functions and graphing.
4. Trigonometric identities and equations.
5. Applications using oblique triangles.
6. Vectors.
7. Polar coordinates and complex numbers.
8. Parametric Equations (optional).

Specific Learning Outcomes

Upon successful completion of the course, the student will be able to…

1.1 Be able to identify various angles: right, acute, obtuse, complementary and supplementary.
1.2 Understand degree and radian measurements of angles and be able to convert radians to degrees and degrees to radians.
1.3 Be able to find arc length and sector area.
1.4 Understand the definition of similar triangles and be able to use proportionality to solve similar triangles.

2.1 Know the right triangle definitions of the six trigonometric functions.
2.2 Be able to solve right triangles using the six trigonometric ratios.
2.3 Solve right triangles and related application problems using trigonometric functions.

3.1 Be able use a calculator to approximate the value of trigonometric functions for an arbitrary angle.
3.2 Know the exact values of the six trigonometric functions for special angles, including quadrantal angles and multiples of 30°, 60°, and 45°, in all quadrants.
3.3 Know (from memory) the graphs of sine and cosine and be able to graph the remaining four trigonometric functions.
3.4 Be able to find amplitude, period, and phase shift for trigonometric functions involving sine or cosine.
3.5 Be able to graph sine and cosine with amplitude, period, and phase shift changes as well as vertical shifts.
3.6 Understand the definition of inverse trigonometric functions.
3.7 Be able to approximate the value of inverse trigonometric functions using a calculator.
3.8 Know the exact values of inverse trigonometric functions for special angles.
3.9 Be able to evaluate the composition of trigonometric and inverse trigonometric expressions.

4.1 Know the following identities: Pythagorean, complementary angles, double angles for sine and cosine, half angle (power reduction) for sine and cosine.
4.2 Understand and be able to use the sum and difference and product to sum/sum to product identities.
4.3 Be able to verify trigonometric identities.
4.4 Be able to use trigonometric identities to find exact values of trigonometric expressions.
4.5 Be able to solve trigonometric equations using trigonometric identities, algebra, and a calculator.

5.1. Be able to solve triangles and related application problems using The Law of Sines.
5.2 Be able to solve triangles and related application problems using The Law of Cosines.
5.3 Be able to find area of oblique triangles (e.g. given two sides and the included angle or three sides using Heron's formula).

6.1 Understand the definition of a vector.
6.2 Be able to find a vector given two points.
6.3 Be able to find the direction of a vector and its magnitude.
6.4 Be able to add and subtract vectors both geometrically and algebraically.
6.5 Be able to calculate the dot product of vectors in 2- and 3-space.
6.6 Be able to find the cross product of two vectors in 3-space.
6.7 Be able to decompose a vector into two orthogonal vectors using vector projection.
6.8 Be able to find unit vectors and scale a vector (i.e find a vector in the same direction but of a different length).
6.9 Be able to use vectors in application problems (optional).

7.1 Understand the Polar Coordinate System versus the Cartesian Coordinate System.
7.2 Be able to plot points given in Polar Coordinates.
7.3 Be able to convert from polar coordinates to rectangular coordinates and vice versa.
7.4 Be able to graph polar equations and standard polar curves by hand and using the calculator. Specifically, know the graphs of circles, cardioids and roses.
7.5 Be able to find the general polar form of a complex number.
7.6 Be able to use DeMoivre's Theorem and the nth — Root Theorem.

8.1 Understand what is meant by parametric equations and when parametric equations are used (optional).
8.2 Be able to convert parametric equations to rectangular and vice versa (optional).
8.3 Be able to graph curves represented by parametric equations by hand and using your calculator (optional).

Other Requirements:

The TI-82, TI-83, TI-84, TI-85, or TI-86 graphing calculator is required for the course. A TI-83 Plus or TI-84 Plus Graphing Calculator is strongly recommended. Graphing calculators capable of symbolic manipulation (such as TI-89 or TI-92) will not be allowed on examinations, the final examination, and where the instructor finds fit.