MATH 127 – Precalculus II (3 Credits)

DESCRIPTION:

Topics include an in-depth investigation of trigonometric functions and their graphs, analytic trigonometry, solutions of triangles, vectors and analytic geometry.

Prerequisite: MATH 126 with a Grade of C or Better; or a Satisfactory ACT/SAT/Placement Test Score

NOTE: This course is essential for students planning to take calculus.

OUTCOMES:

a. Analyze trigonometric and parametric function properties.
b. Graph trigonometric and parametric functions
c. Verify trigonometric identities.
d. Solve trigonometric and parametric equations.
e. Solve triangles using the Laws of Sines and Cosines.
f. Analyze the concepts of vectors and polar coordinates.
g. Investigate properties of conic sections.
h. Apply and extend all concepts.

TEXT:
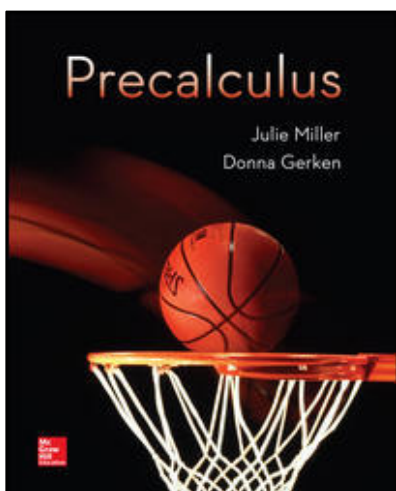
Titles: *Precalculus, 1st Edition;
Authors: Julie Miller and Donna Gerken;
Publisher: McGraw Hill Education;
ISBN-13: 978-0078035609

*Note: Full-time instructors have the right to use no text or a different text.

OUTLINE:

- **Trigonometric Functions**: Find Degree/Radian Measure, Determine Co-Terminal Angles, Compute Arc Length and Sector of a Circle, Compute Linear and Angular Speed, Evaluate Trigonometric Functions Using the Unit Circle, Use Fundamental Trigonometric Identities, Apply the Periodic and Even/Odd Function Properties of Trigonometric Functions, Evaluate Trigonometric Functions of Acute Angles in Right Triangles, Understand Angles of Elevation and Depression in Applications, Evaluate Trigonometric Functions of Any Angle Using Reference Angles, Graph Sine/Cosine/Secant/Cosecant/Tangent/Cotangent Functions, Evaluate the Inverse Sine/Cosine/Secant/Cosecant/Tangent/Cotangent Functions, Compose Trigonometric Functions and Inverse Trigonometric Functions (Miller/Gerken, Chapter 4)
- **Analytic Trigonometry**: Simplify Trigonometric Expressions, Verify Trigonometric Identities, Write an Algebraic Expression as a Trigonometric Expression, Apply the Sum and Difference Formulas for Sine/Cosine/Tangent, Use the Sum and Difference Formulas to Verify Identities, Apply Double Angle and Half Angle Formulas, Apply Power Reducing Formulas, Apply Product-to-Sum and Sum-to-Product Formulas, Solve Trigonometric Equations in Linear Form and Involving Multiple Angles, Solve Higher-Degree Trigonometric Equations (Miller/Gerken, Chapter 5)
- **Applications of Trigonometric Functions**: Solve a Right Triangle and Solve Applications with Right Triangles, Compute the Bearing of an Object, Solve a Triangle Using the Law of Sines (SAA or ASA), Solve a Triangle Using the Law of Sines (SSA with 0, 1 or 2 Solutions), Use the Law of Sines in Applications, Solve a Triangle Using the Law of Cosines (SAS and SSS), Use the Law of Cosines in Applications (Miller/Gerken, Sections 6.1-6.3)
- **Rectangular and Polar Coordinate Systems**: Plot Points Using Polar Coordinates, Convert Ordered Pairs Between Polar and Rectangular Coordinates, Convert Between Equations in Polar and Rectangular Coordinates, Interpret Vectors Geometrically, Represent Vectors in Component Form and Find Their Magnitude and Direction, Perform Operations on Vectors in Component Form, Find a Unit Vector, Use Vectors in Applications by Finding the Magnitude and Direction of the Resultant Force, Compute the Dot Product, Find the Angle Between Two Vectors (Miller/Gerken, Sections 7.1, 7.4-7.5)
- **Analytic Geometry**: Graph an Ellipse Centered at the Origin and Centered at (h, k), Write the Equation of an Ellipse From Given Information, Graph a Hyperbola Centered at the Origin and Centered at (h, k), Write the Equation of a Hyperbola From Given Information, Graph a Parabola with its Vertex at the Origin and with its Vertex at (h, k), Write the Equation of a Parabola From Given Information, Graph a Plane Curve (Parametric Equations) by Plotting Points, Eliminate the Parameter (Miller/Gerken, Sections 10.1-10-3, 10.6)

Optional Topics

- Model Simple Harmonic Motion, Interpret Damped Harmonic Motion, Graph Polar Equations by Plotting Points (Miller/Gerken, Section 6.4)
- Plot Complex Numbers in the Complex Plane, Write the Polar Form of a Complex Number, Compute Powers of Complex Numbers Using de Moivre's Theorem (Miller/Gerken, Sections 7.2-7.3)
- Set Up and Decompose $f(x)/g(x)$ into Partial Fractions (Miller/Gerken, Section 8.3)
- Identify Conic Sections with No Rotation, Use the Rotation of Axes Formulas and Transform Equations by Rotation of Axes, Identify and Graph Conics in Polar Form, Write Terms of a Sequence From the nth Term Defined Recursively (Miller/Gerken, Sections 10.4-10.5)
- Use Summation Notation, Prove a Statement Using Mathematical Induction (Miller/Gerken, Sections 11.1, 11.4)

EVALUATION:

Grades may be determined by student performance in one or more of the following areas: in-class tests, take-home tests, homework assignments, quizzes, special projects, papers, attendance, and class participation. Degree of importance and types of assessment used will depend on the instructor.

This course satisfies the math requirement in the General Education Core component for selected degree and certificate programs at CSN.