COURSE NUMBER: MATH 1316

COURSE TITLE: Plane Trigonometry

CREDIT HOURS: 3  LECTURE HOURS: 3  LAB HOURS: 0

ASSESSMENT(S): Prior to enrolling in this course, the student must demonstrate eligibility to enroll in the following: MATH 1316, MATH 1325, MATH 1350, or MATH 2373.

PREREQUISITE: MATH 1314 or MATH 1414; or equivalent.

COREQUISITE: None

COURSE DESCRIPTION: In-depth study and applications of trigonometry including definitions, identities, inverse functions, solutions of equations, graphing, and solving triangles. Additional topics such as vectors, polar coordinates and parametric equations may be included.

TEXTBOOK: Trigonometry (7th edition), Charles P. McKeague and Mark D. Turner, Brooks/Cole (Cengage Learning), 2013. In addition, some professors may use WebAssign, which requires a purchased access code. New packages purchased from any Collin bookstore will include an access code for WebAssign.

Online courses: E-mail your professor, ebook@collin.edu or rdeskins@collin.edu for textbook information.

SUPPLIES: Graphing calculator required.

STUDENT LEARNING OUTCOMES:

Upon completion of this course the student should be able to do the following:

1. Compute the values of trigonometric functions for key angles in all quadrants of the unit circle measured in both degrees and radians.
2. Graph trigonometric functions and their transformations.
3. Prove trigonometric identities. (CS/CT)
4. Solve trigonometric equations.
5. Solve right and oblique triangles. (EQ)
6. Use the concepts of trigonometry to solve applications. (CS/CT/EQ)

COURSE REQUIREMENTS: Completion of required exams, quizzes, and assignments. Graphing calculators are used in lieu of trig tables.

COURSE FORMAT: Lecture and guided practice or online course delivery

METHOD OF EVALUATION: A minimum of four written exams and a comprehensive final exam will be given. Homework and/or quizzes may be used in place of one exam or in addition to exams. The weight of each of these components of evaluation will be specified in the individual instructor’s addendum to this syllabus. All out-of-class course credit, including take-home exams, home assignments, service-learning, etc. may not exceed 25% of the total course grade; thus, at least 75% of a student’s grade must consist of exams given in class or the testing center, and no student may retake any of these exams.
METHOD OF EVALUATION: A minimum of four proctored exams, and a proctored comprehensive final exam will be given. Homework and/or quizzes may be used in place of one exam or in addition to exams. The weight of each of these components of evaluation will be specified in the individual instructor’s addendum to this syllabus. All out-of-class course credit, including home assignments, service-learning, etc. may not exceed 25% of the total course grade; thus, at least 75% of a student’s grade must consist of proctored exams, and no student may retake any of these exams.

ATTENDANCE POLICY: Attendance is expected of all students. If a student is unable to attend, it is his/her responsibility to contact the instructor to obtain assignments. Please see the schedule of classes for the last day to withdraw from the course with a grade of W.

RELIGIOUS HOLY DAYS: In accordance with section 51.911 of the Texas Education Code, the college will allow a student who is absent from class for the observance of a religious holy day to take an examination or complete an assignment scheduled for that day within a reasonable time. A copy of the state rules and procedures regarding holy days and the form for notification of absence from each class under this provision are available from the Admissions and Records Office. Please refer to the current Collin Student Handbook.

ADA STATEMENT: Collin College will adhere to all applicable federal, state and local laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal educational opportunity. It is the student’s responsibility to contact the ACCESS office, SCC-D140 or 972.881.5898 (V/TTD: 972.881.5950) to arrange for appropriate accommodations. See the current Collin Student Handbook for additional information.

ACADEMIC ETHICS: Please see section 7-2.2 of the Collin Student Handbook. Contact the Dean of Students at 972.881.5771 for the student disciplinary process and procedures.

COURSE CONTENT: Proofs and derivations will be assigned at the discretion of the instructor. The student will be responsible for knowing all definition and statements of theorems for each section outlined in the following modules.

MODULE 1: The Six Trigonometric Functions and Right Triangle Trigonometry

The student will be able to:

1. Understand angles and degree measure.
2. Understand and know the different kinds of triangles.
3. Use the Pythagorean Theorem for right triangles.
4. Solve special right triangles.
5. Understand the rectangular coordinate system and be able to graph lines, parabolas, and circles.
6. Use the distance formula.
7. Understand and be able to draw angles in standard position and determine when two such angles are coterminal.
8. Understand and use the definition of the trigonometric functions for angles in standard position.
9. Know how to determine the algebraic sign of the trig functions in each of the four quadrants.
10. Learn the basic trigonometric identities and use them to find trigonometric function values, simplify expressions, and prove new identities.
11. Understand and use the definition of the trigonometric functions as right triangle ratios.
12. Understand cofunctions and be able to use the Cofunction Theorem.
13. Learn the exact values of the trigonometric functions for special angles.
14. Use decimal degrees and degrees, minutes, and seconds for angles.
15. Know how to use a calculator to find trigonometric function values for acute angles and how to find the angle whose trigonometric function value is given.
16. Solve right triangles, using the correct significant digits for sides and angles.
17. Solve applied problems using right triangles and understand the concepts of angle of elevation and depression and bearings.
18. Understand geometric vectors and how to use them to solve problems involving force and work.

MODULE 2: Radian Measure and Graphing and Inverse Functions

The student will be able to:
1. Understand reference angles and the reference angle theorem.
2. Use reference angles to find exact values of trig functions.
3. Use a calculator to find approximate values of trig functions as well as the angles whose trig value is given and which lie in a given interval.
4. Understand and calculate radian measure and convert between degrees and radians.
5. Understand the definition of the circular functions.
6. Learn the unit circle and know how to use it to evaluate trig functions.
7. Know the domains and ranges of the six circular functions.
8. Calculate the arc length of a circle, the area of a circular sector, and solve applied problems.
9. Understand the concepts of periodic function, period, and amplitude.
10. Know and be able to draw the graphs of the six basic trigonometric functions.
11. Know which of the six trigonometric functions are even and which are odd.
12. Understand how a change in amplitude, period, and reflection alters a function’s graph.
13. Know how to sketch the graphs of and find their periods and amplitudes.
14. Understand how to perform vertical and horizontal (phase) shifts on sine and cosine graphs.
15. Know how to graph tangent, cotangent, secant, and cosecant graphs with transformations of their basic graphs.
16. Find an equation for the graph of a trigonometric function.
17. Review the notation and properties of inverse functions.
18. Know the definitions of the inverse sine, cosine, and tangent functions and their domains and ranges.
19. Know how to evaluate the inverse sine, cosine, and tangent functions exactly and with a calculator.
20. Know how to simplify compositions of a trig function with an inverse function.

MODULE 3: Identities, Formulas, and Equations

The student will be able to:
1. Use basic trigonometric identities to verify other identities.
2. Determine when an equation is not an identity.
3. Know the sum and difference formulas and use them to find exact values and verify other identities.
4. Know the double-angle formulas and use them to find exact values and verify other identities.
5. Know the half-angle formulas and use them to find exact values and verify other identities.
6. Simplify expressions involving inverse functions without a calculator.
7. Solve trigonometric equations which are of linear or quadratic form.
8. Use identities to solve trigonometric equations.
9. Solve trigonometric equations that involve multiple angles.
10. Graph a curve defined by parametric equations by hand and with a calculator.
11. Eliminate the parameter.
MODULE 4: Applications of Trigonometry – Triangles, Complex Numbers, and Polar Coordinates

The student will be able to:
1. Use the Law of Sines to solve AAS or ASA triangles and applications involving such triangles.
2. Use the Law of Sines to solve ambiguous SSA triangles and applications involving such triangles.
3. Use the Law of Cosines to solve SAS and SSS triangles and applications involving such triangles.
4. Work with algebraic vectors.
5. Find the dot product and use it to find the angle between two vectors, determine if two vectors are parallel or perpendicular, and calculate work.
6. Plot points in polar coordinates.
7. Convert points between polar and rectangular coordinates.
8. Convert equations from polar to rectangular coordinates and vice-versa.
9. Graph equations in polar coordinates and be aware of the common graphs of such equations.

Optional topics

The student will be able to:
1. Calculate the area of a triangle given SAS, AAS, and SSS.
2. Write a complex number in trigonometric form and vice versa.
3. Multiply and divide complex numbers in trigonometric form.
4. Use DeMoivre’s Theorem to find powers of complex numbers in trigonometric form.
5. Find all nth roots of a complex number in trigonometric form.
6. Graph the nth roots of a complex number.
7. Use the roots of a complex number to solve an equation.