Course description: Trigonometric functions of angles, radian measure, fundamental identities; addition, product, and half angle formulas, solution of triangles; polar coordinates; inverse trigonometric functions, complex numbers.

Credit hours: 3

The following is an excerpt from SFA Policy 5.4:

The federal definition of a credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally established equivalency that reasonably approximates:

1. Not less than one hour of classroom or direct faculty instruction and a minimum of two hours out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or 10 to 12 weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time, or;

2. At least an equivalent amount of work as outlined in item 1 above for other academic activities as established by the institution including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours.

To this end, all students in courses offered by the Department of Mathematics and Statistics that wish to be successful should plan to spend a minimum of two hours outside of class for every credit hour associated with this course. Expected activities to be completed in the time outside of class include reviewing notes from previous class meetings, reading assigned course resources, completing all assigned exercises and projects, and performing periodic assessment preparation.

Course Prerequisites and Corequisites: See general course prerequisites.

Course outline:

- Angles and definitions of trigonometric functions
  - Angles
    - Degree measure of angles
    - Reference angles
    - Radian measure of angles
    - Arc length, angular velocity, linear velocity
  - Trigonometric functions
    - Definition using the unit circle
    - Reciprocal, ratio, and Pythagorean identities
    - Definition using ratios of sides of right triangles
    - Evaluating exact values for special angles
- Graphs of trigonometric functions
  - Basic graphs of the trigonometric functions
  - Modified graphs of the trigonometric functions
    - Amplitude
    - Period
    - Vertical translation
    - Phase shift
- Inverse Trigonometric Functions and Solving Equations
  - Definitions and graphs of inverse trigonometric functions
  - Calculations with inverse trigonometric functions
  - Solving trigonometric equations
    - Using factoring, identities, and quadratic formula
    - Arguments with multiple angles
    - Using inverse functions to approximate solutions

Approximate time spent

15%
• **Identities** 20%
  - Logic and techniques for proving identities
  - Calculations with identities
  - Sum and difference identities
  - Even, odd, and cofunction identities
  - Double and half-angle identities
  - Product-to-sum and sum-to-product identities

• **Solving Triangles** 15%
  - Accuracy and significant digits
  - Solving right triangles
  - Law of Cosines
  - Law of Sines
  - Ambiguous case (SSA)
  - Applications
    - Navigation
    - Surveying
    - Angles of depression/elevation
    - Areas of triangles

• **Vectors, Complex Numbers, and Polar Coordinates** 20%
  - Vectors
    - Definitions
    - Algebraic representations and resolving vectors
    - Resultant vector
    - Angle between vectors
    - Dot product and orthogonality
    - Applications
      - Forces
      - Air speed/ground speed
      - Work
  - Complex number system
    - Definitions
    - Arithmetic and simplification of complex numbers
    - Trigonometric form
    - Products and quotients in trigonometric form
    - De Moivre’s Theorem
    - nth root theorem
  - Polar coordinate system
    - Definitions
    - Various representations for points using polar
    - Conversion between polar and rectangular coordinates
    - Graphs of polar equations
    - Conversion between polar and rectangular
    - Special polar graphs

**Academic Integrity**

Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

The penalty for a student found cheating on any part of an assignment, quiz, or exam in this class will range from a grade of zero on the work to a grade of F in the course, and may result in additional, more severe disciplinary measures. A student who allows another to copy his work and the student copying the work are both guilty of cheating. Do your own work. Do not show your completed work to others. Do not allow others to copy your work.
Definition of Academic Dishonesty (SFA policy 4.1):
Academic dishonesty includes both cheating and plagiarism. Cheating includes, but is not limited to:
- using or attempting to use unauthorized materials on any class assignment or exam;
- falsifying or inventing of any information, including citations, on an assignment;
- helping or attempting to help other student(s) in an act of cheating or plagiarism.
Plagiarism is presenting the words or ideas of another person as if they were one’s own. Examples of plagiarism include, but are not limited to:
- submitting an assignment as one’s own work when it is at least partly the work of another person;
- submitting a work that has been purchased or otherwise obtained from the Internet or another source;
- incorporating the words or ideas of an author into one's paper or presentation without giving the author credit.

Withheld Grades Semester Grades (SFA Policy 5.5)
Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average. The circumstances precipitating the request must have occurred after the last day in which a student could withdraw from a course. Students requesting a WH must be passing the course with a minimum projected grade of C.

Students with Disabilities
To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices.

Acceptable Student Behavior
Classroom behavior should not interfere with the instructor’s ability to conduct the class or the ability of other students to learn from the instructional program (see the Student Conduct Code, policy 10.4). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed.

Student Learning Outcomes (SLO): At the end of MTH 133, a student who has studied and learned the material should be able to:
1. State and use the unit circle and ratio definitions of the six trigonometric functions.
2. Recall and use exact values of the trigonometric functions at integer multiples of π/4 and π/6 in various contexts, especially in graphing trigonometric functions.
3. Graph the trigonometric functions, and graph transformations of trigonometric functions by recognizing amplitude, changes in period, vertical translations, and phase shifts.
4. Use appropriate trigonometric identities in solving equations involving trigonometric functions and in calculating trigonometric function values.
5. Use logical reasoning and known trigonometric identities to verify that an equation is a trigonometric identity.
6. Use inverse trigonometric functions in applications and in solving equations.
7. Determine unknown measures of sides and/or angles of triangles for which some specific measures are given.
8. Solve application problems using tools such as vectors, right triangle trigonometry, the Law of Sines, and the Law of Cosines.
9. Perform arithmetical operations with complex numbers and find powers and roots of complex numbers in trigonometric form.
10. Use the polar coordinate system, relate it to the rectangular coordinate system, and graph equations using polar coordinates.

There are no specific program learning outcomes for this major addressed in this course. It is a general education core curriculum course and/or a service course.

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