CORE CURRICULUM COMPONENT APPLICATION
Sam Houston State University

Revised October, 2012

PART I – Course Information

Course Type
☒ Existing/Restructured
☐ New Course Proposed Fall 2013
If new, have you submitted a Form B to the SHSU Curriculum Committee? ☐ Yes ☐ No

Course Prefix & Number: MATH 1316

Texas Common Course Number (TCCN Matrix): MATH 1316

Course Title: Plane Trigonometry

Course Catalog Description (Copy and paste from online catalog for existing courses):
Topics include coordinate systems, circular functions, solutions of triangles, identities, trigonometric equations, and inverse functions.

Course Prerequisites: THEA score of 270 or its equivalent

Available Online?
☐ Yes, currently developed in online delivery mode
☐ Anticipated development in online delivery mode (Semester, Year:)
☒ No

Number of Sections to be Offered per Academic Year: 10

Estimated Enrollment per Section: 36

Course Level (freshman, sophomore): freshman

Designated Contact Person (for follow-up communication purposes): Dr. Rebecca Garcia

E-Mail Address: rgarcia@shsu.edu

Phone: 936-294-3520

Approvals

Department Chair:	Signature	Date: 10-18-12
Academic Dean:	Signature	Date: 10/22/12

Submit completed, signed form to Core Curriculum Committee - Box 2478 or Fax 4-1271

PART II – THECB Foundational Component Areas

See Appendix for full description of each component area.

Select Component Area: II. Mathematics

In one paragraph, describe how the proposed course will fulfill the core and skill objectives of the component area:

Plane trigonometry is the study of those periodic functions which arise from the arrangement of geometric objects in the plane. In particular, students completing this course will define the trigonometric functions from basic principles in order to understand the relationship between quantitave measurements and spatial arrangements in the plane. Implicitly, students successfully completing this course will (1) refine their understanding of key mathematical concepts such as functions and their general properties, (2) gain increased quantitative literacy in logic, patterns and relationships by proving identities involving these functions, and (3) learn to apply these concepts in appropriate settings, solving problems of triangles, angular velocity and other problems involving physical motion.

PART III – Course Objectives & Student Learning Outcomes (SLO)

Insert the applicable course objectives stated as student learning outcomes (e.g., Students completing the course will be able to...) that support the core component area objectives. Please reference the component rubric for additional information on core component area objectives.

Objective/SLO 1:

Students successfully completing this course will gain a greater understanding of the use of trigonometric functions in describing natural and physical arrangements; refine pattern recognition skills via graphing these functions and verification and/or proof of trigonometric identities; and reformulate real world problems into accurate mathematical expressions that can be solved. In so doing, students will have increased quantitative literacy in the logic of describing geometric arrangements using trigonometric functions, the patterns within the properties of these functions, and the relationships among these functions.

How will the objective be addressed (including strategies and techniques)?

Students will be exposed to the relationship between the definitions and properties of the six basic trigonometric functions and their graphical representation. In particular, students will be able to translate between the definition and graph of a modified trigonometric function. In addition, students will be able to relate certain properties of each of these functions to the other functions. For example, students will derive the double-angle and sum-to-product formulas of

all six basic trigonometric functions. Students will be able to write a valid equation using the trigonometric functions given either the arrangement of vectors in the plane or the measurements of the angles and lengths of sides of a given triangle.

Describe how the objective will be assessed:

This objective will be assessed through embedded problems in quizzes, exams, and/or in-class worksheets. Instructors will incorporate a common subset of problem types in one of the exams of each section. As an example, instructors may include a question that requires the student to prove one of the basic trigonometric identities, solve a triangle with more than one (or no) solution, or provide a sketch of the graph of a given trigonometric function that has been modified from its basic form.

Objective/SLO 2:

Students successfully completing this course will be able to state fully the definitions, properties, and uses of the six trigonometric functions. Emphasis will be placed on accurately representing given mathematical information both symbolically and graphically, with attention given to expressing the trigonometric relationship among graphically presented items in written form. In so doing, students will gain a greater understanding of key mathematical concepts.

How will the objective be addressed (including strategies and techniques)?

In order to fully comprehend the importance of the trigonometric functions, their definitions must be fully understood. Simply memorizing their function values (on the unit circle, for example) does not provide the skills necessary to use these functions properly in calculus, much less correctly apply them when solving problems. All students will therefore be able to identify the domain, range, graph, and other fundamental properties of each of these functions.

In addition, the key uses of the trigonometric functions will be more fully understood after students are able to express information that is presented graphically or verbally as an equation involving these functions. That is, students will be able to turn a diagram or a set of sentences containing both known and unknown quantities into an algebraic and/or trigonometric equation that adequately captures the information required to determine those unknown quantities.

Describe how the objective will be assessed:

This objective will be assessed through embedded problems in quizzes, exams and/or in-class worksheets. Instructors will incorporate a common subset of problem types in one of the exams of each section. As an example, instructors may be asked to include a question that requires students to "solve a triangle" which has two solutions. Students may also be asked to translate information presented pictorially (e.g., the shadow of a tall object) as a trigonometric equation.

Objective/SLO 3:

Students successfully completing this course will use appropriate technology to enhance mathematical thinking and understanding, solve problems using mathematical concepts, and judge the level of reasonability of the results. Students will learn to interpret mathematical formulas, graphs and tables and will expand their mathematical reasoning skills to develop sound mathematical arguments.

How will the objective be addressed (including strategies and techniques)?

Applications are an important part of understanding the key concepts in trigonometry. In particular, the applications have implicit conditions wherein these concepts make sense (e.g., sizes of angles in triangles, non-negative distances). Significant time will be spent on developing principle ideas arising from physics and construction engineering, specifically how concepts of trigonometry are applied to further understanding these applications. While this course will prepare students for using trigonometry in differential calculus, not all students will proceed to calculus. Therefore, problems will be presented such as spatial arrangement, angular velocity, and other topics not explicity involving calculus.

Describe how the objective will be assessed:

This objective will be assessed through embedded problems in quizzes, exams and/or in-class worksheets. Instructors will incorporate a common subset of problem types in final exams of each section. As an example, instructors may include a question that requires the student to determine the area of the sector defined by a given angle within a circle with a given radius. Or perhaps students will be asked to compare the angular velocity of an object on a rotating disk to its linear velocity.

Objective/SLO 4:

How will the objective be addressed (including strategies and techniques)?

Describe how the objective will be assessed:

Objective/SLO 5:

How will the objective be addressed (including strategies and techniques)?

Describe how the objective will be assessed:

PART IV – THECB Skill Objectives

Address each of the THECB skill objectives required within the component area. Explain how the skill is addressed, including specific strategies to address the skill(s). *Address ALL skill objectives associated with the selected Component Area. (See Appendix)*

1. **Critical Thinking Skills**: to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information

How will the skill be addressed (including specific strategies, activities, and techniques)?

Trigonometry is the development of the basic groundwork for metric geometry. Distance, angle measure, and congruence of triangles are all developed through trigonometry. A comprehensive understanding of these concepts is necessary for success in calculus or any field requiring a quantitative understanding of spatial geometry, e.g. industrial technology.

The ability to convert information presented graphically or pictorially (such as the arrangement of vectors in space or the directions of moving objects) to a mathematical equation will invariably require an understanding of trigonometry. Being able to define those trigonometric functions and understand their properties is fundamental to this process.

There are many concepts of trigonometry that appear in contexts that may be surprising to a typical student. For example, the hyperbolic trigonometric functions are actually exponential functions that possess properties that mimic those of the standard trigonometric functions. These hyperbolic functions describe, among other things, the behavior of a wire hanging between two rigid poles. Being able to recognize the application of hyperbolic trigonometric functions as well as using their properties is one way to ensure students are able to think critically about the concepts and uses of trigonometry.

2. **Communication Skills**: to include effective development, interpretation and expression of ideas through written, oral and visual communication

How will the skill be addressed (including specific strategies, activities, and techniques)?

Students will develop their written, oral and visual communication skills as a natural part of the learning process of trigonometry. Obtaining a true understanding the content of trigonometry requires each students works closely with graphical representations of mathematical functions and using such visual representations to communicate information about the function and its

behavior through writing and speech. Students are routinely asked to explore and explain a variety of concepts and applications in writing exercises that challenge students to discuss important trigonometric concepts with precision. In addition, many of the exercises task the student with translating plain language into symbolic mathematical expressions, resolving the problems algebraically, and communicating the results in plain language, either verbally or written.

Improving communication skills could be addressed in one of two ways, either in the form of class presentations or within group work. In those classrooms which implement student presentations, students will be expected to present solutions to several problems to the rest of the class on a regular basis. Solutions will be presented in both written form (on the board, in front of the room) and orally (explaining methods used and conclusions drawn). Students presenting solutions will receive immediate feedback from those students listening to the presentation.

Those classrooms not having students present their work to their classmates will use group work to address communication skills. On a regular basis (such as during weekly quizzes) the class will be partitioned into small groups of three or four students, and each group will work on either a lengthy problem or on a sequence of problems to be solved using trigonometry. The groups will either be assigned by the instructor or formed by the students. Typically each student turns in her own set of solutions, requiring communication among group members, ensuring complete, correct solutions.

3. Empirical and Quantitative Skills: to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions

How will the skill be addressed (including specific strategies, activities, and techniques)?

Knowing the properties and behavior of the six basic trigonometric functions is an integral part of being able to correctly apply these functions to those contexts encountered in later mathematics courses. For example, knowing that the sine and cosine functions are periodic and bounded allows it to have a broad range of applications, from biological settings to Fourier series.

In order to understand these properties, students must develop skills to manipulate and simplify the trigonometric functions as well as their graphs. Early on, multiple representations of the basic trigonometric functions are stressed: verbal, visual, algebraic and numeric. Students will learn to generate and interpret graphs and the language of trigonometry as tools for understanding both the quantitative and empirical real-world relationships of periodic functions. A main focus of trigonometry is the complete analysis of standard mathematical functions: periodicity, intervals on which a function increases/decreases, the domain and range of functions, and their asymptotic and long-term behavior.

4. Teamwork: to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal

How will the skill be addressed (including specific strategies, activities, and techniques)?

This skill will not be addressed.

5. Personal Responsibility: to include the ability to connect choices, actions and consequences to ethical decision-making

How will the skill be addressed (including specific strategies, activities, and techniques)?
This skill will not be addressed.

6. Social Responsibility: to include intercultural competence, knowledge of civic responsibility, and the ability to engage effectively in regional, national, and global communities

How will the skill be addressed (including specific strategies, activities, and techniques)?
This skill will not be addressed.

PART V – SHSU Core Curriculum Committee Requirements

1. Using a 15-week class schedule, identify the topics to be covered during each week of the semester. Provide sufficient detail to allow readers to understand the scope and sequence of topics covered.

Week 1	Angles, degrees, special triangles, the rectangular coordinate system
Week 2	Definition of the six trigonometric functions, introduction to identities
Week 3	Right triangle trigonometry, trigonometric functions of an acute angle
Week 4	Solving right triangles, applications
Week 5	Reference angles, radians and degrees
Week 6	Circular functions, lengths of arcs, area of a sector
Week 7	Basic graphs of trigonometric functions, amplitude, period, reflection, and vertical translation for sine and cosine functions
Week 8	Horizontal translation, graphing the remaining trigonometric functions
Week 9	Inverse trigonometric functions and their graphs
Week 10	Proving identities, sum and difference formulas
Week 11	Double-angle formulas, half-angle formulas
Week 12	Solving trigonometric equations
Week 13	Trigonometric equations involving multiple angles
Week 14	The Law of Sines
Week 15	The Law of Cosines

2. Attachments (Syllabus Required)

Syllabus Attached? ☒ Yes ☐ No

Other Attached? ☒ Yes ☐ No If yes, specify: An additional syllabus for an alternate teaching style

Appendix: THECB Component Area Descriptions and Skill Requirements

I. Communication (Courses in this category focus on developing ideas and expressing them clearly, considering the effect of the message, fostering understanding, and building the skills needed to communicate persuasively. Courses involve the command of oral, aural, written, and visual literacy skills that enable people to exchange messages appropriate to the subject, occasion, and audience.)

II. Mathematics (Courses in this category focus on quantitative literacy in logic, patterns, and relationships. Courses involve the understanding of key mathematical concepts and the application of appropriate quantitative tools to everyday experience.)

III. Life and Physical Sciences (Courses in this category focus on describing, explaining, and predicting natural phenomena using the scientific method. Courses involve the understanding of interactions among natural phenomena and the implications of scientific principles on the physical world and on human experiences.)

IV. Language, Philosophy, and Culture (Courses in this category focus on how ideas, values, beliefs, and other aspects of culture express and affect human experience. Courses involve the exploration of ideas that foster aesthetic and intellectual creation in order to understand the human condition across cultures.)

V. Creative Arts (Courses in this category focus on the appreciation and analysis of creative artifacts and works of the human imagination. Courses involve the synthesis and interpretation of artistic expression and enable critical, creative, and innovative communication about works of art.)

VI. American History (Courses in this category focus on the consideration of past events and ideas relative to the United States, with the option of including Texas History for a portion of this component area. Courses involve the interaction among individuals, communities, states, the nation, and the world, considering how these interactions have contributed to the development of the United States and its global role.)

VII. Government/ Political Science (Courses in this category focus on consideration of the Constitution of the United States and the constitutions of the states, with special emphasis on that of Texas. Courses involve the analysis of governmental institutions, political behavior, civic engagement, and their political and philosophical foundations.)

VIII. Social and Behavioral Sciences (Courses in this category focus on the application of empirical and scientific methods that contribute to the understanding of what makes us human.
Courses involve the exploration of behavior and interactions among individuals, groups, institutions, and events, examining their impact on the individual, society, and culture.)

Required Skill Objectives

Foundational Component Areas	Skill Objectives					
	Critical Thinking	Communication	Empirical & Quantitative	Team Work	Social Responsibility	Personal Responsibility
Communication	✓	✓		✓		✓
Mathematics	✓	✓	✓			
Life and Physical Sciences	✓	✓	✓	✓		
Language, Philosophy & Culture	✓	✓			✓	✓
Creative Arts	✓	✓		✓	✓	
American History	✓	✓			✓	✓
Government/Political Science	✓	✓			✓	✓
Social and Behavioral Sciences	✓	✓	✓		✓	

Submit completed, signed form to Core Curriculum Committee - Box 2478 or Fax 4-1271

Course Syllabus
MTH 1316
Plane Trigonometry
Fall 2014

Location:
Time and Days:
Professor:
Office:
Telephone: (936) 294 – xxxx
e-mail:
course web site: Blackboard
Office hours:

Course Description: This course includes the study of trigonometry in the plane, including the graphs and inverses of all trigonometric functions, proving identities, and solving triangles.

Course Objectives: Students completing this course should have mastery of the following major concepts. Other techniques and ideas will also be covered: All trigonometric functions, their graphs and inverses; solving triangles; proving identities; and vectors.

- Students successfully completing this course will gain a greater understanding of the use of trigonometric functions in describing natural and physical arrangements; refine pattern recognition skills via graphing these functions and verification and/or proof of trigonometric identities; and reformulate real world problems into accurate mathematical expressions that can be solved. In so doing, students will have increased quantitative literacy in the logic of describing geometric arrangements using trigonometric functions, the patterns within the properties of these functions, and the relationships among these functions.

- Students successfully completing this course will be able to state fully the definitions, properties, and uses of the six trigonometric functions. Emphasis will be placed on accurately representing given mathematical information both symbolically and graphically, with attention given to expressing the trigonometric relationship among graphically presented items in written form. In so doing, students will gain a greater understanding of key mathematical concepts.

- Students successfully completing this course will use appropriate technology to enhance mathematical thinking and understanding, solve problems using mathematical concepts, and judge the level of reasonability of the results. Students will learn to interpret mathematical formulas, graphs and tables and will expand their mathematical reasoning skills to develop sound mathematical arguments.

Required Textbook: *Trigonometry* (7th Edition) by McKeague and Turner. Thomson Brooks/Cole.

Required Supplies: A graphing calculator - TI-83 or TI-84 recommended. Calculators with Computer Algebra Systems such as TI-89 will not be allowed. If you have questions about your calculator, please see me.

Attendance Policy: Regular and punctual attendance for this course is mandatory. If class must be missed, the student is expected to get the notes from a classmate, and to check Blackboard for announcements and updated assignments. For all documented and university-approved absences (e.g. hospitalization, court appearances, university athletic conferences, etc...) students must immediately contact and inform the instructor of the situation and present proper documentation upon reentering the classroom. Students are expected to arrive to class on time. If a student is perpetually late, they will be asked not to attend class unless they arrive on time.

Textbook Homework: Each homework will consist of three equally important parts.

(a) **Advanced Reading:** Before every class day, the student must read the corresponding section. You must read and reread as needed for complete understanding.

(b) **Answers to reading questions:** In a sheet of paper, you must write answers to both the "Getting Ready for Class" questions and the "Concepts and Vocabulary" questions corresponding to the section you just read. These two sets of questions are located at the end of each section. You must write **both** the statement of the question and its answer on the same sheet. You must turn in your work at the beginning of class.

(c) **Take-home exercises:** A set of take-home exercises will be assigned on each class day. This set of problems will not be collected, but students are encour-

aged to complete this assignment as the exam problems will be similar to some of the problems in these homework assignments.

Each student is responsible to ask questions about homework problems which he/she was not able to complete or did not understand. It is also their responsibility to come to office hours, or otherwise contact someone for help. Finally, each student is also responsible to work on as many problems from each section as needed in order to master the material.

Quizzes: Towards the end of each and every class day, there will be a short quiz consisting of the questions in the "Learning Objectives Assesment" at the end of the corresponding section. Students must write solutions to these problems in a separate sheet of paper. Students must provide complete justification for every single problem. Often times, you will be required to write an English sentence to explain your thought process in solving a particular question. An answer without complete and correct justification will be marked wrong even if the answer is correct. There will be no partial credit in these quizzes. There will be no makeup quizzes. To accommodate for unexpected circumstances, the lowest two quizzes will be dropped.

Participation: I expect everyone to attend and participate actively in class, in particular to speak up during class discussion with questions and ideas, and to work well with others. A substantial part of your work for the course is this active participation in class. Please always be on time and prepared for class.

Exams: There will be three exams during the semester. They are tentatively scheduled to occur on:

Exam 1	Chapters 1 & 2	Thursday, September 27
Exam 2	Chapters 3 & 4	Thursday, November 1
Final Exam	Chapters 5, 6 & 7	Thursday, December 13 11:00 am – 1:00 pm

Any changes to this schedule will be announced in class and posted on Blackboard. There will be no makeup exams, except for official University-sponsored activities.

Grading Plan: The course grade is based on:

Reading Assignments	20%
Quizzes	20%
Exam 1	20%
Exam 2	20%
Final Exam	20%

There is no curve in this class, and no additional extra credit, so keep up as the semester progresses. The course grade will be assigned via the following scale.

Percentage earned	Grade
90-100%	A
80 - 89%	B
70 - 79%	C
60 - 69%	D
0 - 59	F

Academic Dishonesty: All students are expected to engage in all academic pursuits in a manner that is above reproach. Students are expected to maintain complete honesty and integrity in the academic experiences both in and out of the classroom. **Any student found guilty of dishonesty in any phase of academic work will be subject to disciplinary action.** The University and its official representatives may initiate disciplinary proceedings against a student accused of any form of academic dishonesty including, but not limited to, cheating on an examination or other academic work which is to be submitted, plagiarism, collusion and the abuse of resource materials.

Classroom Rules of Conduct: Students will refrain from behavior in the classroom that intentionally or unintentionally disrupts the learning process and, thus, impedes the mission of the university. Students are prohibited from using tobacco products in class, making offensive remarks, reading newspapers, sleeping, talking at inappropriate times, wearing inappropriate clothing or engaging in any other form of distraction. Inappropriate behavior in the classroom shall result in a directive to leave class. Students who are especially disruptive also may be reported to the Dean of Students for disciplinary action in accordance with university policy.

Use of Telephones and Text Messagers: Cellular telephones and pagers must be turned off before class begins. Failure to comply with this instructor's policy could result in expulsion from the classroom or with multiple offenses, failure of the course. Arrangements for handling potential emergency situations may be granted at the discretion of the instructor. Any use of a telephone or text messager or any device that performs these functions during a test period is prohibited. These devices should not be present during a test or should be stored securely in such a way that they cannot be seen or used by the student. Even the visible presence of such a device during the test period will result in a zero for that test. Use of these devices

during a test is considered de facto evidence of cheating and could result in a charge of academic dishonesty.

Visitors in the Classroom: Unannounced visitors to class must present a current, official SHSU identification card to be permitted in the classroom. They must not present a disruption to the class by their attendance. If the visitor is not a registered student, it is at the instructor's discretion whether or not the visitor will be allowed to remain in the classroom.

Student Absences on Religious Holy Days Policy: Section 51.911(b) of the Texas Education Code requires that an institution of higher education excuse a student from attending classes or other required activities, including examinations, for the observance of a religious holy day, including travel for that purpose. A student whose absence is excused under this subsection may not be penalized for that absence and shall be allowed to take an examination or complete an assignment from which the student is excused within a reasonable time after the absence.

University policy 861001 provides the procedures to be followed by the student and instructor. A student desiring to absent himself/herself from a scheduled class in order to observe (a) religious holy day(s) shall present to each instructor involved a written statement concerning the religious holy day(s). This request must be made in the first fifteen days of the semester or the first seven days of a summer session in which the absence(s) will occur. The instructor will complete a form notifying the student of a reasonable time frame in which the missed assignments and/or examinations are to be completed.

Disabled Student Policy: It is the policy of Sam Houston State University that no otherwise qualified disabled individual shall, solely by reason of his/her handicap, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any academic or Student Life program or activity. Disabled students may request help with academically related problems stemming from individual disabilities from their instructors, school/department chair, or by contacting the Chair of the Committee for Continuing Assistance for Disabled Students and Director of the Counseling Center, Lee Drain Annex, or by calling (936) 294-1720.

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Additional Information: All information on this syllabus is subject to change. Any changes will be announced in class.