Application for Certification of a Course as a General Education Course

CTE QUANTITATIVE AND LOGICAL REASONING CATEGORY

Applicant: Robert Bates and Sterling Foster Course Alpha and Number: Math 150 P

Course Title: Technical College Mathematics

Instructions:

Explain how the learning taking place in this course meets the requirements listed below for the Quantitative and Logical Reasoning General Education Category. Do both of the following:

- Identify specific course SLOs that align with each requirement.
- Describe class assignments or activities in which students learn and/or demonstrate the requirement objective. Assignments and/or activities cited should be sufficiently important in terms of both time spent on them and their impact on students’ final grades in the course.

Try to address all of the requirements. The strength of some responses should counterbalance the weakness of others. Address each of the questions listed under each requirement with typed responses.

Also attach a copy of the official course outline (see Curriculum Proposal Form).

The Requirements:

The course...

1 Promotes the recognition of formal numerical and symbolic systems and an understanding of what they represent.
   a. Does the course require students to demonstrate their knowledge of the meaning and use of formal numerical and symbolic systems? Yes / No
   b. What activities or assignments must students do to demonstrate this knowledge?
   c. What Specific Skills are the students evaluated on?

2 Promotes an understanding of the basic operating principles or rules that govern the use of those formal systems.
   a. Does the course require students to demonstrate their understanding of the established rules and principles regarding how to use formal numerical and symbolic systems of representation? Yes / No
   b. What activities or assignments must students do to demonstrate this knowledge?
   c. What Specific Skills are the students evaluated on?

3 Promotes an understanding of the connection between real-world problems and their expression and solution in the language of formal systems.
   a. Does the course require students to apply an understanding of the use of formal symbols to how they apply to addressing real-world issues and problems? Yes / No
   b. What activities or assignments must students do to demonstrate this knowledge?
   c. What Specific Skills are the students evaluated on?

4 Emphasizes the ability to analyze a problem and correctly select the means by which it can be solved.
   a. Does the course require students to engage in the analysis of problems and to demonstrate their ability to choose which formal numerical or symbolic system can be used to solve these problems? Yes / No
   b. What activities or assignments must students do to demonstrate this knowledge?
   c. What Specific Skills are the students evaluated on?

Applicant’s signature: Sterling Foster Date: Sept. 11, 2015

Please submit this application to the CTE GenEd Sub-board Chair.
Requirments:

1. Promotes the recognition of formal numerical and symbolic systems and an understanding of what they represent.
   a. Does the course require students to demonstrate their knowledge of the meaning and use of formal numerical and symbolic systems? Yes / No
   Yes, besides the real numbering system, the course utilizes the symbolic system of trigonometry and vectors; students learn sine, cosine, and tangent trigonometric functions with their uses in triangles with Law of Sines and Cosines, the sine wave graphs with amplitude and period, the uses in vectors with magnitude and direction, and their overall application to the technical fields.

   b. What activities or assignments must students do to demonstrate this knowledge?
   Students will be required to demonstrate their knowledge on homework assignments, quizzes and exams. See some sample problems attached.

   c. What Specific Skills are the students evaluated on?
   The course SLOs are specific topics with skills which relate to various problems. These problems test the student’s understanding. See some sample problems attached.

2. Promotes an understanding of the basic operating principles or rules that govern the use of those formal systems.
   a. Does the course require students to demonstrate their understanding of the established rules and principles regarding how to use formal numerical and symbolic systems of representation? Yes / No
   Yes, using trigonometry as the foundation of the course, there are multiple principles and rules. To determine angles with trigonometry students must learn the unit circle, quadrant signs, reciprocal functions, and inverses. For right triangles, students learn to use SOH, CAH, TOA and x, y, r set-up to determine side lengths and angles. Also Law of Sines has possible problem cases depending on the given values and angle. Other more basic operating principles would be PEMDAS and Pythagorean formula.

   b. What activities or assignments must students do to demonstrate this knowledge?
   Students will be required to demonstrate their knowledge on homework assignments, quizzes and exams. See some sample problems attached.

   c. What Specific Skills are the students evaluated on?
   The course SLOs are specific topics with skills which relate to various problems. These problems test the student’s understanding. See some sample problems attached.

3. Promotes an understanding of the connection between real-world problems and their expression and solution in the language of formal systems.
   a. Does the course require students to apply an understanding of the use of formal symbols to how they apply to addressing real-world issues and problems? Yes / No
   Yes, since this course is specifically created to address higher mathematics in the trade fields, almost all of the SLO topics and skills directly relate to real-world problems. In trigonometry and vectors, solving triangle sides and angles are constantly used in the real-world from framing
trusses to course trajectories.

b. What activities or assignments must students do to demonstrate this knowledge?
Students will be required to demonstrate their knowledge on homework assignments, quizzes and exams. See some sample problems attached.

c. What Specific Skills are the students evaluated on?
The course SLOs are specific topics with skills which relate to various problems. These problems test the student’s understanding. See some sample problems attached.

4. Emphasizes the ability to analyze a problem and correctly select the means by which it can be solved.
   a. Does the course require students to engage in the analysis of problems and to demonstrate their ability to choose which formal numerical or symbolic system can be used to solve these problems? Yes / No
Yes, within the course there are several multi-step problems, such as adding vectors and solving triangles with trigonometry, these type of problems take careful analytical skills to determine the correct steps to the solution. For example, Sin(x), Cos(x), and Tan(x), as well as their inverses, can have multiple values and angles. The students must analyze the sign and quadrant from the solution to identify the correct answer. Also when using Law of Sines the solution can be none, one, or even two possible triangles, forcing the students to analyze the results.

   b. What activities or assignments must students do to demonstrate this knowledge?
Students will be required to demonstrate their knowledge on homework assignments, quizzes and exams. See some sample problems attached.

c. What Specific Skills are the students evaluated on?
The course SLOs are specific topics with skills which relate to various problems. These problems test the student’s understanding. See some sample problems attached.
CTE Quantitative and Logical Reasoning Category - Math 150P

General Syllabus Information

Math 150P – Technical College Mathematics

Description:
Geometric angles of polygons and circles, including chord, tangent, arc, interior and exterior angle theorems. Trigonometry for right triangles and oblique triangles. Law of Sines & Law of Cosines. Graphing vectors, adding vectors with trigonometry, and determine component vectors. Solve course topics in applied work-related problems. Intended for students in the Pearl Harbor Naval Shipyards program (PHNSY).

Student Learning Outcomes (SLOs):
1. Determine angle values in geometric figures by applying theorems of vertical, alternate-interior, and corresponding angles
2. Compute the lengths of sides and angles of simple geometric shapes
3. Compute interior and exterior angles of polygons by applying polygon angle theorems.
4. Apply chord, tangent, arc, and central; angle theorems in applied problems
5. Apply tangent and secant theorems in computing arcs and angles formed on, inside, and outside a circle
6. Determine the area of segments and sectors of a circle
7. Compute lengths of sides of similar polygons
8. Solve for any side or angle in a right or oblique triangle using trigonometry
9. Solve right and oblique triangle problems using trigonometry given in word form including problems involving angle of elevation and angle of depression
10. Solve complex applied problems that require forming two or more (right or oblique) triangles by the projection of auxiliary lines
11. Know and apply the law of Sines and Cosines
12. Determine the six trig functions of angles in any quadrant.
13. Without a calculator determine the co-function of any acute angle and compare it to the given function of the angle to determine which function is greater.
14. Analyze graphs of the six trig functions over a given interval
15. Graph any angle and vector in standard position on the Cartesian coordinate plane
16. Computer vector and scalar quantities
17. Add vectors using scale drawings and trigonometry
18. Determine component vectors and be able to add them using trigonometry
19. Solve applied problems using vector components

Additional topic suggested by physics instructors – solving linear systems of two equations with two unknowns using the substitution method