

CATALOG INFORMATION

Dept and Nbr: APTECH 90B    Title: QUANT REASON/APTECH  
Full Title: Quantitative Reasoning in Applied Technology  
Last Reviewed: 10/17/2011

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	4.00	Lecture Scheduled	4.00	17.5	Lecture Scheduled	70.00
Minimum	4.00	Lab Scheduled	0	17.5	Lab Scheduled	0
		Contact DHR	4.00		Contact DHR	70.00
		Contact Total	8.00		Contact Total	140.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 140.00

Total Student Learning Hours: 280.00

Title 5 Category: AA Degree Applicable  
Grading: Grade or P/NP  
Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP  
Also Listed As:  
Formerly: CET 90B

**Catalog Description:**  
A course in quantitative reasoning which applies trigonometry principles to problems encountered in surveying, civil engineering, construction, electronics and related engineering technologies. The areas of study are the analysis, solution and application of angle measurements and their related functions, associated graphical representations, solution to triangles, complex numbers and analytic geometry, as they are related to the trades and various technologies.

**Prerequisites/Corequisites:**  
Completion of Ap Tech 90A

**Recommended Preparation:**  
Math 155

**Limits on Enrollment:**

**Schedule of Classes Information:**  
Description: A course in quantitative reasoning which applies trigonometry principles encountered in surveying, civil engineering, construction, electronics and related engineering technologies. (Grade or P/NP)  
Prerequisites/Corequisites: Completion of Ap Tech 90A

Recommended: Math 155

Limits on Enrollment:

Transfer Credit: CSU;

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

<b>AS Degree:</b>	<b>Area</b>		<b>Effective:</b>	<b>Inactive:</b>
	B	Communication and Analytical Thinking	Fall 2009	Spring 2016
	B	Communication and Analytical Thinking	Fall 1981	Fall 2009
<b>CSU GE:</b>	MC	Math Competency		
	<b>Transfer Area</b> B4	Math/Quantitative Reasoning	<b>Effective:</b> Fall 1991	<b>Inactive:</b> Fall 1997
<b>IGETC:</b>	<b>Transfer Area</b>		<b>Effective:</b>	<b>Inactive:</b>
<b>CSU Transfer:</b>	Transferable	<b>Effective:</b>	Spring 1982	<b>Inactive:</b> Spring 2016
<b>UC Transfer:</b>		<b>Effective:</b>		<b>Inactive:</b>

**CID:**

**Certificate/Major Applicable:**

Both Certificate and Major Applicable

## **COURSE CONTENT**

**Outcomes and Objectives:**

The student will be able to:

1. State the purpose, function and application of trigonometry, including definitions, characteristics of functions, radian and degree measurements, and inverse functions.
2. Demonstrate and apply Pythagorean theorem to the laying out of a right triangle with a tape.
3. Demonstrate and apply trigonometry to solve right triangles including applications to the construction trades with the determination of the slopes of roofs and various member roof cuts.
4. Demonstrate and apply trigonometry to solve right triangles including applications to the construction trades with the determination of the angles found in rafters, studs and bracing.
5. Demonstrate and apply trigonometric concepts of oblique triangles.
6. Demonstrate & apply the trigonometric concepts of components including vectors and vector addition found in the construction trades of horizontal and vertical components of forces.
7. Demonstrate and apply the techniques of analytic geometry with regard to arc lengths and areas found in the construction trades as shown with the determination of the arc length and area of sectors, and arc lengths and areas found in the construction trades.
8. Demonstrate and apply the techniques used in the graphing of trigonometric functions as found in the construction, electrical and

electronic technology trades as shown with the determination of amplitude, periodic functions, resonance, graphs of trigonometric functions, general graphing and graphing by the addition of ordinates.

## **Topics and Scope:**

Theories, concepts and skills used in quantitative reasoning which applies goniometric principles to solve selected problems encountered in surveying, civil engineering, construction, electronics and related engineering technologies. For example the topics covered include:

1. Application of Trigonometric Functions
  - a. application of definitions for surveying
  - b. characteristics of functions used
  - c. applications of radian and degree measurements to triangular lots
  - d. applications to right triangles as found in construction applications
  - e. application to the length and areas of sectors (i.e. streets and highway curves)
2. Application involving Oblique Triangles
  - a. applications of trigonometric functions to similar triangles
  - b. application of oblique triangles
  - c. determination of the area of triangles
  - d. applications of the Law of Sines
  - e. applications of the Law of Cosines
  - f. ambiguous triangles and associated errors in judgment
3. Components of Vectors and Vector Addition
  - a. definition of vectors
  - b. addition and subtraction of vectors
  - c. complex numbers
  - d. polar coordinates
4. Applications of Arc Lengths and Areas
  - a. application to the length and areas of sectors (i.e. streets and highway curves)
  - b. applications of analytic geometry
  - c. applications to irregularly shaped lots
5. Application of Sine and Cosine Graphs
  - a. general graphing of functions and graphing by the addition of coordinates
  - b. analysis of amplitude
  - c. analysis of periodic function
  - d. analysis of resonance

## **Assignment:**

Through written assignments, the student will correctly use:

1. Trigonometry in laying out right angles using tape measure, determining slope of roofs, angles of rafters, and finding the length of truss members.
2. Trigonometric functions in determining the voltage and current relationships found in inductive/capacitive circuits, the interpretation of Lissajous patterns, and the structural dampening effects of sine and cosine waves.

3. Right and oblique triangle mathematic principles for problems encountered in finding the lengths of truss members and property line lengths.
4. Complex numbers for the purposes of analyzing the sum of two perpendicular forces, and the addition or subtraction of vector forces encountered in building a bridge.
5. Analytic geometry as needed to determine the arc length and sector areas used in highway curves and land areas within highway curves.

### Methods of Evaluation/Basis of Grade:

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Lab reports

Writing  
5 - 10%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework problems

Problem solving  
10 - 50%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Performance exams

Skill Demonstrations  
25 - 50%

**Exams:** All forms of formal testing, other than skill performance exams.

QUIZZES AND TECHNICAL PROBLEMS TO SOLVE

Exams  
10 - 40%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

ATTENDANCE AND CLASS PARTICIPATION

Other Category  
0 - 10%

### Representative Textbooks and Materials:

Fundamentals of Technical Mathematics, Arthus D Kramer: Glencoe/McGraw-Hill, 2000.

Applied Trigonometry, McHale and Witzke: Addison-Wesley, 1999.