

**COURSE OUTLINE SPRING 2009**

MAT110  
**Course Number**

Elementary Technical Mathematics  
**Course Title**

3  
**Credits**

3 lecture hours  
**Hours**

**Catalog Description:**

Designed for students in specific technology programs who have some algebra background and need to become proficient to apply mathematical concepts in these programs. Topics in arithmetic, geometry, algebra and elementary trigonometry are covered with emphasis upon their application to technology. Students in fields requiring subsequent mathematics courses should not take MAT110.

**Prerequisites:**

Completion of MAT03 with a minimum grade of C, completion of a course equivalent to MAT 037, or an appropriate score on the College Level Math Placement Test, or permission of the department chair person.

**Co-requisites:** None

**Required Materials:**

1. Text: *Elementary Technical Mathematics*, 9<sup>th</sup> edition by Dale Ewen and C. Robert Nelson (Thomson Brooks/Cole)
2. Calculator: A scientific calculator is suggested.

**Last revised:** Spring 2009

**Course Coordinator:**

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### **Course Competencies/Goals:**

Students will be able to demonstrate through tests, quizzes, homework, and assigned projects the ability to:

1. Find the sides of a right triangle using trigonometric ratios and the Pythagorean Theorem.
2. Convert degree to radians and radian to degree measure.
3. Solve problems involving the six trigonometric ratios (sin, cos, tan, cot, sec, sec).
4. Sketch graphs of the sine and cosine functions.
5. Use signed numbers and be able to manipulate algebraic operations using signed numbers.
6. Solve for a specific variable in an algebraic equation or formula.
7. Factor numbers and algebraic expressions into prime factors.
8. Solve problems that involve decimals, scientific notation, and fractions.
9. Make conversions between the Metric and the English systems and apply this knowledge to solve real life problems. .
10. Determine the precision, accuracy, tolerance of resistors using the color code, and be able to make readings in circular scale instruments.
11. Solve and graph linear equations in two variables. .
12. Solve a system of two linear equations (graphing, substitution, and elimination).
13. Express imaginary numbers in standard form.
14. Read and make correlation of the information provided by bar, circle, and line graphs
15. Apply each of the above techniques in various real world applications.

### **Course-specific General Education Knowledge Goals and Core Skills:**

#### **General Education Knowledge Goals**

**Goal 1. Communication.** Students will communicate effectively in both speech and writing.

**Goal 2. Mathematics.** Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.

**Goal 4. Technology.** Students will use a scientific calculator proficiently.

#### **MCCC Core Skills**

**Goal A. Written and Oral Communication in English.** Students will communicate effectively in speech and writing, and demonstrate proficiency in reading.

**Goal B. Critical Thinking and Problem-solving.** Students will use critical thinking and problem solving skills in analyzing information.

CG means, Course Goal, GE means General Education Goal, and MCS means Mercer Core Skills in this document.

## **Course Content**

### **Unit I: Oblique and Right Triangles, Radian Measure, Sine and Cosine Graphs (4.0 total weeks)**

*The student will be able to:*

1. Distinguish between oblique and right triangle. (CG 1,2,3; GE 1,2,4; MCS A,B)
2. Label the right triangle properly (angle and sides). (CG 1,2,3; GE 1,2,4; MCS A,B)
3. Write and use the Pythagorean Theorem to find the missing side in a right triangle. (CG 1,2,3;GE 1,2,4; MCS A,B)
4. Define and use the six basic trigonometric ratios (sin, cos, tan, csc, sec and cot) of a right triangle. (CG 1, 2,3; GE 1,2,4; MCS A,B)
5. Use trigonometric ratios to find the angles in a right triangle. (CG 1,2,3; GE 1,2,4; MCS A,B)
6. Use trigonometric ratios to find the side of in a right triangle. (CG 1,2,3; GE 1,2,4; MCS A,B)
7. Apply the trigonometric ratios to real world problems. (CG 1, 2,3; GE 1,2,4; MCS A,B)
8. Measure angles in degree or radian measure. (CG 1,2,3,5; GE 1,2,4; MCS A,B)
9. Define a radian and a degree and solve problems using radian and degree measure. (CG 1,2,3,5; GE 1,2,4; MCS A,B)
10. Use the conversion formula to convert radian to degree and degree to radian measure. (CG 4,5,6; GE 1,2,4; MCS A,B)
11. Recognize and sketch graphs for the sine and cosine.

### **Unit II: Systems of Linear Equations, Basic Concepts, Decimal Fractions, The Metric System, and Measurements.**

**The student will be able to:**

1. Solve problems involving with decimal fractions including rounding to the proper significant digits. (CG 5,8; GE 1,2,4,15; MCS A,B)
2. Understand percentage and apply the concept to solve problems. (CG 5,8; GE 1,2,4,15; MCS A,B)
3. Write numbers in scientific notation and use scientific notation to perform calculations. (CG 5,8; GE 1,2,4,15; MCS A,B)
4. Solve problem involving signed numbers. (CG 5,6,7,8; GE 1,2,4; MCS A,B)
5. Solve for a specific variable on given formulas. (CG 5,8; GE 1,2,4; MCS A,B)
6. Factor numbers and algebraic expressions into the product of prime factors. (CG 7; GE 1,2,4; MCS A,B)
7. Recognize and be able to make measurements within the Metric System. (CG 7,8,9; GE 1,2,4; MCS A,B)

8. Convert units between both systems of measurement, the Metric and the English systems. (CG 7,8,9; GE 1,2,4; MCS A,B)
9. Identify significant digits and be able to identify precision and accuracy in making measurements. (CG 7,8,9; GE 1,2,4; MCS A,B)
10. Determine the value of tolerance of resistors using the color code. (CG 7,8,9,15; GE 1,2,4; MCS A,B)
11. Make readings using circular and uniform scale instruments. (CG 7,8,9,14,15; GE 1,2,4; MCS A,B)
12. Solve pairs of linear systems of equations having solutions by graphing. (CG 5,6,7,8,11,12; GE 1,2,4; MCS A,B)
13. Solve pairs of linear systems of equations having solutions by algebraic techniques (substitution, elimination). (CG 5,6,7,8,11,12; GE 1,2,4; MCS A,B)

### **Unit III – Working with Formulas, Graphing Linear Equations, Imaginary Numbers, Bar, Circle, and Broken Line other Graphs**

*The student will be able to:*

1. Analyze the given data, find the equation that relates to the data and solve the formula for the unknown variable. (CG 5,6,7,8; GE 1,2,4; MCS AB)
2. Substitute the given data into the solved formula and find the value of the unknown quantity. (CG 5,6,7,8; GE 1,2,4; MCS AB)
3. Substitute the given data into the formula and solved for the unknown quantity. (CG 5,6,7,8; GE 1,2,4; MCS AB)
4. Use the calculator to find the reciprocal of a given number or quantity. (CG 5,6,7,8; GE 1,2,4; MCS AB)
5. Graph linear equations in two variables by point plotting. (CG 5,6,7,8,11; GE 1,2,4; MCS AB)
6. Define and know the formula to find the slope of lines. (CG 5,6,7,8,11,15; GE 1,2,4; MCS AB)
7. Write the linear equation given two points on a line and slope. (CG 5,6,7,8,11,15; GE 1,2,4; MCS AB)
8. Use slope-intercept forms of linear equations to sketch lines. (CG 5,6,7,8,11,15; GE 1,2,4; MCS AB)
9. Use the slope to identify parallel and perpendicular lines. (CG 5,6,7,8,15; GE 1,2,4; MCS AB)
10. Find the x- and y- intercept of graph of equations. (CG 5,6,7,8,15; GE 1,2,4; MCS AB)
11. Solve problems involving imaginary numbers. (CG 5,6,7,8,15; GE 1,2,4; MCS AB)
12. Use, read, and interpret bar, circle, and broken-line graphs (CG 10; GE 1,2,4; MCS AB)

## **General Course Structure**

The content of the course is divided into three units with approximately the same amount of class time being devoted to each unit. The assessment of the course is based on tests and quizzes, followed by a comprehensive final exam.

## **Examination and Required Work**

- ◆ **Exams:** It is recommended that a test be given at the end of each unit. Each unit covers approximately 8 – 10 sections of the text. The instructor will write the unit tests and the final exam. The unit tests can be given in class or to use the Academic Testing Center at the discretion of the instructor.
- ◆ **Quizzes:** The number of quizzes is up to the individual instructor.
- ◆ **Homework:** Selection and grading of homework problems is up to the individual instructor.
- ◆ **Final exam:** A comprehensive final exam should be given in the classroom at the end of the semester.

## **Academic Integrity Statement:**

Mercer County Community College is committed to Academic Integrity – the honest, fair, and continuing pursuit of knowledge, free from fraud or deception. Students should never:

- Knowingly represent the work of others as their own
- Knowingly represent previously completed academic work as current
- Fabricate data to support academic work
- Use or obtain unauthorized assistance in the execution of any academic work
- Give fraudulent assistance to other students
- Unethically use technological means to gain academic advantages

Violators of the above actions will be penalized, and offenders will be reported to the Academic Integrity Committee. Please see the Student Handbook on Academic Integrity for additional details.