ELEN 173
Tools for Circuit Analysis

Overview

On completion of this course, the successful students will have demonstrated that they have acquired a detailed knowledge of the essential applied mathematical skills and techniques necessary to support the Marine Electrician technical courses. These skills combined with the other technology courses will provide the student with sufficient knowledge to perform planned and corrective maintenance on trade-related equipment. Successful students will understand and be able to solve practical electrical problems through the use of equations, functions and graphs, systems of linear equations, factoring and fractions, operations with radicals, complex numbers, and logarithmic functions.

CREDIT:	2
IN-CLASS WORKLOAD:	5 hours lecture 1 hour tutorial
OUT-OF-CLASS WORKLOAD:	5 hours
PREREQUISITES:	

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Topic Outline (hours)

1. **Basic mathematics with real numbers** *(Page 1: CH1-1 to CH1-2)* **6**

   (a) Operations with whole numbers
   (b) Common fractions
   (c) Add and subtract fractions
   (d) Multiply and divide fractions
   (e) Operations with decimals
   (f) Real numbers
   (g) Basic laws of real numbers
   (h) Arithmetic of real numbers

2. **Exponents and Radicals** *(Page 16: CH1-4 to CH1-9)* **8**

   (a) Exponents (including zero and negative exponents)
   (b) Scientific notation
   (c) Radical and rational exponents
   (d) Algebraic expressions
   (e) Add and subtract algebraic expressions
   (f) Multiply and divide algebraic expressions
   (g) SI units and conversion of units

3. **Complex Numbers** *(Page 318: CH12)* **8**

(a) The j operator
(b) Rectangular form and polar form complex numbers
(c) Operations with complex numbers
(d) Basic graphing techniques
(e) Graphical representation of complex numbers
(f) Conversion of rectangular to polar form
(g) Conversion of polar to rectangular form

4. **Algebraic Equations** *(Page 128: CH5-1, Page 389: CH14-4)* **8**

(a) Types of equations;
(b) Rules of solving linear equations with numerical coefficients
(c) Solving equations involving literal coefficients
(d) Radical equations

5. **Algebraic Factoring and Fractions** *(Page 164: CH6)* **8**

(a) Factoring
(b) Special products
(c) Removing common factors
(d) Grouping
(e) Reducing and simplifying fractions
(f) Multiplication and division of fractions
(g) Addition and subtraction of fractions
(h) Simplifying complex fractions
(i) Fractional equations

6. **Function and Graphs** *(Page 75: CH3)* **5**

(a) Types of functions
(b) Domain and range
(c) Dependent and independent variables
(d) Functional notation
(e) Evaluation of functions
(f) Solving problems with functions
(g) Graphing functions in rectangular coordinates

7. **Straight Lines** *(Page 97: CH3-6, Page 131: CH5-2)* **4**

(a) Plotting straight lines
(b) Finding the slope of the line from its graph
(c) Finding the slope of the line from its function
(d) Determining the equation of a line from its graph
(e) Recognizing equations of straight lines
(f) Solving problems involving straight lines
(g) Parallel and perpendicular lines
(h) Determining if two lines are parallel or perpendicular
(i) Perform linear interpolation

8.	**Systems of linear equations** *(Page 128: CH5)*	**8**

(a) Systems of linear equations with two variables
(b) Algebraic methods
    (1) Elimination
    (2) Substitution
    (3) Comparison
(c) Systems of linear equations with more than two equations and more than two variables
(d) Determinants
(e) Word problems

9.	**Logarithmic and Exponential Functions** *(Page 349: CH13)*	**7**

(a) Graphing logarithmic and exponential functions
(b) Properties of logarithmic and exponential functions
(c) Converting between exponential and logarithmic forms
(d) Solving logarithmic and exponential equations
(e) Plotting on logarithmic and semi logarithmic graphing paper

10.	Tests and Midterms	**6**
11.	Tutorials	**14**
12.	Review for Final Exam	**2**
	Total:	**84**

Evaluation

Letter grades will be assigned according to college policy. A 60% minimum must be achieved in both the theory and lab portions of the course in order to pass.

Final Grade Composition

Assignments		5%
Quizzes		30%
Midterm Exam		20%
Final Exam		45%
Total		**100%**

Text Books and References

Washington, Basic Technical Mathematics with Calculus, 6th edition, 1995

Other References:

Distributed as needed.