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Course Outline for MATH 53A

TECHNICAL INTERMEDIATE ALGEBRA FOR WELDING A

Effective: Fall 2018

I. CATALOG DESCRIPTION:
MATH 53A — TECHNICAL INTERMEDIATE ALGEBRA FOR WELDING A — 2.00 units

This course provides a survey of algebraic processes with an emphasis on applications in welding. Topics covered include, but are not limited to: algebraic expressions, plane geometry, the geometry of solids, and triangle trigonometry. This course may not be used as a prerequisite for any transfer level course.

2.00 Units Lecture

Prerequisite
MATH 72C - Technical Elementary Algebra C
with a minimum grade of C
or

MATH 72D - Technical Elementary Algebra D
with a minimum grade of C

Grading Methods:
Letter or P/NP

Discipline:
- Mathematics

	MIN
Lecture Hours:	36.00
Expected Outside of Class Hours:	72.00
Total Hours:	108.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. PREREQUISITE AND/OR ADVISORY SKILLS:

Before entering the course a student should be able to:

A. MATH72C
1. Perform computations with decimal numbers to a specified number of significant digits;
2. Solve applied problems involving percentages;
3. Solve problems using U.S. customary units and metric units of length, area, volume, mass, temperature, and time;
4. Perform conversion of measurements within the U.S. or metric systems and between the U.S. and metric systems;
5. Use measuring instruments with accuracy;
6. Solve applied problems using percentages and systems of measurement.

B. MATH72D
1. Apply concepts of slopes and rates of change
2. Write equations of lines
3. Develop and describe basic linear models
4. Solve systems of linear equations in two variables by graphing
5. Solve systems of linear equations in two variables by either the elimination or the substitution methods
6. Solve applied problems using a variety of techniques including proportions, percentages, linear equations or systems of linear equations

IV. MEASURABLE OBJECTIVES:

Upon completion of this course, the student should be able to:

A. Evaluate and simplify formulas and algebraic expressions;
B. Perform operations with algebraic expressions;
C. Simplify expressions with exponents;
D. Solve literal equations;
E. Apply principles of scientific notation;
F. Apply principles of plane geometry to solve problems involving angles, areas, and perimeter;
G. Apply principles of solid geometry to solve problems involving surface area, lateral surface area and volume;

H. Perform calculations involving trigonometric ratios and radian/degree conversions;
I. Solve triangle problems using right-triangle trigonometry, the Law of Sines or the Law of Cosines.

V. CONTENT:
- A. Algebraic expressions
  1. Operations with algebraic expressions
     a. Addition and subtraction (review)
     b. Multiplication and division
     c. Laws of exponents
  2. Formulas
     a. Evaluation
     b. Solving literal equations
  3. Applications in welding
- B. Scientific notation
  1. Interpreting and understanding scientific notation
  2. Converting between decimal form and scientific notation
  3. Computations in scientific notation
  4. Applications in welding
- C. Plane Geometry
  1. Angles
     a. Classification
     b. Measurement
     c. Angle relationships related to intersecting or parallel lines
     d. Angles in a triangle
  2. Regular and irregular polygons
     a. Area
     b. Perimeter
  3. Circles
     a. Area
     b. Circumference
  4. Applications in welding
- D. Solid Geometry
  1. Surface area, lateral surface area, and volume of
     a. Prisms
     b. Pyramids and frustums of pyramids
     c. Cylinders
     d. Spheres
     e. Cones and frustums of cones
  2. Applications in welding
- E. Triangle Trigonometry
  1. Angle conversions
     a. Converting between degrees, minutes, and seconds, and decimal degrees
     b. Converting between degree and radian measure
  2. Linear and angular speed
  3. Trigonometric ratios
  4. Solving right triangles
  5. Solving oblique triangles using the Law of Cosines or the Law of Sines
  6. Applications in welding

VI. METHODS OF INSTRUCTION:
- A. **Lecture** -
- B. **Audio-visual Activity** - web-based and/or videos embedded in an e-text
- C. Homework
- D. Assigned readings with questions to be answered in writing
- E. **Classroom Activity** - Collaborative learning activities

VII. TYPICAL ASSIGNMENTS:
- A. Homework
  1. Problems from the text should be assigned for each section covered. The number of problems assigned may vary from section to section and from instructor to instructor, but the homework assignments should include a sufficient number and variety of problems to develop both skill and conceptual understanding. A typical assignment should take an average student 1 to 2 hours for each hour in class.
  2. The majority of the problems assigned should be those for which answers are readily available so that students may obtain immediate feedback on their work.
  3. Homework assignments may include reading the text or viewing tutorial videos. An instructor may require written work in conjunction with such assignments (e.g., have students complete a Q & A sheet related to the assigned reading or tutorial).
- B. Classroom Activity
  1. Collaborative learning, done in small groups of 2-4 students, can be used to introduce new concepts, build skills, or teach problem solving.
  2. Sample Collaborative learning assignment: Working in groups, students apply principles of solid geometry to determine the amount of sheet metal needed to construct a hollow-bodied object in the shape of a prism.

VIII. EVALUATION:
- A. **Methods**
  1. Exams/Tests
  2. Quizzes
  3. Home Work
  4. Other:
     a. Collaborative group activities in class
- B. **Frequency**
  1. Recommend a minimum of three exams plus the final exam
  2. Homework should be assigned for each section covered
  3. The number of quizzes and collaborative activities are at the discretion of the instructor

IX. TYPICAL TEXTS:

1. Carman, Robert, and Hal Saunders. *Mathematics for the Trades.* 10th ed., Pearson Higher Education, Inc., 2015.
2. Ewan, Dale. *Elementary Technical Mathematics.* 12th ed., Cengage, 2019.
3. Peterson, John, and Robert Smith. *Introductory Technical Mathematics.* 7th ed., Cengage, 2019.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

A. Scientific calculator