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**Course Outline for MATH 71B**  
**APPLIED MATHEMATICS FOR TECHNICIANS B**  
**Effective: Fall 2011**

**I. CATALOG DESCRIPTION:**

MATH 71B — APPLIED MATHEMATICS FOR TECHNICIANS B — 1.50 units

This course provides a survey of mathematical techniques used in the technical trades including: an introduction to linear equations; scientific notation; plane and solid geometry; and, triangle trigonometry. There is an emphasis on practical applications related to a variety of technical fields throughout. May not receive credit if Mathematics 71 or 71Y or INDT 74 have been completed.

1.50 Units Lecture

**Prerequisite**

MATH 71A - Applied Mathematics for Technicians A  
with a minimum grade of C  
or

MATH 71X - Math for Technicians  
with a minimum grade of C

**Grading Methods:**

**Discipline:**

	<b>MIN</b>
<b>Lecture Hours:</b>	27.00
<b>Total Hours:</b>	27.00

**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. MATH71A
- B. MATH71X

**IV. MEASURABLE OBJECTIVES:**

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

- A. Accurately perform arithmetic calculations with whole numbers and fractions by hand;
- B. Demonstrate competence using a calculator to perform arithmetic calculations with integers, fractions and decimal numbers;
- C. Demonstrate a knowledge of the English and metric units of length, area, volume, mass, temperature and time;
- D. Solve applied problems involving arithmetic operations and measurement;
- E. Perform length, weight and capacity reductions and conversions between the English and metric systems;
- F. Evaluate and simplify formulas and expressions;
- G. Solve linear equations and formulas using the addition and multiplication principles of equality;
- H. Demonstrate a knowledge of ratios, proportions and percentages;
  - I. Solve applied problems involving ratios, proportions and percentages;
- J. Apply principles of plane geometry to solve problems involving angles, areas and perimeter;
- K. Apply principles of solid geometry to solve problems involving surface area, lateral surface area and volume;
- L. Perform elementary calculations involving trigonometric ratios and radian/degree conversions;
- M. Solve triangle problems using right-triangle trigonometry, the Law of Sines or the Law of Cosines;
- N. Demonstrate an ability to accurately use measuring instruments.

**V. CONTENT:**

- A. Introduction to algebra
  - 1. Evaluating and simplifying algebraic expressions
  - 2. Multiplication and division of algebraic expressions
- 3. Linear equations
  - a. Using the addition and multiplication principles of equality to solve linear equations
  - b. Solving linear equations with grouping symbols
- 4. Formulas
  - a. Evaluation

- b. Solving a formula for a specified letter
  - 5. Solving applied problems by writing and solving equations
- B. Scientific notation
  - 1. Interpreting and understanding scientific notation
  - 2. Converting between decimal form and scientific notation
  - 3. Computations in scientific notation
  - 4. Applications
- C. Plane geometry
  - 1. Angles
    - a. Classification
    - b. Measurement
    - c. Use of a protractor
    - d. Angle relationships related to intersecting or parallel lines
    - e. Angles in a triangle
  - 2. Regular and irregular polygons
    - a. Area
    - b. Perimeter
  - 3. Circles
    - a. Area
    - b. Circumference
  - 4. Applications
- 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
- E. Triangle trigonometry
  - 1. Angle conversions
    - a. Converting between degrees, minutes, seconds and decimal degrees
    - b. Converting between degree and radian measure
  - 2. Linear and angular speed
  - 3. Pythagorean Theorem
  - 4. Trigonometric ratios
  - 5. Solving right triangles
  - 6. Solving oblique triangles
    - a. Law of Sines
    - b. Law of Cosines

#### VI. METHODS OF INSTRUCTION:

- A. Lecture or Tutorials
- B. Group and individual activities in class
- C. Homework
- D. Assigned readings in the text

#### 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 (e.g., from the answer appendix in the text), so that students may obtain immediate feedback on their work. 3. Homework assignments may include reading the text. Students may be asked to read sections in advance of the lecture and then to re-read them after the lecture, to reinforce important concepts and skills. An instructor may require written work in conjunction with the reading assignments (e.g., have students complete a Q & A sheet related to the assigned reading). 4. Tutorials and videos may be assigned to supplement reading and instruction B. In-Class 1. Collaborative learning, done in small groups of 2-4 students, can be used to introduce new concepts, build skills, or teach problem solving. Students may be asked to present their results. 2. Sample collaborative learning assignment: Students use measuring tools to determine the dimensions of physical objects and then use geometric formulas to compute the lateral surface area, surface area and volume of the objects. 3. Sample collaborative learning assignment: Students work together to solve applied problems involving the Law of Sines and the Law of Cosines.

#### VIII. EVALUATION:

##### A. **Methods**

- 1. Exams/Tests
- 2. Quizzes
- 3. Projects
- 4. Group Projects
- 5. Home Work
- 6. Other:
  - a. Methods
    - 1. Examinations (in-class)
    - 2. Comprehensive final examination
    - 3. Any of all of the following at the discretion of the instructor
      - a. Homework
      - b. Quizzes (announced or unannounced, in-class or take home)
      - c. Collaborative group activities
      - d. Projects

##### B. **Frequency**

- 1. Frequency
  - a. Recommend a minimum of four exams plus the final
  - b. Homework should be assigned for each section covered
  - c. Number of quizzes and collaborative activities are at the discretion of the instructor

IX. TYPICAL TEXTS:

1. Carman, Robert A., and Hal M. Saunders *Mathematics for the Trades*. 8th ed., Pearson-Prentice Hall, 2008.
2. Achatz, Thomas, and John G. Anderson *Technical Shop Mathematics*. 3rd ed., Industrial Press, Inc, 2005.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

- A. Scientific calculator, six-inch protractor-ruler.