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Course Outline for MATH 71A
APPLIED MATHEMATICS FOR TECHNICIANS A
Effective: Fall 2017

I. CATALOG DESCRIPTION:

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

This course provides a survey of mathematical techniques used in the technical trades including: Arithmetic, both by-hand and with calculator; ratios, rates and proportions; metric and U.S. systems of measurement. There is an emphasis on practical applications related to a variety of technical fields throughout.

1.50 Units Lecture

Grading Methods:

Letter or P/NP

Discipline:

	MIN
Lecture Hours:	27.00
Total Hours:	27.00

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

III. PREREQUISITE AND/OR ADVISORY SKILLS:

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. Demonstrate a knowledge of ratios, proportions and percentages;
- G. Solve applied problems involving ratios, proportions and percentages;
- H. Demonstrate an ability to accurately use measuring instruments.

V. CONTENT:

- A. Whole number arithmetic
 - 1. Addition, subtraction, multiplication and division of whole numbers
 - 2. Order of operations
 - 3. Applications
- B. Fraction arithmetic
 - 1. Addition, subtraction, multiplication and division of fractions
 - 2. Proper and improper fractions
 - 3. Mixed numbers
 - 4. Conversion between improper and mixed number forms
 - 5. Applications
- C. Decimal Arithmetic
 - 1. Place-value and reading and writing decimal numbers
 - 2. Addition, subtraction, multiplication and division of decimal numbers
 - 3. Fraction/decimal conversions
- D. Signed numbers and real number arithmetic
 - 1. Addition, subtraction, multiplication and division of signed numbers
 - 2. Exponents
 - 3. Square roots
- E. Calculator computations
 - 1. Arithmetic with signed real numbers (integers, fractions and decimals)
 - 2. Evaluating integer powers and square roots
 - 3. Order of operations
- F. Ratios, rates and proportions
 - 1. Writing, simplifying and interpreting ratios and rates
 - 2. Solving proportions
 - 3. Direct and inverse proportion and similar triangles
 - 4. Applications
- G. Percentages

1. Meaning of percent
 2. Fraction/decimal/percent conversions
 3. Solving percent equations
 4. Applications
- H. Measurement
1. Precision and accuracy of measurement figures
 2. Units of measure
 3. Addition, subtraction, multiplication and division of measurement figures to a specified degree of accuracy
 4. Accurate use of measurement scales and tools, including micrometers and calipers
- I. English and metric systems of measurement
1. English measurement system units of measure
 2. Conversions between units of measure in the English system
 3. Metric measurement system units of measure
 4. Conversions between units of measure in the metric system
 5. Converting between metric and English systems of measure

VI. METHODS OF INSTRUCTION:

- A. **Classroom Activity** -
- B. **Lecture** - or Tutorial
- C. **Written exercises and case studies** -
- D. **Directed Study** -
- E. **Individualized Instruction** -
- F. **Audio-visual Activity** -

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: Using measurement tools such as protractors and calipers, students practice measuring a variety of objects and answer questions about precision and accuracy. Students compare answers to check the validity of their work and assist each other in using the tools.
 3. Sample collaborative learning assignment: Given a to-scale drawing, students use measurement tools to determine the sizes of the figures drawn, then use ratios and proportions to convert the measurements to real-world dimensions.

VIII. EVALUATION:

A. **Methods**

1. Exams/Tests
2. Quizzes
3. Projects
4. Group Projects
5. Class Participation
6. Class Work
7. Home Work
8. Lab Activities

B. **Frequency**

1. Recommend a minimum of four exams plus the final
2. Homework should be assigned for each section covered
3. 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*. 9th ed., Pearson-PrenticeHall, 2015.
2. Washington, Allyn. *Basic Technical Mathematics*. 10th ed., Pearson, 2014.
3. Peterson, John, and Robert Smith. *Introductory Technical Mathematics*. 6th ed., Cengage, 2013.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

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