

# Syllabus

## MATH 1020 TECHNICAL MATH

2015

### Committee Members:

Melissa Kosch, Central Community College  
Kathy Woitaszewski, Central Community College  
Cathy Brunkhorst, Metropolitan Community College  
Chad Swanson, Mid-Plains Community College  
Tom Sullivan, Northeast Community College  
Kent Vollenweider, Southeast Community College

*Tom Sullivan*

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**Facilitator**

Date Reviewed: \_\_\_\_\_

*Jody Tomanek*

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**NCCA Council of Chief Academic Officers Chair**

Date Approved: \_\_\_\_\_

*May 21, 2015*

**I. CATALOG DESCRIPTION:**

**MATH 1020 Technical Mathematics**

**Pre-Requisites/Co-Requisites:** Appropriate assessment score

**Description:** This course provides the math skills required in career/technical fields. The course includes a review of arithmetic operations, exponents, algebraic operations, and right triangle trigonometry with emphasis placed applications.

**Credit/Contact Hour Designation:** 3 semester credit hours; 4.5 quarter credit hours; 45 contact hours

**II. COURSE OBJECTIVES:** Course will

1. Apply arithmetic properties
2. Apply measurement concepts to real-world applications
3. Apply ratios and proportions to problem-solving for technical applications
4. Apply formula manipulation and evaluation for problem solving for unknown values
5. Apply geometric formulas and concepts to problem solving of technical applications
6. Apply right triangle relationships to problem solving of technical applications.

**III. STUDENT LEARNING OUTCOMES:** Students will be able to

1. Apply arithmetic to technical applications.
2. Find and convert measurements.
3. Compare quantities in ratio form and by solving both direct and inverse proportions.
4. Analyze and manipulate formulas for problems with unknown values.
5. Identify and apply perimeter, area, and volume formulas for two-dimensional and three-dimensional figures.
6. Solve right triangles.

**IV. CONTENT/TOPICAL OUTLINE**

A. Arithmetic

- i. Review of operations with whole numbers, fractions, and decimals
- ii. With and without technology

B. Percent

- i. Convert between fractions, decimals, and percents
- ii. Solve percent problems for base, percent, or amount given two of the quantities
- iii. Apply percents to real world applications, ie. sales tax, discount, tolerance, commission

C. Ratios, Proportions, Inverse & Direct Variation

D. Measurement Systems

- i. Metric to metric conversions for length, area, volume, and weight

The minimum expectation is that the metric prefixes from kilo- to milli- are memorized.

- ii. English to English conversions for length, area, volume, and weight

The minimum expectation is that the conversions listed are memorized:

Inches, feet, yards

Ounces, pounds, ton

Fluid ounces, cups, pints, quarts, gallons

iii. Metric to English conversions, and vice versa, for length, area, volume, and weight

The minimum expectation is that the following conversions are memorized:

1 inch = 2.54 centimeters

1 pound = 2.2 kilograms

1 quart = 1.06 liters

E. Significant Digits, Precision, Accuracy

F. Measuring Tools

- i. Measure with a variety of tools, including the ruler, tape measure, caliper, and micrometer.
- ii. Read a Vernier scale on micrometers and calipers.

G. Scientific Notation

- i. Convert between standard notation and scientific notation
- ii. Multiply and divide numbers in scientific notation

H. Exponential Notation and Square Roots

I. Operations with Integers

- i. With and without technology

J. Order of Operations

- i. Include square roots and powers

K. Algebra

- i. Translate an English phrase to a mathematical equation
- ii. Isolate a variable in an equation
- iii. Solve one and two-step equations
- iv. Manipulate and evaluate formulas

L. Geometry

- i. Classify angles
- ii. Measure angles with a protractor
- iii. Determine the value of angles in relationship with a transversal
- iv. Identify polygons, ie. triangles, quadrilaterals, pentagons, hexagons
- v. Calculate area and perimeter of basic shapes, ie. squares, rectangles, parallelograms, triangles, circles
- vi. Calculate volume of basic solids, ie. prisms, cylinders, spheres
- vii. Calculate the area and volume of irregular shapes consisting of the basic shapes

Note: A reference sheet with formulas will be provided.

M. Right Triangle Trigonometry

- i. Apply the Pythagorean Theorem.
- ii. Find the sine, cosine, and tangent of an angle.
- iii. Solve right triangles for all sides and angles.
- iv. Solve real world applications involving right triangles.

Note: Definitions of the sine, cosine, and tangent ratios are to be memorized.

**V. INSTRUCTIONAL MATERIALS:**

- A. Mathematics for the Trades, 10<sup>th</sup> Edition, Saunders & Carman
- B. Elementary Technical Mathematics, 11<sup>th</sup> Edition, Cengage
- C. add program specific books – ie Northeast drafting book

Supplemental materials:

Measuring tools or online simulators (tape measure, micrometer, caliper and other measuring tools)

Scientific calculator

**VI. METHOD OF PRESENTATION**

- A. Methods of presentation are determined by the instructor. They traditionally include some combination of the following:
  1. Lecture
  2. Small Group Discussion
  3. Speaker Presentation
  4. MyLabPlus
  5. Online/Hybrid
  6. Engaged Learning Experience Activities
  7. Lab Setting

**VII. METHOD OF EVALUATION**

- A. Methods of evaluation are determined by the instructor. They traditionally include some combination of the following:
  1. Unit Tests
  2. Comprehensive Final Exam
  3. Quizzes
  4. Assignments- Written, Hands-on Application, and/or MyLabPlus

**VIII. INSTITUTIONAL DEFINED SECTION**

(to be used at the discretion of each community college as deemed necessary)