



# **ILLINOIS VALLEY COMMUNITY COLLEGE**

## **COURSE OUTLINE**

**DIVISION: Natural Science & Business**

**COURSE: MTH 1206 Technical Mathematics I**

Date: Spring 2021

Credit Hours: 3

Prerequisite(s): Appropriate placement or completion of MTH 0910 with a C or better

Delivery Method:

<input checked="" type="checkbox"/> Lecture	<b>3 Contact Hours (1 contact = 1 credit hour)</b>
<input type="checkbox"/> Seminar	<b>0 Contact Hours (1 contact = 1 credit hour)</b>
<input type="checkbox"/> Lab	<b>0 Contact Hours (2-3 contact = 1 credit hour)</b>
<input type="checkbox"/> Clinical	<b>0 Contact Hours (3 contact = 1 credit hour)</b>
<input checked="" type="checkbox"/> Online (VCM)	
<input type="checkbox"/> Blended	

Offered:  Fall     Spring     Summer

IAI Equivalent – **Only for Transfer Courses**–go to <http://www.itransfer.org>:

### **CATALOG DESCRIPTION:**

This course in Technical Mathematics includes topics in arithmetic, the metric system, selected topics in basic algebra, practical geometry and right triangle trigonometry. Emphasis is on the use of mathematics to solve typical job problems. An individualized study approach is used.

## GENERAL EDUCATION GOALS ADDRESSED

*[See last page for Course Competency/Assessment Methods Matrix.]*

### Upon completion of the course, the student will be able:

*[Choose up to three goals that will be formally assessed in this course.]*

- To apply analytical and problem solving skills to personal, social, and professional issues and situations.
- To communicate successfully, both orally and in writing, to a variety of audiences.
- To construct a critical awareness of and appreciate diversity.
- To understand and use technology effectively and to understand its impact on the individual and society.
- To develop interpersonal capacity.
- To recognize what it means to act ethically and responsibly as an individual and as a member of society.
- To recognize what it means to develop and maintain a healthy lifestyle in terms of mind, body, and spirit.
- To connect learning to life.

### EXPECTED LEARNING OUTCOMES AND RELATED COMPETENCIES:

*[Outcomes related to course specific goals. See last page for more information.]*

#### Upon completion of the course, the student will be able to:

1. Demonstrate a working knowledge of arithmetic.
  - 1.1. Perform the operations of adding, subtracting, multiplying, and dividing on whole numbers, fractions, decimals, and signed numbers.
  - 1.2. Perform operations in the correct order on problems that contain different operations, parenthesis, and exponents.
  - 1.3. Substitute given values into formula and calculate the unknown.
  - 1.4. Apply the operations of arithmetic to determine solutions to applied problems.
  - 1.5. Solve percentage problems.
  - 1.6. Write numbers in scientific notation.
2. Demonstrate a working knowledge of the English and Metric Systems of measurement.
  - 2.1. Know the relationship between various measurements in the English system and be able to connect one to the other.
  - 2.2. Learn the basic units and common prefixes of the SI metric system relating to length, mass, weight, volume, area, time, and temperature.
  - 2.3. Convert within the metric system.
  - 2.4. Apply the rules for precision and accuracy to solutions of problems.
3. Demonstrate the ability to manipulate polynomials.
  - 3.1. Simplify algebraic expressions.
  - 3.2. Add and subtract monomials and polynomials.
4. Demonstrate the ability to solve equations and formulas.
  - 4.1. Determine if a given value is a solution of a given equation.
  - 4.2. Solve linear equations in one variable.
  - 4.3. Solve formulas for one variable in terms of other variables.

5. Demonstrate a working knowledge of ratio and proportion.
  - 5.1. Use ratios to compare quantities.
  - 5.2. Solve a proportion when one element is unknown.
  - 5.3. Use direct and inverse variation to solve problems.
6. Demonstrate a working knowledge of geometry.
  - 6.1. Recognize and define angle, vertex, acute, right, obtuse, intersection lines, parallel, lines, perpendicular lines, complementary angles, supplementary angles, vertical angles, and polygons.
  - 6.2. Use a protractor to measure angles.
  - 6.3. Use the properties of parallel lines to determine angle measure.
  - 6.4. Recognize the following figures and know the formulas for finding area and perimeter: rectangle, square, parallelogram, rhombus, trapezoid, and triangle.
  - 6.5. Use a calculator and Pythagorean Theorem to calculate one side of a right triangle when the two other sides are given.
  - 6.6. Use the properties of similarity to find the missing information in various similar figures.
  - 6.7. Find area and circumference of circles.
  - 6.8. Define central angle, inscribed angle, arc, chord, tangent, and secant.
  - 6.9. Convert between degree measure and radians.
  - 6.10. Find the area of a sector of a circle.
  - 6.11. Find surface area and volume of prisms, cylinders, pyramids, cones, and spheres.
7. Demonstrate a working knowledge of right triangle trigonometry.
  - 7.1. Calculate sine, cosine, and tangent ratios given the sides of a triangle.
  - 7.2. Use a calculator to find sine, cosine, and tangent of angles.
  - 7.3. Find the degree measure of an angle given its sine, cosine, or tangent.
  - 7.4. Solve right triangles.
  - 7.5. Apply trigonometric ratios to applied problems.

### **MAPPING LEARNING OUTCOMES TO GENERAL EDUCATION GOALS**

*[For each of the goals selected above, indicate which outcomes align with the goal.]*

<b>Goals</b>	<b>Outcomes</b>
First Goal	
To connect learning to life.	1.1. Perform the operations of adding, subtracting, multiplying, and dividing on whole numbers, fractions, decimals, and signed numbers. 1.5. Solve percentage problems. 2.1. Know the relationship between various measurements in the English system and be able to connect one to the other. 2.3. Convert within the metric system. 5.1. Use ratios to compare quantities. 6.4. Recognize the following figures and know the formulas for finding area and perimeter: rectangle, square, parallelogram, rhombus, trapezoid, and triangle.

	<p>6.5. Use a calculator and Pythagorean Theorem to calculate one side of a right triangle when the two other sides are given.</p> <p>6.7. Find area and circumference of circles.</p> <p>6.11. Find surface area and volume of prisms, cylinders, pyramids, cones, and spheres.</p> <p>7.5. Apply trigonometric ratios to applied problems.</p>
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## **COURSE TOPICS AND CONTENT REQUIREMENTS:**

- I. Basic concepts
  - a. Addition, subtraction, multiplication, and division of whole numbers
  - b. Addition, subtraction, multiplication, and division of fractions
  - c. Addition, subtraction, multiplication, and division of decimals
  - d. Addition, subtraction, multiplication, and division of signed numbers
  - e. Order of operations
  - f. Formulas
  - g. Prime factorization
  - h. Scientific notation
  - i. Percents
- II. Metric and English systems
  - a. Basic units
  - b. Conversion factors within systems
  - c. Precision and accuracy
- III. Basic algebra
  - a. Operations with polynomials
  - b. Simplifying algebraic expressions
  - c. Solving equations in one variable
  - d. Formulas
- IV. Ratios and proportion
  - a. Definition
  - b. Applications using ratios
  - c. Applications using proportions
  - d. Percents
  - e. Direct variation with application
  - f. Inverse variation with application
- V. Geometry
  - a. Angles and polygons
  - b. Quadrilaterals
  - c. Triangles
  - d. Similar polygons
  - e. Circles
  - f. Radian measure
  - g. Prisms
  - h. Cylinders
  - i. Pyramids and cones

- j. Spheres
  - k. Applications
- VI. Trigonometry
- a. Ratios
  - b. Finding angles with ratios
  - c. Finding sides with ratios
  - d. Solving right triangles
  - e. Applications

**INSTRUCTIONAL METHODS:**

- Lectures
- Small group/one-on-one discussion
- Discussion boards
- Class participation and activities
- Computer assignments (homework, section videos, examples, etc.)
- Quizzes
- Unit Tests

**INSTRUCTIONAL MATERIALS:**

**Text:** Introduction to Technical Mathematics, Washington, Triola & Reda, 5<sup>th</sup> edition, Pearson.

**Computer software:** MyMathLab

**STUDENT REQUIREMENTS AND METHODS OF EVALUATION:**

8 unit tests—100 points each

A minimum grade of 75% is required on each test

1 comprehensive final exam—100 points

MyMathLab assignments

Quizzes

A= 91-100

B= 82-90.9

C= 74.5-81.9

D= 65-74.4

F= 0-64.9

**OTHER REFERENCES**

How to solve Word Problems in Algebra: A Solved Problem Approach, Mildred Johnson, McGraw-Hill, 1976.

Elementary Technical Mathematics, Ewen and Nelson, et al, 7<sup>th</sup> edition, Brooks/Cole Publishing, Pacific Grove, California.

# Course Competency/Assessment Methods Matrix

MTH 1206	Assessment Options																																		
<p>For each competency/outcome place an "X" below the method of assessment to be used.</p>	Assessment of Student Learning	Article Review	Case Studies	Group Projects	Lab Work	Oral Presentations	Pre-Post Tests	Quizzes	Written Exams	Artifact Self Reflection of Growth	Capstone Projects	Comprehensive Written Exit Exam	Course Embedded Questions	Multi-Media Projects	Observation	Writing Samples	Portfolio Evaluation	Real World Projects	Reflective Journals	Applied Application (skills) Test	Oral Exit Interviews	Accreditation Reviews/Reports	Advisory Council Feedback	Employer Surveys	Graduate Surveys	Internship/Practicum /Site Supervisor Evaluation	Licensing Exam	In Class Feedback	Simulation	Interview	Written Report	Assignment			
	Direct/ Indirect	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	I	I	I	I	D	D									
<p>Assessment Measures – Are direct or indirect as indicated. List competencies/outcomes below.</p>																																			
<p>1.1. Perform the operations of adding, subtracting, multiplying, and dividing on whole numbers, fractions, decimals, and signed numbers.</p>								X	X					X																					X
<p>1.2. Perform operations in the correct order on problems that contain different operations, parenthesis, and exponents.</p>								X	X					X																					X
<p>1.3. Substitute given values into formula and calculate the unknown.</p>								X	X					X																					X
<p>1.4. Apply the operations of arithmetic to determine solutions to applied problems.</p>								X	X					X																					X
<p>1.5. Solve percentage problems.</p>								X	X					X																					X







