

THE SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY  
SAULT STE. MARIE, ON



COURSE OUTLINE

Course Title: Applied Resource Calculations

Code No.: MTH107-3

Semester: One

Program(s): Forestry Technician, Fish & Wildlife Technician,  
Parks and Outdoor Recreation

Author: The Mathematics Department

Date: August 2003

Previous Outline Dated: August 2002

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

Total Credits: 3

Prerequisite(s): None

Hours/week: 3

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**I. COURSE DESCRIPTION:**

This course includes a review of basic algebraic processes, estimation, the metric system, practical applications in plane and solid geometry, word problems, ratio, proportion and percent.

**II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:****A. Learning Outcomes**

1. Perform calculations using exact and approximate numbers
2. Use different units of measure
3. Apply the basic concepts of plane geometry to solve problems
4. Apply the basic concepts of solid geometry to solve problems
5. Use basic algebraic concepts to solve problems
6. Apply the concepts of ratio, proportion, variation, and percentage to solve problems

**B. Learning Outcomes and Elements of the Performance**

1. Perform calculations using exact and approximate numbers.

**Potential Elements of the Performance:**

- Categorize numbers as exact or approximate
  - Know the three rules for significant digits
  - Determine the number of significant digits contained in an approximate number
  - Define accuracy
  - Round a given number off to the indicated accuracy
  - Add, subtract, multiply, and divide with approximate numbers
  - Write a given number using scientific notation
2. Use different units of measure.

**Potential Elements of the Performance:**

- Use the International System of Units (SI)
- Evaluate and use the SI prefixes
- Convert from one SI (metric) unit to another
- Convert within the British/American customary system
- Convert between metric units and British units
- Perform calculations with denominate numbers

**II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE  
(continued):**

3. Apply the basic concepts of plane geometry to solve problems.

**Potential Elements of the Performance:**

- Define properties of lines and angles
- Define the measurement of angles
- Explain the meaning of the perimeter and vertices of a polygon
- Know the names of some common polygons
- List and describe six triangular shapes
- List and describe five quadrilateral shapes
- Find the perimeter and area of a rectangle or square given its length and width
- Find the perimeter and area of a parallelogram given its length and height
- Find the perimeter and area of a triangle and trapezoid given its base and height
- Explain what is meant by a right triangle, an isosceles right triangle, a  $30^\circ - 60^\circ$  right triangle, and an equilateral triangle
- State and use the Pythagorean theorem to find the side length of a right triangle
- Explain what is meant by the radius, diameter, chord, segment, and sector of a circle
- Find the circumference of a circle given its radius or diameter
- Find the diameter or radius of a circle given its circumference
- Find the area of a circle given its radius or circumference
- Find the diameter or radius of a circle given its area
- Find the area of a ring

4. Apply the basic concepts of solid geometry to solve problems.

**Potential Elements of the Performance:**

- Find the surface area and volume of a rectangular prism
- Find the surface area and volume of a triangular prism
- Find the surface area and volume of a cylinder
- Find the surface area and volume of a hollow cylinder
- Find the surface areas and volumes of square, rectangular, and triangular right pyramids
- Find the surface area and volume of a cone
- Find the surface area and volume of a frustum of a pyramid
- Find the surface area and volume of a frustum of a cone
- Find the surface area and volume of a sphere

**II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE  
(continued):**

5. Use basic algebraic concepts to solve problems.

**Potential Elements of the Performance:**

- Evaluate signed numbers
- Perform operations with signed numbers
- Simplify roots and powers of signed numbers
- State the definition of a variable, expression, and term
- Identify and define an equation
- Separate a term into variables and constants
- Identify the symbols of grouping
- Add and subtract polynomials
- Use the law of exponents in multiplication and division
- Multiply two or more monomials
- Multiply a monomial by a multinomial
- Multiply two binomials
- Multiply two or more multinomials
- Raise a multinomial to a power
- Simplify an expression by removing grouping symbols
- Divide a monomial by a monomial
- Divide a polynomial by a monomial
- Define an equation
- Substitute numerical values into equations
- Substitute denominate numbers into a formula
- Identify the degree of an equation
- Solve a simple equation
- Solve simple literal equations
- Factor by common factoring
- Factor by grouping
- Factor a difference of squares
- Factor a simple trinomial
- Factor a general trinomial
- Define an algebraic fraction
- Identify and manipulate equivalent algebraic fractions
- Reduce an algebraic fraction to lowest terms
- Multiply and divide algebraic fractions
- Add and subtract algebraic fractions

**II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE  
(continued):**

6. Apply the concepts of ratio, proportion, variation, and percentage to solve problems.

**Potential Elements of the Performance:**

- Define the concept of a ratio
- Define a proportion
- Find missing terms of a proportion
- Apply the principles of proportions to rates and similar figures
- Define a direct variation
- Determine a constant of proportionality
- Apply joint, inverse, and combined variation
- Define with respect to percent problems: base, amount, and rate
- Convert fractions or mixed number to a percent
- Convert percents to decimals
- Convert a percent to a common fraction
- Solve percentage problems, for various missing elements such as amount, base, or rate
- Solve problems involving percent change

**III. TOPICS TO BE COVERED:****Approximate Time Frame**

- |                                   |          |
|-----------------------------------|----------|
| 1. a) Estimation                  |          |
| b) Dimensional Analysis           | 8 hours  |
| c) The Metric and British System  |          |
| 2. Plane Geometry                 | 6 hours  |
| 3. Solid Mensuration              | 10 hours |
| 4. Elementary Algebra             | 16 hours |
| 5. Ratio, Proportion, and Percent | 8 hours  |

**IV. LEARNING ACTIVITIES:**

<b>TOPIC NUMBER</b>	<b>TOPIC DESCRIPTION</b>	<b>REFERENCE CHAPTER ASSIGNMENTS</b>	
<b>1.0</b>	<b>Estimation, Dimensional Analysis and Units Rounding</b>	<b>Chapter 3</b>	
1.1	Approximate numbers and rounding off procedures	Ex:	3-1 p. 55 3-2 p. 57 3-3 p. 59 3-4 p. 61 3-5 p. 64 3-6 p. 69 3-7 p. 71
1.2	Dimensional analysis for conversion between systems of measure and within systems	Ex.	4-1 p.77
1.3	The "SI" metric system and the British Engineering System	Ex.	4-2 p. 80 4-3 p. 82 4-4 p. 84 Class notes
<b>2.0</b>	<b>Plane Geometry</b>	<b>Chapter 13</b>	
2.1	Lines and angles	Ex.	13-1 p. 241
2.2	Triangles		13-2 p. 249 13-3 p. 255
2.3	Quadrilaterals		13-4 p. 262
2.4	Definition and theorems of the circle		13-5 p. 266
2.5	Review		Review exercise p. 268
<b>3.0</b>	<b>Solid Mensuration</b>		
3.1	Prisms	Ex.	14-1 p. 275
3.2	Cylinders		14-2 p. 279
3.3	Pyramids and Cones		14-3 p. 285
3.4	Frustum		Class notes
3.5	Spheres		14-4 p. 287
<b>4.0</b>	<b>Review of Elementary Algebra</b>		
4.1	Operations with signed numbers	Ex.	6-1 p. 104 6-2 p. 106 6-3 p. 109 6-4 p. 112 6-5 p. 115

**IV. LEARNING ACTIVITIES:**

TOPIC NUMBER	TOPIC DESCRIPTION	REFERENCE CHAPTER ASSIGNMENTS	
4.2	Introduction to Algebra: i) Adding and subtracting ii) Laws of exponents	Ex.	7-1 p. 126 7-2 p. 130 7-3 p. 136
4.3	a) Multiplication of algebraic expressions including Special Products	Ex.	8-1 p. 141 8-2 p. 143 8-3 p. 145 8-4 p. 147 8-5 p. 149 8-6 p. 150
	b) Division of algebraic expressions	Ex.	9-1 p. 156 9-2 p. 158
4.4	Solutions and properties of linear equations	Ex.	10-1 p. 167 10-2 p. 173 10-3 p. 175
4.5	Factoring	Ex.	16-1 p. 323 16-2 p. 327 16-3 p. 332 16-4 p. 338
4.6	Equivalent fractions	Ex.	17-1 pp. 350-351
4.7	Multiplication and division of fractions	Ex.	17-2 pp. 355-356
4.8	Addition and subtraction of fractions	Ex.	17-3 pp. 362-363
<b>5.0</b>	<b>Ratio, Proportion and Variation</b>		
5.1	Write the ratio of numbers or quantities in simplest form	Ex.	26-1 p. 588
5.2	Solve a proportion for an unknown term	Ex.	26-2 pp. 593-595
5.3	Direct variation	Ex.	26-3 pp. 600-602
5.4	Joint, inverse and combined variations	Ex.	26-4, pp. 607-609
5.5	Review exercises		pp. 609-611
5.6	Converting to and from percent	Ex.	5-1 p. 90
5.7	Solving percentage problems	Ex.	5-2 pp. 92-94
5.8	Percent change	Ex.	5-3 pp. 96-97

**V. REQUIRED RESOURCES / TEXTS / MATERIALS:**

1. Introductory Algebra and Trigonometry with Applications, by Calter, P. and Rogers, C. F.
2. Calculator: (Recommended) SHARP Calculator EL-531. *The use of some kinds of calculators may be restricted during tests.*

**VI. EVALUATION PROCESS/GRADING SYSTEM:****MAJOR ASSIGNMENTS AND TESTS**

Regular topic tests will contribute a minimum of **60%** of the overall mark.

While regular tests will normally be scheduled and announced beforehand, there may be an unannounced test on current work at any time. Such tests, at the discretion of the instructor, may be used for up to **30%** of the overall mark.

The instructor will provide you with a list of test dates and other required evaluation information for your class section. Tests may be scheduled out of regular class time.

**ATTENDANCE**

It is your responsibility to attend all classes during the semester. Research indicates there is a high correlation between attendance and student success.

If you are absent from class, it is your responsibility to find out what work was covered and assigned and to complete this work before the next class. Your absence indicates your acceptance of this responsibility.

**Unexcused absence from a test may result in a mark of zero (“0”).** Absence may be excused on compassionate grounds such as verified illness or bereavement. On return from an excused absence, you should ask your instructor to schedule the writing of a make-up test. Failure to do so will be considered as an unexcused absence.

**METHOD OF ASSESSMENT (GRADING METHOD)**

The following semester grades will be assigned to students in postsecondary courses:

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 - 100%	4.00
A	80 - 89%	3.75
B	70 - 79%	3.00
C	60 - 69%	2.00
F (Fail)	59% and below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field /clinical placement or non-graded subject area.	
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.	
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.	
NR	Grade not reported to Registrar's office.	
W	Student has withdrawn from the course without academic penalty.	

**VI. EVALUATION PROCESS/GRADING SYSTEM (Continued):**

The method of calculating your weighted average will be defined by your instructor. Since grades are based upon averages, it follows that good marks in some tests can compensate for a failing mark in another test.

**Make-Up Test (if applicable)**

An “X” grade may be assigned at the end of the regular semester if you have met **ALL** of the following criteria for the course:

- an overall average between 50% and 59% was achieved
- at least 50% of the tests were passed
- at least 80% of the scheduled classes were attended
- at least 80% of quizzes and assignments were submitted
- all of the topic tests were written

If you are assigned an “X” grade, you may convert it to a “C” grade by writing a make-up test on topics agreed to by the instructor. This test will be available at the time agreed to by your instructor.

At the end of the regular term, it is your responsibility to obtain your results from your instructor and, in the event of an “X” grade, to inquire when the make-up test will be available.

The score you receive on this make-up test will replace your original test score and be used to re-calculate your weighted average. If the re-calculated average is 60% or greater, a “C” grade will be assigned. If the re-calculated average is 59% or less, an “F” grade will be assigned.

**“F” and “X” Grades at the end of the Semester**

If an “X” grade is not cleared by the specified date, it will become an “F” grade. Except for extenuating circumstances, an “X” grade in Math will not be carried into the next semester.

**VII. SPECIAL NOTES:**Special Needs:

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your instructor and/or the Special Needs office. Visit Room E1204 or call Extension 493 so that support services can be arranged for you.

Retention of course outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

**VII. SPECIAL NOTES (continued):**Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student Rights and Responsibilities*. Students who engage in “academic dishonesty” will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course outline amendments:

The Professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

**VII. PRIOR LEARNING ASSESSMENT:**

Students who wish to apply for advanced credit in the course should consult the professor or the Coordinator, Mathematics Department. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

There is a MTH107 Challenge exam in place.

**VIII. DIRECT CREDIT TRANSFERS:**

Students who have completed an equivalent post-secondary course must bring relevant documents to the Coordinator, Mathematics Department:

- a copy of course outline
- a copy of the transcript verifying successful completion of the equivalent course

Note: A copy of the transcript must be on file in the Registrar's Office.