

SAULT COLLEGE
of Applied Arts and Technology
Sault Ste. Marie

COURSE OUTLINE

MATHEMATICS

MTH 126-4

(All Technicians except for
Mechanical, Electrical and
Aviation.)

revised June igsi

r4MATHEMATICS (MTH 126-4)

TEXT:

"Essentials of Mathematics"; Fourth Edition, (Person)

REFERENCES:

"Technical Mathematics"; Third Edition, (Rice and Knight)

"Elementary Technical Mathematics"; Second Edition, (Juszli and Rogers)

"Examples in Practical Mathematics"; (L. Turner)

"Basic Mathematics for Science and Engineering"; (Andres et al)

"Basic Mathematics for Electronics"; (N. Cooke)

"National Certificate ,Mathematics"; Volumes 1 and 2, (Abbot et al)

"Basic Mathematics for Technical Courses"; (Tuites)

"Senior Algebra for High Schools"; (Petrie et al)

"Trigonometry and Statistics"; (Petrie et al)

"Problems in Practical Mathematics"; (William and Straka)

"Mathematics for Students of Building"; (Jury and Hasslen)

"Technical Mathematics with Calculus"; Second Edition, (Rice and Knight)

"Basic Technical Mathematics with Calculus"; (Washington)

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NOTES:

This course outline covers the second semester mathematics for Forestry, Civil, Architectural, Construction, Geology and Chemistry Technicians only.

For the convenience of the instructors, the topics have been arranged into sections. The reference texts are mostly "Essentials of Mathematics" (Person) or "Introduction to Technical Mathematics" (Washington). When another text is to be used^ it is indicated by letters.

R K = Technical Maths with Calculus by Rice and Knight
S L = Applied Maths for Eng. & Science by Shere and Love
J R = Elementary Technical Mathematics by Juszli and Rodgers

The topic exponents and radicals is to be covered completely in this semester with emphasis on manual calculation procedures. Film strips 1114 and 1150 can be used as instructional aids.

*The topic of Ratio and Proportion is well illustrated in the reference book "Senior Algebra for High Schools" (Petrie). Emphasis should be on course-related examples.

For use of logarithmic tables and computations with logarithms will be required in surveying.

The review of definitions of trig, functions could be done by using film strip 1143, The degree system, along with the use of natural trig, functions and tables and the solution of right triangles are covered as an aid to other subject areas.

The law of Sines and Cosines can also be demonstrated by film strips 1158 and 1169 respectively. When possible, subject related problems should be given for application.

TOPICAL OBJECTIVES

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TOPIC NO. 1: Fractional Equations and Formulas

The student will be required to:

- a) Solve equations with fractions and verify the results.
- b) Solve a literal equation or formula for any unknown quantity, (literal number), in terms of all the others.
- c) Solve work problems that require the use of the above knowledge.

TOPIC NO. 2: Systems of Linear Equations

The Student will be required to:

- a) Solve a system containing two linear equations with two unknowns by the following methods:
 1. elimination by addition and subtraction.
 2. elimination by substitution.
 3. elimination by comparison.
 4. determinants (optional)
- b) Solve a system of equations with three or more unknowns.
- c) Solve practical, miscellaneous problems involving two or more linear equations. ^ fl

TOPIC NO. 3: Graphs, Graphical Solutions, Straight Lines

The student will be required to:

- a) become familiar with the Cartesean Co-ordinate plane and how to plot points on it.
- b) plot the graph of a linear equation of two unknowns.
- c) use a graph to solve two simultaneous linear equations.
- d) learn the definition of how to calculate the slope of a line.

TOPIC NO. 4: Exponents & Radicals

The student will be required to:

- a) know and use the laws of exponents (position, zero, negative, and fraction) and to perform the basic arithmetic operations on algebraic expressions that contain them.
- b) know and use the laws of radicals and to perform the basic arithmetic operations on expressions that contain them.
- c) -understand the concept of scientific notations and learn manual arithmetic ways to evaluate powers and roots of diverse number quantities.

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TOPIC NO.	PERIODS	TOPIC DESCRIPTION	REFERENCE
1	- 6	<u>Fractional Equations and Formulae</u> Equations with fractions Literal equations and formulae Word Problems	Person Ch. 13
2	4	<u>Systems of Linear Equations</u> Algebraic methods of solution Systems of two or more unknowns Word Problems Determinants (optional)	Person Ch. 14
3	6	<u>Graphs, Graphical Solutions, Straight Lines</u> Rectangular co-ordinate system Graph of a linear equation Graphical Solution of Two Simutaneous Equations Slope of a line (optional) Graphs of Other Functions (optional)	Person Ch. 15
4	12	<u>Exponents and Radicals</u> Power and Roots Laws of Exponents (zero, negative, fractional) Scientific Notation (emphasise for Forestry) Square Roots Roots and Radicals (simplifying) Operations on Radicals (omit for Forestry)	Person Ch. 16,17
5	10	<u>Quadratic Equations</u> Incomplete (pure) Quadratics Solutions of the General Quadratic by Factoring and the Quadratic Formula only Applications - Word Problems Radical Equations (Optional) Graphical Methods Extraneous Roots (Optional) Imaginary Numbers (Optional)	Person " RK 341-348 RK 345 RK 300-302
6	8	<u>Logarithms (Z Group Only)</u> The Meaning and Notation of Logarithms Use of Table-Interpolation Computation by Logarithms (products quotients, powers and roots) Logarithmic and Exponential Equation Change of Base Natural Logarithms - Conversion formula only	Person Ch. 33-35

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TOPIC NO.	PERIODS	TOPIC DESCRIPTION	REFERENCE
7	4	<u>Ratio and Proportion</u> Ratio Proportion Variation-Direct, Inverse, Joint Solutions of Variational Problems	Person Ch. 23
8	4	<u>Review of Basic Trigonometry</u> Plane Figures, Angles, Triangles Right Triangles, Definition of Trig. Ratios Solving Right Triangles Applications	Person Ch. 36,38
9	6	<u>Oblique Triangles</u> Sine Law Cosine Law {may be replaced with *below) Law of Tangents* (optional)	Person Ch. 44
10	2	<u>Areas of Trinagles (4 situations]</u> Logarithmic Solutions (optional)	Person Ch. 26 RK p. 473
TOTAL HOURS	62	End of Semester	

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TOPICAL OBJECTIVES:

TOPIC NO. 5: Quadratic Equations

The student will be required to:

- a) solve a quadratic equation by factoring[^] completing the square, quadratic formula and, where possible, by graphing.
- b) learn the procedures required to solve radical equations and equations of quadratic type.
- c) solve practical problems utilizing quadratic equations and the maximum/min-imum concepts.
- d) recognize and know what to do with an imaginary root.

TOPIC NO. 6: Logarithms (Z Group Only)

The student will be required to:

- a) know the properties of logarithms of numbers.
- b) how to use a table of mantissae of common logarithms with emphasis on interpolation to find the mantissa of the logarithm of any number.
- c) how to compute numerical products, quotients, powers and roots of numbers of combinations thereof using base 10 logarithms.
- d) solve logarithmic and exponential equations.
- e) understand logarithms to any base and be able to convert from one base to another.
- f) how to find and use natural logarithms by conversion formulae.

TOPIC NO. 7: Ratio, Proportion.and Variation

The student will be required to:

- a) define and know the properties of a ratio and a proportion.
- b) understand the meaning of direct, inverse and joint variation and how to change a verbal variation statement into an algebraic or symbolic statement of variation.
- c) solve various practical problems involving ratios, variations or proportionality concepts.

TOPIC NO. 8: Review of Basic Trigonometry

The student will be required to:

- a) be able to recognize, identify, and know the properties of simple plane figures such as angles, triangles, right triangles, etc.
- b) memorize, understand and use the six trigonometric functions of an angle and be able to use the table of natural trig functions including interpolation-
- c) solve right triangle long hand and by logarithms and use the knowledge to solve practical problems.

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TOPICAL OBJECTIVES:

TOPIC NO. 9: Oblique Triangles

The student will be required to solve various oblique triangles using the sine, cosine and (optional) tangent laws in longhand calculations using calculators.

TOPIC NO. 10: Areas of Trinagles

The student will be required to compute the areas of various oblique triangles using various data, formulae and computational methods (longhand)