Math Fundamentals

Applied Science and Environmental Technology

Course Number: MAT8001	**Contribution to Program:** Vocational		**Normative Hours:** 45
Applicable Program(s): Multiple Programs	**AAL:** Multiple Levels	**Core/Elective:** Multiple Core/Elective	**Approval Date:** 08/06/2012
Prepared by: Mohammed Mostefa Professor			**Approved by:** Christopher Janzen Chair, Applied Science & Environmental Technology
Co-Requisites N/A			**Approved for Academic Year:** 2012-2013
Pre-Requisites N/A			

COURSE DESCRIPTION

Students learn foundational mathematics required in many College technical programs. Students also solve measurement problems involving a variety of units and ratio and proportion problems. They manipulate algebraic expressions and solve equations. Students evaluate exponential and logarithmic expressions, study the trigonometry of right triangles and graph a variety of functions.

ESSENTIAL EMPLOYABILITY SKILLS

The course contributes to your program by helping you achieve the following Essential Employability Skills:

3	Execute mathematical operations accurately.(T,A)
4	Apply a systematic approach to solve problems.(T,A)
5	Use a variety of thinking skills to anticipate and solve problems.(T,A)

T: Teach **A:** Assess **CP:** Culminating Performance

COURSE LEARNING REQUIREMENTS/EMBEDDED KNOWLEDGE AND SKILLS

COURSE LEARNING REQUIREMENTS **When you have earned credit for this course, you will have demonstrated the ability to:**	**EMBEDDED KNOWLEDGE AND SKILLS**
1. Perform basic algebraic operations with signed numbers.	ı Perform basic mathematical operations such as addition, subtraction, multiplication, division and apply the rule of order of operations on numerical expressions. ı Express numbers in scientific notation. ı Express numbers in engineering notation.
2. Solve a variety of measurement problems.	ı Convert units of measure within and between the US Customary (in, ft, mile, lb,° F) and metric system (m, g, s, F, H, °C). ı Convert units of linear measure, area and volume. ı Express numbers using significant digits.
3. Perform basic mathematical operations on algebraic expressions.	ı Add, subtract, multiply and divide algebraic expressions.
4. Solve simple equations.	ı Solve simple equations, formulas and literal equations. ı Solve ratio and proportion problems. ı Solve equations involving numerical fractions.

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5. Graph functions.	ı Express a function using functional notation. ı Sketch the graph of a function. ı Graph a linear function. ı Solve equations graphically.
6. Solve systems of two linear equations in two unknowns.	ı Solve systems of two linear equations in two unknowns using elimination by addition or subtraction.
7. Factor algebraic expressions.	ı Factor algebraic expressions using common factors. ı Factor trinomials of the form: $x^2 + bx + c$. ı Factor algebraic expressions using difference of squares.
8. Simplify and perform algebraic operations on numerical and algebraic expressions involving integral and fractional exponents.	ı Apply the laws of exponents to simplify and perform operations on algebraic expressions involving integral and fractional exponents. ı Write in simplest forms 2^{nd} order radicals. ı Solve simple equations involving radicals.
9. Solve quadratic equations.	ı Solve quadratic equations by factoring ı Solve quadratic equations using the quadratic formula.
10. Manipulate trigonometric functions of acute angles and solve problems involving the trigonometry of right triangles.	ı Draw an angle in standard position. ı Calculate the value of the primary (sin, cos, tan) trigonometric functions of an acute angle. ı Calculate the acute angle given the value of a primary trigonometric function. ı Solve right triangles using their properties and SOH CAH TOA. ı Solve applied problems using the trigonometry of the right triangle.
11. Sketch the graph of the sine and cosine functions where angles are expressed in degrees.	ı Calculate the amplitude, phase shift and displacement. ı Graph of the functions y = asinx and y = acosx. ı Graph of the functions y = asinbx and y = acosbx. ı Graph of the functions y = asin(bx + c) and y = acos(bx + c).
12. Evaluate exponential and logarithmic expressions.	ı Identify the exponential and logarithmic functions. ı Convert between exponential and logarithmic forms. ı Simplify logarithmic expressions using the properties of logarithms. ı Evaluate the logarithm to base 10 and base e.

LEARNING RESOURCES

Pearson Education Custom Package for Algonquin College consisting of:

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- Algonquin College custom edition created from “Introduction to Technical Mathematic" 5 e by Washington, Triola, Reda
- Students Solutions Manual
- Technical mathematics Study Card
- MyMathLab Access Kit
- Algonquin College Insert Sheet

Other Required Resources:

Scientific Calculator. Sharp WBK531 is recommended.

NOTE: Graphing calculators are not permitted for use in this course.

LEARNING ACTIVITIES

During this course, you are likely to experience the following learning activities:

- class lectures
- discussions
- problem solving activities
- electronic demonstrations
- homework exercises

EVALUATION/EARNING CREDIT

The following will provide evidence of your learning achievements:	This activity validates the following Course Learning Requirements and/or Essential Employability Skills:
Assignments (four) 20%	- Perform basic mathematical operations on algebraic expressions. - [CLR 3] - Graph functions. - [CLR 5] - Perform basic algebraic operations with signed numbers. - [CLR 1] - Solve a variety of measurement problems. - [CLR 2] - Solve simple equations. - [CLR 4] - Solve systems of two linear equations in two unknowns. - [CLR 6] - Factor algebraic expressions. - [CLR 7] - Simplify and perform algebraic operations on numerical and algebraic expressions involving integral and fractional exponents. - [CLR 8] - Manipulate trigonometric functions of acute angles and solve problems involving the trigonometry of right triangles. - [CLR 10] - Sketch the graph of the sine and cosine functions where angles are expressed in degrees. - [CLR 11] - Evaluate exponential and logarithmic expressions. - [CLR 12] - Solve quadratic equations. - [CLR 9] - Execute mathematical operations accurately. - [EES 3] - Apply a systematic approach to solve problems. - [EES 4] - Use a variety of thinking skills to anticipate and solve problems. - [EES 5]
Final Assessment 30%	- Factor algebraic expressions. - [CLR 7] - Simplify and perform algebraic operations on numerical and algebraic expressions involving integral and fractional exponents. - [CLR 8] - Perform basic mathematical operations on algebraic expressions. - [CLR 3] - Graph functions. - [CLR 5] - Solve simple equations. - [CLR 4] - Solve systems of two linear equations in two unknowns. - [CLR 6]

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	ı Perform basic algebraic operations with signed numbers. - [CLR 1] ı Solve a variety of measurement problems. - [CLR 2] ı Manipulate trigonometric functions of acute angles and solve problems involving the trigonometry of right triangles. - [CLR 10] ı Sketch the graph of the sine and cosine functions where angles are expressed in degrees. - [CLR 11] ı Evaluate exponential and logarithmic expressions. - [CLR 12] ı Solve quadratic equations. - [CLR 9] ı Execute mathematical operations accurately. - [EES 3] ı Apply a systematic approach to solve problems. - [EES 4] ı Use a variety of thinking skills to anticipate and solve problems. - [EES 5]
Test 1 15% Test 2 15% Quiz 1 5% Quiz 2 5%	ı Solve a variety of measurement problems. - [CLR 2] ı Perform basic mathematical operations on algebraic expressions. - [CLR 3] ı Perform basic algebraic operations with signed numbers. - [CLR 1] ı Factor algebraic expressions. - [CLR 7] ı Simplify and perform algebraic operations on numerical and algebraic expressions involving integral and fractional exponents. - [CLR 8] ı Solve simple equations. - [CLR 4] ı Solve systems of two linear equations in two unknowns. - [CLR 6] ı Manipulate trigonometric functions of acute angles and solve problems involving the trigonometry of right triangles. - [CLR 10] ı Sketch the graph of the sine and cosine functions where angles are expressed in degrees. - [CLR 11] ı Evaluate exponential and logarithmic expressions. - [CLR 12] ı Graph functions. - [CLR 5] ı Solve quadratic equations. - [CLR 9] ı Execute mathematical operations accurately. - [EES 3] ı Apply a systematic approach to solve problems. - [EES 4] ı Use a variety of thinking skills to anticipate and solve problems. - [EES 5]
MyMathLab Quizzes 10%	ı Perform basic algebraic operations with signed numbers. - [CLR 1] ı Solve simple equations. - [CLR 4] ı Solve systems of two linear equations in two unknowns. - [CLR 6] ı Factor algebraic expressions. - [CLR 7] ı Simplify and perform algebraic operations on numerical and algebraic expressions involving integral and fractional exponents. - [CLR 8] ı Perform basic mathematical operations on algebraic expressions. - [CLR 3] ı Graph functions. - [CLR 5] ı Manipulate trigonometric functions of acute angles and solve problems involving the trigonometry of right triangles. - [CLR 10] ı Sketch the graph of the sine and cosine functions where angles are expressed in degrees. - [CLR 11]

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- Evaluate exponential and logarithmic expressions. - [CLR 12]
- Solve quadratic equations. - [CLR 9]
- Execute mathematical operations accurately. - [EES 3]
- Apply a systematic approach to solve problems. - [EES 4]
- Use a variety of thinking skills to anticipate and solve problems. - [EES 5]

COLLEGE GRADING NUMERICAL EQUIVALENT TABLE

Final Grade	Mark Equivalent	Numeric Value	Final Grade	Mark Equivalent	Numeric Value
A+	90-100%	4.0	C+	67-69%	2.3
A	85-89%	3.8	C	63-66%	2.0
A-	80-84%	3.6	C-	60-62%	1.7
B+	77-79%	3.3	D+	57-59%	1.4
B	73-76%	3.0	D	53-56%	1.2
B-	70-72%	2.7	D-	50-52%	1.0
			F	0-49%	0
			FSP	0	0

PRIOR LEARNING ASSESSMENT AND RECOGNITION

Students who wish to apply for prior learning assessment and recognition (PLAR) need to demonstrate competency at a post-secondary level in all of the course learning requirements outlined above. Evidence of learning achievement for PLAR candidates includes:

- Other
  See College Policy #AA06 for details on eligibility and process. For this course, evidence of learning achievement for PLA candidates will include the successful completion of a challenge exam with a breadth of coverage and level of difficulty equivalent to the final examination in the course.

RELATED INFORMATION

The following information is course-specific:

The course consists of 3 hours of lectures per week. It is anticipated that you will need to spend an additional 3 hours per week, on average, of your own time for homework exercises and study. The students' ability to successfully complete the homework exercises will directly correlate with their level of success on assignments, quizzes, tests and the final assessment. Failure to do homework exercises may mean you are unable to complete similar questions found on assignments, quizzes, tests and the final assessment.

During this course you are likely to experience:

Lectures:

Lectures will present the theoretical material of the course.

- Students are expected to attend all of the lectures.
- Course material will be presented, aided by use of overhead projections, demonstrations and brief lecture notes during lectures. Students are expected to prepare their own personal notes and are responsible for all the material presented. If you miss a class, make sure you get the relevant notes from another student before the next class
- Students are expected to read and understand specific sections of the textbook as indicated in the course syllabus, which will be provided by the course professor.
- Students will be expected to ask for clarification and explanations as required.
- Students are encouraged to ask questions during lectures and to consult with the professor on topics that they do not clearly understand. The course material is cumulative and does not lend itself well to "cramming" at the last minute. Ask your questions early and often.
- The professor will inform students, at the beginning of the course, of suitable times for consultation.

In order to pass the course, the student must have a grade of at least 50% or **"D-"** on assignments, tests, quizzes and the final exam combined. For a complete breakdown of the grading system, please refer to college directive E-11.

Late assignments will not be accepted for submission and will receive a mark of zero.

The final assessment is designed to be a comprehensive, summative evaluation instrument. If, as a result of being off-track in your program or some unforeseen circumstance, you note that there is a scheduling conflict in your final assessment schedule, it is your responsibility to alert your course professor no later than one week before final assessments start, to allow for any special arrangements.

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In the case of a documented emergency that causes a student to miss a quiz, class test or final assessment, the professor in consultation with the Chair, as required, will determine how the marks will be made up and/or final grade adjusted.

Retention of course material. It is your responsibility to retain copies of all assignments, quizzes and mid-term tests (returned from the professor), and any other evaluations and pertinent records (except for final exams, which are not returned) in case you become involved in an appeal hearing at a later date.

It is also your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

See College Policies #AA19 or #AA37 for details.

The following information is school/department-specific:

The following information is College-wide:

Email
Algonquin College provides all full-time students with an e-mail account. This is the address that will be used when the College, your professors, or your fellow students communicate important information about your program or course events. It is your responsibility to ensure that you know how to send and receive e-mail using your Algonquin account and to check it regularly.

Centre for Students with Disabilities (CSD)
If you are a student with a disability, it is strongly recommended that you identify your needs to the professor and the Centre for Students with Disabilities (CSD) by the end of the first month of the semester in order that any necessary support services can be arranged for you.

Academic Integrity* & Plagiarism*
Adherence to acceptable standards of academic honesty is an important aspect of the learning process at Algonquin College. Academic work submitted by a student is evaluated on the assumption that the work presented by the student is his or her own, unless designated otherwise. For further details consult Algonquin College Policies AA18 **http://www2.algonquincollege.com/directives/files/2012/04/AA18.pdf** and AA20 **http://www2.algonquincollege.com/directives/files/2011/08/AA20.pdf**

Student Course Feedback*
It is Algonquin College's policy to give students the opportunity to complete a course assessment survey in each course that they take which solicits their views regarding the curriculum, the professor and the facilities. For further details consult Algonquin College Policy AA25 **http://www2.algonquincollege.com/directives/files/2011/10/AA25.pdf**

Use of Electronic Devices in Class*
With the proliferation of small, personal electronic devices used for communications and data storage, Algonquin College believes there is a need to address their use during classes and examinations. During classes, the use of such devices is disruptive and disrespectful to others. During examinations, the use of such devices may facilitate cheating. For further details consult Algonquin College Policy AA32 **http://www2.algonquincollege.com/directives/files/2011/11/AA32.pdf**

Transfer of Credit
Students, it is your responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

***** College policies (previously called directives) are under review and redesign. The term *directives* is being retired. As such, the policy classification nomenclature is in transition. Students, it is your responsibility to refer to the Algonquin College Directives/Policies website for the most current information available at**:(http://www2.algonquincollege.com/directives/)**

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