



Mathematics Department

Applied Mathematics for Civil Technology

201-912-DW

COURSE OBJECTIVES

The purpose of this course is to upgrade students' mathematical abilities, for application to problems arising in Civil Engineering Technology. Particular emphasis will be placed on geometry, analytic geometry, and trigonometry. In addition, some high school algebra topics will be reviewed.

COURSE COMPETENCIES

This course will allow the student to fully achieve the competency:

01X2: To solve mathematical problems related to buildings and public works.

Elements of the Competency:

1. To examine the elements of a problem situation.
2. To establish quantity ratios and percentages.
3. To apply trigonometric methods.
4. To apply vector calculation methods.
5. To calculate distances, areas and volumes.
6. To present the results and justify the problem-solving process.

PRE-REQUISITE

Registration in Civil Engineering Technology and High School Functions or the equivalent CEGEP Mathematics course (Math 201-015-50).

PONDERATION

3-2-3

EVALUATION SCHEME AND SCHEDULE

The Institutional Student Evaluation Policy (ISEP) is designed to promote equitable and effective evaluation of student learning and is therefore a crucial policy to read and understand. The policy describes the rights and obligations of students, faculty, departments, programs, and the College administration with regard to evaluation in all your courses, including grade reviews and resolution of academic grievance. ISEP is available on the Dawson website.

Term Work

A minimum of 3.5 hours of in class testing is required.

Final Examination

The Final Examination will be a supervised, comprehensive examination held during the formal examination period.

Grading Policy

Grading will be based on:

Final examination	40%
Term work	60%

To pass the course, the students must obtain at least 60%.

REQUIRED TEXT AND MATERIALS

Text:

Combat Mathematics: Technical Problems for Civil Engineering, Rene de Graaf
Precalculus, version 3, Carl Stitz and Jeff Zeager, July 2013, <http://www.stitz-zeager.com>
Trigonometry, Michael Corral, 2009, <http://www.mecmath.net/trig>
Functions and Trigonometry, George McArthur

Calculator: Students are only permitted to use the Sharp EL-531X, XG or XT calculator during tests and examinations.

TEACHING METHODS

Explanatory presentations, followed by in class problem sessions, and supplemented by assignments.

Problem solving is an essential component of this course. You will be expected to solve word problems, and to present your solutions to these and all other problems in a logical and coherent fashion. Answers should be clearly stated, with appropriate units of measurement included. Marks may be deducted for work that is inadequate in these respects.

Course/College Policies

ISEP Statement:

The Institutional Student Evaluation Policy (ISEP) is designed to promote equitable and effective evaluation of student learning and is therefore a crucial policy to read and understand. The policy describes the rights and obligations of students, faculty, departments, programs, and the College administration with regard to evaluation in all your courses, including grade reviews and resolution of academic grievance. ISEP is available on the Dawson website. (<https://www.dawsoncollege.qc.ca/governance/institutional-student-evaluation-policy/>)

ATTENDANCE AND COURSE PARTICIPATION REQUIREMENTS

Students should refer to the Institutional Student Evaluation Policy (ISEP section IV-C) regarding attendance.

Attendance is recommended for the successful completion of the course.

LITERACY STANDARDS

Problem solving is an essential component of this course. Students will be expected to analyze problems stated in words, to present their solutions logically and coherently, and to display their answers in a form corresponding to the statement of the problem, including appropriate units of measurement. Marks will be deducted for work which is inadequate in these respects, even though the answers may be numerically correct.

STUDENT CONDUCT:

- (a) Students have an obligation to arrive on time and remain in the classroom for the duration of scheduled classes and activities.
- (b) Students have an obligation to write tests and final examinations at the times scheduled by the teacher or the College. Students have an obligation to inform themselves of, and respect, College examination procedures.
- (c) Students have an obligation to show respectful behavior and appropriate classroom deportment. Should a student be disruptive and/or disrespectful, the teacher has the right to exclude the disruptive student from learning activities (classes) and may refer the case to the Director of Student Services under the Student Code of Conduct.
- (d) Electronic/communication devices (including cell phones, mp3 players, etc.) have the effect of disturbing the teacher and other students. All these devices must be turned off and put away. Students who do not observe these rules will be asked to leave the classroom.

Everyone has the right to a safe and non-violent environment. Students are obliged to conduct

themselves as stated in the Student Code of Conduct and in the ISEP section on the roles and responsibilities of students. (ISEP section II-D)

ACADEMIC INTEGRITY

Cheating in Examinations, Tests, and Quizzes

Cheating includes any dishonest or deceptive practice relative to formal final examinations, in-class tests, or quizzes. Such cheating is discoverable during or after the exercise in the evaluation process by the instructor. Such cheating includes, but is not limited to:

- a. copying or attempting to copy another's work.
- b. obtaining or attempting to obtain unauthorized assistance of any kind.
- c. providing or attempting to provide unauthorized assistance of any kind.
- d. using or possessing any unauthorized material or instruments which can be used as information storage and retrieval devices.
- e. taking an examination, test, or quiz for someone else.
- f. having someone take an examination, test, or quiz in one's place.

Unauthorized Communication

Unauthorized communication of any kind during an examination, test, or quiz is forbidden and subject to the same penalties as cheating.

Plagiarism on Assignments and the Comprehensive Examination

Plagiarism is the presentation or submission by a student of another person's assignments or Comprehensive Assessment as his or her own. Students who permit their work to be copied are considered to be as guilty as the plagiarizer.

Penalties

Cheating and plagiarism are considered extremely serious academic offences. Action in response to an incident of cheating and plagiarism is within the authority of the teacher.

Penalties may range from zero on a test, to failure in the course, to suspension or expulsion from the college.

According to ISEP, the teacher is required to report to the Sector Dean all cases of cheating and plagiarism affecting a student's grade. (see ISEP section V-C.)

INTENSIVE COURSE CONFLICTS & POLICY ON RELIGIOUS OBSERVANCE

If a student is attending an intensive course, the student must inform the teacher, within the first two weeks of class, of the specific dates of any anticipated absences.

Students observing religious holidays must **inform** each of their teachers, in writing, of the specific dates as soon as possible, but **no later than the end of the second week of the impacted semester or term**. Alternative arrangements convenient to both the student and the teacher must be made at the earliest opportunity. In the event that the date of a religious observance has yet to be determined, students must submit the name of the observance to their teachers and provide them with the specific date(s) as soon as it becomes available. This applies both to the semester or term, as well as to any final examination period. Students who make such arrangements will not be required to attend classes or take examinations on the designated days, nor be penalized for their absence.

It must be emphasized, however, that this College policy should not be interpreted to mean that a student can receive credit for work not performed. It is the student's responsibility to fulfill the requirements of the alternative arrangement. (ISEP Section IV-D)

A form for this purpose is available at the end of this document.

MATH TUTORIAL ROOM

Volunteer math teachers are available for help in room 7B.1 from 10:00 to 16:00 (Monday through Friday) and from 17:00-18:00 (Monday through Thursday).

COURSE CONTENT & Tentative SCHEDULE

(the number of classes listed is approximate)

Review, Algebra and Other (1 week)

- notes Numbers
- notes Rules of Exponents
- notes Ratio and Proportions
- notes Conversion between metric and imperial units.

Linear Expressions (1 1/2 weeks) (using *Precalculus by Carl Stitz and Jeff Zeager* and *McArthur's Functions and Trigonometry*)

- §2.1 Linear Functions #1-26
- notes Linear Equations, Inequalities, and Graphs
- notes Average, Weighted Average
- §2.5 Regression (*teach equation*) #1-3

Quadratic Expressions and Polynomials (2 weeks) (using *Precalculus by Carl Stitz and Jeff Zeager* and *McArthur's Functions and Trigonometry*)

- notes Multiplying and Dividing Polynomials
- notes Factoring
- §2.3 Quadratic Functions #1-9, 17, 21, 26, 31-36

Rational and Radical Expressions (2 weeks) (using *McArthur's Functions and Trigonometry*)

- notes Simplifying Rational Expressions
- notes Solving Rational Equations
- notes Roots; Solving Radical Equations

Introduction to Functions (1 week) (using *Precalculus by Carl Stitz and Jeff Zeager*)

- §5.1 Function Composition #1-24
- §5.2 Inverse Functions #1-20

Exponential and Logarithmic Functions (2 weeks) (using *Precalculus by Carl Stitz and Jeff Zeager* and *McArthur's Functions and Trigonometry*)

- §6.1 Introduction to Exponential and Logarithmic Functions #1-76
- §6.2 Properties of Logarithms #1-29
- §6.3 Exponential Equations #1-33
- §6.4 Logarithmic Equations #1-24
- notes Graphs

Systems of Equations (1/2 week) (*using Precalculus by Carl Stitz and Jeff Zeager*)

Systems of Linear Equations

§8.1 Solving Systems of two and three equations #1-23

Trigonometry (2 weeks) (*using Trigonometry by Michael Corral*)

Right Triangle Trigonometry

§1.1 Angles #1-10
§1.2 Trigonometric Functions of an Acute Angle #1-18, 37-40
§1.3 Applications and Solving Right Triangles #1-5, 15-23, 26-29
§1.4 Trigonometric Functions of Any Angle #1-36

General Triangles

§2.1 The Law of Sines #1-9, 15
§2.2 The Law of Cosines #1-16
§2.4 The Area of a Triangle #1-7

Trigonometric Identities

§3.1 Basic Trigonometric Identities #4-15
§3.2 Sum and Difference Formulas(optional) #2-5, 7-14
§3.3 Double-Angle #1-8

Radian Measure

§4.1 Radians and Degrees #1-10
§4.2 Arc Length #1-11
§4.3 Area of a Sector #1-19

Solving Trigonometric Equations

§6.1 Solving Trigonometric Equations #1-12

Vectors (1 week) (*Precalculus by Carl Stitz and Jeff Zeager*)

§11.8 Introduction to Vectors; Finding Vector Components #1-52, 58-61

notes Application: Finding and Solving: Equations from Static Equilibrium Conditions

Geometry & Applied Problems (2 weeks) (*Combat Math.: Tech. Problems for Civil Engineering by Rene de Graaf and McArthur's Functions and Trigonometry*)

General Geometry

notes Corresponding angles
notes Similar Triangles
notes Area of Quadrilaterals
notes Volume of Solid Geometric Figures

RELIGIOUS OBSERVANCE/ INTENSIVE COURSES FORM

Students who intend to observe religious holidays or who take intensive courses must inform their teachers in writing as prescribed in the ISEP Policy on Religious Observance. (ISEP Section III-D)

The following form must be submitted within the first two weeks of classes.

Name: _____

Student Number: _____

Course: _____

Teacher: _____

Date:

Description:
