



**Mathematics Department Engineering Mathematics I for  
Mechanical Technology**  
**201-941-DW**

## COURSE OBJECTIVES

The purpose of this course is to make the students think. The area in which this is practiced consists of the mathematical problems arising from current procedures in mechanical engineering e.g. robotics, numerical control techniques, estimation, CAD and design in general. Basic techniques of geometry and algebra will be reviewed, expanded, and applied to a set of exercises specifically designed for students in the Mechanical Technology

Program. The student will be given the mathematical knowledge to solve these problems and at the same time the student will get the preparation needed for the Technical Calculus course.

## COURSE COMPETENCIES

This course contributes to the partial achievement the competency:

**012E: Solve problems related to industrial mechanics.**

### Elements of the Competency:

1. To analyze situations involving variables.
2. To identify dimensions and coordinates for complex objects.
3. To prepare estimates using matrices.
4. To analyze the forces exerted on an object.
5. To analyze the variables of outputs, speeds, and accelerations.
6. To reason with rigor.
7. To communicate clearly and precisely.
8. To extend to different fields of application.

## **PRE--REQUISITE**

High School Functions or the equivalent CEGEP Mathematics course (Math 015).

## **PONDERATION**

2--2--2

## **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**

The final grade is calculated following the scheme:

- |  |     |
|--|-----|
| 1. Term Mark (tests, quizzes, assignments) | 60% |
| 2. Final Examination                       | 40% |

Term work is detailed in the teacher specific supplement, appended.

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

## **REQUIRED TEXT AND MATERIALS**

**Text:** The required text is:

1. *Combat Mathematics: Technical Problems for Mechanical Engineering (2019)* by R. DeGraaf.

### **References:**

- 1) Technical Mathematics with Calculus by P. Calter, M. Calter, P. Wraight, and S. White, third edition
- 2) *Basic Technical Mathematics with Calculus* by A.J. Washington, tenth edition.

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

## TEACHING METHODS

Lectures and problem sessions.

## 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 OBLIGATIONS

- (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) Cellular phones, pagers and musical listening devices have the effect of disturbing the teacher and other students. All these devices should be turned off. 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 following assignments are from Combat Mathematics by R. Degraaf*

### **ALGEBRA AND EQUATIONS:**

#### **Solving systems of equations using Gauss Jordan Elimination: (2 weeks)**

Chapter 1: Exercises [1 - 15] and Handout on applications

#### **Intersection problems: (1 week)**

Chapter 4: Figures [1 - 6]

#### **Solving Polynomial, Rational and Radical Equations: (1 week)**

Chapter 2: Exercises [1 - 12]

#### **Solving Equations involving Exponents and Logarithms.**

#### **Isolating Variables and Evaluating functions: (1 week)**

Chapter 3: Exercises [1 - 12]

## **GEOMETRY DIAGRAMS:**

**Bridge frames and simple Dovetails: (2 weeks)**  
(Trigonometry, Trapezoid area and Similar triangles)

**Figures [7 - 19]**

**Ball Bearings and Stamping of Boltheads (1 week)**  
(Law of cosines, Regular polygons, Isosceles triangles,  
Volumes of Regular solids)

**Figures [20 - 23]**

**Belt Length: (1 week)**  
(Similar and Congruent triangles,  
Inscribed and Circumscribed circles, Tangency)

**Figures [24 - 27]**

**Baseplates: (1 week)**

**Figures [28 - 36]**

**Conical Problems: (1 week)**

**Figures [37 - 40]**

**Rolling Boiler Plates: (1 week)**

**Figures 41 & 42**

**Numerical Control Drilling Machines: (2 weeks)**  
(Geometry of parallel lines)

**Figures [43 - 49]**

## **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 IV--D)

The following form must be submitted within the first two

weeks of classes.

Name: \_\_\_\_\_

Student Number: \_\_\_\_\_

Course: \_\_\_\_\_

Teacher: \_\_\_\_\_

**Date of Holiday      Description of Holiday:**