

**DAWSON COLLEGE**  
**MATHEMATICS DEPARTMENT**  
**LINEAR ALGEBRA 201-NYC-05 (Regular)**  
**STUDY GUIDE**  
**PONDÉRATION: 3-2-3**

**Prerequisite:** High school or CEGEP Functions. Note, however, that the majority of the students who take this course have already passed Calculus I and Calculus II so they exhibit a fair degree of mathematical maturity.

**Text:** Elementary Linear Algebra (Abridged Version) - 10<sup>th</sup> Ed., by H. ANTON.

**References:**

- 1) Linear Algebra with Applications, by W.K. NICHOLSON.
- 2) Linear Algebra, by S. GROSSMAN.
- 3) Elementary Linear Algebra, by B. KOLMAN.
- 4) Linear Algebra - Ideas and Applications by R.C. PENNEY.

**Methodology:** Lectures and problems sessions.

**Grading Policy:** The student's grade shall consist of:  
(a) Term work for 50% and Final Exam for 50%  
OR  
(b) Final Exam for 100%.

To qualify for (b), the student must have obtained at least 50% on term work and have written more than 50% of the class tests.

**N.B.** For a Science (200.xx) student who elects to do the Comprehensive Assessment in this section, the above scheme represents 90% of his/her final grade. The Assessment makes up the other 10%.  
IF A STUDENT FAILS THE ASSESSMENT (i.e. obtains less than 60%), HE/SHE CANNOT GRADUATE.

**Termwork:** The term grade is based on a minimum of 4½ hours of tests/quizzes. A minimum of 3 class tests will be given.

**Calculators:** A calculator without text storage or graphing capabilities is allowed, for class tests and the Final Exam.

**Literacy Policy:** 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.

**Religious Holidays:**

*Students who wish to observe religious holidays must inform each of their teachers in writing within the first two weeks of each semester of their intent to observe the holiday so that alternative arrangements convenient to both the student and the teacher can be made at the earliest opportunity. The written notice must be given even when the exact date of the holiday is not known until later. 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.*

**Course Goals:** The main purposes of this course are 3-fold:

- (a) to acquaint the student with the TERMINOLOGY, PROPERTIES, and APPLICATIONS of MATRICES, DETERMINANTS, LINEAR SYSTEMS of EQUATIONS, and VECTORS in THE PLANE and SPACE.
- (b) to show how the properties of VECTORS can be utilized in the analysis of LINES and PLANES in 3-space.
- (c) to discuss the notions of VECTOR SPACE, SUBSPACE, LINEAR INDEPENDENCE/DEPENDENCE, SPANNING, BASIS and DIMENSION using primarily examples from (1) and (2).

By the completion of the course, the student should be able to solve problems of a computational nature and be able to handle various types of simple proofs.

### **Students' Obligations:**

- (a) Students have an obligation to remain informed about what takes place in their regularly scheduled classes. Absence from class does not excuse students from this responsibility.
- (b) Students have an obligation to arrive on time and remain for the duration of scheduled classes and activities.
- (c) 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.
- (d) 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.
- (e) 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.
- (f) Cell phones must also be put away. Text messaging is not allowed in class.

### **Policy on Cheating and Plagiarism**

#### **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 Assessment**

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.

#### **Obligation of the Teacher**

Every instance of cheating or plagiarism leading to a resolution that impacts on a student's grade must be reported by the teacher, with explanation, in writing to the Chair of Mathematics and to the Dean of Pre-University Studies. A copy of this report must also be given to the student.

#### **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 of the course, to suspension or expulsion from the college.

#### **Department Website:**

For final exams from previous years and other useful information consult the Department Website

<http://www.dawsoncollege.qc.ca/programs/disciplines/mathematics>

## Specific Competencies for the 10<sup>th</sup> Edition of Anton

<u>TOPICS</u>	<u>SPECIFIC COMPETENCY</u> (*indicates the topic is not covered in the text)	<u>LEARNING ACTIVITIES</u> (chapter, sections & problems in text) (**indicates a theoretical problem)	<u>TIME</u> (in weeks)
Systems of Linear Equations	Solving systems of linear equations using Gaussian elimination and Gauss-Jordan elimination. Properties of matrices and matrix algebra. Definition of matrix inverse and more matrix algebra. Properties of elementary matrices, finding inverse matrix. Theorems on invertibility and solutions of systems. Diagonal, triangular and symmetric matrices.	1.1 prob 1-17, T-F; 1.2 prob 1-32, 35, 37-42,T-F  1.3 prob 1-17(odd ), 19- 23,27- 30, T-F 1.4 prob 4-10,14-17,21, 25-42,51-55,T-F 1.5 prob 1-32, 35, 37-43, T-F 1.6 prob 1-23, T-F 1.7 prob 1-28,32-39, T-F Supp. Ex. 8-15, 17-21 2.1 prob 1-39, T-F	5
The Determinant Function	Evaluating determinants by cofactor expansion; the adjoint of a square matrix; finding inverses using the adjoint, solving systems of linear equations using Cramer's Rule. Evaluating determinants by row reduction. Investigating properties of the determinant function.	2.2 prob 1-17 19-36,T-F 2.3 prob 3,5,7-39,T-F Supp. Ex. 16, 31, 32,33	2
Euclidean vectors spaces	The geometric definition of a Vector, component notation for a vector. Norm of a vector, vector arithmetic. The dot product: vector projections and applications. The Cross Product and its properties and applications. The Scalar Triple Product and applications. Lines and Planes in Space (the following additional problems are covered). <ul style="list-style-type: none"> <li>• calculations of distance, between 2 skew lines.*</li> <li>• near point problems: the closest point on a plane to a point,* the closest point on a line to a point.*</li> </ul> Additional problems on lines, planes, distances, near points will be provided.	3.1 prob 1-31(odd), T-F 3.2 prob 1-27 (odd) 3.3 prob 1-40 (odd), T-F 3.4 prob 1-25 (odd), T-F  3.5 prob 1-35, T-F	3
Supplementary part	Any one of the following topics: <ul style="list-style-type: none"> <li>• Vector spaces</li> <li>• Linear Programming</li> <li>• Other (Specified by the teacher)</li> </ul>		3

Individual instructors will provide a detailed outline for the Supplementary part of the course.

In addition, a Maple exercise module will be available for students which contains problems on matrices, determinants, vector operations and row reduction.

A few optional exercises on eigenvalues and eigenvectors are also included.