

Grant MacEwan University

Basic Linear Algebra I

Math 120 (AS01)

Fall 2012

Instructor: Dr. Karen Buro

Office: 5-107C

Phone: 780-633 3911

E-mail: burok@macewan.ca **best way to contact me**

Web Page: <http://academic.macewan.ca/burok/>

Office Hours: M 2-3, WF 1-2

Lecture Time: MWF 12-1

Lecture Room: 5-152

Course Hours: Lecture 45

Help Centre: 5-206

Course Description: Topics covered are: systems of linear equations; vectors in n-space; vector equations of lines and planes; matrix algebra; inverses and invertibility; introduction to linear transformations; subspaces of n-space; determinants; introduction to eigenvalues and eigenvectors; dot product and orthogonality; introduction to vector spaces; applications in a variety of fields. Notes: Students can obtain credit in only one of MATH 120, MATH 102 or MATH 125. Students planning to transfer to Engineering should take MATH 125.

Course Objectives: The objective of this course is to familiarize students with the basic notions and results of linear algebra and to provide a strong background in analytic thinking should the student continue with further courses in mathematics.

Course Prerequisite: Pure Math 30

Required Learning Materials:

1. *Introduction to Linear Algebra for Science and Engineering*, by D. Norman, D. Wolzok
the textbook denoted (N) in the schedule

2. *The Space of Geometric Vectors and Analytic Geometry of Lines and Planes*, by Mark Solomonovich
the textbook denoted (S) in the schedule

Other Learning Resources: Blackboard site; see "Blackboard Site" section below.

Seminars, Assignments and/or Reports: There will be ten (10) assignments to be handed in for grading (generally weekly). See "Assignments" section below for details.

Grade Evaluation:

Term Examinations (2 at 25% each)	50%
Final Examination	35%
Assignments	15%
	100%

Examination Dates and Locations:

Term Examination 1: Wednesday October 3, in class (50 minutes)

Term Examination 2: Wednesday November 2, in class (50 minutes)

Final Examination: Wednesday December 12, 1-3 p.m. (2 hours), Room TBA

(Note: Students are responsible for verifying the date of the final examination when the final examination schedule is posted later in the term.)

Format of Examinations: written, closed book, no calculators

Final Grade:

A+	95-100
A	90-94
A-	85-89
B+	80-84
B	75-79
B-	70-74
C+	65-69
C	60-64
C-	55-59
D+	50-54
D	45-49
F	0-44

Please Note:

1. Official final grades can be accessed through myStudentSystem. Grant MacEwan University adheres to the Alberta Common Grading Scheme, which is a letter grade system. While instructors may use percentages to aid in their grade development, only the letter grade will appear on transcripts.
2. A minimum grade of C- is required to receive transfer credit or to satisfy a prerequisite for a higher level course.
3. **A minimum of 40% is required on the final exam in order to obtain a grade of C- or better in the course.**

Student Responsibilities: Students are expected to be aware of their academic responsibilities as outlined in the Students' Rights and Responsibilities section in the MacEwan University Calendar.

1. **ACADEMIC INTEGRITY:** MacEwan's Academic Integrity Policy (C1000) promotes honesty, fairness, respect, trust, and responsibility in all academic work. According to the policy, "All members of the University community have the right to work and study in an environment of Academic Integrity and a responsibility to protect Academic Integrity by being aware of this policy" (2.3).

The policy defines academic dishonesty as the following: "Academic dishonesty involves participating in acts by which a person fraudulently gains or intentionally attempts to gain an unfair academic advantage thereby compromising the integrity of the academic process" (3.5). Here are four common forms of academic dishonesty as outlined in the policy:

- 3.5.1 **Cheating on Tests and Examinations:** Copying the work of others or the use, or attempted use, of unauthorized notes, information, materials, study aids, or devices in any academic exercise or activity.
- 3.5.2 **Plagiarism:** The use and submission of another's words, ideas, results, work, or processes without providing appropriate credit to the individual(s) responsible for same.
- 3.5.3 **Improper Collaboration:** Inappropriate sharing of work on an assignment that was intended as an individual assignment or working together in groups beyond the degree of permissible collaboration set out by the instructor.
- 3.5.7 **Multiple Submission:** Submitting the same academic work in multiple courses without permission of the instructor(s).

A more detailed description of academic dishonesty can be found in the Academic Integrity Policy. Students are responsible for understanding what constitutes academic dishonesty. All incidents of academic dishonesty are reported to and recorded by the Office of Academic Integrity. The penalties for academic dishonesty include the following:

- a mark reduction up to zero on a piece of academic work
- a grade reduction up to an F in the course

- a requirement to withdraw (with transcript notation) from a program for a specified period of time
- expulsion from the University (with transcript notation)

Please see the Academic Integrity Policy at

<https://facultycommons.macewan.ca/services/academic-integrity> for more details.

2. **REGISTRATION STATUS:** You are responsible for your registration status at MacEwan University. Program Advisors may assist you with the process of registration, including adding or dropping of courses, but it is your responsibility to verify that these changes have been officially completed. This verification can be done at any time using MyStudentSystem. You should check your official registration status before the last date to officially withdraw from the course.
3. **WITHDRAWING FROM THE COURSE:** If you stop attending class you must complete a Course Drop Form, have it signed by a Science Program Advisor, and submit it to the Registrar's Office by the last day to withdraw as provided in the Academic Schedule in the MacEwan University Calendar. Failure to officially withdraw will result in a grade being assigned based on course work completed. Late withdrawals are only allowed for exceptional circumstances.
4. **ATTENDANCE AND PUNCTUALITY:** While attendance is not graded, you are expected to attend every class. Note that important information regarding assignments and tests may be announced in class at any time throughout the semester. **If you miss a class, it is your responsibility to find out what you have missed** – the instructor is not responsible for any consequences arising from a student missing any information due to nonattendance. Punctuality is expected every class. If you absolutely must be late due to an unforeseen circumstance, please enter quietly and discreetly.
5. **EXAMINATIONS:** Your student photo I.D. is required at examinations. It is at the discretion of the instructor whether you will be allowed to write the examination if you arrive over 15 minutes after the examination has begun. You must remain in the examination room for at least 20 minutes from the time the exam has commenced. Electronic equipment (iPods, cell phones, etc.), other than calculators that have been approved by the instructor, is not allowed to be used during examinations. Permission to use the washroom during examinations is at the discretion of the instructor and may require accompaniment.
6. **MISSED TERM EXAMINATIONS:** If you miss a term examination you must provide the instructor with an explanation within 24 hours or a mark of zero may be given. Notification may be provided through e-mail, voice mail, or direct contact with the instructor. Official documentation as to why the examination was missed will be needed to assess whether your absence will be excused or not. If your absence is excused the weight of this examination will be added to the weight of the final examination in the course. Medical excuses must include the date you were examined, the specific dates for the period of the illness, a clear statement indicating that the severity of the illness prevented you from attending school or work, and the signature of the examining physician (a signature by office staff on behalf of the physician is not acceptable). A mark of zero will be given if the instructor considers the excuse inappropriate or inadequately substantiated.
7. **DEFERRED FINAL EXAMINATIONS:** A deferred examination will be granted if a student misses the final lecture examination for reasons considered by the Science Department to be unavoidable (deferred examinations do not apply to term or laboratory examinations). An application for a deferred examination must be provided to the Science Department no later than two business days after the date of the missed final examination. Application forms are available from the Science Office (5-173) and must be submitted with appropriate documentation. Students should advise the instructor prior to the examination if they know beforehand that they will be unable to attend the scheduled examination time. Deferred

examinations are granted by a Chair in the Science Department, not by the course instructor. If you have any questions about the process please call the Science office at 780 497 5786.

8. **LATE ASSIGNMENTS:** Late assignments will not be accepted. This is due to both reasons of principle (being fair to the whole class), and reasons of practicality (the grader comes only once a week to pick up the assignments).
9. **CELL PHONES:** Cell phones are to be turned off during lectures, laboratories, seminars, and examinations (except under exceptional circumstances in which approval has been given by the instructor). **Texting is not permitted in class.**
10. **STUDENTS WITH DISABILITIES:** Students with disabilities who may have special requirements in this course are advised to discuss their needs with Services to Students with Disabilities located in the Student Resource Centre. You should advise the course instructor(s) of any special needs that are identified. See Policy E3400 Students with Disabilities.
11. **STUDENT APPEALS:** MacEwan University has a policy regarding Student Appeals (E3103). You should access this policy to become aware of the deadlines and guidelines that need to be followed if you are appealing a grade or other University assessment.
12. **MYMAIL.MACEWAN UNIVERSITY EMAIL:** All students are given a <name>@mymail.MacEwan University.ca e-mail address. This e-mail address is available to the course instructor who may distribute relevant course information or announcements via e-mail. The Science Program regularly communicates with the students via e-mail. Check your mymail.MacEwan University.ca e-mail regularly *or* forward it to an e-mail address you check regularly. If you use e-mail to communicate with your instructor you must use your mymail account. This is to protect your privacy; if a non-mymail account is used, there is no way for an instructor to verify the identity of the sender.
13. **OTHER:** 1. Calculators are **not** allowed during examinations. 2. Internet use is not permitted during class. 3. **Texting is not permitted in class.**

Lecture Topics: The following sections from the required course materials will be covered (the same sequence is being followed in the schedule):

A. From Solomonovich (S):

1. Linear Operations with Geometric Vectors
 - 1.1 Geometric Vectors: Basic Notions
 - 1.2 Linear Operations with Geometric Vectors
 - 1.3 Linear Combinations of Vectors. Linear Independence. Spanning Sets.
 - 1.4 A Basis in a Line, in a Plane, and in Space of Geometric Vectors.
Coordinate Systems and Spaces R , R^2 , and R^3 .
 - (i) A line of vectors and R .
 - (ii) A plane of vectors and R^2 .
 - (iii) The space of geometric vectors and R^3 .
2. The Dot Product and Cross Product of Vectors.
 - 2.1 The Dot Product of Vectors.
 - 2.2 The Cross Product and Triple Product of Vectors

3. Equations of Lines and Planes.

- 3.1 Equations of Lines.
- 3.2 Equations of Planes.

B. From Norman & Wolczuk (N):

Introduction to vectors in

- 1.2 Vectors in
- 1.3 *Length and Dot Product in

Systems of Linear Equations

- 2.1 Systems of Linear Equations and Elimination
- 2.2 Reduced Row Echelon Form, Rank, and Homogeneous Systems
- 2.3 Application to Spanning and Linear Independence
- 2.4 *Applications

Matrices, Linear Mappings, and Inverses

- 3.1 Operations on Matrices
- 3.2 Matrix Mappings and Linear Mappings
- 3.3 Geometrical Transformations
- 3.4 Special Subspaces for Systems and Mappings: Rank Theorem
- 3.5 Inverse Matrices and inverse Mappings
- 3.6 *Elementary Matrices

Determinants

- 5.1 Determinants in Terms of Cofactors
- 5.2 Elementary Row Operations and the Determinant
- 5.3 Matrix Inverse by Cofactors and Cramer's Rule
- 5.4 Area, Volume, and the Determinant

Vector Spaces

- 4.1 Spaces of Polynomials
- 4.2 Vector Spaces
- 4.3 Bases and Dimensions
- 4.4 Coordinates with respect to a Basis
- 4.5 General Linear Mappings
- 4.6 *Matrix of a Linear Mapping
- 4.7 Isomorphisms of Vector Spaces

Eigenvectors

- 6.1 Eigenvectors and Eigenvalues

Asterisk (*) stands for the topics that are optional for Math 120 (possible additional topics if time permits)

Schedule and List of Assignments (tentative; subject to change; all changes are advertised in classes):

Week (bold indicates exam dates)		Sections covered	Assignment due dates and notes
1	Sep 4 - 7	1.1, 1.2, 1.3 (S)	No assignment due
2	Sep 10 - 14	1.4, 2.1, 2.2(S)	
3	Sep 17 - 21	2.2, 3.1, 3.2 (S)	Assign. 1 due Sep 17 Sect 1.1-1.4 (S)
4	Sep 24 - 28	3.2, 1.2, 1.3* (N)	Assign. 2 due Sep 24 Sect 2.1, 2.2 (S)
5	Oct 1 - 5	Review Term Exam 1 (Covers all the material of the weeks 1-4)	Assign. 3 due Oct 1 Sect 3.1, 3.2 (S), 1.2(N)
6	Oct 9 - 12 Monday Oct 8: University closed for Thanksgiving	2.1, 2.2 (N)	No assignment due
7	Oct 15 - 19	2.3, 3.1 (N)	Assign. 4 due Oct 15 Sect 2.1, 2.2 (N)
8	Oct 22 - 26	3.2, 3.3(N)	Assign. 5 due Oct 22 Sect 2.3, 3.1 (N)
9	Oct 29 - Nov 2	3.3, 3.4 (N) Term Exam 2 (Covers all the material of the weeks 6 – 8)	Assign. 6 due Oct 29 Sect 3.2, 3.3 (N)
10	Nov 5 - 9	3.5, 3.6* (N)	Assign. 7 due Nov 5 Sect 3.3, 3.4 (N)
11	Nov 13 - 16 Monday Nov 12: University closed Remembrance Day	5.1 – 5.4 (N)	No assignment due
12	Nov 19 - 23	4.1 – 4.4	Assign. 8 due Nov 19 Sect 5.1 - 5.4(N)
13	Nov 26 -30	4.5, 4.6*, 4.7, 5.1	Assign. 9 due Nov 26 Sect 4.1 – 4.4 (N)
14	Dec 3-4	Review	Assign. 10 due Dec 3 Sect 4.5 -4.7, 5.1 (N)
	Thursday Dec 12 1 – 3 p.m.	Final Exam (2 hrs)	<i>Final Exam covers all topics in course</i>

Assignments: There are ten (10) graded homework assignments; they are due Mondays at **noon**. All assignments will be posted on my website.

Assignments are to be handed in the assignment box marked "Karen Buro" or in class, no later than the due date, and no earlier than 6 days before the due date. The assignment box is in the filing cabinet near 5-107. Please note that **late assignments will not be accepted under any circumstances**. Marked assignments will be returned to you in class, and the solutions to the assignments will be posted on my website.

- **Procedure for submission of assignments:**

The due dates of the assignments are shown in the schedule; the due time is noon.

Any changes to the due dates or included problems will be announced in your lectures.

1. Please use clean edged standard letter-size paper.
2. Make a habit of doing neat and presentable work: if the grader has difficulties when deciphering what you have written, the problem will not be graded, and the respective credit will be 0 (ZERO).
3. Show all your work and explain the steps of your solution; **explain them in words** if necessary: the grader is not supposed to guess what you mean, - it must be written.
4. If you have more than one sheet, please **staple** them together properly. **Do not use paper clips** or other devices.
5. Ensure that you have affixed the appropriate **coloured label** provided to you along with this outline, and that you have legibly hand printed all the required information on the label. **The label should be stapled to the upper left corner** of the first page of your assignment.
6. Assignments must be dropped **no later than noon** into the drawer labelled “**Karen Buro**” in one of the filing cabinets near room 5-107.
7. **If an assignment is not completed and delivered according to the above procedure, it will be immediately recycled and the grade 0 will be assigned.**
8. When you receive the marked assignments, make sure that the marks are totalled correctly. Try to do your best to understand your mistakes. In order to do this you may try to solve the problem again and /or compare your solution/answer with the solution placed on the my website. Make a habit of checking your marked solutions with those placed on my website even if the marker assigned you a perfect score. This will serve not only as a review, but it may possibly also bring to your attention an alternate approach to solving problems and may even identify, to your advantage, the situation where the marker may have given you credit for an incorrect solution! This is very rare, but this knowledge will spare you from losing valuable marks in examinations, and also serve as your personal quality control device.
9. **If you disagree with the grade** assigned by your grader for a certain problem or if some grades are missing or they are not totalled correctly, write **a clear message on a separate page for your grader**, staple it to your assignment and put it in the filing cabinet when you deliver your next assignment. If **after reading the answer from your grader**, the conflict has not been resolved and you think you are right and your grader is wrong, bring your assignment and the correspondence to the instructor.

Disclaimer: The information in this Course Outline is subject to change; any changes will be announced and distributed to the class or, if applicable, in the laboratory.

My Website: Please ensure that you check the my website regularly. Assignments, assignment solutions, extra course materials, extra worked-out examples, practice exams, and important announcements will all be posted there.

Disclaimer: The information in this Course Outline is subject to change; any changes will be announced and distributed to the class or, if applicable, in the laboratory.