Department of Mathematics and Statistics University of Victoria

Course Outline: **Math 211 Matrix Algebra I** **Summer 2017**

Instructor: Marcelo Laca Office: SSM A548 E-mail: laca

Lectures: Mondays and Thursdays 1:00 – 2:20 PM **DTB A104**

Office hours: Mondays and Thursdays 11:30 – 12:20, by email, and by appointment.

Coursespaces: HW assignments and general course information will be posted in the course webpage.

Course Description: Euclidean vector spaces; systems of linear equations, solution of linear systems by Gaussian elimination, matrices and matrix algebra; brief introduction to abstract vector space; determinants; eigenvectors; orthogonality and applications.

Textbook: Daniel Norman and Dan Wolczuk, *Introduction to Linear Algebra for Science and Engineering*, Pearson, Second edition (2012). Course topics correspond to textbook sections 1.1-1.4; 2.1-2.3; 2.4 (selected topics); 3.1-3.7; 4.6- 4.7; 5.1-5.4; 6.1-6.2; 7.1-7.2; 7.3 (if time permits).

Homework: There will be 4 homework assignments, due at the beginning of lecture on Thursday May 11, May 25, June 29, and July 20. To receive full credit, your solutions to the assigned problems must be correct, complete and clear. They should also be neat, in particular, scribbles, loose pages and pages ripped from a spiral binding are not acceptable.

Midterm: There will be one midterm test in class, on Monday, June 12.

Evaluation: Your grade in the course will be computed based on the percentage grades on assignments (HW), midterms (MT) and final exam (FE) according to:

CG% = HW x 24% + MT x 26% + FE x 50%.

Percentage scores will be converted to letter grades according to the university-wide standard table. (http://web.uvic.ca/calendar2014/FACS/UnIn/UARe/Grad.html)

Missing work: Don't! But if you must miss one homework or the Midterm test for documented reasons warranting an academic concession, I will compute a fair CG% from the available grades. This may include, at my discretion, shifting up to 10% to the Final Exam. Missing two or more scores for whatever reason, is a significant problem that cannot be fixed by reassigning percentages. If it happens, we will need to talk and reassess your standing in the course.
If you have a question or concern about your mark on a test, you must bring it to my attention within 7 calendar days of the date the test is returned, after which period there will be no reassessment.

General Course Policies: Regulations common to all courses offered by our department, may be found in http://www.uvic.ca/science/mathstatistics/undergraduate/course-policies/index.php
Make sure you know them. They bite.

Specific Academic Integrity Issues For This Course: You are welcome, in fact encouraged, to discuss the problems with others, but the homework problem sets are neither group projects nor exercises in searching the internet. You must write down and understand each solution in detail by yourself, which implies that you will be able to explain it if asked. In addition, *you must reference any external source precisely*, as this will allow me to evaluate your personal contribution. Failure to do this constitutes a breach of academic integrity, which is a serious issue. If you have any doubt regarding this, you should bring it up before submitting the work. Any form of cheating or misconduct in will be dealt with immediately under the terms of the University Academic Misconduct Policy.

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Chapters and sections covered *(weekly coverage is approximate and tentative)*

Chapter 1: **Euclidean Vector Spaces** *(week 1)*
- 1.1 Vectors in R^2 and R^3
- 1.2 Vectors in R^n
- 1.3 Length and Dot Product
- 1.4 Projections and Minimum Distance

Chapter 2: **Systems of Linear Equations** *(weeks 2 and 3)*
- 2.1 Systems of linear equations and elimination
- 2.2 Reduced Row Echelon Form, Rank, and Homogeneous Systems
- 2.3 Applications to Spanning and Linear Independence

Chapter 3: **Matrices, Linear Mappings, and Inverses** *(weeks 3, 4, and 5)*
- 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
- 3.7 *L*-*U* Decomposition

Chapter 4: **Vector Spaces (Subspaces of R^n)** *(week 6 and 7)*
- 4.3 Bases and Dimensions (more about 2.3)
- 4.4 Coordinates With Respect to a Basis
- 4.6 Matrix of a Linear Mapping

Chapter 5: **Determinants** *(weeks 8 and 9)*
- 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 Determinant

Chapter 6: **Eigenvectors and Diagonalization** *(weeks 10 and 11)*
- 6.1 Eigenvalues and Eigenvectors
- 6.2 Diagonalization

Chapter 7: **Orthonormal Bases** *(weeks 12 and 13)*
- 7.1 Orthonormal bases and Orthogonal Matrices
- 7.2 Projections and the Gram-Schmidt Theorem

IMPORTANT DATES:

1 May	Mon	First lecture
11 May	Thu	HW 1 solutions due in class
13 May	Sat	Last day to add this course
25 May	Thu	HW 2 solutions due in class
3 June	Sat	Last day to drop courses with 50% fee reduction
12 June	Mon	Midterm Test I during class
28 June	Wed	Last day to drop this course without academic penalty
29 June	Thu	HW 3 solutions due in class.
3 July	Mon	Reading Break
20 July	Thu	HW 4 solutions due in class
27 July	Thu	Last lecture
8 - 18 Aug		Final Examination Period

AVAILABLE HELP:

The **Mathematics & Statistics Assistance Centre** provides a convenient environment where students can go to work, on their own or in groups, and to discuss math & stats problems. The Centre is staffed with talented Teaching Assistants who are happy to discuss primarily first and second year course material with you. Please see http://www.uvic.ca/science/math-statistics/undergraduate/msac/index.php for more information.

Students in Undergraduate Mathematics and Statistics (SUMS) was founded in 2014 as the reincarnation of a previous undergraduate course union that had been inactive for a few years. Please see http://www.uvic.ca/science/math-statistics/undergraduate/sums/index.php for more information.