MAT1341B: COURSE SYLLABUS

INSTRUCTOR: Anne Broadbent

- **Office:** Room KED 204C (585 King Edward), Tel: (613) 562–5800 x2104
- **E-mail address:** `abroadbe@uottawa.ca`
  In your emails, please include the *course code*, *your name* and *student number* in the **subject**.
- **Office hours:** Tuesdays 14:45–15:45, Thursdays 15:15–16:15, or by appointment. Any modifications will be posted on Blackboard. No office hours during reading week.

COURSE HOMEPAGE: See the course website on Blackboard (`https://uottawa.blackboard.com`) for announcements, lecture notes, grades, sample tests and more (login and registration required).

PREREQUISITE: Calculus and Vectors (MCV4U), MAT1339, or an equivalent. You *must* have one of these to be enrolled.

LEARNING OBJECTIVES: By the end of this course, students are expected to:

1. Manipulate and represent complex numbers in Cartesian and polar form.
2. Understand and apply the properties of addition and scalar multiplication of vectors, of the dot product and orthogonal projections (high school review).
3. Represent and manipulate lines and planes in $\mathbb{R}^3$; compute normal vectors and intersections. Use the cross product to compute normal vectors, distances between geometric objects, area of triangles and parallelograms and volumes of parallelepipeds (high school review).
4. Understand, apply and prove basic properties relating to Vector Spaces (subspaces and spanning sets, linear dependence and independence, bases and dimension theorems); recognize and describe concrete examples (and non-examples) of vector spaces and subspaces, including low dimensional geometrical subspaces of $\mathbb{R}^2$ and $\mathbb{R}^3$.
5. Solve systems of linear equations and homogeneous systems of linear equations by using matrix operations, including Row Echelon Forms and Reduced Row Echelon Forms of matrices, and Gaussian elimination algorithm. Determine rank and explain its significance. Represent and solve real-world problems in terms of linear systems.
6. Perform matrix operations (including multiplication and block multiplication, computation of the transpose, inverse and determinant); understand and explain their properties and significance.
7. Define and compute the column space, row space and nullspace of a matrix (as well as their bases); relate these concepts to properties of linear systems.
8. Compute orthogonal projections and identify their importance in approximation, and construct orthogonal bases using the Gram-Schmidt procedure.
9. Define and compute determinants; recognize certain types of matrices where the determinant is easy to compute.
10. Define and compute eigenvalues and their associated eigenvectors; determine if a matrix is diagonalizable and compute diagonalizations.
11. Recognize and use matrices to represent linear transformations, and find their kernel, image, rank and nullity.

LECTURES:
Tuesdays 13:00–14:20 and Thursdays 11:30–12:50 at Art Building (ART), room: 033

- First class: September 10, 2015
- **Note:** During lectures the course material and the examples will be discussed in details. You are advised to take notes during lectures. You should also prepare for each lecture by reading ahead from the course text.

PRIMARY TEXTBOOK: "*Vector Spaces First*", by Thierry Giordano, Barry Jessup and Monica Nevins. (E-book available online to registered students via Blackboard).

APPROXIMATE COURSE CONTENT: Chapters 1–19 and 21–24. Please note that the material in chapters 2 and 3 is merely review and, together with chapter 1, will be the subject of the first (Diagnostic) test.

OPTIONAL TEXTBOOK: "*Linear Algebra with Applications*" by Keith Nicholson (Custom publication for the University of Ottawa, McGraw Hill Custom Publishing): Appendix A, 4.1–4.3 (review); Thm 2.1 (for vectors in $\mathbb{R}^n$), 6.1– 6.4 (with examples from 1.1, 2.1, 2.2, 5.1, 5.2), 1.1–1.4, 2.1–2.4, 5.4, 5.3, 8.1, 3.1–3.3, 2.6, 7.1, 7.2. Please note that the material in sections 4.1–4.3 is merely review and will be part of the subject of the Diagnostic test. The order in which the material is covered is roughly that of the above list. However, your class notes and "Vector Spaces First" should be your primary sources.

PROBLEM SESSIONS/DGDS: Discussion Groups (DGDs) will take place every Monday throughout the term until lectures end (except during Thanksgiving and Study Week, or if there's a test):

Discussion Groups	Day and Time	Place
DGD (1)	Mondays, 14:30 – 16:00	Vanier Hall (VNR), room: 1075
DGD (2)	Mondays, 13:00 – 14:30	Fauteux Hall (FTX), room: 133
DGD (3)	Mondays, 16:00 – 17:30	Montpetit Hall (MNT), room: 207
DGD (4)	Mondays, 16:00 – 17:30	Morisset Hall (MRT), room: 256

- First DGD: Monday, September 14, 2015
- **Note: You are responsible for all the material covered in DGDs**. The DGDs will help you getting your hands dirty by working on exercises individually. You will also have a chance to see problems supplementing the material covered during the lectures. In addition, the problems worked out in the DGDs will be similar to the problems on the tests and final exams. One way of making the DGDs useful for yourself is to try solving the exercises beforehand and ask from the TA any question you might have. However, you should not consider the DGD as another lecture.

EXAMS:

- The *final* exam will be scheduled by the registrar during the exam period (the exact date will be announced accordingly). You are responsible to find the date, place and time of the final exam yourself – do not rely on your friends for this.
- There will be **four** tests and all (except test 3) will be held during the DGDs. The details are as follows:

Tests	**Date**	**Time and Place**
Test 1 (Diagnostic Test)	Monday, September 21, 2015	DGD time and room
Test 2	Monday, October 19, 2015	DGD time and room
Test 3	Thursday, November 12, 2015	In class: 11:30-13:00, ART 033
Test 4	Monday, November 30, 2015	DGD time and room

- **Important Note 1: The results of test 3 will not be available before the official drop date (November 20, 2015).**
- **Important Note 2:** This course is **cumulative**, i.e. the tests will cover all the material that we have covered in the course up to that point.
- **Important Note 3:** All the tests and exams will be closed book and no notes and calculators will be allowed (or required).

GRADING SCHEME:

Final Exam	50%
Tests	50% ($4 \times 12.5\%$ for each test)

with the following exceptions:

- If you miss any test, its weight will be shifted to the final exam.
- If your grade on the final exam is less than 45%, your final grade will be your final exam grade.
- For each test mark that is lower than your final exam grade, the weight of that test will be moved to the final.

For more details on grading scheme, you can refer to:
`http://www.uottawa.ca/about/academic-regulation-10-grading-system`

You can find more details about the supplemental examinations at:
`http://www.uottawa.ca/about/academic-regulation-9-evaluation-of-student-learning`
(This is for those who receive an E for their final grade and are given another opportunity to write a supplemental exam.)

IMPORTANT DATES: Some important dates, such as the deadline to add or withdraw from courses, can be found at: http://www.uottawa.ca/important-academic-dates-and-deadlines/

HELP CENTRE: This is a drop-in centre located at Marion Hall, Room 201, in which you can find math professors and graduate students who can help you with problems and exercises. For more details, please refer to: http://science.uottawa.ca/mathstat/en/help-centre

CLASS RULES AND REGULATIONS: To make the lectures as productive as possible for everyone, you are asked to respect the following rules:

- Be on time for each class and do not leave early. If necessary to do so, make every effort not to disturb others.
- Electronics are distracting for you and the people around you. Unless you are using the device as a learning aid, please turn off all electronics and put them away.

ACADEMIC FRAUD: Any incident of such kind will be reported to the Faculty without exception, including plagiarism and cheating during exams and the respective penalties range from receiving an F in the course to expulsion from the University. For more details on the University's policies on academic regulations, please refer to:
http://www.uottawa.ca/academic-regulations/academic-fraud.html

ACCESSIBILITY: The students in need of accommodation during this course due to a disability affecting mobility, vision, hearing, mental or physical health are advised to inform the Access Service (http://www.sass.uottawa.ca/access/) about their needs.