# Mathematics 2051: Linear Algebra – Winter 2008

**Classrooms**: SN 3042
**Time**: Lecture MWF 4:00 -4:50 pm
**Instructor**: Dr. Margo Kondratieva
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**Prerequisite:**

The prerequisite is Math-2050.

**Getting Help:**

There are few ways of getting help. First, I'll have **office hours MW 3pm-4pm**, so feel free to come to them. If you need to speak to me outside of those times please make an appointment. If you have a quick question or remark send me an e-mail.

**Marking Scheme:**

There will be an exercise set almost every week which I'll usually hand out on Fri. They'll usually be due a week later on Fri. Based on the homework exercises there will be a 15 minutes quiz on Fridays at the beginning of class. The **quizzes** will be worth *only* **10**% of your final mark, *but doing the exercises is extremely important for your understanding and success in the course!*

There will also be **one midterm test** tentatively on Friday **February 22** . The test will be worth **30**% of your final mark.

The **final exam** will cover the entire course. It will be worth **60**% of your final mark.

**Note:** If you miss a quiz or midterm for an acceptable reason, write me a note explaining the circumstances and I'll shift the weighting for the missed work to the final exam. Such notes should be submitted within a week of the missed event.

Missing the final exam is a much more serious matter. It can be deferred if you have three exams all scheduled within a 24 hour period, or if you suffer bereavement or serious medical problems. Deferrals must be officially applied for using forms that you can obtain from the General Office (HH-3003).

**Formula Sheet and Calculators:**

Graphing calculators such as the TI81,82,83,84,85,86 are allowed during tests and the final exam. However, calculators that can do symbolic manipulations such as the TI89, TI92, or HP48G are not allowed. If you use your calculator to store notes or formulas, you must delete this material before the start of any test, or exam. Bringing electronic notes into an exam is the equivalent of bringing in a cheat sheet, and will be dealt with in the same way (see MUN calendar).

**Text and Course Outline:**

The official text is Linear Algebra by W.Keith Nicholson, 5th edition, McGraw-Hill, 2006. You are advised to read an appropriate section before starting doing your homework exercise set and prepare for a quiz. In addition your are advised to look through the lecture notes and handouts I may distribute.

We'll cover the following material, which is organized into four units (the class schedule is tentative and may vary):

| **Unit 1** | **The Vector Space $R^n$** | class |
|---|---|---|
| 1.1 | Linear vector spaces and subspaces. Examples in $R^3$. | Jan 7-11 |
| 1.2 | Linear independence. Basis. Dimension of the space. | Jan 14-18 |
| 1.3 | Coordinates of a vector in a basis. Change of basis. | Jan 21-23 |
| 1.4 | Rank of a matrix as a dimension of row/column space. | Jan Jan 25 |
| 1.5 | Multiple eigenvalues and dimension of eigenspaces. | |
| | Diagonalization revised. | Jan 28, 30 |
| **Unit 2** | **Orthogonality** | class |
| 2.1 | Dot product as an inner product: axiomatic approach. | Feb 1,4 |
| 2.2 | Orthogonality and orthogonalization. Orthogonal basis. | Feb 6-11 |
| 2.3 | Isomorphism of Euclidian spaces. | Feb. 13-15 |
| | Test 1 | Feb 22 |
| **Unit 3** | **Quadratic Forms** | class |
| 3.1 | Inner product as a positively defined quadratic form. | Feb 25,27 |
| 3.2 | Diagonalization of a matrix of a quadratic form. Jacobi method. | Feb 29, Mar 3 |
| 3.3 | Principal Axis Theorem with applications in 2D. | Mar 5-10 |
| **Unit 4** | **Linear transformations** | class |
| 4.1 | Linear transformations and matrices. | Mar 12-14 |
| 4.2 | Kernel and image of a linear transformation. | Mar 17-21 |
| 4.3 | Composition of linear transformations. | Mar 24-28 |
| 4.4 | Change of basis and matrix of a linear transformation. | Mar 31- Apr 4 |
| | Review for final | TBA, Apr 5-9 |
| | Final exam | TBA, Apr 9-18 |