

## Mathematics 122 – Introductory Linear Algebra

**Text:** *Elementary Linear Algebra, Applications Version, 8<sup>th</sup> ed.*, by Howard Anton and Chris Rorres, Wiley, 1999.

**Course Outline:**

The course covers the first four chapters of the Anton-Rorres text, with additional material from Chapters 5, 7 and 11. MA122 provides an introduction to the theory and applications of linear algebra.

Textbook problems will be assigned regularly throughout the course. Even though no marks are explicitly awarded, regular completion of all assigned problems is essential to mastering the course material. *It is extremely important to attempt these problems as soon as possible after the corresponding concepts have been discussed in class.*

Answers to all numerical problems appear in the back of the text itself. Answers to more theoretical problems appear in the *Student Solutions Manual* for the text. Several copies of this manual are available in the Reserve Room of the WLU Library.

**Evaluation:** A final mark out of 100 will be calculated as follows:

Quizzes .....	10%
Test 1 (Wednesday, February 12 <sup>th</sup> , 2003) .....	20%
Test 2 (Wednesday, March 12 <sup>th</sup> , 2003) .....	20%
Final Examination (2 hours, date and time TBA) .....	50%
	100%

*At least 10 % of questions on tests and the exam may cover theory and proofs.*

**The final mark will be converted to a letter grade in accordance with the conversion table, found on page 73 of the undergraduate calendar.**

**Checking Marked Tests:**

Your marked test papers will be returned in class as soon as possible. When this happens, check that all questions have been marked and that the marks have been added correctly. Detailed solutions and a marking scheme for each test will be posted outside the Mathematics Department Office (3<sup>rd</sup> Floor, Woods Building). If you find that marks have been added incorrectly or that, *after* checking the posted solution set, you disagree with the marking of your paper, see your instructor within one week of the date the test was returned in class. *No marks will be changed after that time.*

**Missed Tests:**

Tests missed without a valid, documented excuse (e.g. medical certificate) will be assigned a mark of zero.

*(See reverse)*

**Students are expected to be aware of and abide by all University regulations and policies, as outlined in the current Undergraduate Calendar (the web version is the “official” Calendar). In particular,**

1. Students must reserve the examination period of **Apr. 9-30, 2003**. If you are considering registering for a special examination or event, you should select a time outside the examination period. Consult the Undergraduate Calendar (print or web version) for special circumstances for examination deferment.
2. Students with disabilities or special needs are advised to contact *Laurier's* **Special Needs Office** for information regarding its services and resources. Students are encouraged to review the current Undergraduate Calendar (print or web version) for information regarding all services available on campus.
3. The penalties for plagiarism and other forms of academic misconduct are severe and enforced at all times. The *Student Code of Conduct and Discipline*, and the procedures for investigating and determining appropriate disciplinary measures for breaches of this *Code* are given in the current Undergraduate Calendar (print or web version). Wilfrid Laurier University uses software that can check for plagiarism. Students may be required to submit their written work in electronic form and have it checked for plagiarism.
4. Students are to adhere to the *Principles in the Use of Information Technology*. These *Principles* and resulting actions for breaches are stated in the current Undergraduate Calendar (print or web version).

**New Course Drop Dates Winter 2003:**

Jan. 10: final day to drop 12-week course(s) with no tuition charge

Jan. 17: final day to drop 12-week or withdraw at 10% tuition charge

**NEW** Mar. 10: final day to drop course(s) or withdraw from 12-week course(s) without failure and for tuition adjustment.

# Mathematics 122 – Introductory Linear Algebra

## Assigned Problems and Approximate Schedule

*Problems are from Anton/Rorres, Elementary Linear Algebra, Applications Version, 8<sup>th</sup> ed., Wiley, 1999.*

Do as many of these as you think you need to, and **more** if necessary! They are not to be handed in. Solutions can be found at the back of the book and in the solution manual (on reserve in the library). Don't hesitate to ask for help on any of these problems.

Week	Section	Topics	Problems
1	1.1	Linear Systems	1-8, 10, 11
	1.2	Gaussian Elimination	1, 3, 4(a)(b), 5, 6, 8, 10, 12, 14, 17-19, 25, 27
2	1.3	Matrix Algebra	1, 2, 3(f), 4(b)(c)(h), 5(a)-(h), 7(b)(c), 11, 13(b), 22
	1.4		7, 8, 13, 14, 21, 23
3	1.5	Elementary Matrices, Finding $A^{-1}$ Linear Systems and Matrix Multiplication	1, 3, 4, 5(b), 6(a)(b), 7(c), 8 3, 8, 16, 22
	1.6		
<b>Quiz 1</b>	1.7	Special Types of Matrices	3, 4, 5, 6, 10, 18, 20, 22
4	11.7	Graph Theory	1(b), 2(b), 3, 6, 7
	11.8	Games of Strategy	1, 3-5
5	2.2	Properties of Determinants	2, 7, 12, 17
	2.3	Properties of Determinants	3, 5, 8-12
	2.4	Cofactor Expansion, Cramer's Rule	1, 3, 6, 16-21, 23
6	3.1	Geometric Vectors	3(a)(e), 4, 6, 7, 9
<b>Test 1</b>	3.2	Vectors in $\mathbb{R}^2$ and $\mathbb{R}^3$	1, 3, 4, 6
	3.3	Dot Product, Projections	1-4, 6(d), 8-10, 12, 16
7	3.4	Cross Product	2, 3(a), 4(a), 7, 8(a)
<b>Quiz 2</b>	3.5	Lines and Planes in $\mathbb{R}^3$	1(a), 2, 3, 4(a), 6, 8-11, 17, 22, 30, 39(b), 40(a)
8	9.3	Least Squares Curve-Fitting	1, 3, 8
	4.1	Euclidean $n$ -space	1(e)(f), 5(d), 8, 9(c), 14(a)(d), 16, 24
9	4.2	Linear Transformations	2, 3, 5(c)(d), 9, 11, 20(a), 25(a)
<b>Test 2</b>	4.3	Properties of Linear Transformations	2(a)(c), 3, 6(a)(c), 9, 11, 13, 15, 21
10	5.2	Span	7, 8, 11, 14, 27
	5.3	Linear Independence	3, 7, 8, 11, 14, 15
11	7.1	Eigenvalues and Eigenvectors	1-3, 4-6 (parts (a) only)
	7.2	Diagonalization	8, 10, 13, 19, 21
12	11.16	Cryptography	1-7
		Review	