

THE UNIVERSITY OF WESTERN ONTARIO

**APPLIED MATHEMATICS 1411a** (formerly 025a)  
**Linear Algebra for Engineers**

**Course outline**  
Fall 2012

**Instructor:**

**Natalia Kiriushcheva**

Office: MC 214

email: [nkiriush@uwo.ca](mailto:nkiriush@uwo.ca)

Section 001	M W F	8:30 a.m. – 9:30 a.m.	SEB 1059
Tutorial 002	Tu	10:30 a.m. – 12:30 p.m.	SSC 2028
Tutorial 003	W	4:30 p.m. – 6:30 p.m.	SEB 2100

Office Hours: M W 10:30 – 11:30 a.m. (or by appointment)

**Textbooks:**

“Elementary Linear Algebra. Applications Version”, 10<sup>th</sup> Edition, by Howard Anton and Chris Rorres, John Wiley & Sons, Inc. ISBN: 978-0-470-43205-1 (Required)

“Student Solutions Manual for Elementary Linear Algebra. Applications Version”, 10<sup>th</sup> Edition, by Howard Anton and Chris Rorres, John Wiley & Sons, Inc. ISBN: 978-0-470-45822-8 (Optional)

*Or* The package (textbook and solutions manual together): “Elementary Linear Algebra w/Applications and Student Solutions Manual Set”, 10<sup>th</sup> Edition, by Howard Anton, John Wiley & Sons, Inc.

**Topics:**

**Systems of Linear Equations:** introduction to systems of linear equations, solving systems by Gaussian elimination

**Engineering Applications:** electrical networks, pipe and traffic flow, data fitting

**Matrices:** matrix operations, inverses, elementary matrices, special types of matrices

**Determinants:** cofactor expansion, properties, Cramer's rule

**Vector Spaces:** definition of a vector space and subspace, linear independence, basis and dimension, row space, column space, nullspace, rank and nullity

**Orthogonality:** inner product, orthonormal bases, Gram-Schmidt process, least-squares approximations, orthogonal matrices

## Topics (cont'd):

**Eigenvalues, Eigenvectors:** finding eigenvalues and eigenvectors, characteristic polynomial, properties of eigenvalues and eigenvectors, diagonalization, geometric and algebraic multiplicity, similarity, orthogonal diagonalization of real symmetric matrices

**Linear transformations:** linear mapping between vector spaces, matrix representation of linear transformations

**Additional Topics on Applications:** data fitting using least-squares solutions, quadratic forms

## Grades:

- 10% First Tutorial Test- week of September 24, 2012
- 10% Second Tutorial Test - week of October 9, 2012
- 10% Third Tutorial Test - week of October 29, 2012
- 10% Fourth Tutorial Test - week of November 12, 2012
- 10% Fifth Tutorial Test - week of November 26, 2012
- 50% Final Examination (TBA in the December examination period)

## Addendum to all Applied Mathematics Course Outlines

1. Plagiarism: Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Offence Policy in the Western Academic Calendar).
  2. Plagiarism Checking: The University of Western Ontario uses software for plagiarism checking. Students may be required to submit their written work and programs in electronic form for plagiarism checking.
  3. Prerequisites for a course: Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you will be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.
  4. If computer-marked multiple-choice tests and/or exams are given: Use may be made of software to check for unusual coincidences in answer patterns that may indicate cheating.
  5. Accessibility Statement: Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.
  6. If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to your faculty's Dean's Office as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. In the event of a missed final exam, a "Recommendation of Special Examination" form must be obtained from your faculty's Dean's Office immediately.
- Applied Mathematics 1411a – N. Kiriushcheva Course Outline Fall 2012

For further information please see: <http://www.uwo.ca/univsec/handbook/appeals/medical.pdf>

7. A student requiring academic accommodation due to illness, should use the Student Medical Certificate when visiting an off-campus medical facility or request a Records Release Form (located in the Dean's Office) for visits to Student Health Services. The form can be found here:  
[https://studentservices.uwo.ca/secure/medical\\_document.pdf](https://studentservices.uwo.ca/secure/medical_document.pdf)