

THE UNIVERSITY OF WESTERN ONTARIO

APPLIED MATHEMATICS 1411a (formerly 025a)
Linear Algebra with Numerical Analysis for Engineering

Course outline

Fall 2014

Description (from the Academic Calendar):

Matrix operations, systems of linear equations, linear spaces and transformations, determinants, eigenvalues and eigenvectors, applications of interest to Engineers including diagonalization of matrices, quadratic forms, orthogonal transformations; introduction to MATLAB with applications from linear algebra.

Antirequisite(s): Mathematics 1600A/B

Prerequisite(s): Ontario Secondary School MHF4U or MCV4U, or Mathematics 0110A/B.

Corequisite(s): none

Pre-or Corequisite(s): none

Extra Information: 3 lecture hours, 2 computer lab or tutorial hours, 0.5 course.

Restricted to students in the Faculty of Engineering.

Instructor:

Natalia Kiriushcheva

Office: MC 259

email: nkiriush@uwo.ca

Section 001

M W F

8:30 a.m. – 9:30 a.m.

NS 1

Tutorial 002

Tu

10:30 a.m. – 12:30 p.m.

SEB 2100

and also

Tu

10:30 a.m. – 12:30 p.m.

HSB 13 and HSB 14

Tutorial 003

F

2:30 p.m. – 4:30 p.m.

SEB 1059

and also

F

2:30 p.m. – 4:30 p.m.

HSB 14 and SH 1310

Office Hours:

Monday 10:30 – 11:30 a.m., Friday 9:30 – 10:30 a.m. (or by appointment)

If these office hours do not fit your schedule, send me email and arrange an appointment at another time. You should use the university email address and always include *AM1411A* in the subject line.

Teaching Assistants: Andrew Day (aday46@uwo.ca), Daero Kim (dkim47@uwo.ca), Ashrafur Rahman (srahma33@uwo.ca).

Textbooks:

“Elementary Linear Algebra”, 11th edition, by Howard Anton, John Wiley & Sons, Inc. ISBN: 978-1-118-47350-4

“Student Solutions Manual. Elementary Linear Algebra and Elementary Linear Algebra, Applications Version”, 11th edition, by Howard Anton and Chris Rorres, John Wiley & Sons, Inc. ISBN: 978-1-118-46442-7 (Optional)

Or the package (textbook and solutions manual together): “Elementary Linear Algebra and Student Solutions Manual Set”, 11th edition, by Howard Anton, John Wiley & Sons, Inc. ISBN: 978-1-119-02496-5

Or the package (textbook and full digital version of the solutions manual): “Elementary Linear Algebra and Student Solutions Manual Set”, 11th Edition, by Howard Anton, includes WileyPlus. ISBN: 978-0-470-56002-0.

Or e-book: “Elementary Linear Algebra”, 11th edition, by Howard Anton, ISBN 978-0-470-56933-7, Wiley E-Text will give you access to the textbook, students solution manual, and more. The evaluation copy is available on: <https://www.wileyplus.com/WileyCDA/> .

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

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: introduction to Matlab, data fitting using least-squares solutions, quadratic forms, other engineering applications

Evaluation of students' performance:

- 10% First Tutorial Test – September 23 – October 3, 2014
- 10% Second Tutorial Test – October 7 – October 17, 2014
- 10% Third Tutorial Test – November 4 – November 14, 2014
- 10% Matlab Test – November 18 – November 28, 2014
- 60% Final Examination – 3 hours (TBA in the December examination period)

For the exact dates of tutorials and labs and the exact dates of tests, see the webpage of AM 1411A on OWL: <https://owl.uwo.ca/portal> .

The tutorial tests will be one hour long, closed book. The final exam will be three hours long, “open book”. No electronic devices are allowed during the tests and final examination, except of non-programmable calculators. For a description of the “open book” exam and other information related to our course, see the webpage of AM 1411A on OWL: <https://owl.uwo.ca/portal> .

Addendum to the course outline (UWO policy):

For UWO Policy on Accommodation for Medical Illness and a downloadable SMC see:

http://www.uwo.ca/univsec/handbook/appeals/accommodation_medical.pdf

[downloadable Student Medical Certificate (SMC): <https://studentservices.uwo.ca> under the Medical Documentation heading]

Students seeking academic accommodation on medical grounds for any missed tests, exams, participation components and/or assignments worth 10% or more of their final grade must apply to the Academic Counselling office of their home Faculty and provide documentation. Academic accommodation cannot be granted by the instructor or department.

Students who are in emotional/mental distress should refer to Mental Health@Western

<http://www.uwo.ca/uwocom/mentalhealth/> for a complete list of options about how to obtain help.

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:

http://www.uwo.ca/univsec/handbook/appeals/scholastic_discipline_undergrad.pdf).

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. 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 .