# ENGM1041 Applied Linear Algebra

## Instructors:

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## Meeting Times

Students must register in one lecture section and one tutorial section.

**Lecture Sections:**

Section 1: 10:35 - 11:25 MWF Dunn 117

Section 2: 11:35 - 12:25 MWF Dunn 117

**Tutorial Sections:**

Tut 1: R 15:35 - 17:25 Dunn 301B

Tut 2: F 14:35 - 16:25 Dunn 301B

Tut 3: M 15:35 - 17:25 Dunn 301B

Tut 4: R 10:05 - 11:55 Dunn 301B

Tut 5: T 10:05 - 11:55 Dunn 301B

Tut 6: W 15:35 - 17:25 Dunn 301B

The tutorials are an integral part of the course. The tutorials are used in a number of ways:

- to review and expand upon the material covered in the lectures,
- to work through examples similar to the current assignment problems.

## Textbook

Advanced Engineering Mathematics, 5th edition by Zill and Wright.

This text will be used in ENGM1041, ENGM2101 and ENGM2022.

## Reference

Linear Algebra with Applications. Alternate edition. Gareth Williams. Seventh Edition

## Course Requirements

1. There will be approximately one assignment per week, due by the time specified (usually one week after the assignment is posted). For each assignment you must use the coversheet which is posted on BLS.

   **Late assignments will not be accepted and a mark of zero will be recorded.**

2. Five tests held during class time on Jan 29, Feb 12, Mar 5, Mar 19, and Apr 7, 2013. All students must write the tests at these times.

   **As per Faculty rules, only the official Dalhousie University Health Service form, filled in by a doctor with "too ill to write" and subsequently approved by the Associate Dean's office, will be accepted as an excuse to miss an test. Otherwise, a mark of zero will be recorded.**

3. As there is no "Final Exam" there will be no supplementary exam in this course.

## Grading Formula

10% assignments + 15% test #1 + 15% test #2 + 20% test #3 + 20% test #4 + 20% test #5

## Web Resources

`http://owl.dal.ca/` for all course information.

## Software Resources

GNU Octave, will be used for some assignments. This software is installed on the Faculty of Engineering computers. Students can download and install the program from `http://www.octave.org`.

## Schedule of Events

1. Test #1: Wednesday, Jan 29, 2014, during regular class time, covering assignments 1 and 2.
2. Test #2: Wednesday, Feb 12, 2014, during regular class time, covering assignments 3 and 4.
3. Test #3: Wednesday, Mar 5, 2014, during regular class time, covering assignments 5 and 6.
4. Test #4: Wednesday, Mar 19, 2014, during regular class time, covering assignments 7 and 8.
5. Test #5: Monday, Apr 7, 2014, during regular class time, covering assignments 9 and 10.
6. ASSIGNMENTS:

   Assign #1: Due Monday Jan 20, 2014
   Assign #2: Due Monday Jan 27, 2014
   Assign #3: Due Monday Feb 3, 2014
   Assign #4: Due Monday Feb 10, 2014
   Assign #5: Due Monday Feb 24, 2014

Assign #6: Due Monday Mar 3, 2014
Assign #7: Due Monday Mar 10, 2014
Assign #8: Due Monday Mar 17, 2014
Assign #9: Due Monday Mar 24, 2014
Assign #10: Due Friday Apr 4, 2014

## Course Outline

1. Matrix Algebra (section 8.1).
2. Systems of Linear Equations and applications (section 8.2).
3. Gaussian Elimination Algorithm, Gauss–Jordan Elimination Algorithm (section 8.2).
4. Determinants (sections 8.4 and 8.5).
5. Cramer's rule and applications (sections 8.7).
6. Matrix Inverse and applications (sections 8.6, 8.14).
7. Cross Product, Equation of a plane (sections 7.4 and 7.5)
8. Linear Combinations, Linear Indepedence, Basis and Dimension (section 7.6 and course notes).
9. Rank of a Matrix, row space and column space (section 8.3).
10. Homogeneous Solution, Particular Solution, General Solution (course notes and section 8.3).
11. Orthonormal Vectors, Projections, Gram–Schmidt Orthogonalization (section 7.7)
12. Method of Least Squares and applications (section 8.16).
13. The Eigenvalue Problem (section 8.8).
14. Diagonalization, Orthogonal Diagonalization (sections 8.10, 8.12).
15. Approximation of Eigenvalues (section 8.11).
16. Applications to Population Models, Markov Chains, Compartmental Models (section 8.17)