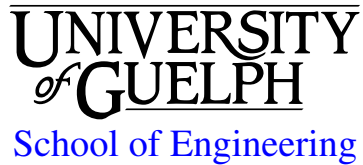


ENGG*1500 Engineering Analysis

Winter 2017



(Revision 0: January, 2016)

1 INSTRUCTIONAL SUPPORT

1.1 Instructor

Instructor: Julie Vale, Ph.D., P.Eng.
Office: THRN 2340, ext. 54863
Email: jvale@uoguelph.ca
Office hours: Tuesday 15:00-16:00 in THRN 1427 and Wednesday 13:30-14:30 in THRN 2340

1.2 Teaching Assistants

GTA	Email
Abeer Al-Hyari	aalhyari@uoguelph.ca
Alexander Fry	afry@uoguelph.ca
Andrea Dinardo	dinardoa@uoguelph.ca
Aubrianna Bilyea	abilyea@uoguelph.ca
Colin Gibson	cgibso05@uoguelph.ca
Craig Duvall	cduvall@uoguelph.ca
David Weales	dweales@uoguelph.ca
Kelsie McNeill	kmcnei02@uoguelph.ca
Mohammed Ahmed	mahmed03@uoguelph.ca

2 LEARNING RESOURCES

2.1 Course Website

Course material, news, announcements, and grades will be regularly posted to the ENGG*1500 [Courselink](#) site. You are responsible for checking the site regularly.

2.2 Required Resources

1. D. Norman and D. Wolczuk, *Introduction to Linear Algebra for Science and Engineering* 2nd ed., Pearson, 1995.

2.3 Additional Resources

Lecture Information: Some lecture notes will be posted on Courselink as they are finalized.

Assignments: Assignment questions are located at the end of each chapter of the course notes. Solutions to selected questions will be posted to the lecture notes section in Courselink by the instructor and the GTAs. Students are encouraged to post their attempts at solutions to the remaining questions in the discussion forums; GTAs and the instructor will monitor these discussions and will provide support to help students arrive at the correct solutions.

Assignments are not graded.

2.4 Communication and Email Policy

As per university regulations, all students are required to check their mail.uoguelph.ca e-mail account regularly: e-mail is the official route of communication between the University and its students.

Important: When writing email to course staff (instructors, TAs, or lab techs), please be professional in your communication. Unprofessional emails will not be responded to. This includes those using l33t, text messaging shorthand, a complete lack of punctuation or capitals, etc.

Furthermore, Miss., Mrs., Ms., and Mr. are inappropriate forms of address for any faculty member who has a PhD. When communicating with the course instructor, (verbally or via email), please use Julie, Dr. Vale, or Professor. Emails using Miss., Mrs., or Ms. will not be responded to.

Finally, due to the large number of students in the course, ensure that ENGG*1500 is in the subject line so that the instructor can easily and quickly find your messages.

3 ASSESSMENT

3.1 Dates and Distribution

Quizzes: There are two quizzes. These are preparatory/review quizzes for the midterm and final exam and will be held on Thursday Feb 16 and Thursday April 6. Each quiz is 20 minutes, multiple choice, held at the beginning of the lecture. No extra time will be given to students who arrive late. If you miss quiz 1, or do better on the midterm, the weight will be placed on the midterm. If you miss quiz 2 or do better on the final, the weight will be placed on the final.

Tutorials and Matlab labs: Attendance will be taken at tutorials. Completed worksheets must be submitted at the end of the tutorial period. These worksheets will be graded. Matlab submissions will be graded during the tutorial session and a small writeup will be submitted to the courselink dropbox.

All sections are full, so please attend your assigned tutorial section.

A makeup session will be available in the last two weeks of class.

Midterm Tuesday, February 28, 17:30-19:00 location TBD

Final Exam: Exam time and location is subject to change. Please see Webadvisor for the latest information.

The breakdown for grading the course is given below. It is based on the premise that you must pass the exams in order to pass the course while ensuring that there are no step discontinuities in the grades (e.g., getting a 50% on the final exam versus a 49% will not change your grade from 70% to 49%).

Define Final Grade := G , Final exam := F , Midterm := M , Quiz 1 := Q_1 , Quiz 2 := Q_2 , and tutorials := T (all in percent).

If you do better on the final than midterm, more weight is placed on the final:

$$E := \frac{1}{0.85} \max\{0.5F + 0.35M, 0.6F + 0.25M\}.$$

Finally, if the overall exam grade is less than 60%, we use a linear interpolation to de-weight the quizzes, tutorials, and labs. This yields the desired result of making it difficult (but not impossible) to pass the course if you fail both the midterm and the final, while removing any step discontinuities in the grade. To achieve this, we use the following scaling factor

$$x := \frac{E - 40\%}{20\%}.$$

Your final grade is then given by

$$G := \begin{cases} 0.85E + 0.02Q_1 + 0.03Q_2 + 0.1T, & E \geq 60\% \\ \min\{(1-x)E + x(0.85E + 0.02Q_1 + 0.03Q_2 + 0.1T), \\ \quad 0.85E + 0.02Q_1 + 0.03Q_2 + 0.1T\}, & 40\% \leq E \leq 60\% \\ \min\{E, 0.85E + 0.02Q_1 + 0.03Q_2 + 0.1T\} & E \leq 40\%. \end{cases}$$

The nominal weighting (i.e., if you get over 60% on everything, do better on the final than the midterm, and do better on the quizzes than the exams) is

- midterm=25%
- final=60%
- quiz 1=2%
- quiz 2=3%
- tutorials = 10%

In one of the tutorials, you will create a MATLAB-based grade calculator to help you experiment with different possible grade outcomes.

3.2 Course Grading Policies

Missed Assessments: If you are unable to meet an in-course requirement due to medical, psychological, or compassionate reasons, please email the course instructor. See the undergraduate calendar for information on regulations and procedures for Academic Consideration:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements. See the undergraduate calendar for information on regulations and procedures for Academic Consideration of Religious Obligations:
<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml>

Missed midterm: If you miss the midterm exam due to grounds for granting academic consideration or religious accommodation, you will have the opportunity to write a make-up midterm exam on Monday March 5, 17:30-19:00. If you are unable to attend the make-up exam as well due to grounds for granting academic consideration or religious accommodation, the weight of the midterm will be moved to the final exam as there will be no further make-up midterm exam. No extra time will be given to students who arrive late.

Missed quizzes: If you miss a quiz for any reason, the weight of the quiz will be added to the midterm for quiz 1 and the final exam for quiz 2. There will be no makeup quizzes. No extra time will be given to students who arrive late.

Late Matlab Reports: Late submissions of reports will be penalized at a rate of 10% **per hour**.

All reports are submitted via courselink. It is **your** responsibility to ensure that your lab has been properly submitted, not your lab partner's. Double check that the correct file has been uploaded to the drop box. If you upload the incorrect file or fail to upload properly and do not fix the problem before the due date, you will be penalized according to the late submission rules: **there will be NO exceptions**. If you are having trouble submitting to courselink, email a copy of your report to the TA or submit a hard-copy **before** the deadline to provide proof that you completed the lab on time. A date stamp on a soft copy file **DOES NOT** constitute proof of timely completion.

Missed tutorials: If you miss a Matlab tutorial, you can attend the tutorial sessions during the makeup week at the end of the term. If you miss a non-Matlab tutorial, the weight will be placed onto the final exam.

Bonus mark cap: There are some bonus marks available in this course; however, no single assessment grade can be greater than 100%.

4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

4.1 Calendar Description

This course deals with engineering applications of matrix algebra, vector spaces and computer techniques to solve linear systems. Topics include linear transformations, eigenvalues and eigenvectors, diagonalization and their applications. Additional topics include complex variable algebra, multi-variable functions, partial derivatives, maxima and minima.

Prerequisite(s): MATH*1200 - Calculus

4.2 Course Aims

This is an introductory course in linear algebra. Linear algebra is one of the most important subjects that you will study in Engineering, as it is used in many courses and design projects. The main goal of the course is to give you a solid foundation in the elementary concepts of linear algebra and to give you exposure to real problems that you will use throughout your engineering career.

4.3 Learning Outcomes

At the successful completion of this course, a student will be able to:

1. Describe and evaluate the properties of vectors and basic vector spaces and subspaces.
2. Set up, manipulate, and solve systems of linear equations for a variety of engineering applications.
3. Describe and evaluate the properties of matrices including inverse matrices, identity matrices, and transpose matrices.
4. Calculate, comprehend, and apply determinants and their applications
5. Calculate, comprehend, and apply eigenvalues and eigenvectors and their applications
6. Calculate, comprehend, and apply complex numbers and their applications
7. Use Matlab to solve various linear algebra problems.

4.4 Graduate Attributes

Successfully completing this course will contribute to the following CEAB Graduate Attributes:

Graduate Attribute	Learning Objectives	Assessment
1. Knowledge Base	all	all
5. Use of Engineering Tools	7	tutorials
6. Communication	all	tutorials

5 TEACHING AND LEARNING ACTIVITIES

Timetables are subject to change. Please see Webadvisor for the latest information.

Tutorials run in alternating weeks, with the even group starting in week 2, and the odd group in week 3.

5.1 Lecture Schedule

The following is a rough guideline for the lecture topics and is subject to change

Euclidean Vector Spaces: Vectors in R^2 and R^3 , Subspaces, Spanning Sets and Linear Independence, Basis,

Systems of Linear Equations: Systems of linear equations and elimination, Matrix representation of a system of linear equations, Types of elementary row operations, Row Echelon Form (REF), Reduced Row Echelon Form, Rank, and Homogenous Systems

Matrices, Linear Mappings, and Inverses: Operations on matrices, Transpose of a matrix, Matrix Multiplication, Identity Matrix, Matrix Mappings and Linear Mappings, Special Subspaces for systems and mappings, Inverse matrices and inverse mappings, LU-Decomposition

Vector Spaces: Subspaces, Dimension, Extending a linearly independent subset to a basis

Determinants: Determinants in terms of cofactors, finding the inverse of a matrix using determinants

Eigenvectors and Eigenvalues: characteristic polynomial, algebraic multiplicity, geometric multiplicity

Diagonalization

Symmetric Matrices: orthogonal matrix, diagonalization

Complex numbers

5.2 Other Important Dates

Please see the schedule of dates for other important dates in the academic year.

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c03/index.shtml>

6 LAB SAFETY

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in. In addition, you are responsible for reporting all safety issues to the laboratory supervisor, GTA or faculty responsible.

7 ACADEMIC MISCONDUCT

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member.

7.1 Resources

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

A tutorial on Academic Misconduct produced by the Learning Commons can be found at:

<http://www.academicintegrity.uoguelph.ca/>

Please also review the section on Academic Misconduct in your [Engineering Program Guide](#).

The School of Engineering has adopted a Code of Ethics that can be found at:

<http://www.uoguelph.ca/engineering/undergrad-counselling-ethics>

8 ACCESSIBILITY

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability for a short-term disability should contact the Student Accessibility Services (SAS) as soon as possible

For more information, contact SAS at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: <http://www.uoguelph.ca/csd/>

9 RECORDING OF MATERIALS

Presentations which are made in relation to course work-including lectures-cannot be recorded or copied without the permission of the presenter, whether the instructor, classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

10 RESOURCES

The Academic Calendars are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs:

<http://www.uoguelph.ca/registrar/calendars/index.cfm?index>