

# SCHOOL OF ENGINEERING

# ENGG\*1500: ENGINEERING ANALYSIS COURSE OUTLINE - WINTER 2009

#### **COURSE DESCRIPTION**

Engineering application of matrix algebra, vector spaces and computer techniques to solve linear systems. Linear transformations. Eigenvalues and eigenvectors. Diagonalization. Complex eigenvalues and eigenvectors.

#### INSTRUCTOR

Dr. Dalia. Fayek dfayek@uoguelph.ca THRN 1340, x52013

#### TEACHING ASSISTANTS

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# **CO-REQUISITES**

ENGG\*1210 Engineering Mechanics I MATH\*1210 Calculus II

## **COURSE SCHEDULE**

Final exam		Mon, April 13, 2009	8:30 – 10:30AM	TBA
	04	Thursday	1:30PM - 2:20PM	MACK 307 (*)
	03	Wednesday	9:30AM – 10:20 AM	MACK 307 (*)
	02	Tuesday	1:30PM – 2:20PM	MACK 307 (*)
TUTORIALS:	01	Monday	9:30AM – 10:20 AM	MACK 307 (*)
		Thursday	10:00AM – 11:20AM	MCLN 102
LECTURES:		Tuesday	10:00AM – 11:20AM	MCLN 102

(\*) Please refer to "Method of Presentation" Section.

#### **TEXT**

Linear Algebra and Its Applications, 3rd Edition, David C. Lay

#### **COURSE OBJECTIVES**

Students who successfully complete this course will be able to:

- describe selected engineering systems in terms of vector and matrix models
- carry out the fundamental operations of vector, matrix and complex variable arithmetic
- solve simultaneous equations, representing engineering systems, by matrix methods
- use computer techniques to solve some engineering problems

#### **COMMUNICATION**

Principal method of communication between instructor, teaching assistants and students is through the email-list **engg1500@listserv.uoguelph.ca**. It's the student's responsibility to ensure that he/she is on the mailing list.

"Courselink" is the course web site. Course material will be posted there.

Office hours will be offered by the instructor and teaching assistants. Schedule of office hours will be emailed to engg1500 list and/or posted on Courselink.

## MATERIAL TO BE COVERED

Engineering Analysis is a core course for all students in Engineering. It covers the uses of vector and matrix techniques used to solve engineering problems. Emphasis is placed on engineering applications and current computer techniques using MATLAB.

Linear systems and their applications	2-2.5 weeks
Matrix operations, determinants and square matrix inverse	1-1.5 week
Vector spaces and Orthogonality	2-2.5 weeks
Eigenvalues and Eigenvectors	1.5 - 2 week
Complex Eigenvalues and Linear transformations	1 - 1.5 week
Diagonalization and Quadratic forms	1.5 week
Possible additional topics to be covered:	
Least Squares	0.5 week
Constrained Linear Optimization	0.5 week
Singular Value Decomposition	0.5 week

# METHOD OF EVALUATION

The final grading will be determined according to the following scheme:

Quizzes	30%
Programming Assignments	20%
Final Exam	50%

#### METHOD OF PRESENTATION

- The material listed above will be presented in 2 lectures per week.
- On alternating weeks, regular one-hour tutorial periods will include problem sets compatible with the lecture material to enhance understanding of the subject matter. These tutorials will be in MACK 307.
- MATLAB training sessions will be conducted during tutorial times in THRN 2313 as outlined in the course calendar (page 4).
- Four in-class quizzes will be written according to the schedule indicated on the course calendar. The best three out of the four quizzes will have the 30% weight in the course evaluation.
- Two programming assignments using MATLAB are required to complete the course requirements. Groups of 2 or 3 students will submit one report <u>electronically</u>. Details of submission will be given for each assignment. Reports for groups having more than 3 students <u>will not be accepted</u>.

# **QUIZ SCHEDULE**

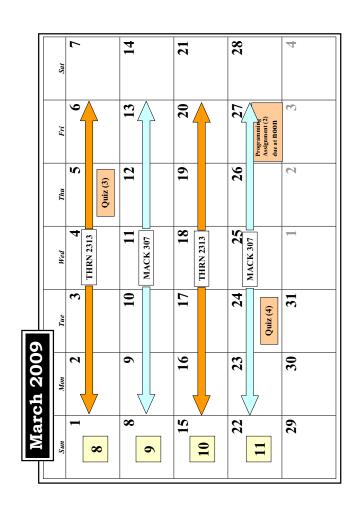
Quiz (1)	Quiz (2)	Quiz (3)	Quiz (4)
Thu January 22	Tue February 10	Thu March 5	Tue March 24

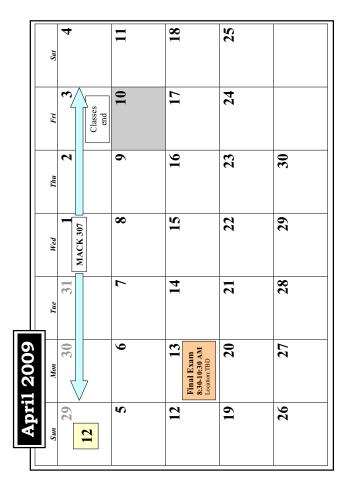
#### ASSIGNMENT SCHEDULE

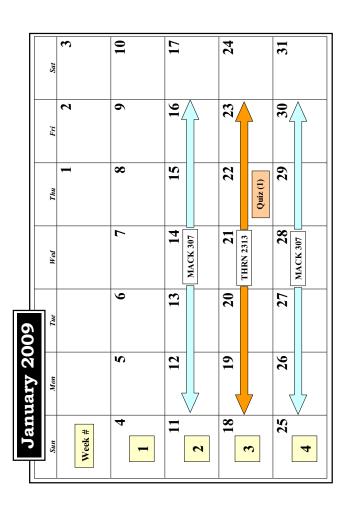
Programming Assignment (1)	Programming Assignment (2)	
Friday, February 6, 2009 at noon	Friday, March 27, 2009 at noon	

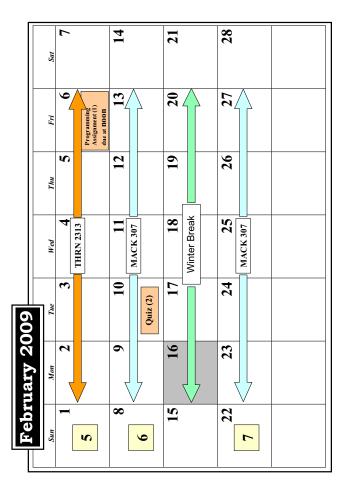
#### **NOTES**

- Programmable functions are not to be used for the quizzes nor final examination.
- Late programming assignments will be <u>penalized 20%</u> of the assignment total mark for every 12-hour delay. The mark of assignments submitted <u>after 24 hours</u> of the due date/time is zero.
- Requests for academic consideration must be made known to the instructor in writing <u>no later</u> than Jan 16<sup>th</sup>, 2009.
- The quiz mark will be based on the best 3 quizzes out of 4. There will be no make-up for any missed quiz. There will be no academic consideration for missed quizzes. If a student writes less than three quizzes, the missing quiz(zes) will have a grade of zero. For example, if a student writes Quiz (1) [15 out 20] and Quiz (2) [15 out of 20]. Then the total grade is 30 out of 60, that is 15% out of the 30% quiz weight in the total course evaluation.
- Any act of academic misconduct will be reported. Please refer to the University of Guelph policies on Academic Misconduct: Section VIII - Undergraduate Degree Regulations and Procedures.









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