Math 115: Linear Algebra for Engineers

Section 7 (RLP) – Spring 2015 Outline

July 23, 2015

Objective. Math 115 is an introduction to the algebra and geometry of $\mathbb{R}^n$, and to abstract vector spaces. We will cover practical linear algebra problems (e.g. systems of linear equations), computational methods to solve them (e.g. Gaussian elimination), and the theory that is necessary to describe those methods rigorously (e.g. linear independence).

Textbook. *Introduction to Linear Algebra for Science and Engineering*, Second Edition, Daniel Norman and Dan Wolczuk.

Course website. We will use UWaterloo's LEARN website (learn.uwaterloo.ca).

Lectures.	RCH-307,	Mon-Wed-Fri	11:30 – 12:20
Make-up lectures	RCH-105,	Tue	11:30 – 12:20 (May 12, May 26, June 9, June 30, July 14)
Last lecture	RCH-307,	Tue July 28	11:30 – 12:20 (Wednesday schedule)

Tutorials.	MC-4061,	Thu	14:30 – 16:20

Instructor.	Laurent Poirrier
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office hours:	Weeks 1&2: Monday 12:30 – 14:00
	From week 3: Wednesday 15:00 – 16:30, or by appointment

TA.	Ehsaan Hossain
email:	ehossain (at uwaterloo)

Assignments. Most weeks, there will be a written assignment covering the material of the week. Assignments will be available on Friday morning, and are due on the following Thursday at the tutorial. No late submissions will be accepted, regardless of circumstances.

You may work on the assignments in small groups. You may also consult your instructor during office hours, and your TA during the tutorials. **You must write up the solutions on your own and mention all collaborations** and sources of help (except your instructors and TAs).

Tutorials and quizzes. Starting from the second week of classes, tutorials are being held every week except midterm week. Each tutorial runs for 1 hour and 50 minutes. The TA will present problems related to the

lecture materials of the previous week. You are encouraged to approach your TA with any difficulty you face in the lectures and assignment during this time.

Some weeks, there will be a 45-minute quiz during the tutorial (from 3:30pm to 4:15pm), which each of you is required to complete on your own. The problems assigned in the quiz will be of similar difficulty to the ones in the assignment, and will test the same material. You are free to consult the text or your notes for the quiz. You are not allowed to discuss the problems with your classmates. You may use a non-graphical non-programming calculator for the quiz. Note, however, that you are not allowed to use one in the exams.

The quiz will be collected at the end of the tutorial along with your assignment. We will not make any accommodations for missed assignments or quizzes for any reason.

Exams. There will be one midterm exam and one final exam. The midterm will be held on Thursday June 18, 1:30pm – 3:30pm. The final exam will be comprehensive, and will be held on Monday August 10, 4:00pm – 6:30pm in MC 2034.

No calculators are allowed in the exams. Missed exams will count as 0 unless suitable medical documentation is provided. There will not be any make-up exams.

Final grade. Assignments and quizzes 15%, midterm 20%, final exam 65%.

Schedule. This is a tentative schedule with topics that we plan to cover. The schedule will change if necessary, and it will be updated here accordingly.

Week	Dates	Text	Topics
1	May 4, 6, 8	1.1, 1.3, 1.4	Operations on vectors and geometry of vectors
2	May 11, 12 (✓), 13, 15	1.2	Subspaces, linear independence, spanning sets
3	May 20, 22	2.1, 2.2	Systems of linear equations
4	May 25, 27, 29 (×)	2.3, 3.1	Matrices and matrix operations
5	June 1, 3, 5	3.3, 3.4	Geometric mappings, special subspaces
6	June 8, 9 (✓), 10, 12	3.5, 3.6, 5.1	Inverses, elementary matrices, determinants by cofactors
7	June 18		Midterm
8	June 22, 24, 26	5.2, 5.3	Determinants by elementary row operations, Cramer's rule
9	June 29, 30 (✓), July 3	6.1, 6.2	Eigenvalues and eigenvectors, diagonalization
10	July 6, 8, 10	7.1, 7.2	Orthonormal bases, Orthogonality, Gram-Schmidt
11	July 13, 17 (×)	8.1	Orthogonal diagonalization
12	July 20, 22, 24	4.2, 9.1	General vector spaces, complex numbers
13	July 27, 28	9.1	Complex numbers

(✓) Confirmed make-up lecture. (×) No make-up lecture.

<center>**Discipline, appeals, accessibility**</center>

Academic Integrity. In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. For more information, check `http://www.uwaterloo.ca/academicintegrity`.

Grievance. A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4, `http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm`. When in doubt please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline. A student is expected to know what constitutes academic integrity to avoid committing academic offenses and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the undergraduate associate dean. For information on categories of offenses and types of penalties, students should refer to Policy 71, Student Discipline, `http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm`. For typical penalties check Guidelines for the Assessment of Penalties, `http://www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm`.

Appeals. A decision made or penalty imposed under Policy 70, Student Petitions and Grievances (other than a petition) or Policy 71, Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72, Student Appeals, `http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm`.

Students with disabilities. The AccessAbility Services, located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with them at the beginning of each academic term.