

## Syllabus for MATH 2331, Linear Algebra

Northeastern University, Summer 2 2017

**Instructor:** Dr. Neranga Fernando

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*Office hours:* Mondays, Tuesdays, and Wednesdays: 10.15am – 11.15am.

*Meeting times and location:* MTWR, 8.00am – 9.40am at Snell Library 117.

**Textbook:** Linear Algebra with Applications, by Otto Bretscher, 5<sup>th</sup> Edition

**Web Materials:** All class announcements, material, and grades will be posted on Blackboard.

**Homework:** Homework will be assigned, but will NOT be collected.

**Tests:** There will be 5 in-class tests during the semester.

Test 1: July 13

Test 2: July 20

Test 3: July 27

Test 4: August 3

Test 5: August 10

It is strongly advised that you do all of assigned homework since the tests will closely resemble the homework problems. No test scores will be dropped. There will be NO make-up tests.

### **Final exam:**

There will be a cumulative final exam in this course. The final exam will be held at Hurtig Hall 129 from 8am to 10am on August 21, 2017. **Check for exam schedule conflicts as soon as possible.** Only two finals at the same time or three in one day is a University recognized legitimate reason to be excused from taking the final at the scheduled time. Students with such a conflict should complete a final exam conflict form, available on the registrar's website.

**Grading:** The course grade will be determined as follows:

Final exam: 40%

Tests: 60%

Letter grades are determined numerically:

$A \geq 93$ ,  $92 \geq A- \geq 90$ ,  $89 \geq B+ \geq 87$ ,  $86 \geq B \geq 83$ ,  $82 \geq B- \geq 80$ ,  
 $79 \geq C+ \geq 77$ ,  $76 \geq C \geq 73$ ,  $72 \geq C- \geq 70$ ,  $69 \geq D+ \geq 67$ ,  $66 \geq D \geq 63$ ,  
 $62 \geq D- \geq 60$ ,  $F \leq 59$

The grade I (Incomplete) will be given only if you have a good attendance record, have missed the final exam for a good reason, and otherwise are doing passing work. An incomplete is

**Issues with the course/instructor:** If you have issues with this course and/or instructor which you are not comfortable discussing with your instructor, you should contact the Teaching Director, Prof. Massey, at [d.massey@northeastern.edu](mailto:d.massey@northeastern.edu).

**Academic Honesty:** Collaboration on quizzes, tests and final exam is not allowed. From Student Code of Conduct (see <http://www.northeastern.edu/osccr/academicintegrity>): "A necessary prerequisite to the attainment of the goals of the University is maintaining complete honesty in all academic work. Students are expected to present as their own only that which is clearly their own work in tests and in any material submitted for credit. Students may not assist others in presenting work that is not their own. ... Offenders are subject to disciplinary action." For more on Academic Integrity see: <http://www.northeastern.edu/registrar/courses/cat1213-univ-proc.pdf>

**Note the Following Dates:**

*July 17 Monday- last day to drop a summer 2 class without a W grade*

*July 17 Monday - last day to elect pass/fail for summer 2*

*July 21 Friday - last day to file a Final Exam Conflict Form for summer 2 classes*

*August 20 Sunday - last day to drop a summer 2 class with a W grade*

**Important:**

- 1) Any student with a disability is encouraged to meet with the instructor during the first week of classes to discuss accommodations. The student must bring a current Memorandum of Accommodations from the Disability Resource Center (DRC).
- 2) If you are an athlete and have conflicts with an important class activity (quiz or final), you should let your instructor know before the end of second week of classes. You should also bring an official letter from the Office of Athletics.
- 3) All electronic devices (mobile phones, laptops etc.) should be turned off during class time, quizzes, and final exam.
- 4) It is University policy that no grade, including an incomplete, can be changed after one year. Exceptions must be authorized by the Academic Standing Committee.
- 5) Syllabus is subject to change. It is your responsibility to be aware of any changes the instructor may make to the syllabus as they are announced in class. Students are responsible for all information given when they are absent.

**TRACE:** Please complete the TRACE evaluations at the end of the course.

## Schedule of Topics and Suggested Homework Exercises

### Week 1: July 3-6

§1.1 Linear Systems #1, 2, 7, 10, 23b,33, 35,42

§1.2 Matrices, Gaussian Elimination #2, 4, 5, 7, 18, 22, 23, 31-33

§1.3 Solution Types, Rules for Matrices #1-8, 10-15, 21-28, 34, 36, 55

### Week 2: July 10-13

§2.1 Linear Transformations #1-6, 24-30

§2.2 Geometry of a Linear Transformation #1, 2, 4-9, 26-28

§2.3 Matrix Products #3-6, 10-13, 17-20, 43-45

§2.4 Inverse of a Linear Transformation #1-6, 16-19, 35, 37, 38

### Week 3 : July 17-20

§3.1 Subspaces, Images, and Kernels #1-3, 6, 14-16, 23-25, 33

§3.2 Bases and Linear Independence #1-7, 9, 11, 12, 14, 15, 17-19, 21-25, 27-30, 31, 33, 39

§3.3 Dimension of a Subspace #1, 2, 5, 6, 11, 12, 17, 18, 21, 22, 24, 27-30

### Week 4: July 24-27

§5.1 Orthonormal Bases and Projections #1, 2, 4, 5, 10, 13, 15, 26, 27

§5.2 Gram-Schmidt, QR Factorization #3, 5, 6, 16, 20, 32, 35

§5.3 Orthogonal Matrices #5-17 odd, 21-25 odd

§5.4 Least Squares and Data Fitting #1, 2, 5-8, 17, 19-21, 31

### Week 5: July 31- August 3

§6.1 Determinants 1, 2, 5, 6, 9-12, 17, 22-24, 27

§6.2 Properties of Determinants #1, 2, 5, 6, 11-16, 37, 38, 40

§7.1 Diagonalization, Eigenvalues #1-9, 15-17, 34, 35

§7.2 Finding the Eigenvalues #1-4, 7-10, 13, 15, 18

**Week 6: August 7-10**

§7.3 Finding the Eigenvectors #1, 2, 4, 7, 8, 11, 12, 21, 23, 25, 27

§8.1 Symmetric Matrices #1, 2, 7-10, 12, 13, 15

§8.2 Quadratic Forms #1-7, 11

**Week 7: August 14-17**

§8.3 Singular Value Decomposition #1-4,

Review

**August 21<sup>st</sup> : Final exam**