COURSE DESCRIPTION
ALGEBRA I: LINEAR
MA 4/534–2C, FALL 2017

DEPARTMENT OF MATHEMATICS
UNIVERSITY OF ALABAMA AT BIRMINGHAM

Course Instructor: Dr. Junfang Li
Office: CH491
Phone#: (205) 934-2154
E-mail: jfli@uab.edu
Office Hours: TTh 9:30 am-11am, drop-in, phone/email for appointment.

Meeting times: TTh 11:00am-12:15pm.
Meeting location: HHB126
Prerequisite: Grade of C or better in MA 126, MA 226 or equivalent
Credits: 3 semester hours
Textbook: Elementary Linear Algebra by Howard Anton (Recommended), John Wiley and Sons, Inc., 2014. Topics to be covered can be found in Chapters 1–8, including methods of proof.

Important dates:
First day of classes: Tuesday, August 29, 2017.
Last day to Drop/Add: Tuesday, September 5, 2017.
Last day to withdraw: Friday, October 20, 2017.
Last day of classes: Thursday, December 7, 2017.
Major exams: Test 1: near Tuesday, October 10, 2017;
Test 2: near Thursday, November 29, 2017;
These dates are tentative.
Final exam: Tuesday, December 12 from 10:45–1:15pm.

Course policies:
• Please make sure that you are able to receive e-mail through your Blazer-ID account. Official course announcements may be sent to that address.
• If you wish to request a disability accommodation please contact DSS at 934-4205 or at dss@uab.edu.
• If a test is missed due to a serious verifiable circumstance or official university business, the test grade will be replaced with the properly rescaled final exam score. You have to advise the instructor of such circumstances at the earliest possibility.

Date: August 25, 2017.
No books or notes will be allowed during any of the tests.

Methods of teaching and learning:
- Class meetings of 75 minutes consisting of lectures and discussions of examples and homework problems. Time for three in-class tests is included.
- Students are expected to undertake at least 6 hours of private study and homework per week.

Assessment procedures:
- Student achievement will be assessed by the following measures:
  - Homework and Quizzes. Sporadic unannounced (or announced) quizzes will be given. Quiz problems are taken from the homework problem sets and classroom work. This allows students to gauge whether they are ready to work problems in a test situation. Homework/Quizzes contribute 20% to the course average.
  - Two in-class tests. Each test contributes 20% to the course average. (Students in MA534 will have additional questions.)
  - A 150-minute comprehensive final examination. The final contributes 40% to the course average.
- Your course performance is the maximum of your course average and your final exam grade, each being a number between 0 and 100.
- Your final grade is determined according to the following table:
  
<table>
<thead>
<tr>
<th>Course performance:</th>
<th>88-100</th>
<th>75-87</th>
<th>62-74</th>
<th>50-61</th>
<th>below 50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final Grade:</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>F</td>
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</tbody>
</table>

- In addition, your grade may be raised by a strong performance on the final exam (normally at most one letter grade).

Tips:
- Help may be available in the Math Learning Lab HHB 202.
- By working steadily and regularly, you will increase your chances to succeed in this course.
- Remember, being a full-time student is a full-time job.

Aims of the course: Upon successful completion of the course, a student
- has been introduced to Mathematical Induction and Methods of Proof;
- understands the geometric interpretation of solutions of systems of linear equations and can use Gaussian Elimination to find the solutions;
- knows algebraic operations and properties of matrices, invertible matrices and inverses, and how to compute the inverses by row operations and to solve systems of linear equations via inverses;
- knows how determinants are defined and how to evaluate them, and to solve systems of linear systems using Cramers Rule;
- visualizes intuitively vectors in Euclidean spaces, i.e. length and angle, etc., and uses coordinates in computing these quantities;
- develops a understanding of general real vector spaces, including subspaces, linear independence, basis and dimension;
- knows about eigenvalues and eigenvectors of square matrices and how to compute them;
knows the concept of linear transformations, and how to find the matrix representation of a linear transformation

Course content:
- Mathematical Induction, basic logic, methods of proof
- Linear Equations: Gaussian Elimination
- Matrices: Operations and properties, invertible matrices, inverses
- Determinants: Cofactor expansions, row reduction, Cramers Rule
- Euclidean Vector Spaces: Norm, dot product and distance, orthogonality
- General Vector Spaces: Real vector spaces, subspaces, linear independence, basis, dimension
- Eigenvalues and Eigenvectors: Eigenspaces, characteristic polynomials
- Linear Transformations: Matrix representation
- Selected Additional Topics for Graduate Students

Sections to be covered:
(1) Chapter 1: 1.1 - 1.8 (mostly review of matrix algebra).
(2) Chapter 2: 2.1 - 2.3.
(3) Chapter 3: 3.1 - 3.5 (mostly review of some Calculus II material).
(4) Chapter 4: 4.1 - 4.10.
(5) Chapter 5: 5.1 - 5.2.
(6) Chapter 6: 6.1 - 6.3.
(7) Chapter 7: 7.1 - 7.3.
(8) Chapter 8: 8.1 - 8.4.