

**MATH 300: Linear Algebra**  
**Spring 2020**                      **Section 001**                      **3 credit hours**

<b>Instructor:</b> <b>Dr. Zach Abernathy</b>	<b>Instructor's Teaching</b> TR 2:00-3:15pm
<b>Office:</b> Bancroft 161	<b>Schedule:</b> Owens 103
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<b>Office Phone:</b> 803-323-4605	
<b>Math Department:</b> 803-323-2175	<b>Office Hours:</b> MW: 1:00-2:00pm and by appointment.
<b>Campus Email:</b> abernathyz@winthrop.edu	
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The instructor reserves the right to make modifications to this syllabus. Students will be notified in class & by email.

**Departmental Goals for Students**

1. Students apply fundamental mathematical concepts and techniques to solve problems and evaluate results.
2. Students demonstrate the ability to apply appropriate technologies to the study of mathematics and effectively use such technologies to investigate and develop an understanding of mathematical ideas.

**Specific Course Goals**

- Students will demonstrate an understanding of and competence with the basic ideas of linear algebra including concepts of linearity, theory of matrices, linear transformation, eigenvalues, eigenvectors and diagonalization.
- Students will investigate applications of linear algebra, develop the ability to work with advanced technology tools within the study of course concepts, and apply reasoning and communication skills to elementary proofs.

**Determination of Grade**

**Homework Assignments (25%)**

At the end of each section, a homework assignment will be made. You are expected to complete the assignment and the instructor will grade selected problems from each assignment. Late work will not be graded unless prior arrangements have been made with the instructor. At the close of the semester, these homework grades will be averaged and converted to a 100-point scale.

**Course Projects (5%)**

Course projects will be assigned to supplement course material and illustrate the many applications of linear algebra to other disciplines. You will have two weeks to complete each project and handouts will be distributed later in the semester with all expectations outlined for each project.

**Tests (50%)**

There will be three in-class tests as listed on the attached schedule. You are expected to take the tests and the final exam at the scheduled time. Make-up tests are not given. An unexcused absence will result in the grade of zero for any missed test. Excused absences from tests will be dealt with at the end of the term and may depend on individual circumstances. Anticipated absences should be reported and verified in advance; emergency absences must be verified within one week after returning to class. Any questions concerning grading of tests must also be resolved within one week after the tests are returned.

**Final Exam (20%)**

The cumulative final exam is scheduled for Wednesday, April 29th, 2020, 11:30am.

**Letter Grade Determination:**

92-100 A	90-91.99 A-	87-89.99 B+	82-86.99 B	80-81.99 B-	77-79.99 C+
72-76.99 C	70-71.99 C-	67-69.99 D+	62-66.99 D	60-61.99 D-	<60 F

### Attendance Policy

The University Attendance policy as stated in the current catalog

(<https://www.winthrop.edu/recandreg/undergraduate-catalogs.aspx>): if a student's absences in a course total 25 percent or more of the class meetings for the course, the student will receive a grade of N if the student withdraws from the course before the withdrawal deadline; after that date, unless warranted by documented extenuating circumstances as described in the previous section, a grade of F or U shall be assigned.

### Text and Materials

- Required Text: *Linear Algebra and its Applications* by David C. Lay. Fifth Edition. Boston: Pearson, 2016.
- The ability to use *Mathematica* is a prerequisite skill for this course.

### Policies

1. Winthrop University is committed to providing accessible learning experiences and equal access to education for all students. The syllabus is available in alternate formats upon request. If you are a student with a disability (including mental health concerns, chronic or temporary medical conditions, learning disabilities, etc.) and you anticipate or experience academic barriers due to the condition, please contact The Office of Accessibility (OA) for information on accommodations, registration, and procedures. After receiving approval for accommodations through OA, please make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely manner. OA contact information: [accessibility@winthrop.edu](mailto:accessibility@winthrop.edu); 803-323-3290; 307 Bancroft Hall Annex.
2. Review the student code of conduct for university policies on academic misconduct. Academic misconduct will not be tolerated and will result in a failing grade on the assignment and/or in the course. The full handbook is available online at: (<https://www.winthrop.edu/studentconduct/winthrop-university-student-handbook.aspx>)
3. All electronic devices (including cell phones) other than a calculator should be set to silent and kept in your book bag or purse throughout class time unless otherwise instructed.
4. Students may not use cell phones, MP3 players, or other electronic devices in place of a calculator. Students may not share calculators during quizzes, tests, or the final exam. Any student caught using an unapproved electronic device during a quiz, test, or the final exam will receive a grade of zero on that assessment and the incident will be reported to the Dean of Students.

**Drop/Add:** Through F 1/17  
**Spring Break:** M 3/16 - F 3/20

**SU and Course Withdraw Date:** W 3/11  
**Final Exam:** W 4/29 11:30am

### Tentative Course Schedule

	Date	Section	Topic
T	1/14	1.1	Systems of Linear Equations
R	1/16	1.2	Row Reduction and Echelon Forms
T	1/21	1.3	Vector Equations
R	1/23	1.4	The Matrix Equation $A\mathbf{x}=\mathbf{b}$
T	1/28	1.5	Solution Sets of Linear Systems
R	1/30	1.7	Linear Independence
T	2/4	1.8	Introduction to Linear Transformations
R	2/6	1.9	The Matrix of a Linear Transformation
T	2/11		<b>Test 1</b>
R	2/13	2.1	Matrix Operations
T	2/18	2.2/2.3	The Inverse of a Matrix, Characterizations of Invertible Matrices
R	2/20	2.4	Partitioned Matrices
T	2/25	2.5	Matrix Factorizations
R	2/27	2.6	The Leontief Input-Output Model
T	3/3	2.7	Applications to Computer Graphics
R	3/5	2.7	Applications to Computer Graphics
T	3/10	2.8	Subspaces of $\mathbf{R}^n$
R	3/12	2.9	Dimension and Rank
	3/16-20	<b>No class</b>	<b>Spring Break</b>
T	3/24	3.1	Introduction to Determinants
R	3/26		<b>Test 2</b>
T	3/31	5.1, 5.2	Eigenvalues and Eigenvectors, The Characteristic Equation
R	4/2	5.3	Diagonalization
T	4/7	5.4	Eigenvectors and Linear Transformations
R	4/9	5.5	Complex Eigenvalues
T	4/14	5.6	Discrete Dynamical Systems
R	4/16	6.1	Inner Product, Length, and Orthogonality
T	4/21		<b>Test 3</b>
R	4/23		Review and Evaluation

## Assigned Homework Exercises

Text: *Linear Algebra and its Applications* by David C. Lay. Fifth Edition. Boston: Pearson, 2016.

Section	Exercises
1.1	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 29, 31
1.2	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27
1.3	1, 3, 5, 7, 9, 11, 13, 15, 17, 21, 23, 25, 27, 29
1.4	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 29, 31, 33, 39
1.5	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 27, 29, 31, 33, 35
1.7	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 27, 29, 31, 33, 35, 37, 39
1.8	1, 3, 5, 7, 9, 11, 17, 19, 21, 37, 39
1.9	1, 3, 5, 7, 9, 11, 15, 17, 19, 23, 25, 27, 31, 35, 39
2.1	1, 3, 5, 7, 9, 15, 17, 19, 21, 23, 25, 27, 37
2.2	1, 3, 5, 7, 9, 13, 15, 17, 19, 21, 23, 29, 31
2.3	1, 3, 5, 7, 9, 11, 17, 19, 21, 23, 25, 27, 29, 31
2.4	1, 3, 5, 7, 11, 13, 17, 21
2.5	1, 3, 5, 7, 9, 11, 13, 15, 17
2.6	1, 3, 5, 7, 9, 13
2.7	1, 3, 5, 7, 15, 17, 19
2.8	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37
2.9	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29
3.1	1, 3, 5, 7, 9, 11, 13, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39
5.1	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 37, 39
5.2	1, 3, 5, 7, 9, 11, 13, 15, 17, 21
5.3	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 35
5.4	11, 13, 15, 17, 19, 21, 25, 31
5.5	1, 5, 7, 11, 13, 15, 17, 19, 21, 23
5.6	1, 3, 5, 7, 9, 11, 13, 15, 17
6.1	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 23, 27, 29