

Fall 9-1-2018

# M 221.01: Introduction to Linear Algebra

Gregory M. St George  
*University of Montana, Missoula*

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## Recommended Citation

St George, Gregory M., "M 221.01: Introduction to Linear Algebra" (2018). *Syllabi*. 8226.  
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## Math 221: Linear Algebra, Autumn 2018, section 1.

**Catalog Description:** Offered autumn and spring. Prereq., M 172 or M 182. Vectors in the plane and space, systems of linear equations and Gauss-Jordan elimination, matrices, determinants, eigenvalues and eigenvectors, vector spaces, linear transformations. Calculators and/or computers used where appropriate.

**Goals:** The learning goals, as defined by the mathematics department, are:

1. To learn the basic linear algebra topics: the theory of linear equations, matrix algebra, determinants, vector spaces, linear transformations, orthogonality, eigenvalues and eigenvectors.
2. To understand some applications of linear algebra.
3. To begin to learn to write and read simple proofs.

**Teacher:** Greg Saint George

**Contact Info.:** Office: Math 313. Phone: 243-4146.  
e-mail: gregory.stgeorge@umontana.edu

**Office hours:** To be announced.

**Text:** David Lay, *Introduction to Linear Algebra* 3<sup>d</sup> Ed. (Updated or not).

The instructor believes that the students should have a reasonably authoritative text which has undergone professional review. This text satisfies that requirement. The current (5<sup>th</sup>) edition of Lay's book is available on Amazon for \$160. For those who don't get one in the lottery, 3<sup>d</sup> editions are available by searching on a used book site. Two of them are

bookfinder.com and used.addall.com

At this writing (23 Aug. 2018) there are about six available for less than \$10, and many more for less than \$20. There are two versions of the 3<sup>d</sup> a 'regular' and an 'updated' one (ISBN's: updated: 0 321 28713 4, regular 0 201 70970 8.) Either is fine (the updated one contains a software CD which is probably out-of-date by this time). There seem to be more of the 'updated' version available.

There are two copies of Lay's book on Reserve, as well as a Study Guide. The library is also making a .pdf of the first chapter which I will post as soon as I receive it. The Study Guide has worked out solutions to the odd numbered problems. One of the books on reserve is an Instructor's Edition (this is the one which is on 2-hour reserve) which has the answers to the even numbered problems in the back. I do not 'teach from a text', so although I will follow the general order of the topics in the book, it will be used as a source of problem, and as an alternate presentation from the one given in class.

I wrote a set of notes for Linear Algebra which follow my usual approach more closely and which I will make available on Moodle as we move along.

**Website:** I will use the Moodle site at UM online as a document repository (and only for that purpose).

**Grading Policies:** The course consists of not only the material in the assigned readings, homework problems and problem sets, but also any material added in class. The grading will be based on tests, quizzes, graded homework (problem sets), perhaps some computer assignments and a final. All quizzes will be announced at least a day in advance. Extraordinary performance on the final may, at the instructor's discretion, be the basis for raising a grade, and the final may be waived for students with exceptional averages. Whether or not there are problem sets will depend upon the availability of a grader; if I can't find one these will probably not be possible.

**Software and Calculators:** Only particularly stupid calculators will be allowed on tests. I hope we will do problems which will require mathematical software, but you should not have to buy anything. My preference is for open source software, so I will use the sympy and numpy packages which I will run out of python 3.6. No python knowledge is required for this class, and if we use any particular function I will provide handouts and explanations on how to run these.

**On reserve:** There are, or will be, a copies of several texts on two-hour reserve at the library, with overnight checkout permitted.

**Video Resource:** Videos of Dr. Gilbert Strang teaching a beginning section of Linear Algebra at MIT in 1999 are available at

<http://ocw.mit.edu/courses/mathematics/18-06-linear-algebra-spring-2010/video-lectures/>

These lectures represent a more sophisticated, authoritative, and complete approach than you will get in this class, which will be at a lower level. There are many other Linear Algebra resources online, of varying reliability. I trust you are as good at finding these as I am, though I may call attention to some as the semester goes on.

**Academic Honesty:** All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University.

**Student Conduct Code:** All students need to be familiar with the Student Conduct Code. The Code is available for review online; the easiest way to find it is to search for "Student Conduct Code" via the "A to Z Index" link on the top of the UM home page.)

**Accomodation.** The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students. If you think you may have a disability adversely affecting your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommason Center 154 or 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.