

Syllabus, Math 414

(Linear Algebra II, Fall 2015)

Instructor Information

- **instructor:** Matthew Hirn
- **office:** Wells Hall C303
- **email:** mhirn@math.msu.edu
- **phone:** (517) 355-9697
- **course webpage:**
<https://matthewhirn.wordpress.com/teaching/fall-2015-math-414/>

Meeting Time and Classroom: MWF 3:00 PM-3:50 PM in Wells Hall A328

Office Hours:

- Tuesday from 3:00 PM - 4:00 PM
- Wednesday from 2:00 PM – 3:00 PM
- Thursday from 4:00 PM – 5:00 PM
- By appointment

Prerequisites: Math 309 or Math 317H

Course Description and Instructional Objectives: This course has three objectives:

- You will learn the core theory of abstract vector spaces and linear maps. These topics include subspaces, the theory of finite dimensional vector spaces, linear transformations, null spaces, range, eigenvalues and eigenvectors, inner product spaces, the spectral theorem, singular value decompositions, Jordan form, complexification, bilinear and quadratic forms, dual spaces and tensors.
- You will improve your ability to understand, digest, and prove/create mathematical statements in an abstract setting. The core guiding principle is that for abstract settings there is frequently a collection of a few simple primary examples with which you are familiar, and you can use this familiarity at the concrete level to transfer understanding, techniques, and theorems back to the abstract level of presentation. In this class, you can very frequently fall back to the real n -dimensional space, \mathbb{R}^n , or the space of polynomials of degree at most m with complex coefficients, $\mathcal{P}_m(\mathbb{C})$, as concrete examples with which you are familiar.
- You will improve your ability to write logically correct, readable, and focused proofs regarding mathematical statements.

Grading:

- Homework: 30%
- Midterm 1: 20%
- Midterm 2: 20%
- Final Exam: 30%

All homework assignments and exam grades will be out of 100%. The class will be curved, but on the following dates I will send you your raw total score out of 100% in addition to your current grade on a 4.0 scale *if I were to curve the class on that date*:

- September 27, 2015 (September 28 is the last day to drop with refund)
- October 20, 2015 (October 21 is the last day to drop with no grade reported)
- December 11, 2015 (Last day of classes)

Please note that the final curve applied to the class (after all homework assignments and exams are graded) *may be different* than the hypothetical curves reported on the above dates. However, the final curve will be *no worse* than:

Raw Score	Equivalent Grade on 4.0 Scale
92 – 100	4.0
87 – 92	3.5
82 – 87	3.0
77 – 82	2.5
72 – 77	2.0
67 – 72	1.5
60 – 67	1.0
0 – 60	0.0

Required Textbook: *Linear Algebra Done Right*, Third Edition, by Sheldon Axler
<http://linear.axler.net>

Supplementary Text: *Linear Algebra Done Wrong*, by Sergei Treil, freely available at
<http://www.math.brown.edu/~treil/papers/LADW/LADW.html>

Exam Dates:

- Midterm 1: October 12, 2015, in class
- Midterm 2: November 23, 2015, in class
- Final Exam: December 17, 2015, 3:00 PM-5:00 PM

Homework: Homework will be assigned every Friday and collected the following Friday in class, unless stated otherwise. No late homework is accepted. Not every homework problem will be graded; your score will be determined from those which are graded. The homework must be written in a clear manner, with sufficient English prose to make the argument readily understandable. If I or the grader cannot easily follow your work, you will lose points.

Homework is easily the most important activity for learning in this course. It will involve both short answer and proof type questions. All claims and statements in your answers must be justified in a rigorous and logical fashion; in short you must prove your assertions.

You may discuss homework assignments with your classmates. However, what you turn in must be your own, original work.

Reading: In addition to attending lecture and doing homework assignments, you should also be reading the book. It is excellently written (and developed here at MSU!), and furthermore, we will not be able to prove every theorem and go over every topic in detail in class. However, you will still be responsible for knowing them.

Academic Honesty: Cheating in any form will not be tolerated and will be reported. You will receive a zero on any assignment in which there is a case of cheating. This includes, but is not limited to, plagiarism, failure to give proper citations, and copying another's work.

If you are preparing an assignment and have a question about whether you are adhering to this policy, please ask me. If you work on an assignment with other students, you must give credit to your collaborators.

MSU's policy on academic integrity can be found at the following URL:
<https://www.msu.edu/~ombud/academic-integrity/index.html>

Disability Services: Accommodations for persons with disabilities can and will be made in this course. All arrangements will be organized through the RCPD office as MSU. Persons with disabilities who are interested in the available services should contact the MSU Resource Center for Persons with Disabilities (RCPD) at (517) 884-7273 or online at <http://www.rcpd.msu.edu>.