

Math 342: Linear Algebra II

Winter 2020

(Section 020, CRN 39670)

Course Credits: 4

Lectures: 11:00 - 11:50 AM on MWF at Bexell Hall 412.

Instructor: Tuan Pham, [phamt3@oregonstate.edu]

TA: Matthias Merzenich, [merzenim@science.oregonstate.edu]

Course website:

<http://people.oregonstate.edu/~phamt3/Courses/W20-Math-342/W20-Math-342.html>

Office: Kidder 268, **phone:** 541-713-6196

Office Hours:

Mon, Wed, Fri 1:00 - 2:00 PM at Kidder 268,

Thu 12:00 - 2:00 PM at Kidder 268,

Wed 2:00 - 3:00 PM at Kidder 108 J (computer lab).

Textbook: we will be using two textbooks “*Linear Algebra Done Wrong*” by Sergei Treil, available online at <https://www.math.brown.edu/~treil/papers/LADW/LADW-2014-09.pdf> and “*Linear Algebra Done Right*” 3rd Edition, by Sheldon Axler, available online at <https://link-springer-com.ezproxy.proxy.library.oregonstate.edu/book/10.1007/978-3-319-11080-6>.

Course Description: we will learn abstract vector spaces, with an emphasis on the space of matrices, the space of functions, and their subspaces. We will then discuss linear maps (maps between two vector spaces) and spectral theory of linear maps. Up to this point, the course is more or less a generalization of Math 341 to abstract vector spaces other than \mathbb{R}^n or \mathbb{C}^n . From here, we will discuss the notion of distance (norm) in vector spaces. Then we will discuss orthogonality of vectors and singular value decomposition. An important element of this course is to practice writing detailed proofs.

Math 342 Learning Outcomes: A successful student in MTH 342 will be able to:

1. Use axioms to check if a set is a vector space, a map is a linear map, etc.
2. Use linear isomorphism (usually via coordinates) to convert a problem on an abstract vector space to a problem on \mathbb{R}^n or \mathbb{C}^n .
3. Check if a linear map is diagonalizable and diagonalize it.
4. Orthogonalize a given set of vectors using Gram-Schmidt algorithm.
5. Find singular value decomposition of a given matrix.

Topics covered: See the tentative calendar.

Grading:

Homework: 22%

Recitation: 15%

Lecture worksheets: 8%

Midterm: 25%

Final Exam: 30%

Homework: there will be 8 homework sets, each due on Friday at the beginning of class, except for the first week and the week of midterm exam. Each homework set is worth 30 points. Most homework sets contain a bonus problem (for example, a Matlab problem).

Policy: Homework must be turned in on paper. The bonus problems are optional. Doing them correctly can give you up to 6 bonus points (adding up to a maximum of 36 points/HW). If you do a Matlab problem, you should print your codes and attach them to your homework. You are encouraged to work together in groups. However, homework must be written individually in your own words and reflect your own understanding. Late homework will not be accepted. Turn in whatever you have completed by the due time. Only a few selected problems will be graded in detail. The rest will be given credit based on completion.

Requirements for written work: this course requires the written communication of mathematical ideas. To obtain full credit for your work, you must write coherently, in complete sentences, with attention to your audience.

Mathematical software: Matlab is a helpful tool, but is not required for this course. Nevertheless, you are encouraged to learn how to use Matlab along the course by working on some bonus homework problems. You can download Matlab with OSU's license to your personal computer here: <https://is.oregonstate.edu/service/software/matlab>. If you are unable to install it on your computer, you can use the online version through Citrix Receiver (see the course website for instruction). Or you can use computers at the lab room Kidder Hall 108 J almost anytime from 9 AM to 4 PM, Monday through Friday.

Recitation activities: there will be worksheets handed out in during weekly recitation. You can discuss with your partner(s) or ask your TA for help. Worksheets will be collected and graded.

Lecture worksheets: in some lectures (unannounced), there will be worksheets handed out for practice. You will take a picture of the whole front page (make sure the your name is readable) and upload it on Canvas. The due time is 1 PM of the same day the worksheet is given. Worksheets are given in class only. The lowest 2 worksheet scores will be dropped. Each worksheet will be graded on the scale of 2. Zero point is given if worksheet is not submitted online or no meaningful work is shown. One point is given if worksheet shows too little work. Two points if there is a reasonable amount of work shown. You can discuss with your partner(s) or ask the instructor for help.

Midterm Exam: in class, on Monday Feb 10.

Policy: Calculator is not allowed, but you can bring a sheet of paper containing up to 10 statements of definitions or theorems. Each statement must be numbered from 1 up to 10. Proctor can provide draft papers upon request. Scratch papers and note card should be turned in with your completed midterm. Some formula will be given on the front page of the exam. Any regrading request must be addressed within two weeks after the exam is returned. There

will be no make-up exam except for exceptional reasons.

Final exam: 2:00 - 3:50 PM, Tuesday Mar 17, Room TBA.

Policy: the Final exam is cumulative, but mostly on the the second half of the course. Policy is similar to midterm exam, except that your note card can contain up to 15 statements. Any requests for special accommodation (make-up exam, etc) must be addressed to instructor prior to the day of the Final exam. Skipping Final exam will automatically result in a grade of F.

Grade lines: the course grades will not be harder than: A 100-90%, B 89-80%, C 79-70%, D 69-60%, and F 59% and under. Scores on Canvas are raw scores. The running total that Canvas provides may not be accurate since it does not take into account the percentage of homework/exams as indicated above. Instructor will calculate total course scores at the end of the term.

Other Learning Resources: The Math Learning Center MLC in Kidder 108 is a great place to drop in for help. It is open from 9 AM to 4 AM Monday through Friday from the second week of classes to the end of dead week.

Academic Honesty

Students are expected to comply with OSU's Student Conduct Code:

<http://studentlife.oregonstate.edu/code>

Accordingly, academic dishonesty is defined as an intentional act of deception in one of the following areas:

Cheating – use or attempted use of unauthorized materials, information, or study aids.

Fabrication – falsification or invention of any information.

Assisiting – helping another commit an act of academic dishonesty.

Tampering – altering or interfering with evaluation instruments and documents.

Plagiarism – representing the words or ideas of another person as one's own.

Statement Regarding Students with Disabilities

Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at <http://ds.oregonstate.edu>. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

Reach Out for Success

University students encounter setbacks from time to time. If you encounter difficulties and need assistance, it is important to reach out. Consider discussing the situation with an instructor or academic advisor. Learn about resources that assist with wellness and academic success at <http://oregonstate.edu/ReachOut>. If you are in immediate crisis, please contact the Crisis Text Line by texting OREGON to 741-741 or call the National Suicide Prevention Lifeline at 1-800-273-TALK (8255)