

## INFORMATION SHEET

Math 300: Linear Algebra, Fall 2018, Professor Rebecca Field

Section 1 MWF 11:15am–12:05pm, Roop G10 (basement level)

Section 2 MWF 12:20–1:10pm, Roop G10 (basement level)

Required materials: *Linear Algebra: Ideas and Applications* fourth edition by Richard C. Penney and a scientific calculator

Exam dates:

Midterm 1: Friday, September 21

Midterm 2: Friday, October 19

Midterm 3: Wednesday, November 14

Final Exam Section 1: December 10, 10:30am–12:30pm

Section 2: December 12, 10:30am–12:30pm

Contact information for Professor Field

Office: Roop 114

Phone: 540-746-1231

Email: [fieldre@jmu.edu](mailto:fieldre@jmu.edu)

Webpage: <https://educ.jmu.edu/~fieldre/300.html>

<https://canvas.jmu.edu>

Office Hours: MW 2:00–3:00pm

T 3:00–4:00pm in Roop 114

(will be expanded/changed as necessary), and by appointment.

*You can always make an appointment to see me*

(except Thursdays, I am out of town most Thursdays)

MATH 300 is an introduction to linear algebra. It is presumed to be your first course on the topic, so it is completely self contained. Topics covered include vector spaces, matrices and determinants, systems of linear equations, linear transformations, and eigenvalues and eigenvectors. We will emphasize both the theory and the computations of these topics. In particular, linear algebra provides the perfect setting to practice your proof-writing skills as we begin to introduce some of the major ideas in modern mathematics. For example, the idea of abstraction will come up early and often.

Linear Algebra is one of the most useful areas of mathematics, both from a practical and a theoretical perspective. Practically, the simplest non-trivial functions are linear ones, the first model anyone tries is a linear one (you only need two data points to make a linear model, and it has to be at least close to right near those data points). Theoretically, many, even most PhD theses in pure math turn out to have a core of linear algebra. That is, math graduate students spend years figuring out how to turn their research problem into linear algebra (which, invariably is too esoteric to have a known solution, but as linear algebra it is usually solvable, and that's the thesis). In fact, in a couple of weeks, I should be able to show you something from a research project of mine that is immediately recognizable as simple linear algebra in a complicated context.

Here is my most important piece of advice about this course: this material can be deceptive. Linear algebra often works exactly the way you think it should and that breeds complacency. In order to discourage this (and to assist in your mastery of material that is fundamental to the sciences in general) I have outlined a strict schedule of topics with both pre and post class assignments, videos, and reading. As this course is halfway between the 200 level calculus type classes and the 400 level abstract math classes, I am keeping some of the things I think help with calculus (strict schedule and daily quizzes) as well as adding some of the things that are important for more advanced classes like written homework and weekly quizzes. We will not be repeating topics and the material is even more cumulative than you are used to, so my advice is DO NOT MISS CLASS!! (If you must miss a class, get notes from one of your classmates *and read them* before the next class.) I'm also advising you to DO YOUR HOMEWORK!! It is not possible to actually learn this material without doing problems. You might be able to convince yourself you understand, but if you can't do problems, you aren't at the level of understanding required to pass the class.

Things we will work on throughout the semester (math is a learned behavior, not an innate one):

- Skills specific to this class (linear algebra tools and techniques and how and why they work)
- More general mathematical techniques that can be used both inside and outside of this class
- Problem solving skills and creativity
- Mathematical communication skills, both written and oral, both formal and informal.
- Mathematical appreciation.

I will expect you to:

- Attend every class and actively participate
- Be on time and prepared for each class. This involves completing all of your pre-class assignments like reading the book, watching the videos, and/or solving problems as specified for that day in the calendar (check the course website for updates).
- At least attempt each of the homework problems.

- Ask questions when you do not understand something or when you want to know more about a topic.
- Seek extra help if you do not understand a concept.
- Keep up with the class. This class is far more cumulative than any of your previous courses and if you fall behind, you will soon find that you understand not a word.

**GRADES:** Your grade for this course will be determined by daily quizzes (10%), online homework (10%), weekly quizzes (15%), three midterms (15% each) and a final exam (20%). Class participation is very important and will be counted with your weekly quizzes.

Your final course grades will be determined using statistical methods, the class average, and historical class averages. I do not use a predetermined scale. I reserve the right to decide borderline grades based on participation, effort, and improvement. I also reserve the right to fail any student who gets less than 50% on the final exam. I reserve the right to fail, at my discretion, any student who misses more than one fourth of the scheduled classes.

**DAILY QUIZZES:** These will take place at the beginning of class every day and will be based on the pre-class assignment for that day (see the course schedule for details, new pre-class assignments will be added throughout the semester). If you do the pre-class assignment (reading the book, watching videos, doing problems) you should do well on the daily quizzes. We discuss the daily quiz directly after you hand them in, so there will be no make-ups and coming to class late will earn you partial credit (for attendance). If you would like to know your cumulative daily quiz grade, you will need to keep track of them yourself (you will know how many points you got from the class discussion).

**ONLINE HOMEWORK:** This will be WeBWorK. Due to the nature of WeBWorK, these problems will tend towards the computational. Unless otherwise specified (e.g. True/False problems) you will be allowed unlimited tries for each of the problems (though I will be able to look how many times you tried it and all of your answers, trying a problem multiple times will not effect your grade - provided you do eventually get it right). You are allowed to use your book, your class notes, and your approved scientific calculator (one that does not do matrix computations, more on this below) as well as work with other students, tutors in the SMLC (Math 300 is not an officially supported course in the SMLC, but many of the tutors will be able to help if they have the time). Do not wait until the last minute to do the WeBWork problems! They can be quite time consuming. They are due by the beginning of class most Fridays and we will have either a weekly quiz or a Midterm at each due date (you absolutely need to have slept in order to do well on the weekly quizzes and Midterms). The one thing that is emphatically *not* worth your time is looking up the answers to the WeBWorK problems online. If you do this, or copy the answers from someone else, you are violating the Honor Code in addition to wasting time that should be spent learning.

It is extremely important that you practice doing matrix computations using only your approved scientific calculator as that will be all that is allowed on Weekly Quizzes, Midterms, and the Final (aka the vast majority of your grade). Webwork for all jmu math courses is at <https://webwork.cit.jmu.edu/>, scroll down for MATH300 and pick your section number. Please do not worry about getting 100% on these assignments as the system can be buggy and annoying. Consequently, I will be adding (up to) 10% to all scores below 100.

**WRITTEN HOMEWORK:** There is a list of homework problems corresponding to each class available at <http://educ.jmu.edu/~fieldre/300homework>. You will not hand in your work for these problems, so only you need to be able to read your answers. Instead, your mastery of the skills/proof/concepts in the written homework will be measured by a weekly quiz that will take place on Fridays at the beginning of class. Because of this, please do not waste your time neatly writing up answers for concepts you have already mastered. Do, however, at least try each of the problems and do so before the corresponding Friday Weekly Quiz.

**WEEKLY QUIZZES:** These will cover the material in the written homework (linked off the course website) as well as important definitions/theorems/concepts from class. In total, all of the Weekly Quizzes together will count for 15% of your grade (equal to the contribution of one Midterm). Included in your Weekly Quiz grade will be both Class Participation as well as a pair of Essays and a Mandatory Office Meeting within the first two weeks of class (you will get extra credit for making that visit in the first week of class, there will be additional Friday office hours (10-11am, 2-3pm) for the first two weeks to help facilitate this visit).

**I do not give make- up quizzes or tests but in some circumstances I may be able to “excuse you from a quiz or a test.** In some (special) circumstances, I may offer the option of taking a “guinea pig” version of a quiz or test *before* the scheduled quiz/test date, but this is at my discretion. In a case of

emergency, you should contact me as soon as possible.

**MIDTERMS and FINAL EXAM:** There will be three Midterms and a Final Exam whose dates are listed at the top of this handout. **Please mark these dates on your calendar and make your travel plans around these exams. Vacation travel of any kind is not an acceptable excuse for missing an exam.** You will be allowed to use your (approved) scientific calculator during the exam (it shouldn't actually be necessary, but I have been known to make computational errors while writing exams, so you should bring it just in case). You should expect problem similar to Written Homework problems (including ones that did not happen to appear on a Weekly Quiz) as well as problems similar to WeBWorK and problems similar to ones we discussed in class. There will be questions asking about definitions and/or theorems from class and the text as well as problems that will require you to use your skills in new ways or to explain or use the ideas that underlie the techniques we have covered.

**CALCULATORS:** You are allowed and expected to use an approved scientific calculator on quizzes and exams. No graphing calculators, phones, tablets, or computers will be allowed during quizzes or exams. To be approved by me, a scientific calculator must NOT have the capability to graph functions or compute with vectors and/or matrices and must NOT have programmable memory beyond the ability to store a constant. The following models of calculators are automatically approved. If you need to purchase a calculator, you should be able to find a calculator from this list for 10–15. Note: If you are accustomed to using a graphing calculator, you may find it easier to use a calculator that displays two or more lines these calculators are indicated by \*.

Texas Instruments: TI30XA, TI30XIIS\*, TI30XSMultiview\*, TI34Multiview\*

Casio: fx-260SOLAR, fx-300ESPLUS\*, fx-300MSPLUS\*

Sharp: EL-501X, EL-509W\*, EL-509X\*, EL-510RN, EL-531/W531\*(W, WH, G, H, X, XH, or XG)

I must approve any calculator not listed above before it can be used. Please email me the model number no later than three days before the first quiz/exam on which you intend to use the calculator so that I can ensure that it meets the specifications. Older calculators with model numbers similar to those listed above are likely acceptable (for example, a TI-34 as opposed to a TI-34Multiview), but you must check with me about your specific model. If you purchase a new calculator not listed above, do not open the packaging until after it has been approved as you may need to return it.

**ATTENDANCE:** I expect you to come to class everyday, be on time, have done your pre-class assignment, and actively participate in the class. If you miss a class, it is your responsibility to get notes from a classmate and *read them before the next class*.

**GROUP WORK:** You will occasionally work in small groups in this class. Experimental data has shown that group work is beneficial to *all* of the students in the group (not just ones who get help) and the ability to cooperate is a vital need both at work and at home.

**HONOR CODE:** Any incidence of suspected or witness cheating or academic dishonesty will be sent to the Honor Board. Academic dishonesty has become entirely too pervasive here at JMU and I will not accept it inside out outside of my classroom.

**CANVAS, COURSE WEBSITE, and EMAIL:** We will be attempting to use Canvas (<http://canvas.jmu.edu>) as a location for class videos as well as a method of handing in written assignments (for example, Essays). Everything else will be on the course website at <http://educ.jmu.edu/~fieldre/300.html> This includes the course schedule (with updates of specific pre-class assignments), a list of Written Homework Problems (with both dates to start them and due dates at <http://educ.jmu.edu/~fieldre/300homework>), as well as information about exams, answer keys to previous Weekly Quizzes and/or Midterms. Please check the course schedule for your pre-exam assignment and do it before class on the specified day. I do not check my email more than once per day and never in the morning before class. If you need to get hold of me before class, the only way to do so is by phone (my personal phone number is at the top of this hand out, please don't abuse it). I send most class announcements by jmu email (through mymadison), so please do check your JMU email at least every other day.

**GETTING HELP:** There are many ways to get help with this course, starting with asking me for help. This is what my office hours/appointment are for. It's part of my job and I love my job, so please do come see me for help during office hours, by talking to me after class, or by email/phone. You never need to

make an appointment to see me during office hours (I will be there no matter what), but if you can't make any of my office hours, I encourage you to make an appointment. My availability for appointments will be on my office door (within a few days).

It is also a good idea to form study groups. We will take some of the first day of class for you to exchange phone/email info with your fellow classmates (an exception to the electronic devices rule). It can be extremely helpful to talk with classmates about problems and course material. Research has shown that students performance improves when they get together after working on homework problems to share their viewpoints and strategies, catch mistakes, explain ideas, and quiz each other, but be sure that you attempt the problems before discussing them and that you understand how to do the problems on your own after the group meeting!

**ELECTRONIC DEVICES:** Please turn off your cell phone ringer prior to class and keep your phone, laptop, tablet, etc. in your bag throughout class (unless otherwise specified as an in class activity). If I notice you violating this policy, I reserve the right to confiscate said device until the end of class. The only exception to this policy is your (approved) scientific calculator which you can keep on your desk and use during class. If you have other technology that you would like to use in class for educational purposes, please contact me to discuss an exception to this policy.

**DISABILITY ACCOMMODATIONS:** If you are a student with a documented disability, who will be requesting accommodations in my class, please make sure that you are registered with the Office of Disability Services, Student Success Center, Room 1202, 568-6705, and provide me with an Access Plan letter outlining your accommodations. I will be glad to meet with you privately to discuss your needs. Access plans must be provided and discussed with me at least four business days before the date of any quiz/exam for which accommodations are requested. You must also meet all deadlines established by the Office of Disability Services in order to guarantee accommodations.

**UNIVERSITY POLICIES:** Information about university policies that apply to all courses is available at <http://www.jmu.edu/syllabus/>

**CHANGES to the SYLLABUS:** I reserve the right to make changes to this syllabus with an announcement in class.

### **Official Goals of the Course as Stated by the JMU Department of Mathematics and Statistics**

1. To develop an understanding of the logical structure and style of mathematics by:
  - (a) Using reason in an orderly, cogent fashion.
  - (b) Writing clear, well-organized solutions to problems.
  - (c) Evaluating critically and using mathematical definitions.
  - (d) Constructing proofs of mathematical theorems using direct and indirect arguments.

Structure refers to the foundations of mathematics and to the techniques used to build on those foundations. Style refers to the clarity, elegance, efficiency, and precision desirable in mathematical expression.

2. To develop computational skills such as:
  - (a) Using matrices to solve systems of linear equations.
  - (b) Determining whether a given set of vectors forms a basis for a vector space.
  - (c) Determining the matrix of a linear transformation relative to given bases.
3. To develop an understanding of the theory of calculus and algebraic structures by knowing:
  - (a) The concept of a vector space and subspace.
  - (b) The concepts of a spanning set, linear dependence, basis, and dimension of a vector space.
  - (c) The basic concepts of matrices and linear transformations.
  - (d) The basic concept of determinants.