Linear Algebra

Math 241—— Fall 2018—— Michael Penn

MWF —— 11:00-11:50am —— MR 509

- **Instructor:**
  Michael Penn
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- **Office Hours:**
  - Tuesday & Thursday 9:30-12:30pm
  - By Appointment

Textbook:

- A First Course in Linear Algebra, by Robert Beezer.

Course Description:

Systems of linear equations, vector spaces and subspaces, bases and dimension, linear transformations, eigenvalues and eigenvectors, and inner product spaces. *Hours credit: 3. Prerequisite: MATH 149R or permission of the Department.*

Goals:

- To build an understanding of the abstract basics of linear algebra.
- To explore some applications of linear algebra.
- To continue development of your mathematical reasoning and problem solving skills.

Course Structure:

The method of delivery of the course material will vary wildly depending on exactly what we are covering during a given class meeting. Some days will be mostly lecture based while other days will include a lecture and a planned group work assignment. At times we will spend class time in groups working through the material using a "discovery" method. By using all of these different methods the course will hopefully never be dull and everyone will have the chance to learn in their own style.

Homework Assignments:

- **Problem Sets:** Homework will be assigned nearly every class day and will be due the following class day at 11:59pm. Homework will be completed via the online homework system WebWork. The appropriate link is

  `http://ec2-52-90-130-90.compute-1.amazonaws.com/webwork2/F2017Math241`

  12345

- **Computer Labs:** We will explore the ideas of this course using the computational tool `Mathematica`. You should expect such an assignment approximately every other week.
- **Writing Assignments:** You will be asked to explore some of the more conceptual topics of our class via short essays. You should expect such an assignment approximately every other week.

Readings:

Reading assignments and exercises will be made alongside the homework. I do not expect a full comprehension of the material from these readings although I will expect that simple definitions and such can be presented this way. You are expected to keep notes from these readings inside a "reading notebook" to be turned in sporadically throughout the semester. This notebook should also contain the reading exercises as well.

Exams:

Exams will be distributed at the start of class on the exam day. They are to be turned in at the start of the next class meeting. With respect to the honor code, you are to work alone on the exam for a maximum of two hours. Further instructions will be given with each exam.

- Exam 1: Monday, September 24
- Exam 2: Monday, November 5
- Final Exam: During Final Exam Week

Group Work:

Though we will not use in class group work every class, we will fairly often. The purpose of this group work is to engage you in collaborative problem solving. A portion of your grade will be determined by how well you participate in these groups. I have borrowed some guidelines for working in groups from Professor William Barker from Bowdoin College. These are essential so that we may get the most out of our class time.

1. **Work together** to achieve groups solutions to the class problems, do not work separately in your own notebook and then present finished work at the board. Listen to each other; the group is more than the sum of its parts.
2. **Use the board:** it is the best way to achieve effective collaborative work. As soon as work begins on a particular question someone should go to the board and
   (a) write down the question
   (b) draw a picture (if appropriate) to represent the items under study.

   Then, if attempting to probe a result, any "obvious" lines of attack should be started. All work should go through the person at the board.
3. **Rotate board duty** throughout the group. Everyone needs this experience.
4. **Insist on understanding.** Make sure everyone understands what is being discussed. If you are confused, then speak up - never hang back. If someone else is confused, then offer assistance - but remember that simply giving the answer to a problem is usually not the best way to help a person's understanding.
5. **Contribute, don't overwhelm.** Avoid the extremes of being overly passive or overly dominate. Everyone must participate in the group.
6. **Keep good notes!** You will important ideas during group work that you may want to review later.
7. **Don't give away answers.** Topics may arive about which you have more knowledge (perhaps from another course) than your group mates. In such case you must temporarily change your relationship to the group from student to "resource person", acting somewhat like an instructor. *Do not simply give out the solution to the problem at hand* - this would steal from your group members benefit of self-discovery, and you would lose the benefits of seeing a solution develop through the minds of other people.

8. **Seek understanding, not speed.** Don't worry about the pace of other groups. Speed has little correlation with how "smart" a group is. Many a "slower" group simply sees more in the given problems or examines details in greater depth.

Rough Schedule

Weeks 1 & 2	Systems of Linear Equations
Weeks 3& 4	Vectors
Weeks 5 &6	Matrices
Weeks 7 & 8	Vector Spaces
Week 9	Determinants
Week 10	Eigenvalues
Weeks 11& 12	Linear Transformations
Weeks 13&14	Representatons

Grading:

The exact scores that determine letter grades will be determined based on class performance. I expect these to be fairly similar to the standard (90%-100%)A, (80%-89%)B, and so on. The breakdown of grading is as follows:

- Class Participation: 10%
- Homework: 10%
- Reading Notebook: 10%
- Labs: 10%
- Exam 1: 20%
- Exam 2: 20%
- Final Exam: 20%

Attendance Policy:

You are expected to attend all class meetings. Greater than 3 absences will result in a lowering of your overall grade by one letter. Greater than 5 absences will result in failing this course.

Electronics Policy:

Other than an electronic calculator, the use of electronic devices is prohibited in this course unless explicitly granted for special assignments. An exception for the use of a cell phone may be made by prior arrangement with me under special circumstances. Other than that, any use of a cell phone, lap-top computer, or other electronic device will be treated as an honor code violation. As per Randolph College policy, all cell phones must be placed in the basket at the front of the room during testing.

Support Services:

Randolph College is committed to providing learning experiences that are accessible for all students, and will make reasonable accommodations for individuals with documented disabilities. If you have a learning difference or a disability mental health, medical, or physical impairment please contact Diane Roy, Coordinator of Disability Services, in the Academic Services Center, 4th floor, Lipscomb Library; at (434) 947-8132; or at `droy@randolphcollege.edu`.

Mandatory Reporting:

At Randolph College, all College faculty are mandated reporters. In the event that you choose to write or speak about having experienced sexual violence, including rape, sexual assault, sexual harassment, intimate partner violence, or stalking and specify that this violence occurred while you were a Randolph student, I must inform the Colleges Title IX Coordinator, Sharon Saunders We do this to make sure you are able to get all the information and support you need. I understand you may not be interested in making a complaint at this time; however, I am required to report what you confide in me.