Syllabus for Math 45 – Eureka Campus	
Semester & Year	Fall, 2016
Course ID and Section #	Math 45 E0359
Instructor's Name	David Arnold
Day/Time	MTThF, 2:50-3:55
Location	SC 214
Number of Credits/Units	4

Contact Information	*Office location*	SC 216H
	Office hours	M 1:00-2:00 PM, W 4:00-5:00 PM, F 1:00-2:00 PM, Online Office Hours, T Th, 9:00-10:00 PM
	Phone number	(707) 476-4222
	Email address	david-arnold@redwoods.edu
Textbook Information	*Title & Edition*	Linear Algebra and Its Applications 4th ed
	Author	David Lay
	ISBN	0-321-38517-9

Course Description

A course which develops the techniques and theory needed to solve and classify systems of linear equations. Solution techniques include row operations, Gaussian elimination, and matrix algebra. Properties of vectors are investigated in two and three dimensions, leading to the notion of an abstract vector space. Vector space and matrix theory are presented including topics such as inner products, norms, orthogonality, eigenvalues, eigenspaces, and linear transformations. Selected applications of linear algebra are included..

Student Learning Outcomes

1. Solve systems of linear equations using Gaussian elimination and matrix algebra, and apply these techniques to real world applications. Interpret the value of a determinant geometrically and use the value to determine the singularity of a matrix.
2. Determine the dimension of a vector space (e.g. the null space, the column space, and the row space of a matrix) and find a basis for the vector space.
3. Determine the matrix of a linear transformation and analyze the geometric action of the transformation and its inverse (if it exists).
4. Determine the eigenvalues and eigenvectors of a matrix and find bases for the eigenspaces. Interpret the definition of eigenvalues and eigenvectors geometrically. Use orthonormal bases to solve problems in linear algebra.

Special Accommodations

College of the Redwoods complies with the Americans with Disabilities Act in making reasonable accommodations for qualified students with disabilities. Please present your written accommodation request at least one week before the first test so that necessary arrangements can be made. No last-minute arrangements or post-test adjustments will be made. If you have a disability or believe you might benefit from disability related services and may need accommodations, please see me or contact Disabled Students Programs and Services. Students may make requests for alternative media by contacting DSPS at 707-476-4280.

Academic Support

Academic support is available at Counseling and Advising and includes academic advising and

educational planning, Academic Support Center for tutoring and proctored tests, and Extended Opportunity Programs & Services, for eligible students, with advising, assistance, tutoring, and more.

Academic Honesty

In the academic community, the high value placed on truth implies a corresponding intolerance of scholastic dishonesty. In cases involving academic dishonesty, determination of the grade and of the student's status in the course is left primarily to the discretion of the faculty member. In such cases, where the instructor determines that a student has demonstrated academic dishonesty, the student may receive a failing grade for the assignment and/or exam and may be reported to the Chief Student Services Officer or designee. The Student Code of Conduct (AP 5500) is available on the College of the Redwoods website at: http://www.redwoods.edu/board/Board-Policies/Chapter-5-Student-Services, and scroll to AP 5500. Additional information about the rights and responsibilities of students, Board policies, and administrative procedures is located in the college catalog and on the College of the Redwoods website.

Disruptive Classroom Behavior

Student behavior or speech that disrupts the instructional setting will not be tolerated. Disruptive conduct may include, but is not limited to: unwarranted interruptions; failure to adhere to instructor's directions; vulgar or obscene language; slurs or other forms of intimidation; and physically or verbally abusive behavior. In such cases where the instructor determines that a student has disrupted the educational process a disruptive student may be temporarily removed from class. In addition, he or she may be reported to the Chief Student Services Officer or designee. The Student Code of Conduct (AP 5500) is available on the College of the Redwoods website at: http://www.redwoods.edu/board/Board-Policies/Chapter-5-Student-Services and scroll to AP 5500.
Additional information about the rights and responsibilities of students, Board policies, and administrative procedures is located in the college catalog and on the College of the Redwoods website.

Emergency Procedures for the Eureka campus:

Please review the campus evacuation sites, including the closest site to this classroom (posted by the exit of each room). The Eureka **campus emergency map** is available at: (http://www.redwoods.edu/aboutcr/Eureka-Map; choose the evacuation map option). For more information on Public Safety, go to http://www.redwoods.edu/publicsafety. In an emergency that requires an evacuation of the building:
- Be aware of all marked exits from your area and building.
- Once outside, move to the nearest evacuation point outside your building:
- Keep streets and walkways clear for emergency vehicles and personnel.
- Do not leave campus, unless it has been deemed safe by the Incident Commander or campus authorities. (CR's lower parking lot and Tompkins Hill Rd are within the Tsunami Zone.)

    RAVE – College of the Redwoods has implemented an emergency alert system. In the event of an emergency on campus you can receive an alert through your personal email and/or phones at your home, office, and cell. Registration is necessary in order to receive emergency alerts. Please go to https://www.GetRave.com/login/Redwoods and use the "Register" button on the top right portion of the registration page to create an account. During the registration process you can elect to add additional information, such as office phone, home phone, cell phone, and personal email. Please use your CR

email address as your primary Registration Email. Your CR email address ends with "redwoods.edu." Please contact Public Safety at 707-476-4112 or security@redwoods.edu if you have any questions.

College of the Redwoods is committed to equal opportunity in employment, admission to the college, and in the conduct of all of its programs and activities.

David Arnold

Mathematics

- [Department Home Page](#)
- [Canvas](#)
- [WebAdvisor](#)
- [Optimath](#)
- [David Arnold Home](#)

Math 45: Instructor's Syllabus

There are files on this site in PDF format. You will need to [download](#) a free copy of the Acrobat Reader to read them. Click the following icon to obtain a free copy of the Acrobat Reader.

It is important that you have the most current version of the Acrobat Reader that your system will allow. The above links will take you to the Adobe site. The Adobe site will analyze your system, but you may be asked to choose the appropriate version of the reader for your system. If this happens, carefully select the appropriate version of the reader.

Official Course Outline

The official course outline for Linear Algebra, including content, objectives, and student learning outcomes, can be viewed online via the following link:

[Math 45 Course Outline](#)

You'll find the following course learning outcomes on the course outline:

1. Solve systems of linear equations using Gaussian elimination and matrix algebra, and apply these techniques to real world applications. Interpret the value of a determinant geometrically and use the value to determine the singularity of a matrix.
2. Determine the dimension of a vector space (e.g. the null space, the column space, and the row space of a matrix) and find a basis for the vector space.
3. Determine the matrix of a linear transformation and analyze the geometric action of the transformation and its inverse (if it exists).
4. Determine the eigenvalues and eigenvectors of a matrix and find bases for the eigenspaces. Interpret the

definition of eigenvalues and eigenvectors geometrically. Use orthonormal bases to solve problems in linear algebra.

Catalogue Description

A course which develops the techniques and theory needed to solve and classify systems of linear equations. Solution techniques include row operations, Gaussian elimination, and matrix algebra. Properties of vectors are investigated in two and three dimensions, leading to the notion of an abstract vector space. Vector space and matrix theory are presented including topics such as inner products, norms, orthogonality, eigenvalues, eigenspaces, and linear transformations. Selected applications of linear algebra are included.

Special notes or advisories: Computer exploration is an integral component of this course. Students will also create and present oral and written analyses of a topic that requires use of the concepts and techniques learned in this course.

Prerequisites

Math 50A (Differential Calculus) and Math 25 (or equivalent) with a grade of "C" or better.

Describe representative skills without which the student would be highly unlikely to succeed: Students must have well-developed mathematical reading and writing skills to be successful in this course. Some of the course material involves concepts from calculus

Instructor's Schedule

The following link contains a copy of my schedule, including office hours.

[Schedule and Office Hours](#)

Note: These are "official" office hours. However, I will make myself available whenever I can. Please do not be afraid to ask for help at any time as I am always eager to help.

Office Location and Phone

- Science building SC 216H
- Office phone: (707) 476-4222

Email

My email address is: David-Arnold@redwoods.edu

Getting Help

Help is available in many forms.

- Your instructor is always available for help in SC 216H when he isn't teaching class or attending a meeting. Take advantage.
- The Academic Support Center (ASC) in the library provides individual and group tutoring. You need to check in at the ASC desk and make an appointment to meet with a tutor.

- You can get wonderful assistance for your class in the Mathlab (again located in the ASC). Comprehensive information on the Mathlab is available at the following link:

  Information on the MathLab

Classroom Environment

It is expected that everyone involved in this class, teacher and students alike, will act in a manner conducive to providing a comfortable environment for learning, a classroom where students feel free to ask and answer questions without fear of embarrassment or ridicule.

It is important to stay on task when class is in session. Hence, conversation not pertaining to the subject at hand should be taken outside the classroom.

I understand that students will have to get up and leave the room for various reasons and I also understand that students will arrive late from time to time. However, courtesy requires that you enter and leave as quietly as possible, without disturbing discussion or lecture.

It is essential for student success to maintain a good environment in the classroom. If you have any personal difficulties with the learning envrionment in the classroom, please visit me in my office to discuss them.

Textbook

Linear Algebra and Its Applications, Fourth Edition, David C. Lay, Pearson: ISBN-10: 0321385179
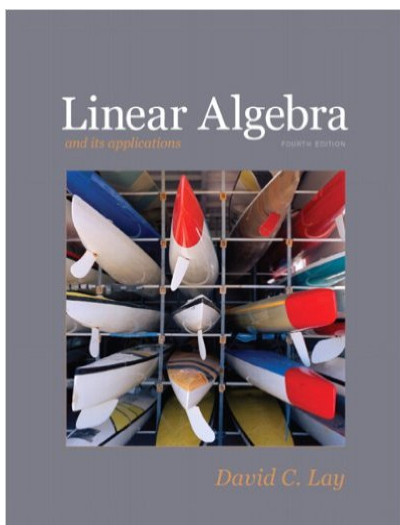
The Math Department has bought 20 copies of this textbook. They can be checked out in the CR Library for a full semester. It's first come, first served, so come early in case they run out.

The book is **not** available in the CR Bookstore, but if you wish to purchase a book for yourself, then here are a few links where you can order a copy online:

- Amazon has links to used copies:

  Amazon

- Campus Books has some online new and used:

  Campus Books

- Book Finder also has some online new and used:

  Book Finder

It's really important that you get the correct ISBN: 0321385179.

Reading the Textbook

It is important that you read and work the examples in the textbook before attemping the exercises. Many students will work the process in reverse. That is, they begin working the exercises, then if stuck, they page back through the narrative in the text seeking a similar example to the exercise on which they are working. This is **not** a recommended approach to the study of mathematics.

Study Guide

Student Study Guide of Linear Algebra and Its Applications, Fourth Edition, David C. Lay, Pearson: ISBN-10: 0321388836
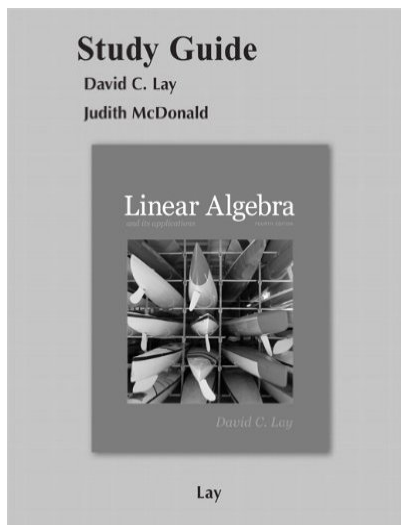
The Math Department has bought 20 copies of this Study Guide. They can be checked out in the CR Library for a full semester. It's first come, first served, so come early in case they run out.

The Study Guide is **not** available in the CR Bookstore, but if you wish to purchase a book for yourself, then here are a few links where you can order a copy online:

- Amazon has links to used copies:

  Amazon

- Campus Books has some online new and used:

  Campus Books

- Book Finder also has some online new and used:

  Book Finder

It's really important that you get the correct ISBN: 0321388836.

Resources for Lay's Book

There are a lot of resources for students using Lay's Linear Algebra and its Applications:

Student Resources

When you get on this page, click the link **Student Resources**. Clicking **Getting Started with Technology** will open several links, including **Getting Started with Mathematica**. Clicking **Applications by Chapter** opens a huge number of PDF document links that have applications for each chapter. Clicking **Data Files** will allow you to download **Mathematica** notebooks with data for exercises in the text. Clicking **Review Sheets and Practice Exams** opens exactly what is stated in the link.

Computing Resources

The Eureka campus houses computing facilities for its calculus students. They are located in the Science building, room SC 212. There are a number of powerful software packages on the machines in this room that will aid in the study of calculus. See your instructor for login name and password.

- Your personal login gives you a folder where you can submit your work. This folder is secure and the files in this folder cannot be read or written to by anyone but you.

Computer Lab -- Code of Conduct

Please see Computer Labs --- Code of Conduct for a set of rules and guidelines for computer use and maintaining decorum in the study rooms available in the physical sciences building.

Calculators

Most of our computation and plotting will be done with Mathematica. Whatever graphing calculator you currently own will be sufficient for your needs in this course.

Mathematica

Mathematica is a powerful software package created by the engineers at the Wolfram Mathematica. Mathemaica software can be installed on several platforms, including Linux, Mac OS X, and Windows XP.

Mathematica is installed on the computers in the SC 212 computer lab. Mathematica is also installed on the computers in the ASC.

To obtain a free version of Mathematica for use on your personal, go to Mathematica at College of the Redwoods. Slide down to where it says **Student personally owned machines**. Make sure you use **Student personally owned machines** and not the sections for faculty or campus machine use. Once you are at the section **Student personally owned machines**, perform each of the following tasks:

1. In number one, part (a), click the **user.wolfram.com** link and fill out (completely) the form using your @mycr.redwoods.edu email address.
2. Once you have completed the first step, go to step 2 and click on the **Fill out this form** link to request an activation key. It usually takes less than a day or two to receive an email with an activation key and instructions for downloading and installing Mathematica.
3. If you experience any problems, contact me via a Canvas email.

Homework

Homework will be assigned daily and will be due the next class meeting. Each homework will be assigned a grade ranging from 0-10 points, bases on completeness, the following of directions, and the quality of work.

It is essential that students keep up with the homework on a daily basis. Each time you come to class without your homework, you are not prepared to take part in the class at a level geared to your success. Therefore, students are encouraged to hand in homework on time. However, I am acutely aware of the responsibilities that many students have to deal with outside the classroom. Consequently, I do allow a "grace period" of one class period for late work. That is, if you hand your homework in by the next class period, I will still accept the assignment. However, there is an automatic 2-point deduction for late work. Homework later than one class period will not be accepted.

If you are experiencing difficulty getting your homework in on time, or if you know an upcoming event will interfere with getting your homework in on time, please discuss this with your instructor. We can possibly make some arrangment to help facilitate the completion of your work.

In order to facilitate the recording of homework scores, students are required to place their name in the upper right-hand corner of their homework assignment and staple the pages together with a single staple in the upper left-hand corner. On the first line of the of the first page of your homework, please write down the assignement number, the pages that encompass the assignement, and list each exercise number assigned. For example, the first line of your homework might read:

Assignment #12, Page 150, #1, 3, 5, 7, 8, 10, 11, 23, 45

Exams and Quizzes

Over the years, I have become more and more frustrated with the approach that students take in their studies. Typically, when students know an exam is coming up, they put on hold studies in their other classes to "cram" for the upcoming test. This is perfectly understandable and I freely admit that I did much the same thing when I was a student.

However, this is really not a good way to learn. Often, students are frustrated to find themselves behind in their other classes as they stuggle to prepare for an exam. They are unable to participate in lectures and they cannot follow the material in class because they are sections behind in their work. This is also frustrating for the teacher as he often winds up talking to himself during lecture.

Consequently, we will have frequent quizzes to make sure that you keep up with the material. Hopefully, this will encourage students to keep up-to-date on the current material.

There will also be a mideterm examination near the midpoint of the semester. This will be a full period examination.

Finally, each student is required to complete a term project in the class. Details for the project will follow below.

Student Term Projects

Each student in linear algebra is required to create a linear algebra project. This project will take the place of the final examination in linear algebra. The class will meet during the final examination period when students will present their projects.

Project Requirements

Each student (or student team) must prepare two reports: (1) a paper, and (2) a presentation. Here are some guidelines:

- The relevant due dates and description of grading can be found in Timelines and Grading.
- You may work alone or as a team. Teams may be composed of no more than two students. If you work as a team, each student must share equally in the workload and verbal presentation of the project. That is, both students must *speak* to the class. You may not have one student give the oral part of the presentation while the other student handles the visuals, for example.
- The subject of the project must be a real world application of linear algebra. There are several good sources for potential projects:
    - The periodical stacks at the CR or HSU library are a good source for potential projects. Often, it is best to skim the bibliographies of various textbooks for papers involving modeling in disciplines of interest to you before going to the library to search through the periodicals.
    - Harvey Mudd College has catalogued all articles in the College Mathematics Journal (Formerly the Two Year College Mathematics Journal) and the Mathematics Magazine of the MAA. A searchable database is available at http://www.math.hmc.edu/journalsearch/.
    - There are a number of important environmental sources in our area that you might find potentially inetersting: the pulp mill, the power plant, Pacific Lumber, etc.
    - The HSU mathematics department is famous for its mathematical modeling. You might try contacting one of the professors there for a potential project idea. A number of CR mathematics faculty earned their degress at HSU and may suggest project ideas of interest.
    - I personally collect papers on applications of linear algebra. See me in my office if you would like to browse my collection.
- The individual students or student teams must present their projects to the class. This presentation should include creative and appropriate use of technology as well as use of linear algebra technique learned during the semester. You may also use linear algebra technique that was not covered during the semester. For example, if you do project in mechanics that requires the use of the Euler-Lagrange equations, then you may take the time to learn the Euler-Lagrange formulation and include this technique in both your paper and presentation.
- Both your paper and presentation must be typeset using Latex.
- You will want to create two folders in your Math45 folder on your computer. One folder should be named **TermPaper**, the other should be named **PresentationSlides**. Place all files associated with your paper in the **TermPaper** folder and all files associated with your presentation in the **PresentationSlides** folder.
- The writing in your paper must be original. The writing must be your own. You may not copy prose from papers and call it your own. If there is an appropriate use of a quote that you would like to use, you must reference it professionally and in a correct manner.
- Your project is complete when your instructor has published both your paper and presentation on the website.
- The project is mandatory. You will not pass the class if you fail to complete and present your student project.

Some thoughts on your presentation.

- Presenters should limit their talk to 15 minutes.
- Remember that you have all semester to work through the intricate details of the mathematics required by your topic. However, you will quickly put your audience to sleep if you pound them with too much mathematical detail during your presentation. It may be better to concentrate more on the results of your topic during the presentation. Carefully built slides or programmed simulations will capture the attention of the audience, while a sea of mathematical detail might quickly put them to sleep.
- Your paper is a completely different story. It is expected that you will include both the results and images as well as all of the mathematics that produced them. Concentrate on clearly presenting all of the work that you have put into your topic, including all relevant mathematics.
- Your presentation should be completely professional. The use of "gimmicky" sounds and animations are not allowed in your presentation.
- You should not use the whiteboard during your presentation. All of your material should be placed on slides in advance of your presentation.

Important Dates

You can find some very important dates for the full semester at the following link, things such as census dates, last date for student withdrawal, etc.

Important Dates

Attendance Policy

A student who is absent from class for the amount of time equal to two weeks of classes, will be withdrawn from the course, unless there are extenuating circumstances that are communicated to the instructor in a timely manner. This "faculty withdrawal" can occur between Week 4 and Week 10 of the semester.

Attendance will be recorded each class session. If you know you will be missing class, you should let your instructor know. If you come in after roll has been taken, come up after class and let your instructor know you are here.

Grades

To determine your grade in the class, points from homework, quizzes, midterms, and final exams will be totaled. You will be able to keep up with your current grade by logging into the Gradebook throughout the semester.

Gradebook

When Problems Arise

Should problems arise during the semester, always contact your instructor to let me know what's going on. That's the only way I can help.

Emergency Procedures

Please review the campus evacuation sites, including the closest site to this classroom (posted by the exit of each room) and shown in Emergency Evacuation Safe Zones. See Public Safety for more information on campus Emergency Procedures.

During an evacuation:

- Be aware of all marked exits from your area and building. Know the routes from your work area to the nearest exits.
- Once outside, move to the nearest evacuation point outside your building.
- Keep streets and walkways clear for emergency vehicles and personnel.
- Do not leave campus, unless it has been deemed safe by the Incident Commander or campus authorities. (Be aware CR's lower parking lot and 101 frontage are within the Tsunami Zone).

RAVE - College of the Redwoods has implemented an emergency alert system. Everyone is entered already to receive a message at their CR email address. In the event of an emergency on campus, you can also elect to receive an alert through your personal email, and/or phones at your home, office, and cell. This emergency alert system will be available to all students, staff, and other interested parties.

Registration is necessary in order to receive emergency alerts. Please go to https://www.GetRave.com/login/Redwoods and use the "Register" button on the top right portion of the registration page to create an account. During the registration process you can elect to add additional information, such as office phone, home phone, cell phone, and personal email. Please use your CR email address as your primary Registration Email. Your CR email address ends with "redwoods.edu."

We will test the system each semester to be sure that you are getting alerts at all of your destinations. Please contact Public Safety, 707-476-4112, security@redwoods.edu, if you have any questions.

The Syllabus is Subject to Change

As instructor, I reserve the right to make adjustments to the syllabus should things not proceed as smoothly as expected. .

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