Syllabus for Math 45

Course Information

Semester & Year: Fall 2021
Course ID & Section #: Math45-E2299
Instructor's name: Jackson
[if synchronous] Day/Time of required meetings:
[if in-person] Location: Tuesday 2:50-4:05 PM
[if needed] Number of proctored exams:
Course units: 4

Instructor Contact Information

Office location or *Online: SC 216L
Office hours: Online TBA
Phone number: Cell 707 496 5842
Email address: steve-jackson@redwoods.edu

Textbook: Linear Algebra and its Applications, Fourth Edition, Lay. There should be textbooks in the library for term checkout.
We will also be using the online homework system found in MyOpenMath. To register use the link myopenmath.com with

Course ID:116558
Course name: Math45-E2299 Fall2021
Enrollment key: 27182828

Catalog 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. Note: Calculators and computer software may be employed to further explore concepts.

Course Student Learning Outcomes *(from course outline of record)*

CSLOs

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.

Prerequisites/co-requisites/ recommended preparation

MATH50A - Differential Calculus

Rationale for Prerequisite: Course material involves concepts from calculus. 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. Course matrierial can involve differentiation and the use of limits.

AND

Advisory

MATH50B - Integral Calculus

A year of college calculus. Prior or concurrent course work with vector calculus or vector-intensive physics would be helpful.

Accessibility

Students will have access to online course materials that comply with the Americans with Disabilities Act of 1990 (ADA), Section 508 of the Rehabilitation Act of 1973, and College of the Redwoods policies. Students who discover access issues with this class should contact the instructor.

College of the Redwoods is also committed to making reasonable accommodations for qualified students with disabilities. If you have a disability or believe you might benefit from disability-related services and accommodations, please contact your instructor or Disability Services and Programs for Students (DSPS). Students may make requests for alternative media by contacting DSPS based on their campus location:

- Eureka: 707-476-4280, student services building, 1st floor
- Del Norte: 707-465-2324, main building near library
- Klamath-Trinity: 530-625-4821 Ext 103

During COVID19, approved accommodations for distance education classes will be emailed to the instructor by DSPS. In the case of face to face instruction, please present your written accommodation request to your instructor at least one week before the first test so that necessary arrangements can be made. Last-minute arrangements or post-test adjustments cannot usually be accommodated.

Evaluation & Grading Policy

We will have three chapter exams and a final exam. All exam points are weighted equally. We will also have several quizzes throughout the semester. Quiz points carry the same weight as exam points.

Exams/Quiz = 80%

Homework = 20%

$$Overall\ \ Score = 0.8 * \frac{number\ of\ exam\ points\ student\ earns}{number\ of\ exam\ points} + \frac{0.2(number\ of\ homework\ points\ student\ earns)}{number\ of\ homework\ points}$$

Multiply by 100 to get your Overall Percentage

The course grade is assigned as follows:

A = 90-100%

B+ = 85-89%

B = 80-84%

C+ = 75-79%

C = 70-74%

D = 60-69%

F = otherwise

Admissions deadlines & enrollment policies

Fall 2021 Dates

- *Classes begin: 8/21/21*
- *Last day to add a class: 8/27/21*
- *Last day to drop without a W and receive a refund: 9/03/21*
- *Labor Day Holiday (all campuses closed): 09/06/21*
- *Census date: 9/07/21 or 20% into class duration*
- *Last day to petition to graduate or apply for certificate: 10/28/21*
- *Last day for student-initiated W (no refund): 10/29/21*
- *Last day for faculty-initiated W (no refund): 10/29/21*
- *Veteran's Day (all campuses closed): 11/11/21*
- *Fall Break (no classes): 11/22/21 – 11/26/21*
- *Thanksgiving Holiday (all campuses closed): 11/24/21 – 11/26/21*
- *Final examinations: 12/11/21 – 12/17/21*
- *Last day to petition to file P/NP option: 12/17/21*
- *Semester ends: 12/17/21*
- *Grades available for transcript release: approximately 01/07/22*

Academic dishonesty

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. 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 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, the student 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. 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.

Inclusive Language in the Classroom

College of the Redwoods aspires to create a learning environment in which all people feel comfortable in contributing their perspectives to classroom discussions. It therefore encourages instructors and students to use language that is inclusive and respectful.

Setting Your Preferred Name in Canvas

Students have the ability to have an alternate first name and pronouns to appear in Canvas. Contact Admissions & Records to request a change to your preferred first name and pronoun. Your Preferred Name will only be listed in Canvas. It does not change your legal name in our records. See the Student Information Update form.

Canvas Information

If using Canvas, include navigation instructions, tech support information, what Canvas is used for, and your expectation for how regularly students should check Canvas for your class.
Log into Canvas at https://redwoods.instructure.com
Password is your 8 digit birth date
For tech help, email its@redwoods.edu or call 707-476-4160
Canvas Help for students: https://webapps.redwoods.edu/tutorial/
Canvas online orientation workshop: Canvas Student Orientation Course (instructure.com)

Community College Student Health and Wellness

Resources, tools, and trainings regarding health, mental health, wellness, basic needs and more designed for California community college students, faculty and staff are available on the California Community Colleges Health & Wellness website.

Wellness Central is a free online health and wellness resource that is available 24/7 in your space at your pace.

Students seeking to request a counseling appointment for academic advising or general counseling can email counseling@redwoods.edu.

Emergency procedures / Everbridge

College of the Redwoods has implemented an emergency alert system called Everbridge. In the event of an emergency on campus you will receive an alert through your personal email and/or phones. Registration is not necessary in order to receive emergency alerts. Check to make sure your contact information is up-to-date by logging into WebAdvisor https://webadvisor.redwoods.edu and selecting 'Students' then 'Academic Profile' then 'Current Information Update.'

Please contact Public Safety at 707-476-4112 or security@redwoods.edu if you have any questions. For more information see the Redwoods Public Safety Page.

In an emergency that requires an evacuation of the building anywhere in the District:

- 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 campus authorities.

Del Norte Campus Emergency Procedures

Please review the Crescent City campus emergency map for campus evacuation sites, including the closest site to this classroom (posted by the exit of each room). For more information see the Redwoods Public Safety Page.

Eureka Campus Emergency Procedures

Please review the campus emergency map for evacuation sites, including the closest site to this classroom (posted by the exit of each room). For more information on Public Safety go to the Redwoods Public Safety Page It is the responsibility of College of the Redwoods to protect life and property from the effects of emergency situations within its own jurisdiction.

In the event of an emergency:

1. Evaluate the impact the emergency has on your activity/operation and take appropriate action.
2. Dial 911, to notify local agency support such as law enforcement or fire services.
3. Notify Public Safety 707-476-4111 and inform them of the situation, with as much relevant information as possible.
4. Public Safety shall relay threat information, warnings, and alerts through the Everbridge emergency alert system, Public address system, and when possible, updates on the college website, to ensure the school community is notified.
5. Follow established procedures for the specific emergency as outlined in the College of the Redwoods Emergency Procedure Booklet, (evacuation to a safe zone, shelter in place, lockdown, assist others if possible, cooperate with First Responders, etc.).
6. If safe to do so, notify key administrators, departments, and personnel.
7. Do not leave campus, unless it is necessary to preserve life and/or has been deemed safe by the person in command.

Klamath Trinity Campus Emergency Procedures

Please review the responsibilities of, and procedures used by, the College of the Redwoods, Klamath-Trinity Instructional Site (KTIS) to communicate to faculty, staff, students and the general public during an emergency. It is the responsibility of College of the Redwoods, Klamath-Trinity Instructional Site (KTIS) to protect life and property from the effects of emergency situations within its own jurisdiction.

1. In the event of an emergency, communication shall be the responsibility of the district employees on scene.
   a. Dial 911, to notify local agency support such as law enforcement or fire services.
   b. If safe to do so, notify key administrators, departments, and personnel.
   c. If safe to do so, personnel shall relay threat information, warnings, to ensure the school community is notified.
   d. Contact Jolene Gates 530-625-4821 to notify of situation.
   e. Contact Hoopa Tribal Education Administration office 530-625-4413
   f. Notify Public Safety 707-476-4111.
2. In the event of an emergency, the responsible district employee on scene will:
   a. Follow established procedures for the specific emergency as outlined in the College of the Redwoods Emergency Procedure Booklet.
   b. Lock all doors and turn off lights if in lockdown due to an active shooter or similar emergency.

c. Close all window curtains.
d. Get all inside to safe location Kitchen area is best internal location.
e. If a police officer or higher official arrives, they will assume command.
f. Wait until notice of all is clear before unlocking doors.
g. If safe to do so, move to the nearest evacuation point outside building (Pooky's Park), directly behind the Hoopa Tribal Education Building.
h. Do not leave site, unless it has been deemed safe by the person in command. Student Support Services (required for online classes)

Student Support Services

The following online resources are available to support your success as a student:

- CR-Online (Comprehensive information for online students)
- Library Articles & Databases
- Canvas help and tutorials
- Online Student Handbook

Counseling offers assistance to students in need of professional counseling services such as crisis counseling.

Learning Resource Center includes the following resources for students

- Academic Support Center for instructional support, tutoring, learning resources, and proctored exams. Includes the Math Lab & Drop-in Writing Center
- Library Services to promote information literacy and provide organized information resources.
- Multicultural & Diversity Center

Special programs are also available for eligible students include

- Extended Opportunity Programs & Services (EOPS) provides financial assistance, support and encouragement for eligible income disadvantaged students at all CR locations.
- The TRiO Student Success Program provides eligible students with a variety of services including trips to 4-year universities, career assessments, and peer mentoring. Students can apply for the program in Eureka or in Del Norte
- The Veteran's Resource Center supports and facilitates academic success for Active Duty Military, Veterans and Dependents attending CR through relational advising, mentorship, transitional assistance, and coordination of military and Veteran-specific resources.
- Klamath-Trinity students can contact the CR KT Office for specific information about student support services at 530-625-4821

The Written Homework Assignments:

Math 45 Linear Algebra Fall 2021 Jackson

There will also be online homework in MyOpenMath

Where appropriate check your work on your calculator or in appropriate software.

Section 1.1 Systems of Linear Equations
Problems: 3, 5, 7, 9, 11, 13, 15, 21, 23, 24, 31, 33

Section 1.2 Row Reduction and Echelon Forms

Problems: 1-20, 23-28 7-14 four

Section 1.3 Vector Equations
Problems: 1, 5, 7, 9, 11-14, 17-22, 25, 26

Section 1.4 The Matrix Equation $A\mathbf{x} = \mathbf{b}$
Problems: 1-20, 27, 28, 31, 32

Section 1.5 Solution Sets of Linear Equations
Problems: 1-14, 17, 19, 21, 29-34

Section 1.6 Applications of Linear Systems
Problems: 3,13,15

Section 1.7 Linear Independence
Problems: 1, 5, 9-20, 23-30, 33, 35, 37, 39, 41

Section 1.8 Introduction to Linear Transformations
Problems: 1, 3, 5, 9, 15, 17-20, 25-31, 33, 37

Section 1.9 The Matrix of a Linear Transformation
Problems: 1,3, 5, 7, 9, 13, 25-28, 31-34, 35

Section 1.10 Linear Models in Business, Science, and Engineering
Problems: Choose

Section 2.1 Matrix Operations
Problems: 1, 3, 5, 9, 11, 13, 17-26, 27, 35M, 37M

Section 2.2 The Inverse of a Matrix
Problems: 1, 3, 7, 9, 11-24, 35, 36M, 39M, 41M

Section 2.3 Characterization of Invertible Matrices
Problems: 1, 3, 5, 7, 9M, 15-24, 41M, 44M

Section 2.4 Partitioned Matrices
Problems: 1-10, 13, 14, 16, 19, 20, 27M

Section 2.5 Matrix Factorization
Problems: 1, 5, 11, 13, 22-26, 31MW

[Section 2.6 The Leontief Input-Output Models
Problems: Choose]

Section 2.7 Application to Computer Graphics
Problems: Choose

Section 3.1 Introduction to Determinants
Problems: 1, 3, 5, 19, 13, 19, 27, 33-36, 43M

Section 3.2 Properties of Determinants
Problems: 1, 3, 9, 11, 19, 25, 29

Section 3.3 Cramer's Rule, Volume, and Linear Transformations
Problems: 5, 9, 13, 21, 33M, 35M

Section 4.1 Vector Spaces and Subspaces
Problems: 1-18, 23, 24, 35M, 37M, 38M

Section 4.2 Null Spaces, Column Spaces, and Linear Transformations
Problems: 3-6, 7-14, 17-26

Section 4.3 Linearly Independent Sets; Bases
Problems: 1, 3, 5, 7, 9, 11, 21-25, 17M

Section 4.4 Coordinate Systems
Problems: 1, 3, 5, 7, 9, 11, 13, others?, 25, 27

Section 4.5 The Dimension of a Vector Space
Problems: 1, 5, 11, 13, 17, 19, others, 33M

Section 4.6 Rank
Problems: 1, 3, 5, 7, 15, 17, more?, 27-29, 35M

Section 4.7 Change of Basis
Problems: 12, 1, 5, 7, 9, 13, 15, 17M

Section 4.8 Application to Difference Equations
Problems: 1, 7, 9, 13, 21, 27, 29

Section 4.9 Application to Markov Chains
Problems:

Section 5.1 Eigenvectors and Eigenvalues
Problems: 1, 3, 5, 7, 13, 17, 19, 27, 37M, 39M

Section 5.2 The Characteristic Equation
Problems: 7, 13, 15, 17, 19, 29M

Section 5.3 Diagonalization
Problems: 1, 3, 5, 13, 19, 33M, 35M

Section 5.4 Eigenvectors and Linear Transformations
Problems: 3, 5, 7, 11, 19, 25, 31M

Section 5.5 Complex Eigenvalues
Problems: 3, 7, 19, 27M, 23, 24

Section 5.6 Discrete Dynamical Systems
Problems: 1, 3, 7, 17M

Section 5.7
Section 5.8

Section 6.1 Inner Product, Length, and Orthogonality
Problems: 1, 3, 5, 7, 11, 13, 17, 19, 23, 33M, 27-31

Section 6.2 Orthogonal Sets
Problems: 1, 3, 5, 7, 9, 11, 15, 17, 19, 35M

Section 6.3 Orthogonal Projections
Problems: 1, 3, 5, 7, 9, 11, 13, 17, 19

Section 6.4 The Gram-Schmidt Process
Problems: 1, 3, 5, 9, 11, 13, 25M

Section 6.5 Least-Squares Problem
Problems: 3, 5, 11, 15

Section 6.6 Application to Linear Models
Problems: ?

Section 7.1 Diagonalization of Symmetric Matrices
Problems: 1, 3, 5, 7, 9, 11, 15, 17, 19 , 23, 37M

Section 7.2 Quadratic Forms
Problems: 1, 3, 5, 7, 11, 15, 17