Course Outline of Record Report
11/14/2019

MATHC257 : Linear Algebra

General Information

Author (s):	• Vivian Baker • Rogers, Steven
Course Code (CB01):	MATHC257
Course Title (CB02):	Linear Algebra
Department:	Mathematics
Proposal Start:	Fall 2018
TOP Code (CB03):	(1701.00) Mathematics, General
SAM Code (CB09):	Non-occupational
Distance Education Approved:	Yes
Course Control Number (CB00):	CCC000504279
Curriculum Committee Approval Date:	10/20/2017
Board of Trustees Approval Date:	12/14/2017
External Review Approval Date:	Pending
Course Description:	This course covers the following topics: systems of linear equations; matrices; n-dimensional real vector spaces; general vector spaces; linear transformations; eigenvalues and eigenvectors; and applications of the above topics.
Submission Type:	Change to Content
	Course is being updated to align program applicability with current programs, move current C-ID-defined SLO's to "Objectives," add locally-determined SLO's..

Faculty Minimum Qualifications

Master Discipline Preferred:	• Mathematics
Alternate Master Discipline Preferred:	• Engineering • Physics/Astronomy
Bachelors or Associates Discipline Preferred:	No value
Additional Bachelors or Associates Discipline:	No value

Course Development Options

Basic Skills Status (CB08)	**Course Special Class Status (CB13)**	**Grade Options**
Course is not a basic skills course.	Course is not a special class.	• Letter Grade methods • Pass/No Pass

Allow Students to Gain Credit by Exam/Challenge	Allowed Number of Retakes	Course Prior to College Level (CB21)
	0	Not applicable.

Rationale For Credit By Exam/Challenge	Retake Policy Description	☑ Allow Students To Audit Course
No value	Type:|Non-Repeatable Credit	

Associated Programs

☑ Course is part of a program

Associated Program	Award Type
CC Liberal Arts: Mathematics & Science	A.A. Degree Major
Associate in Science Degree In Mathematics for Transfer	A.A. Degree for Transfer
Economics Associate in Arts Degree for Transfer (AA-T)	A.A. Degree for Transfer
CSU General Education (CSU GE Breadth)	CSU General Education (CSU GE Breadth)
Intersegmental General Education Transfer Curriculum Certificate of Achievement	Intersegmental General Education Transfer Curriculum Certificate of Achievement
Economics Associate in Arts Degree for Transfer	A.A. Degree for Transfer

Transferability & Gen. Ed. Options

Transferability	Transferability Status
Transferable to both UC and CSU	Approved

Cerro Coso General Education Requirements	Categories	Transferability Status	Comparable Course
Area 4.2	Language & Rationality Analytical Thinking	Approved	No Comparable Course defined.

CSU General Education Certification	Categories	Transferability Status	Comparable Course
Area B.4	Scientific Inquiry & Quantitative Reasoning Mathematics / Quantitative Reasoning	Approved	No Comparable Course defined.

Intersegmental General Education Transfer Curriculum	Categories	Transferability Status	Comparable Course
Area 2	Mathematical Concepts & Quantitative Reasoning	Approved	No Comparable Course defined.

Units and Hours

Summary

Minimum Credit Units (CB07)	4	**Total Course In-Class (Contact) Hours**	72	**Total Student Learning Hours**	216
Maximum Credit Units (CB06)	4	**Total Course Out-of-Class Hours**	144	**Faculty Load**	-

Credit / Non-Credit Options

Course Credit Status (CB04)	**Course Non Credit Category (CB22)**	**Non-Credit Characteristics**
Credit - Degree Applicable	Credit Course.	No value

Course Classification Code (CB11)	**Funding Agency Category (CB23)**	☐ Cooperative Work Experience Education Status (CB10)
Credit Course.	Not Applicable.	
☐ Variable Credit Course		

Weekly Student Hours

	In Class	Out of Class
Lecture Hours	4	8
Lab Hours	-	-
Activity Hours	-	-

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	54
Course In-Class (Contact) Hours	
Lecture	72
Lab	-
Activity	-
Total	72
Course Out-Of-Class Hours	
Lecture	144
Lab	-

	Activity	-
	Total	144

Time Commitment Notes for Students

No value

Faculty Load

Extra Duty: -   **Faculty Load:** -

Units and Hours - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class
No value	No value	No value	No value

Requisites

Prerequisite

MATHC152 - Analytic Geometry and Calculus II

In Math C257 students are expected to consistently write the derivative of expressions that contain the inverse trigonometric, logarithmic, exponential, hyperbolic, and inverse hyperbolic functions; evaluate integrals (definite and indefinite) by using fundamental integral formulas, partial fractions, integration by parts, and substitutions, trigonometric substitutions; expand skills with limits, including l'Hôpital's Rule and improper integrals; identify the conic section represented by a second degree equation and give the foci, vertices, and directricies; use polar coordinates to graph equations and to find area, arc length, and intersection of curves; use the tests for convergence and divergence of sequences and series; write infinite series representations of various functions; and use the fundamental concepts of vectors including sums, dot product, and projection. Students successfully demonstrating these Math C152 skills will be prepared for Math C257.

Entrance Skills

Skill	Content Review
No value	No value

Limitations on Enrollment

Limitation	Provide Rationale

| No value | No value |

Specifications

Methods of Instruction	Methods of Instruction Rationale
Other	Other Methods: A. lecture and discussion of all course concepts. B. demonstration of developing proofs and solving application problems. C. reading textbooks and journals to see presentations different than those of the instructor. D. assignments and quizzes E. the use of computational and other types of mathematical software
Discussion	No value
Lecture	No value
Demonstration	No value

Assignments

A. Reading assignments from the textbook. B. Bi-weekly homework assignments to be given from the text or online problems from the Pearson course management system . Sample out of class assignment: 1. A dietician is preparing a meal consisting of foods A, B, and C. Each ounce of food A contains 2 units of protein, 3 units of fat, and 4 units of carbohydrate. Each ounce of food B contains 3 units of protein, 2 units of fat, and 1 unit of carbohydrate. Each ounce of food C contains 3 units of protein, 3 units of fat, and 2 units of carbohydrate. If the meal must provide exactly 25 units of protein, 24 units of fat, and 21 units of carbohydrate, how many ounces of each type of food should be used?

Methods of Evaluation	Methods of Evaluation Rationale
Tests	A. tests on course content, to include solving equations as well as demonstration of specific skills. B. quizzes (in-class and take-home) to include solving equations as well as demonstration of specific skills.
Participation	C. group work to analyze and solve application problems.

Equipment

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
David C. Lay	Linear Algebra and Its Applications, 5th Ed.	Pearson	2015	

Other Instructional Materials

Description	Author	Citation
No Value	No Value	No Value

Materials Fee

No

Learning Outcomes and Objectives

Course Objectives

Find solutions of systems of equations using various methods appropriate to lower division linear algebra.

Use bases and orthonormal bases to solve problems in linear algebra.

Find the dimension of spaces such as those associated with matrices and linear transformations.

Find eigenvalues and eigenvectors and use them in applications.

Prove basic results in linear algebra using appropriate proof-writing techniques such as linear independence of vectors; properties of subspaces; linearity, injectivity and surjectivity of functions; and properties of eigenvectors and eigenvalues.

CSLOs

Perform operations on matrices in order to solve a system of linear equations.

Expected SLO Performance: 70.0

Apply operations to matrices to determine the linear span of a set of vectors, and the range and kernel of a linear transformation.

Expected SLO Performance: 70.0

Outline

Outline

The Mathematics Department has adopted the following best practices for teaching this course: offering or awarding extra-credit is forbidden, the allowance of multiple attempts at exams is forbidden, and an approved on-site proctor for online course exams is required.

A. Techniques for solving systems of linear equations including Gaussian and Gauss-Jordan elimination and inverse matrices;
B. Matrix algebra, invertibility, and the transpose;

C. Relationship between coefficient matrix invertibility and solutions to a system of linear equations and
    the inverse matrices;
D. Special matrices: diagonal, triangular, and symmetric;
E. Determinants and their properties;
F. Vector algebra for Rn;
G. Real vector space and subspaces;

H. Linear independence and dependence;

I. Basis and dimension of a vector space;
J. Matrix-generated spaces: row space, column space, null space, rank, nullity;
K. Change of basis;
L. Linear transformations, kernel and range, and inverse linear transformations; M. Matrices of general linear transformations;
N. Eigenvalues, eigenvectors, eigenspace;

O. Diagonalization including orthogonal diagonalization of symmetric matrices;
P. Inner products on a real vector space;
Q. Dot product, norm of a vector, angle between vectors, orthogonality of
   two vectors in Rn;
R. Angle and orthogonality in inner product spaces; and
S. Orthogonal and orthonormal bases: Gram-Schmidt process.

Delivery Methods and Distance Education

Delivery Method: Please list all that apply -Face to face -Online (purely online no face-to-face contact) -Online with some required face-to-face meetings ("Hybrid") -Online course with on ground testing -iTV – Interactive video = Face to face course with significant required activities in a distance modality -Other

Online with some required face-to-face meetings ("Hybrid")
iTV – Interactive video = Face to face course with significant required activities in a distance modality
Online course with on ground testing
Face to face;

Rigor Statement: Assignments and evaluations should be of the same rigor as those used in the on-ground course. If they are not the same as those noted in the COR on the Methods of Evaluation and out-of-class assignments pages, indicate what the differences are and why they are being used. For instance, if labs, field trips, or site visits are required in the face to face section of this course, how will these requirements be met with the same rigor in the Distance Education section?

All assignments in distance education courses (online, hybrid and iTV) are the same as those in the on-ground course, except that students in purely online sections will submit all of their assignments virtually, and students in hybrid sections will submit some of their assignments virtually. Instructor evaluation of student work in distance education courses is the same as in the on-ground course, except that evaluation of student work in online and hybrid courses is presented virtually. Instead of onsite lectures, hybrid and online courses will use videos and written lecture notes.

As with any on-ground class, the instructor must provide substantive critiques of all submitted material and at least general responses to discussion posts. Instructor assigns the completion of math problems in a publisher site as an exercise including check figures and assistance when needed. The publisher's site will reinforce the course's SLO's.

Effective Student-Instructor Contact: Good practice requires both asynchronous and synchronous contact for effective contact. List the methods expected of all instructors teaching the course. -Learning Management System -Discussion Forums -Moodle Message -Other Contact -Chat/Instant Messaging -E-mail -Face-to-face meeting(s) - Newsgroup/Discussion Board -Proctored Exam -Telephone -iTV - Interactive Video -Other (specify)

forums
message
email
face2face
proctored

Software and Equipment: What additional software or hardware, if any, is required for this course purely because of its delivery mode? How is technical support to be provided?

No Value

Accessibility: Section 508 of the Rehabilitation Act requires access to the Federal government's electronic and information technology. The law covers all types of electronic and information technology in the Federal sector and is not limited to assistive technologies used by people with disabilities. It applies to all Federal agencies when they develop, procure, maintain, or use such technology. Federal agencies must ensure that this technology is accessible to employees and the public to the extent it does not pose an "undue burden". I am using -iTV—Interactive Video only -Learning management system -Publisher course with learning management system interface.

itv
LMS
publisher

Class Size: Good practice is that section size should be no greater in distance ed modes than in regular face-to-face versions of the course. Will the recommended section size be lower than in on-ground sections? If so, explain why.

class_size Hybrid 45