Glendale College

Course Outline of Record Report

Course ID 003251

Cyclical Review - March 2025

MATH107 : Linear Algebra

General Information

Author:	• Suzanne Palermo
Attachments:	DE Addendum_MATH_107_COR_3:26:25_CoDE_5:27:25.pdf DE_Addendum_MATH_107_COR_9:8:21_Code_9:28:21.pdf
Course Code (CB01) :	MATH107
Course Title (CB02) :	Linear Algebra
Department:	MATH
Proposal Start:	Spring 2026
TOP Code (CB03) :	(1701.00) Mathematics, General
CIP Code:	(27.0101) Mathematics, General.
SAM Code (CB09) :	E - Non-Occupational
Distance Education Approved:	Yes
Will this course be taught asynchronously?:	No
Course Control Number (CB00) :	CCC000578446
Curriculum Committee Approval Date:	03/26/2025
Board of Trustees Approval Date:	06/17/2025
Last Cyclical Review Date:	03/26/2025
Course Description and Course Note:	MATH 107 introduces vector spaces, linear transformations and matrices, matrix algebra, determinants, eigenvalues and eigenvectors, and solutions of systems of equations. Students explore solution techniques that include row operations, Gaussian elimination and matrix algebra. Students will also learn specific topics in vector spaces and matrix theory that include inner products, norms, orthogonality, eigenvalues, eigenspaces, linear transformations and applications.
Justification:	Mandatory Revision
Academic Career:	• Credit
Mode of Delivery:	• In-Person • Remote • Hybrid • Proctored Online
Author:	No value
Course Family:	No value

Academic Senate Discipline

Primary Discipline:	• Mathematics
Alternate Discipline:	No value
Alternate Discipline:	No value

Course Development

Basic Skill Status (CB08)

Course is not a basic skills course.

☐ Allow Students to Gain Credit by Exam/Challenge

Course Special Class Status (CB13)

Course is not a special class.

Pre-Collegiate Level (CB21)

Not applicable.

Grading Basis

- Grade with Pass / No-Pass Option

Course Support Course Status (CB26)

Course is not a support course

General Education and C-ID

General Education Status (CB25)

GE Status (CSU) B4, (UC) 2

Transferability

Transferable to both UC and CSU

Transferability Status

Approved

Cal-GETC	Area	Status	Approval Date	Comparable Course
Area 2: Mathematical Concepts and Quantitative Reasoning	Mathematical Concepts and Quantitative Reasoning	Approved	09/02/2025	No Comparable Course defined.

GCC General Education Requirements	Area	Status	Approval Date	Comparable Course
Area 2: Mathematical Concepts and Quantitative Reasoning	Mathematical Concepts and Quantitative Reasoning	Approved	09/02/2025	No Comparable Course defined.

Units and Hours

Summary

Minimum Credit Units (CB07)	5
Maximum Credit Units (CB06)	5
Total Course In-Class (Contact) Hours	90
Total Course Out-of-Class Hours	180
Total Student Learning Hours	270

Credit / Non-Credit Options

Course Type (CB04)

Credit - Degree Applicable

Noncredit Course Category (CB22)

Credit Course.

Noncredit Special Characteristics

No Value

Course Classification Code (CB11)

Credit Course.

Funding Agency Category (CB23)

Not Applicable.

☐ Cooperative Work Experience Education Status (CB10)

☐ Variable Credit Course

Weekly Student Hours

	In Class	Out of Class
Lecture Hours	5	10
Laboratory Hours	0	0
Studio Hours	0	0

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	54
Course In-Class (Contact) Hours	
Lecture	90
Laboratory	0
Studio	0
Total	90
Course Out-of-Class Hours	
Lecture	180
Laboratory	0
Studio	0
Total	180

Time Commitment Notes for Students

No value

Units and Hours - Weekly Specialty Hours

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

Prerequisites, Corequisites, Recommended Corequisites, and Recommended Preparation

Prerequisite

MATH104E - Calculus and Analytic Geometry II

Objectives

- Evaluate definite and indefinite integrals using a variety of techniques, including integration by parts, trigonometric substitution, and partial fractions.
- Evaluate improper integrals.
- Model differential equations.

- Solve separable differential equations.
- Work with exponential and logistic models of growth and decay.
- Graph conic sections.
- Determine divergence or convergence of infinite sequences and series by applying convergence tests.
- Differentiate and integrate power series.
- Find Taylor and Maclaurin series for a function.
- Graph equations in polar and parametric form.

OR

Prerequisite

MATH104EH - Honors Calculus and Analytic Geometry II

Objectives

- Evaluate definite and indefinite integrals using a variety of techniques, including integration by parts, trigonometric substitution, and partial fractions.
- Evaluate improper integrals.
- Model differential equations.
- Solve separable differential equations.
- Work with exponential and logistic models of growth and decay.
- Graph conic sections.
- Determine divergence or convergence of infinite sequences and series by applying convergence tests.
- Differentiate and integrate power series.
- Find Taylor and Maclaurin series for a function.
- Graph equations in polar and parametric form.

AND

Advisory

MATH105 - Multivariable and Vector Calculus

Objectives

- Perform basic vector algebra operations.

Entry Standards

Entry Standards	Description
No value	No value

Course Limitations

Cross Listed or Equivalent Course	Description
MATH 107H	No Value

Specifications

Methods of Instruction

Methods of Instruction	Lecture
Methods of Instruction	Discussion
Methods of Instruction	Multimedia
Methods of Instruction	Collaborative Learning
Methods of Instruction	Demonstrations

Out of Class Assignments

- Homework (e.g. problem sets related to course content)
- Group assignments and projects (e.g. group project to solve a “challenging” application problem from the textbook)

Methods of Evaluation	Description of Activity/Interaction
Exam/Quiz/Test	Quizzes
Exam/Quiz/Test	Four or more regularly scheduled exams are required
Exam/Quiz/Test	A comprehensive final examination is required

Textbook Rationale

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Anton, Howard	Elementary Linear Algebra	Wiley	2020	978-1-119-40677-8

Other Instructional Materials (i.e. OER, handouts)

No Value

Learning Outcomes

Course Objectives

Perform matrix arithmetic.

Find the inverse of a matrix.

Solve a linear system of equations using matrix operations (Gaussian and Gauss Jordan elimination).

Evaluate determinants by raw reduction and cofactor expansion.

Identify vector spaces and subspaces.

Determine if a set of vectors is linearly independent.

Find a base for and the dimension of a vector space.

Use the Gram-Schmidt process to find an orthonormal basis for an inner product space.

Find the kernel and range of a linear transformation.

Find matrix representations of linear transformations.

Find the eigenvalues and eigenvectors of a matrix.

Diagonalize a matrix.

Determine eigenvalues and eigenspaces of matrices and linear transformations.

Use quadratic forms to obtain graphs of conic sections and quadratic surfaces.

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.

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

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

SLOs

Analyze vector spaces, subspaces, linear independence, span, bases, dimension, and linear transformations by applying definitions and proving theorems.

Expected Outcome Performance: 70.0

ILOs Core ILOs	Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate creativity that leads to innovative ideas.
	Use quantitative and/or analytical mathematical skills to solve problems and to interpret, evaluate, and process information and data to draw logical conclusions and support claims.
MATH Mathematics A.S. Degree	Analyze, synthesize and evaluate theorems in Linear Algebra
	Solve applications in math and science using derivatives, integrals, differential equations and linear algebra
MATH Mathematics AS-T Degree	Analyze, synthesize and evaluate theorems in Linear Algebra
	Solve application problems in math and science using calculus, differential equations, and linear algebra.
	Solve applications in math and science using derivatives, integrals, differential equations and linear algebra
MATH Mathematics - A.A. Degree Major	Analyze, synthesize and evaluate theorems in Linear Algebra.
	solve applications in math and science using derivatives, integrals, differential equations and linear algebra.
ST DV Liberal Arts: Science and Mathematics Emphasis A.A. Degree	Apply mathematical and scientific ideas to analyze real-world situations.
MATH Data Science for Mathematics AS Degree	Interpret and evaluate data trends, qualitative research, or patterns in complex data sets using statistical techniques, analytic methods, and tools.
CSIS Computer Science A.S. Degree	Prepare a software project to implement a single scientific, mathematical, business, or technical function
CSIS Computer Science Certificate	Prepare a software project to implement a single scientific, mathematical, business, or technical function
MATH Mathematics - AS-T	analyze, synthesize and evaluate theorems in Linear Algebra.
	solve applications in math and science using derivatives, integrals, differential equations and linear algebra.
MATH Mathematics - A.S. Degree Major	analyze, synthesize and evaluate theorems in Linear Algebra.
	solve applications in math and science using derivatives, integrals, differential equations and linear algebra.
ILOs General Education	apply techniques of analysis and critical thinking to critique real world and theoretical topics and issues

Perform matrix and vector operations and apply properties of linear systems, inverses, determinants, eigenvalues/eigenvectors, and inner products to solve problems and prove theorems.

Expected Outcome Performance: 70.0

ILOs Core ILOs	Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate creativity that leads to innovative ideas.
	Use quantitative and/or analytical mathematical skills to solve problems and to interpret, evaluate, and process information and data to draw logical conclusions and support claims.
MATH Mathematics AS-T Degree	Analyze, synthesize and evaluate theorems in Linear Algebra
	Solve application problems in math and science using calculus, differential equations, and linear algebra.
	Solve applications in math and science using derivatives, integrals, differential equations and linear algebra
MATH Mathematics A.S. Degree	Analyze, synthesize and evaluate theorems in Linear Algebra
	Solve applications in math and science using derivatives, integrals, differential equations and linear algebra
MATH Mathematics - A.A. Degree Major	Analyze, synthesize and evaluate theorems in Linear Algebra.
	solve applications in math and science using derivatives, integrals, differential equations and linear algebra.
ST DV Liberal Arts: Science and Mathematics Emphasis A.A. Degree	Apply mathematical and scientific ideas to analyze real-world situations.
MATH Data Science for Mathematics AS Degree	Interpret and evaluate data trends, qualitative research, or patterns in complex data sets using statistical techniques, analytic methods, and tools.
CSIS Computer Science Certificate	Prepare a software project to implement a single scientific, mathematical, business, or technical function
CSIS Computer Science A.S. Degree	Prepare a software project to implement a single scientific, mathematical, business, or technical function
MATH Mathematics - AS-T	analyze, synthesize and evaluate theorems in Linear Algebra.
	solve applications in math and science using derivatives, integrals, differential equations and linear algebra.
MATH Mathematics - A.S. Degree Major	analyze, synthesize and evaluate theorems in Linear Algebra.
	solve applications in math and science using derivatives, integrals, differential equations and linear algebra.
ILOs General Education	apply techniques of analysis and critical thinking to critique real world and theoretical topics and issues

Additional SLO Information

Does this proposal include revisions that might improve student attainment of course learning outcomes?

No

Is this proposal submitted in response to learning outcomes assessment data?

No

If yes was selected in either of the above questions for learning outcomes, explain and attach evidence of discussions about learning outcomes.

No Value

SLO Evidence

No Value

Course Content

Lecture Content

Systems of Linear Equations and Matrices (17 hours)
- Introduction to systems of linear equations
- Gaussian and Gauss-Jordan elimination
- Matrices and matrix operations
- Inverses; rules of matrix arithmetic
- Elementary matrices and finding the inverses of a matrix
- Results on systems of equations and invertibility
- Diagonal, triangular, and symmetric matrices

Determinants (8 hours)
- The determinant function
- Evaluating determinants by raw reduction
- Properties of the determinant function
- Cofactor expansion; Cramer's rule

Vectors in R^n (10 hours)
- Introduction to vectors (Geometric)
- Norm of a vector
- Vector arithmetic
- The dot product and projections
- The cross product
- Orthogonality of two vectors
- Lines and planes in 3-space

Euclidean Vector Spaces (7 hours)
- Euclidean n-space
- Linear transformations from Rn to Rm
- Properties of Linear transformations from Rn to Rm

General Vector Spaces (10 hours)
- Real vector spaces
- Subspaces
- Linear independence
- Basis and dimension
- Raw space, column space and nullspace
- Rank and Nullity

Inner Product Spaces (10 hours)
- Inner products
- Angle and orthogonality in inner product spaces
- Orthonormal bases; Gram-Schmidt process; QR-Decomposition
- Best approximation; least squares
- Orthogonal matrices; change of bases

Eigenvalues and Eigenvectors (11 hours)
- Eigenvalues and eigenvectors
- Diagonalization
- Orthogonal diagonalization

Linear Transformations (11 hours)
- General linear transformations
- Kernel and range
- Inverse linear transformations
- Matrix representations of general linear
- Transformations
- Similarity

Applications (6 hours)

- Fourier Series
- Quadratic Forms and their applications

Total Hours: 90

Additional Information

Repeatability

Not Repeatable

Justification (if repeatable was chosen above)

No Value

Is it possible this course will have a material fee?

No

I have contacted my library liaison (https://campusguides.glendale.edu/faculty/liaisons):

No Value

What term(s) will this course be offered?

Fall/Winter/Spring/Summer

Will any additional resources be needed for this course? (Click all that apply)

- No

If additional resources are needed, add a brief description and cost in the box provided.

No Value

Resources

Did you contact your departmental library liaison?

No

If yes, who is your departmental library liason?

No Value

Did you contact the DEIA liaison?

No

Were there any DEIA changes made to this outline?

No

If yes, in what areas were these changes made:

No Value

Will any additional resources be needed for this course? (Click all that apply)

- No

If additional resources are needed, add a brief description and cost in the box provided.

No Value