11/10/2022 DATE

☐ REQUIRED COURSE
☑ ELECTIVE COURSE

MSD DIVISION

☐ NEW COURSE
☑ REVISION

Lake Land College
Course Information Form

COURSE NUMBER:	MAT-255		TITLE: *(30 Characters Max)*		Linear Algebra			
SEM CR HRS:	3	Lecture:	3			Lab:	0	ECH: 3

Course Level:	☐ Gen Ed / IAI ☑ Baccalaureate /Non-IAI	☐ Career/Technical ☐ Dev Ed/ Not in Degree Audit	Clinical Practicum:	0	Work-based Learning	0	WBL ECH:	0

COURSE PCS #	11 - 27.0101	IAI Code				Contact Hours (Minutes Per Week)		
Repeatable (Y/N): N	Pass/Fail (Y/N): N	Variable Credit (Y/N): N	Min:	Max:		16 Wks	150	8 Wks	300

Prerequisites:	MAT-241 with grade of 'C' or higher
Catalog Description: (40 Word Limit)	A first course in linear algebra covering linear systems, matrices, determinants, vector spaces, inner product spaces, and eigenvalues and eigenvectors, including proofs of theorems and propositions in each topic.

List the Major Course Segments (Units)	Contact Lecture Hours	Contact Lab Hours	Clinical Practicum	Work-based Learning
Systems of Linear Equations	5			
Matrices	8			
Determinants	8			
Vector Spaces	12			
Inner Product Spaces	8			
Other Topics	4			
- Linear Transformations				
- Diagonalization				
TOTAL	45	0	0	0

EVALUATION

QUIZZES ☑	EXAMS ☑	ORAL PRES ☐	PAPERS ☐
LAB WORK ☐	PROJECTS ☑	COMP FINAL ☑	OTHER ☐

COURSE MATERIALS

TITLE:	Differential Equations & Linear Algebra
AUTHOR:	Goode and Annin
PUBLISHER:	Pearson
VOLUME/EDITION/URL:	4th
COPYRIGHT DATE:	2018

MAJOR COURSE SEGMENT	HOURS	LEARNING OUTCOMES
		The student will be able to:
Systems of Linear Equations		
Parametrization	1	Write solution of linear system in parametric form
Elementary Row Operations	1	Learn to use elementary row operations
Gaussian and Gauss-Jordan elimination	2	Row-reduce a matrix to row-echelon or reduced row-echelon form
Application: Polynomial Curve Fitting	1	Find polynomial through n data points

Matrices		
Matrix Operations	3	Learn matrix operations
Transpose and Inverse of a Matrix	3	Use transpose and inverse of a matrix and prove theorems about matrix properties
Elementary Matrices	1	Use elementary matrices
Application: Least Squares Regression	1	Find line of best fit for n data points
Determinants		
Computation of Determinant	2	Learn how to compute determinant
Properties	3	Learn properties of determinants and prove theorems about them
Applications: Eigenvalues and Eigenvectors, Cramer's Rule	3	Find simple eigenvalues and eigenvectors Use Cramer's Rule to solve linear systems
Vector Spaces		
Vector Operations and Properties	1	Learn vector operations and their pro
Vector Spaces and Subspaces	2	Recognize vector spaces and subspaces
Spanning and Linear Independence	2	Determine spanning and linear independence and prove theorems about vector spaces
Basis and Dimension	2	Find a basis for a vector space
Rank and Nullity	2	Understand rank and nullity of a matrix
Coordinates and Change of Basis	2	Find coordinates of a vector relative to a basis and find transition matrix from one basis to another
Application: Linear Differential Equations	1	Find the solution space of a homogeneous differential equation
Inner Product Spaces		
Length and Unit Vectors	1	Compute length of a vector

Dot Product and Angle Between Vectors	2	Compute dot product of 2 vectors
Inner Product Spaces	2	Understand inner product spaces and prove theorems about them
Orthogonal Projections	1	Find orthogonal projection of one vector onto another
Application: Gram-Schmidt Orthonormalization	2	Use Gram-Schmidt orthonormalization procedure to construct an orthonormalized basis for an inner product space
Other Topics		
Linear Transformations	2	Learn basic ideas of linear transformation: kernel, range, rank, nullity, etc.
Diagonalization	2	Learn to diagonalize a matrix
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	45	

COURSE OUTCOMES*	At the successful completion of this course, students will be able to:
	• Solve linear system in parametric form.
	• Use elementary row operations
	• Perform matrix operations
	• Compute determinants
	• Recognize vector spaces and apply subspace test
	• Determine spanning and linear independence
	• Find basis and dimension for a vector space
	• Perform operations in an inner product space
	• Prove theorems involving matrices, determinates, vector space, inner product spaces, and eigenvalues

* Course Outcomes will be used in the Assessment Software for Outcomes Assessment. Limit to 3 - 5.