Universidad Nacional de Ingeniería (UNI)
Escuela Profesional de
Ciencia de la Computación
Sílabo 2024-II

1. CURSO

MA101FCCS. Linear Algebra (Mandatory)

2. INFORMACIÓN GENERAL

2.1 Curso	:	MA101FCCS. Linear Algebra
2.2 Semestre	:	1^{st} Semester.
2.3 Créditos	:	3
2.4 horas	:	2 HT; 2 HP;
2.5 Duración del periodo	:	16 semanas
2.6 Condición	:	Mandatory
2.7 Modalidad de aprendizaje	:	Face to face
2.8 Prerrequisitos	:	None

3. PROFESORES

Atención previa coordinación con el profesor

4. INTRODUCCIÓN AL CURSO

Linear algebra is fundamental to computer science, providing essential tools for algorithm analysis, computer graphics, machine learning, and many other areas. This course provides a solid foundation in the concepts and techniques of linear algebra, with a focus on its application in computing.

5. OBJETIVOS

- Understand the fundamental concepts of linear algebra, including vector spaces, matrices, linear transformations, and systems of linear equations.
- Apply linear algebra techniques to solve problems in various computational contexts.
- Develop abstract reasoning and logical thinking skills to address mathematical problems.

6. RESULTADOS DEL ESTUDIANTE

1) Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions. (Assessment)

6) Apply computer science theory and software development fundamentals to produce computing-based solutions. (Assessment)

AG-C07) Computing Knowledge: Applies appropriate knowledge of mathematics, science, and computing. (Assessment)

AG-C08) Problem Analysis: Identifies, formulates, and analyzes complex computing problems. (Assessment)

AG-C12) Applies computer science theory and software development fundamentals to produce computer-based solutions. (Assessment)

7. TEMAS

Unidad 1: Vector Spaces (8 horas)	
Resultados esperados: 1,6,AG-C07,AG-C08	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Definition of vector space and subspace. • Linear combinations, linear independence, and bases. • Dimension and rank.	• Define and give examples of vector spaces and subspaces. [Familiarizarse] • Determine the linear independence of a set of vectors. [Usar] • Calculate bases and the dimension of a vector space. [Evaluar]
Lecturas : [Str16], [LLM16]	

Unidad 2: Matrices and Systems of Linear Equations (8 horas)	
Resultados esperados: 1,6,AG-C07	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Matrix operations. • Gaussian elimination and reduced row echelon form. • Solving systems of linear equations. • Inverse matrices and determinants.	• Perform matrix operations. [Familiarizarse] • Solve systems of linear equations using Gaussian elimination. [Usar] • Calculate the inverse of a matrix and its determinant. [Evaluar]
Lecturas : [Str16], [LLM16]	

Unidad 3: Linear Transformations (8 horas)	
Resultados esperados: 1,6,AG-C07	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Definition and examples of linear transformations. • Kernel and image of a linear transformation. • Transformation matrices.	• Define and give examples of linear transformations. [Familiarizarse] • Calculate the kernel and image of a linear transformation. [Usar] • Represent linear transformations using matrices. [Evaluar]
Lecturas : [Str16], [LLM16]	

Unidad 4: Eigenvalues and Eigenvectors (8 horas)	
Resultados esperados: 1,6,AG-C07	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Definition and calculation of eigenvalues and eigenvectors. • Diagonalization of matrices. • Applications of eigenvalues and eigenvectors.	• Define and calculate eigenvalues and eigenvectors. [Familiarizarse] • Diagonalize matrices. [Usar] • Apply eigenvalues and eigenvectors to solve problems. [Evaluar]
Lecturas : [Str16], [LLM16]	

Unidad 5: Orthogonality and Least Squares (8 horas)	
Resultados esperados: 1,6,AG-C07	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Inner product and orthogonality. • Orthogonal projections. • Least squares method.	• Define and calculate inner product and orthogonality. [Familiarizarse] • Calculate orthogonal projections. [Usar] • Apply the least squares method. [Evaluar]
Lecturas : [Str16], [LLM16]	

Unidad 6: Applications in Computing (8 horas)	
Resultados esperados: 1,6,AG-C07,AG-C12	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Applications in computer graphics. • Applications in machine learning. • Applications in algorithm analysis.	• Describe applications of linear algebra in computer graphics. [Familiarizarse] • Explain how linear algebra is used in machine learning. [Usar] • Analyze the complexity of algorithms using linear algebra concepts. [Evaluar]
Lecturas : [Str16], [LLM16]	

8. PLAN DE TRABAJO

8.1 Metodología

Se fomenta la participación individual y en equipo para exponer sus ideas, motivándolos con puntos adicionales en las diferentes etapas de la evaluación del curso.

8.2 Sesiones Teóricas

Las sesiones de teoría se llevan a cabo en clases magistrales donde se realizarán actividades que propicien un aprendizaje activo, con dinámicas que permitan a los estudiantes interiorizar los conceptos.

8.3 Sesiones Prácticas

Las sesiones prácticas se llevan en clase donde se desarrollan una serie de ejercicios y/o conceptos prácticos mediante planteamiento de problemas, la resolución de problemas, ejercicios puntuales y/o en contextos aplicativos.

9. SISTEMA DE EVALUACIÓN

********* EVALUATION MISSING ********

10. BIBLIOGRAFÍA BÁSICA

[LLM16] David C Lay, Steven R Lay, and Judi J McDonald. *Linear Algebra and Its Applications*. Pearson, 2016.

[Str16] Gilbert Strang. *Introduction to Linear Algebra*. Wellesley-Cambridge Press, 2016.