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

1. CURSO

MA102FCCS. Integral Calculus (Mandatory)

2. INFORMACIÓN GENERAL

2.1 Curso	:	MA102FCCS. Integral Calculus
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

Differential calculus is a fundamental tool in computer science for understanding and modeling change. This course introduces the main concepts of differential calculus, including limits, derivatives, applications of the derivative, and optimization.

5. OBJETIVOS

- Understand the concept of a limit and its application to calculating derivatives.
- Apply differentiation rules to calculate derivatives of various functions.
- Use the derivative to solve optimization problems, rates of change, and function analysis.

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

7. TEMAS

Unidad 1: Functions and Limits (6 horas)	
Resultados esperados: 1,6,AG-C07	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Review of functions. • Definition of a limit. • Properties of limits. • Limits involving infinity. • Continuity.	• Evaluate limits graphically and numerically. [Familiarizarse] • Apply the properties of limits to evaluate limits algebraically. [Usar] • Determine the continuity of a function. [Evaluar]
Lecturas : [Ste15], [LE14]	

Unidad 2: The Derivative (6 horas)	
Resultados esperados: 1,6,AG-C07	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Definition of the derivative. • Geometric interpretation of the derivative. • Derivatives of polynomial and exponential functions. • Differentiation rules: sum, product, quotient, and chain rule.	• Calculate the derivative of a function using the definition. [Familiarizarse] • Interpret the derivative as the slope of the tangent line. [Usar] • Apply differentiation rules to find derivatives of functions. [Evaluar]
Lecturas : [Ste15], [LE14]	

Unidad 3: Applications of the Derivative (12 horas)	
Resultados esperados: 1,6,AG-C07,AG-C12	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Related rates. • Maximum and minimum values. • Mean Value Theorem. • Concavity and inflection points. • Optimization.	• Solve related rates problems. [Familiarizarse] • Find maximum and minimum values of a function. [Usar] • Apply the Mean Value Theorem. [Evaluar] • Determine the concavity and inflection points of a function. [Evaluar] • Solve optimization problems. [Evaluar]
Lecturas : [Ste15], [LE14]	

Unidad 4: Transcendental Functions (12 horas)	
Resultados esperados: 1,6,AG-C07	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Inverse trigonometric functions. • Hyperbolic functions. • Derivatives of inverse trigonometric and hyperbolic functions.	• Evaluate inverse trigonometric functions. [Familiarizarse] • Define and manipulate hyperbolic functions. [Usar] • Differentiate inverse trigonometric and hyperbolic functions. [Evaluar]
Lecturas : [Ste15], [LE14]	

Unidad 5: Applications in Computing (12 horas)	
Resultados esperados: 1,6,AG-C07,AG-C12	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Algorithm optimization. • Modeling dynamic systems. • Machine learning (e.g., gradient descent).	• Use derivatives to optimize algorithms. [Familiarizarse] • Model dynamic systems using differential equations. [Usar] • Apply differential calculus in machine learning algorithms. [Evaluar]
Lecturas : [Ste15]	

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

[LE14] Ron Larson and Bruce H. Edwards. *Calculus*. Cengage Learning, 2014.

[Ste15] James Stewart. *Calculus: Early Transcendentals*. Cengage Learning, 2015.