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

1. CURSO

MA103FCCS. Differential Calculus (Mandatory)

2. INFORMACIÓN GENERAL

2.1 Curso	:	MA103FCCS. Differential Calculus
2.2 Semestre	:	2^{nd} 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	:	MA102FCCS. Integral Calculus. (1^{st} Sem)

3. PROFESORES

Atención previa coordinación con el profesor

4. INTRODUCCIÓN AL CURSO

Integral calculus is essential in computer science for modeling and solving problems involving accumulation, change, and areas under curves. This course provides the foundations of integral calculus, including integration techniques, applications, and its relationship with differential calculus.

5. OBJETIVOS

- Understand the concept of definite and indefinite integrals.
- Apply various integration techniques to solve problems.
- Use integral calculus to model and solve problems in scientific and engineering contexts, including applications in computing.

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: The Indefinite Integral (6 horas)	
Resultados esperados: 1,6,AG-C07	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Antiderivatives and the indefinite integral. • Basic integration rules. • Integration by substitution.	• Calculate antiderivatives of basic functions. [Familiarizarse] • Apply the basic integration rules. [Usar] • Solve indefinite integrals using the substitution technique. [Evaluar]
Lecturas : [Ste15], [LE14]	

Unidad 2: The Definite Integral (6 horas)	
Resultados esperados: 1,6,AG-C07	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Riemann sums and the definite integral. • The Fundamental Theorem of Calculus. • Calculating areas.	• Approximate definite integrals using Riemann sums. [Familiarizarse] • Apply the Fundamental Theorem of Calculus to evaluate definite integrals. [Usar] • Calculate areas under curves using definite integrals. [Evaluar]
Lecturas : [Ste15], [LE14]	

Unidad 3: Techniques of Integration (12 horas)	
Resultados esperados: 1,6,AG-C07	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Integration by parts. • Integration of trigonometric functions. • Integration by partial fractions. • Improper integrals.	• Apply the technique of integration by parts. [Familiarizarse] • Integrate trigonometric functions using identities and substitution techniques. [Usar] • Solve integrals using the technique of partial fractions. [Evaluar] • Evaluate improper integrals. [Evaluar]
Lecturas : [Ste15], [LE14]	

Unidad 4: Applications of the Definite Integral (12 horas)	
Resultados esperados: 1,6,AG-C07,AG-C12	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Calculating areas between curves. • Calculating volumes of solids of revolution. • Arc length. • Work, average value, and centroids.	• Calculate the area between two curves using definite integrals. [Familiarizarse] • Calculate the volume of solids of revolution using different methods. [Usar] • Calculate the arc length of a curve. [Evaluar] • Apply integrals to calculate work, average value, and centroids. [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 analysis (e.g., calculating time complexity). • Signal and image processing (e.g., integral transforms). • Probability and statistics (e.g., probability density functions).	• Use integrals to analyze the time complexity of algorithms. [Familiarizarse] • Apply integral transforms in signal and image processing. [Usar] • Use integrals in the context of probability density functions. [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.