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

1. CURSO

ST251FCCS. Probability Calculation (Mandatory)

2. INFORMACIÓN GENERAL

2.1 Curso	:	ST251FCCS. Probability Calculation
2.2 Semestre	:	4^{th} 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

Probability calculus is fundamental in computer science for algorithm analysis, system modeling, and decision-making under uncertainty. This course introduces the basic concepts of probability, including random variables, probability distributions, and important theorems like Bayes' theorem.

5. OBJETIVOS

- Understand the fundamentals of probability calculus.
- Apply probability rules to solve problems.
- Analyze different probability distributions and their applications.

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: Introduction to Probability (6 horas)	
Resultados esperados: 1,6,AG-C07	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Sample spaces and events. • Definition of probability. • Conditional probability and independence. • Bayes' theorem.	• Define sample spaces and events. [Familiarizarse] • Calculate probabilities of events. [Usar] • Apply Bayes' theorem to calculate conditional probabilities. [Evaluar]
Lecturas : [**Ross2014**], [**Devore2016**]	

Unidad 2: Discrete Random Variables (8 horas)	
Resultados esperados: 1,6,AG-C07	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Discrete random variables. • Discrete probability distributions (Bernoulli, binomial, Poisson). • Expectation and variance.	• Define discrete random variables and their distributions. [Familiarizarse] • Calculate the expectation and variance of discrete random variables. [Usar] • Apply discrete distributions to model problems. [Evaluar]
Lecturas : [**Ross2014**], [**Devore2016**]	

Unidad 3: Continuous Random Variables (8 horas)	
Resultados esperados: 1,6,AG-C07	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Continuous random variables. • Continuous probability distributions (uniform, exponential, normal). • Expectation and variance.	• Define continuous random variables and their distributions. [Familiarizarse] • Calculate the expectation and variance of continuous random variables. [Usar] • Apply continuous distributions to model problems. [Evaluar]
Lecturas : [**Ross2014**], [**Devore2016**]	

Unidad 4: Joint Probability Distributions (8 horas)	
Resultados esperados: 1,6,AG-C07	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Joint distributions of random variables. • Covariance and correlation. • Independence of random variables.	• Define joint distributions of random variables. [Familiarizarse] • Calculate the covariance and correlation between random variables. [Usar] • Determine the independence of random variables. [Evaluar]
Lecturas : [**Ross2014**], [**Devore2016**]	

Unidad 5: Central Limit Theorem and Law of Large Numbers (6 horas)	
Resultados esperados: 1,6,AG-C07	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Central Limit Theorem. • Law of Large Numbers.	• State and apply the Central Limit Theorem. [Familiarizarse] • Explain the Law of Large Numbers. [Usar]
Lecturas : [**Ross2014**], [**Devore2016**]	

Unidad 6: Applications in Computing (12 horas)	
Resultados esperados: 1,6,AG-C07,AG-C12	
Temas	**Objetivos de Aprendizaje (*Learning Outcomes*)**
• Analysis of probabilistic algorithms. • Modeling stochastic systems. • Machine learning (e.g., probabilistic models).	• Use probability in algorithm analysis. [Familiarizarse] • Model systems using stochastic processes. [Usar] • Apply probability calculus in machine learning models. [Evaluar]
Lecturas : [**Ross2014**]	

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