

Bachelor of Science in Computer Science (B.Sc.)

- **ENG 101: English Composition I (3 Credits)**

The course develops the introductory level of the general Effective Communication competency through the criteria of Written Text Comprehension, Written Text Production, Oral Discourse Production, Oral Discourse Comprehension, Respectful Listening, and Interaction. Oral and written communication skills are developed, as well as active listening for effective communication.

- **ENG 102: English Composition II (3 Credits)**

This course develops the general competencies of Effective Communication and Digital Competency through the comprehension and production of written texts, oral discourses, respectful listening and interaction, and digital literacy.

- **MAT 123: Calculus for Engineers I (3 Credits)**

The Calculus for Engineers I course studies functions, polynomial and rational functions, exponential and logarithmic functions, trigonometric functions, and analytical trigonometry. Exercises and problems related to functions and analytical trigonometry.

- **MAT 134: Calculus for Engineers II (3 Credits)**

All standard integration methods are covered. It includes understanding integration methods, applications of calculus, elements of analytical geometry, improper integrals, and series, including Taylor series. Taylor series and Taylor polynomials are discussed. Parametric and polar curves are introduced, and calculus methods are applied to them.

- **STA 201: Probability and descriptive statistics (3 Credits)**

This course develops the ability to analyze data and interpret information using the methods and techniques of descriptive statistics and probability theory related to their profession.

- **STA 212: Inferential Statistics (3 Credits)**

The purpose of this course is to apply inferential statistics and forecasting methods and techniques to provide relevant and accurate information for decision-making. It provides the ability to investigate, design, and apply strategies for problem-solving based on the analysis and interpretation of data.

- **HUM 111: Introduction to Humanities (3 Credits)**

An introduction to the humanities through a review of some of the main developments in human culture. The objective is to analyze how societies express their ideas through art, literature, music, religion, and philosophy, and to consider some of the underlying assumptions about how societies are formed and function. The focus is on developing the conceptual tools to critically understand cultural phenomena.

- **MAT 121: Analytic Geometry (3 Credits)**

Vectors, lines in two dimensions, circles, conics, coordinate transformation, polar coordinates, parametric equations, and solid analytic geometry of vectors, lines, planes, cylinders, spherical, and cylindrical coordinates.

- **ANT 101: Introduction to anthropology and appreciation of diversity (3 Credits)**

The course focuses on understanding cultural diversity and lifestyle. It will allow students to develop their professional lives by valuing diversity, tolerance, and respect for the environment.
- **HIS 201: US History since 1877 (3 Credits)**

The course will examine the social, political, and cultural history of the United States from Reconstruction to the present. The objective of studying history is to learn about the past, but also to develop skills in analysis, critical thinking, evidence interpretation, and expository writing.
- **CUF 101: Leadership and teamwork (3 Credits)**

This course develops capabilities that enhance the skills of individuals or groups, in addition to inspiring others on the path to follow to achieve objectives.
- **PRO 103: Introduction to Computer Science (3 Credits)**

Introduces the engineering design process; working in engineering teams; getting to know the engineering profession; engineering models, communication skills, oral and written techniques.
- **MAT 103: Discrete Mathematics (3 Credits)**

The course studies the fundamentals of propositional logic and quantification logic. It includes: set theory, mathematical induction, fundamental principles of counting, graph theory, trees, and finite state machines.
- **PHY 204: Physics I with Laboratory (4 Credits)**

Fundamental laws of physics with a focus on mechanics. The topics to be covered in the course include kinematics and dynamics of linear and rotational motion, conservation laws (energy, momentum, and angular momentum), universal gravitation, and various applications of mechanics.
- **CUF 201: Innovation (3 Credits)**

The course develops the competencies of Personal Development and Leadership, and Critical Thinking and Problem Solving with an Entrepreneurial Mindset, which are the demands of the 21st-century professional.
- **CUF 202: Negotiation (3 Credits)**

This course aims to develop the ability to negotiate with different types of people to reach mutually beneficial agreements. The negotiation process, the human factor, the negotiator's tools, and different ways of negotiating are studied.
- **MAT 245: Calculus for Engineers III (3 Credits)**

Indefinite and definite integrals, applications of the definite integral, multiple integrals, ordinary and linear differential equations, Laplace transform, and linear partial differential equations.
- **ALG 203: Design and Analysis of Algorithms (3 Credits)**

Studies the functionality of an algorithm for its design and programming. It focuses on various algorithmic techniques: divide and conquer, dynamic programming, greedy algorithms, and the mathematical foundation necessary to analyze the properties of

these techniques and the algorithms based on them, such as recurrence relations and graph theory.

- **DAT 203: Data Structures and Algorithms (3 Credits)**

Studies data representation, static data structures: one-dimensional array (vector) and matrix, and dynamic data structures: pointers to memory addresses, lists, stacks, queues, trees, and binary trees. Graphs and hash tables, and relational data models. At the end of the course, the student will be able to identify the appropriate data structures to implement computer programs, according to the problem posed.

- **PRO 303: Programming (3 Credits)**

This course is designed for students with basic programming knowledge who seek to deepen their understanding of advanced techniques. Focused on the development of more complex programs, it covers advanced data structures (linked lists, trees, graphs), optimization techniques, recursion, file handling, and database management. The objective is for students to develop the skills to implement efficient solutions to more complex problems, applying good object-oriented programming practices and software design principles.

- **ENG 323: Professional English for Engineering (3 Credits)**

The purpose of this course is to develop the student's ability to communicate orally and in writing in English in their professional environment. The course covers: The importance of engineering, figures and shapes, materials and tools, types of energy, simple machines, numbers, quantities, and units of measurement.

- **EGC 303: Engineering Project Management (3 Credits)**

Lifecycle processes for selecting and managing large-scale projects and ensuring their successful execution. The content includes project phases, milestone definition, work breakdown structure, group decision-making and teamwork, organizational structure, human resources management, technological and economic feasibility, configuration management, budget control, and resource allocation and scheduling. Use of modern tools to plan and control project performance.

- **ADM 225: Business Management (3 Credits)**

Identify and use administrative principles, costs, marketing techniques, and various tools to optimize the resources that allow for business management. This course will enable the design of business plans in different economic sectors, applying strategic tools appropriately to optimize resources.

- **CSC 303: Computer Organization and Assembly Language Programming (3 Credits)**

The course studies the fundamentals of computer operation, the instruction set architecture, assembly language programming, computer organization, pipelining, integer arithmetic, strings and matrices, memory hierarchy, storage, and I/O.

- **SWE 303: Software Engineering (3 Credits)**

Software life cycle models, project management, software development methods, software tools for team-based software engineering, and quality assurance. Life cycle phases: Requirements capture, design, etc.

- **CSC 313: Digital Design (3 Credits)**

Studies the fundamental principles and applications of digital systems. Introduction to representation systems and codes, Boolean algebra, logic gates, combinational circuits, sequential circuits, registers and counters, MSI circuits, arithmetic circuits, and memory devices.

- **CSC 324: Embedded Microprocessor Systems (3 Credits)**

The course studies programming and analysis concepts at the level of integrated microprocessor systems. It includes: a review of the instruction set and assembly language programming, instruction execution cycle, and timing. Introduction to embedded microprocessor systems and their development environment, memory devices, SRAM, DRAM, flash memory and SDRAM controller, interrupts and DMA, timers and counters, serial communication, parallel I/O interface and signal handshaking protocol, keyboards, LCD, VGA interfaces, transducers and sensors, touch panel, converters, buses, access arbitration, schedules, and protocols.

- **DSC 303: Database Management (3 Credits)**

Focuses on the development and management of commercial databases and data warehousing systems. Topics include capturing business requirements through data modeling, SQL, data security, analytical and operational data warehouses, and data integrity.

- **DSC 323: Big Data Analytics in Business (3 Credits)**

Big Data Analytics in Business focuses on technological tools for business analysis. The content includes machine learning, data mining, and text applications for big data, Hadoop, cloud-based solutions, big data programming fundamentals, social media and big data, NoSQL, GIS, and business case studies.

- **PRO 324: Programming Languages (3 Credits)**

Characteristics of different programming paradigms. To develop a basic understanding of an applicative (Scheme) and declarative programming language. To develop an understanding of procedural and object-oriented programming languages (C/C++).

- **PRO 403: Object-Oriented Programming (3 Credits)**

Problem-solving using an object-oriented programming language. Introduction to data structures, software development-related issues, data structure organization concepts, language constructs, algorithmic problems, and social and ethical issues in computing.

- **AIL 403: Artificial Intelligence (3 Credits)**

The course focuses on the study of modern approaches to artificial intelligence. It includes: problem-solving, which addresses general problem-solving; techniques behind DeepBlue and AlphaGo; modeling and reasoning, which addresses knowledge representation and reasoning based on it; and probabilistic modeling and reasoning, which addresses uncertain modeling and reasoning.

- **DSC 404: Machine Learning I (3 Credits)**

The course provides a comprehensive overview of the main machine learning techniques. The fundamentals of advanced machine learning methods, as well as their theoretical context, include topics from learning theory (bias-variance trade-offs; VC theory). Supervised learning of parametric and non-parametric methods, Bayesian models, support vector machines, neural networks, unsupervised learning (dimensionality reduction, kernel tricks, clustering), and reinforcement learning.

- **FIN 324: Economic Engineering (3 Credits)**

The course studies the time value of money. The content includes equivalence factors, nominal interest rate, credit operations, and inflation. Basic accounting concepts. Weighted cost of capital. Depreciation. Project evaluation and sensitivity analysis. The course requires the presentation of a feasibility report for an investment project.

- **PHY 214: Physics II with Laboratory (4 Credits)**

The course also covers the topic of electricity and magnetism from the electrostatics of Coulomb's law to electrodynamics, as contained in Ampere's and Faraday's laws.

- **CSC 445: Operating Systems (3 Credits)**

The student will be able to implement functional operating system configurations considering aspects of efficiency, effectiveness, and licensing. The Operating Systems course covers important topics of the operating system: operating system structure, processes, threads, scheduling, timing, main memory, virtual memory, file systems, mass storage, and I/O systems.

- **CSC 455: Computer Networks (3 Credits)**

The course studies the basic concepts of networks, LAN, WAN, and the Internet, and the network as a platform. Topics such as configuring a network operating system, network protocols and communications, the OSI model, the TCP/IP model, physical layer protocols, data link layer protocols, medium access control, network layer protocols, routing, routers, router configuration, network security, and basic network performance are covered.

- **MAT 305: Matrix and Lineal Algebra (4 Credits)**

Matrices, determinants, vector spaces in R_n , linear independence, basis, solutions of systems, rank of linear transformations, eigenvectors, Jordan canonical form, matrix functions, quadratic forms.

- **SEC 413: Information Assurance and Security (3 Credits)**

This course studies the problems of information assurance (IA) and its solutions, particularly information security in computers and networks. It will focus on IA technology, as well as its political, management, legal, and ethical aspects.

- **CSC 494: Computer Science Capstone Project (3 Credits)**

This course focuses on applying the principles, techniques, methodologies, and tools of software engineering to identify problems and develop solutions for complex technological projects in organizations.