Bachelor of Science in Industrial Engineering (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.

- IEN 101: Introduction to Industrial Engineering (3 Credits)

  The course studies the topics of the major, sharing experiences with industrial engineers working in different types of organizations, conducting virtual technical visits to companies, and using learning by doing as a learning strategy. The contents include history and evolution, production systems for goods and services, tool optimization, management systems, and application software.

- CAD 113: Graphics for Engineers (3 Credits)

  This course will focus on the understanding of 2D and 3D plans, the basic tools to start any construction and manufacturing process.

- 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.

- CHE 101: General Chemistry (3 Credits)

  A detailed study of inorganic chemistry is presented with an emphasis on atomic and molecular structure, chemical reactions and bonding, equilibrium, and the laws and principles of chemistry in terms of modern theory.

- CHE 102: General Chemistry Laboratory (1 Credit)

  General Chemistry laboratory practice. Introduction to laboratory techniques; study of the properties of elements and compounds; synthesis and analysis of natural and commercial materials.

- PRD 213: Production fundamentals (3 Credits)

  Fundamentals of production. It addresses the background and importance of the production function, its interrelation with other functional areas, the relationship with the external environment, and the criteria for the classification of production systems.

- 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.

- 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: Engineering Project Management (3 Credits)

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

- 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.

- IEN 311: Operations Research I (3 Credits)

  This course introduces students to the fundamental problems and the theory and essential mathematical modeling techniques necessary to make more effective decisions and build more productive systems. In addition to analyzing general techniques, the course will focus on various illustrative case studies.

- IEN 314: Planning of facilities and work design (3 Credits)

  The course studies the design of an industrial location. Market study, product feasibility, required designs for the product and processes. Standards, machine characteristics, social and environmental context, among others. Techniques for the initial sketch of an industrial location using SketchUp.

- IEN 316: Digital Manufacturing (3 Credits)

  The course aims to understand and differentiate the techniques used in digital manufacturing from traditional manufacturing, in addition to reflecting on and discussing the current and future challenges and opportunities related to the use of digital manufacturing in industrial production. At the end of the course, the student will be able to evaluate digital manufacturing processes.

- IEN 321: Operations Research II (3 Credits)

  The course explores mathematical modeling and its application in strategic decision-making. This course delves into the world of abstracting reality to develop fundamental skills in problem-solving and resource optimization. In the current era, where data-driven decision-making is essential, operations research becomes a critical tool for addressing a wide range of situations in the business world and beyond. The relevance of this course lies in its ability to provide decision-makers with unique and enriching perspectives that can drive success in any environment.

- IEN 326: Decision support systems (3 Credits)

  The course aims to offer an introduction and an overview of Decision Support Systems (DSS), which encompass various concepts and theories about decisions, biases, data, systems, and decision-making governance. Decision-making is a central activity for individuals, teams, and organizations.

- IEN 346: Quality Engineering (3 Credits)

  This course teaches Quality Engineering concepts and tools. You will learn essential information about quality systems, auditing, product and process control and design, quality methods and tools, applied statistics, Statistical Process Control (SPC), and Design of Experiments.

- PRD 304: Production and inventory control (3 Credits)

  The course introduces basic concepts of production and inventory control, techniques to improve production management in a company without neglecting inventories, such as: productivity measurement, short and medium-term demand forecasting, aggregate production planning, detailed production scheduling, and inventory planning.

- IEN 426: Systems Engineering (3 Credits)

The course aims to cover the fundamental principles of systems engineering and its applications for the development of complex industrial engineering systems, based on three thematic axes: 1) systems engineering as a way of thinking, 2) systems engineering as a set of technical practices, and 3) systems engineering as a methodological process. At the end of the course, the student will be able to define a problem from a systems engineering perspective, conveying the fundamental value of requirements analysis activities and understanding why, when, and how this task can and should be used, as well as being able to design, plan, implement, and control complex social systems.

- 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.

- CSC 435: Systems Simulation (3 Credits)

  The course studies techniques for the development of discrete simulation models, capable of imitating the behavior of a real system, based on the interaction of probabilistic events and that allow analyzing the behavior of the System from the changes of state.

- MAT 323: Differential Equations (3 Credits)

  The course is an introduction to the basic concepts, theory, methods, and applications of ordinary differential equations. Standard techniques for solving ordinary differential equations are emphasized, including, among others, the realization of series solutions and the use of the Laplace transform.

- IEN 446: Service Engineering (3 Credits)

  The course seeks to apply systemic thinking to the analysis of service systems in order to plan, analyze, measure, and improve them. The course starts from a general, historical, and holistic perspective of service science and engineering, covering different types of services. It will range from simple to complex services, and will later study current trends in service engineering and industrial engineering related to services. At the end of the course, the student will be able to plan, analyze, measure, and improve complex systems that offer services to different types of users using tools from industrial engineering and service science.

- 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.

- IEN 494: Industrial Engineering Capstone Project (3 Credits)

This course studies the consulting cycle to evaluate an organization's processes, develop solutions, implement the chosen solution, and follow up on it. The course requires the student to present a real industrial engineering project.

- IEN 414: Ergonomics and Human Factors engineering (3 Credits)

  The course studies how to use ergonomic evaluation tools to improve job design or redesign, prevent ergonomic risks in work processes, and increase productivity through cost reduction. The perception of ergonomics as a factor of business competitiveness in a job is evaluated.

- IEN 424: Supply chain system (3 Credits)

  The course studies the relationship with suppliers for the effective management of transportation, through inventory control and supply and demand planning. All with an emphasis on good management practices and the improvement of operational capacity.

- IEN 455: Industrial safety engineering (3 Credits)

  The course studies the effects of efficiency and effectiveness on profitability. It includes the use of safety and prevention techniques, risk management, and the management of chemical, physical, and biological contaminants. Occupational safety and health management are evaluated.

- IEN 315: Manufacturing Process and Material Engineering I (3 Credits)

  Theories and applications of material forming and removal processes in manufacturing, including product properties, process capabilities, processing equipment design, and economics. A systemic approach to all aspects of manufacturing process engineering.

- IEN 425: Manufacturing Process and Material Engineering II (3 Credits)

  Advanced study of manufacturing processes with an emphasis on modern technologies, process integration, and optimization. Topics include advanced forming and material removal processes, additive manufacturing, automation and control, quality assurance, and sustainable practices in production. The course highlights system-level design considerations, cost efficiency, and innovation in manufacturing, preparing students to analyze, design, and improve complex industrial processes.

- IEN 325: Lean production systems (3 Credits)

  The course studies the elimination of waste, that is, those tasks that involve overproduction, long waiting times, or product defects. The course requires the student to develop and present a Lean production system.

- IEN 445: Lean Six Sigma (3 Credits)

  The course studies methodologies such as Lean, Lean thinking, and its principles and tools. The content includes the DMAIC methodology applied to Lean Six Sigma projects. This methodology is divided into four modules, in which the phases of definition, measurement, analysis/improvement, and control are developed.

- IEN 345: Quality Management (3 Credits)

  The course studies the identification and application of the key processes of an organization, with a quality approach. It develops quality and productivity, current quality management models, basic quality management tools, and models of excellence in

management. The course requires the student to present a comparative analysis report of quality models.