COMPUTER ENGINEERING PROGRAMME

FIRST YEAR

Course: Differential and Integral Calculus I
Class hours: 160
Syllabus: Intervals, inequalities and absolute values. Single variable functions: definition, elementary functions and invertibility. Limit and continuity. Fundamental limits. Derivatives: definition; geometric and kinematic interpretation. Derivative as a rate of change. Differentiation rules, and implicit differentiation. Applications of derivatives. Theorems involving differentiable functions. Analysis of function variation. Optimization problems. L'Hôspital´s rule. Taylor series and approximation error. Antiderivatives. Riemann integrals. Area between curves. Fundamental Theorem of Calculus. Integration techniques. Volumes of solids of revolution. Improper integrals.

Course: Vectors, Curves and Surfaces
Class hours: 80
Syllabus: Vectors in bi and three-dimensional geometric space: definition, addition, scalar multiplication and properties. Dot product, vector projection, cross and triple product. Lines and planes in three-dimensional spaces: equations, relative positions and applications to geometric problems. Definition of curves in two and three-dimensional spaces. Cartesian equations and parameterization of curves in two-dimensional spaces, with an emphasis on lines, circles and conics. Quadric Surfaces. Parameterization of curves in three-dimensional spaces such as intersection of cylindrical, spherical, quadratic and planar surfaces. Vector function ideas. Functions of two real variables: definition, graphical representation and contour lines. Tangent planes and normal lines to surfaces. Partial derivatives: definition and geometric interpretation.

Course: Physics I
Class hours: 160
Syllabus: Theory: physical quantities and their measures. Motion in two or three dimensions. Applied forces. Newton's laws. Equilibrium of particle. Dynamics of particle. Work and kinetic energy. Potencial energy and energy conservation. Power. Momentum, impulse and collisions. Center of mass. Equilibrium of rigid bodies. Laboratory: Physical quantities and their Measures. Measuring instruments. Experiments involving the topics of the subject matter.

Course: Drawing
Class hours: 80 horas
Syllabus: Basic geometric constructions; Projection systems, systems of representation. Reading and interpreting drawings. Technical standards. Sketch orthographic views. Parallel isometric perspective. Auxiliary views and sections, 3D visualization, solid modeling and effects of realism in 3D computer visualization.

Course: Algorithms and Programming
Class hours: 80 horas
Syllabus: Logic. Logic for Engineers. Computer Programming. Algorithm. Flowchart. Data: variables and constants. Numerical, logical, strings and user-defined types of data. Programming structures: sequential, conditional and repetitive. Subroutines. Programming language as a tool for logic development.

Course: General Chemistry
Class hours: 160 horas
Syllabus: Scientific Method; Magnetic Properties; Electronic Distribution; Ionic Bond; Metallic Bond; Molecular Orbitals; Band Theory; Semiconductors; Insulators; Physical-Chemical Properties; Covalent Bond; Lewis Theory; Molecular Geometry (VSEPR); Polarity; Intermolecular Forces; Ideal Gas Model; Real Gas Model (van der Waals); Compressibility Factor; Thermodynamics; Enthalpy, Entropy; Free Energy; Spontaneity; The Study of Chemical Reactions; Equilibria; Chemical Kinetics; Redox Reactions; Electrolysis; Electrochemical Cells; Corrosion.

Course: Engineering Fundamentals
Class hours: 160 horas
Syllabus: Fundamental dimensions. Significant figures. Dimensional analysis. Homogeneity of equations. Systems of units and conversions. Physical measurements and treatment of experimental data. Electronic spreadsheets. Tables and graphs. Curve fittings, linear and non-linear models. Linearization. Trusses, machines and gantries. Optimization. Making prototypes. Oral, written and graphic communication.

Course: Projects and Special Activities I
Class hours: 160
Syllabus: Development of competencies, skills and attitudes relevant to the formation of future Engineer, through electives and student-centered practical activities. Training of interpretation and analysis skills. Problem solving methodologies. Development of engineering projects. Technical visits, lectures, workshops, seminars and technological competitions. Participation In undergraduate monitoring programs, scientific projects and technological research, as well as participation in social responsibility projects.

SECOND YEAR

Course: Differential and Integral Calculus II
Class hours: 80
Syllabus: Partial derivatives: Tangent plane, normal straight. Differentiability. Chain rule and implicit differentiation. Directional derivative and gradient vector. Maximum and minimum values and Lagrange multipliers. Double integrals: definition, properties, polar coordinates and applications. Triple integrals: definition, cylindrical and spherical coordinates and applications. Variable changes in multiple integrals. Vector calculation: vector fields, conservative fields, line integrals, Green's theorem, rotational and divergent operators, surface integrals, Stokes¿s theorem and Gauss¿s theorem.

Course: Computational Mathematics
Class hours: 80
Syllabus: Computer arithmetic / Errors: Type and Propagation / Taylor Series; Matrices and Matrix Operations / Introduction to Linear Systems / Direct Method (Gaussian Elimination) / Iterative methods (Jacobi and Gauss-Seidel) / Stopping and Convergence Criteria / Notions on Conditioning; Algebraic and Transcendent equations / Bisection Method / Newton Method; Approximation of functions / Interpolation / Linear and Polynomial Fit / Transformations / Determination Coefficient; Numerical Integration (Trapezoidal Rule, First and Second Simpson Rules); Solution of Ordinary Differential Equations / Numerical Solution (Euler and Runge-Kutta Methods) / Notions of Stability of the Solution / Errors / Solution of Higher Order Ordinary Differential Equations as a System of First Order Ordinary Differential Equations; Notions of Partial Differential Equations.

Course: Mechanics
Class hours: 80
Syllabus: Frenet frame (Moving Trihedron). Rigid Bodies Kinematics: velocity and acceleration fields, moving reference frames. Rigid Bodies Dynamics: mass distribution, center of mass theorem, angular momentum and angular momentum theorem, kinetic energy and kinetic energy theorem.

Course: Physics II
Class hours: 160
Syllabus: THEORY: Electromagnetic interaction. Electric Field. Gauss´s Law. Electric potential. Eletrostactic energy. Electric current. Magnetic induction. Biot-Savart´s Law. Ampere´s Law. Faraday´s Law. Periodic and oscillatory motions. Simple harmonic motion. Physical concepts of forced oscillations, resonance and damped oscillations. Mechanical waves. Energy propagation. Standing waves. Maxwell´s equations. LABORATORY: D.C. generator. Eletric Field.Filiform conductors. Capacitors. Oscillatory motion. Biot-Savart´s Law. Earth Magnetic Field. Faraday´s Law. Photoelectric effect. Diffraction.

Course: Data Structures and Programming Techniques
Class hours: 160
Syllabus: INTRODUCTION TO C LANGUAGE - compilers, programming environments, primitive data types, control-flow commands, functions and program structure, fundamental data structures: vectors, pointers, strings and files. PROGRAM DESIGN - program refinement, data and functional abstraction, modularity and testing. ABSTRACT DATA TYPES AND THEIR ALGORITHMS - concepts, implementations and applications of sequences, stacks, queues, graphs, digraphs, linked lists and trees. DOCUMENTATION - textual and graphicalrepresentations of the structural, functional and state aspects of C programs. INTRODUCTION TO RELATIONAL DATABASES - entity-relationship diagrams, manipulation of databases with SQL (Structured Query Language), programming with C and SQL.

Course: Fundamentals of Digital Circuits
Class hours: 80
Syllabus: Numbering systems; Two's complement negative numbers; arithmetic. Truth Table; Binary Codes; Boolean algebra; Karnaugh maps and logic function simplification. Logic gates (symbology, voltage levels) and flip-flops. Latches. Combinatorial logic circuits. Registers and shift registers. Counters.

Course: Fundamentals of Analog Circuits
Class hours: 80
Syllabus: Voltage and electrical current; electrical energy and power; Ohm Laws; linear and nonlinear elements; resistors. Voltage and current sources: independent and dependent. Kirchhoff Laws; Node Method; Loop Method. Analysis principles: Superposition, Proportionality and others; Thévenin and Norton Theorems. Capacitor and inductor; reactancies; analysis for RLC circuits in Direct Current DC).

Course: Strength of Materials
Class hours: 80
Syllabus: Statics applied to Strength of Materials. Geometrical properties of an area. Internal forces and moments Diagrams. Axial load: tensile and compression. Pure shear stress: riveted and welded joints. Stresses in symmetrical bending. Bending deformation of straight beams. Torsion of bars with circular cross section. Trusses. Cables.

Course: Transport Phenomena
Class hours: 80
Syllabus: Introduction to fluid mechanics. Concept of fluid particle. Properties of fluids. Statics of fluids. Basic concepts about flow analysis: velocity, flow, mass flow. General equations of fluid mechanics: Bernoulli equation. Equation of continuity. Equation of energy. Flow in pipes, external flow. Differential analysis of heat transfer: conduction, convection, radiation and introduction to heat exchangers.

Course: Projects and Special Activities II
Class hours: 160
Syllabus: Development of competencies, skills and attitudes relevant to the formation of future Engineer, through electives and student-centered practical activities. Training of interpretation and analysis skills. Problem solving methodologies. Development of projects. Technical visits, lectures, workshops, seminars and technological competitions. Participation in undergraduate monitoring programs, scientific projects and technological research, as well as participation in social responsibility projects.

THIRD YEAR

Course: Operating System
Class hours: 80
Syllabus: Concepts, history and structure of operating systems; process management; memory management; file systems; management of E/S; deadlocks; security and user management; interaction between the operating systems; virtual machines; Linux.

Course: Computer Organization and Architecture
Class hours: 80
Syllabus: Internal structure of a processor; how processors fetch and execute instructions, pipeline, memory structures, machine language programming, computer structure (processor, memories and peripherals, RISC and CISC processors, scalar and vector processors. Parallel architectures, SIMD and MIMD computers, shared memory and distributed, unconventional architectures, concurrent processing, parallel processing, interaction between architectures and operating systems, communication between processors, Performance evaluation of computer architectures.

Course: Programming Languages I
Class hours: 160
Syllabus: Fundamental concepts of software engineering and the object orientation paradigm. Development Environments (jdk / Eclipse / NetBeans). Structure of programs with Java. Primitive data types and fundamental classes in Java. Expressions and operators in Java. Programming structures in Java. Variables indexed in Java. Types and Wrappers in Java. Object-oriented programming Java: classes, methods and attributes, encapsulation and concealment of information, constructors, initialization and destruction of objects, use of inheritance / polymorphism, interfaces, abstract classes. Handling Java exceptions. Creating graphical applications with Java FX. Programming with Java (JDBC) databases. Programming with network. Concurrent programming. Collections in Java and file manipulation. Introduction to web development, HTML5, CSS3, JavaScript, Bootstrap, JQuery and other framworks. Client-server architecture for a web application. Introduction to back-end.

Course: Formal Languages, Automata and Compilers
Class hours: 160
Syllabus: ELEMENTS OF DISCRETE MATHEMATICS: Sets and Relations, Functions, Equivalence Relations, Mathematical Induction, Propositional and Predicate Logic, Applications of First-Order Logic, Review of Graphs, Digraphs and Trees. ELEMENTS OF ALGORITHM ANALYSIS: Applications of Discrete Mathematics to Algorithm Analysis. INTRODUCTION TO THEORETICAL COMPUTING MODELS: Finite Automata, Turing Machines, Computability, Decision Problems, Halt Problem, Computational Complexity, Intractable Problems and NP Completeness. GRAMMARS AND LANGUAGES, Relationship among languages, automata and Turing Machines, Grammar Classification: Chomsky Hierarchy, Regular Grammars, Context Free Grammars. ELEMENTS OF COMPILER THEORY: Code scanning, Parsing, EBNF Metalanguage, Semantic Analysis, Attribute Grammars, Symbol Tables, Types and Type Checking, Execution Environments, Memory Organization, Parameter passing mechanisms, Code generation techniques, Code optimization.

Course: Statistics
Class hours: 80
Syllabus: Descriptive Statistics: tabular and graphical presentations, location, variability and distribution shape measures; Probability: basic concepts, unidimensional random variables and common discrete (binomial and Poisson models) and continuous distributions (exponential, Weibull and Gaussian distribution); Estimation: sampling and estimation concepts, sampling distribution, confidence interval (for a population mean, proportion and variance); Hypothesis Tests: basic concepts, testing a single population mean, proportion and variance; testing multiple population means (ANOVA).

Course: Electric Circuits
Class hours: 40
Syllabus: 1) RLC circuits in steady-state: initial and final values; 2) Complex numbers review and notations; 3) Sinusoidal steady-state circuits; 4) Impedance and admitance in Sinusoidal steady-state; 5) Phasor Diagram; 6) Sinusoidal steady-state analysis; 7) Power in Sinusoidal steady-state (apparent power, average power, reactive power); 8) Power factor correction.

Course: Electronic Systems
Class hours: 40
Syllabus: Diodes and their applications: rectifiers and limiters. Bipolar junction transistors (BJT) and applications as a switch. MOSFET and its application as a switch. Operational Amplifiers:

main concepts and topologies. Comparators. Analogic/ Digital conversion (A/D): characteristics (sampling and holding, control, resolution, sampling frequency, dynamic range, conversion time, single ended/differential), numeric codification, types of converters and applications.

Course: Systems and Signals
Class hours: 80
Syllabus: Laplace Transform: meaning of s plan. Dynamical systems and their models in s. Fourier Series: analogy between vectors and signals; trigonometric and exponential forms of Fourier series; Fourier transform; properties of the Fourier transform; analysis in permanent and harmonic regime; convolution and energy. Sampling theorem. Laboratory: acquire and analysis of signals; principles of pattern recognition. Modeling of electronic systems. Applications and design.

Course: Control Systems
Class hours: 80
Syllabus: Analysis of the stationary error in permanent regime. Project of PID and similar controllers using root locus. Project using Nyquist and Bode method. Z-Transform and sampling theorem. Analysis of stability of discrete time systems. Project of controllers in discrete time domain. Laboratory: utilization of the Matlab and Simulink, simulation and control of nonlinear and linear systems, systems parameters estimation, practical implementation of control systems.

Course: Advanced Data Structure Topics
Class hours: 80
Syllabus: Asymptotic Analysis of Algorithms. Knuth model. Analysis of Iterative Algorithms. Analysis of Recursive Algorithms. Recurrences. Analysis of Ordinance Algorithms. Problem Complexity Analysis: Problem Classes P, NP, NP-Complete and NP Hard. Implementation of Linear and Hierarchical Data Structures; Binary Tree; Binary Research Trees; Balancing Binary Research Trees; AVL trees; Black-and-Red Trees; Heaps and Priority Queues; Hash Tables implementation; B-Tree Trees; Theory of graphs; Basic Concepts: Graphs and Subgraphs; Isomorphism; Adjacency and Incidence Matrices; Paths and Cycles. Characterization of Trees; Cutting Edge; Cortices of Vertices; Connectivity: Connectivity of Vertices and Edges; Eulerian and Hamiltonian Cycles; Pairing; Coloring of Vertices and Edges; Planarity; Technical Division and Conquest. Dynamic Programming. Greedy Algorithms.

Course: Projects and Special Activities III
Class hours: 160
Syllabus: Development of competencies, skills and attitudes relevant to the formation of future Engineer, through electives and student-centered practical activities. Training of interpretation and analysis skills. Problem solving methodologies. Development of projects. Technical visits, lectures, workshops, seminars and technological competitions. Participation In undergraduate monitoring programs, scientific projects and technological research, as well as participation in social responsibility projects.

FOURTH YEAR

Course: Software Engineering
Class hours: 160
Syllabus: Objectives, concepts and evolution of Software Engineering. Software process models. Agile development. Requirements Engineering. Requirements modeling. Analysis and Object-Oriented Design. Object Oriented Modeling. UML. Software architecture. Components project. User Interfaces project. Software Quality concepts. Technical Review. Software Testing strategies. Software Configuration Management. Software Project Management. Software Metrics. Software Project estimates. Project schedule. Software Process Improving.

Course: Programming Languages II
Class hours: 160
Syllabus: HTML5 and CSS3: introduction to HTML5 and CSS3, layout, selectors and posting. Forms, transitions and animations, flexbox. CSS Bootstrap library. Javascript: variables and data types, arithmetic operators, functions. jQuery: concepts, content localization, CSS manipulation.

Ionic: first design, structure, themes and CSS3. Introduction to Angular 4, navigation between screens, side menu. Promises, persistence of data, consuming REST services. Docker: Creating the first virtual environment. PHP: introduction to PHP7, client-server architecture. Variables, data types, scope, conditional structures, loops. Arrays, JSON, session control. OO programming. Database, MySQL access, PDO, Data Access Object. Composer, emails with PHPMailer, virtual directories, security. Amazon Web Services, Docker and deploy EC2. Human Interaction Computer: Prototypes and Usability. Details and Microtexts. Standards and Test Libraries with Users. Usability and page performance errors. The ten heuristics of Nielsen. The C.R.A.P. and Mayhew Usability Engineering. Emotional and Social Interaction. Prioritizing Features and Checklist. UI.

Course: Computer Network
Class hours: 160
Syllabus: Introduction to computer networks. Protocol architecture: OSI and TCP/IP model. Network technologies. Interconnection of networks. Fundamentals of Network Security. Network projects

Course: Database
Class hours: 80
Syllabus: Concepts and Architecture of Database Management Systems. Internal architecture of the DBMS. DBMS models. Relational Data Model. Relational algebra. Relational Database Manager System and SQL. Conceptual Database Modeling. Entity-Relationship Model. Introduction to SQL Programming Techniques. Database Project Standardization. File Structures. Indexing Query Processing, Optimization and Database Tuning. Transaction Processing. Competition Control Techniques. Database Security. Data Mining Concepts. Data Warehousing and OLAP Overview. Introduction to BIG DATA. NoSQL Databases.

Course: System Architecture
Class hours: 80
Syllabus: Computational systems architecture, systems architect functions, systems division into layers, microservices, libraries and APIs, distributed systems, multiplatform systems, distributed databases, webservices and the like.

Course: Microcontrollers and Embedded Systems
Class hours: 160
Syllabus: Microprocessor Architecture (Overview): Harvard and Von Neumann; RISC and CISC; bank of registers; bus; memory; peripherals; interruptions; instructions. C language for embedded: code structure; optimizations; pointers; compilation theory. ARM: internal architecture, toolchain; Development of projects using microcontrollers; Function of the modules of a microcontroller (ADC, Timer, PWM etc). Embedded projects and basic communication with dashboards via Http protocol. Sensors and actuators; how to monitor and control the outside world through na embedded system.

Course: Entrepreneurship and Management
Class hours: 80
Syllabus: Brief history of the evolution of the Business Administration in the modern World.Systemic vision of a company, through the General Theory of Organizations Conceptualization and practical application of: Strategic Planning, Marketing Planning, Operations Planning and Financial Planning, through the design of a Business Plan of a new company, thus encouraging the entrepreneurial spirit of the students.

Course: Projects and Special Activities IV
Class hours: 160
Syllabus: Development of competencies, skills and attitudes relevant to the formation of future Engineer, through electives and student-centered practical activities. Training of interpretation and analysis skills. Problem solving methodologies. Development of projects. Technical visits, lectures, workshops, seminars and technological competitions. Participation In undergraduate monitoring programs, scientific projects and technological research, as well as participation in social responsibility projects.

FIFITH YEAR

Course: Artificial Intelligence
Class hours: 80
Syllabus: Introduction. Concepts, evolution and history of artificial intelligence. Classic models of artificial intelligence: Fuzzy logic, artificial neural networks. Applications of fuzzy. Multilayer Perceptron applied in pattern recognition. Concepts of deep learning. Market solutions: scikit-learn e Google TensorFlow). Development of applications and integration with cloud solutions.

Course: Data Science
Class hours: 160
Syllabus: The Data Science discipline will be responsible for interconnecting all the major areas that integrate the theme, such as data analysis, visualization, data engineering, machine learning. Data collection, cleaning and analysis. Project development with data visualization. Introduction to the PowerBi tool. Analysis and extraction of information using the PowerBi tool. Introduction to Descriptive Analysis. Integration of Artificial Intelligence with the Data Science area. The importance of the correct choice: Normalization, Selection of attributes and metrics. Data analysis in a big data scenario. Big Data concepts and definition. Main features of Big Data. Introduction to information management and storage. Features of a Big Data platform. Technologies associated with the Big Data Platform. Structured Data and Unstructured Data. Cloud Service Models. Parallelization of processing (Map Reduce) Hadoop and Hive. Mining and information extraction with parallelism using Spark;

Course: Information Security
Class hours: 80
Syllabus: Definitions in the Information Security Area, Classical Cryptography, Private Key Algorithms, Public Key Algorithms, Hash Functions, Digital Signatures, Digital Certificates, PGP, Security in the TCP/IP Model, Introduction to Pentest, Security Analysis, Ethical Principles, Laws and Regulations, Responsibilities required for an Information Security Professional.

Course: IT Infrastructure and Cloud Computing
Class hours: 80
Syllabus: Cloud overview. Economy and Costs. Global Infrastructure. Computing, storage and database. Cloud security. Creating Network Environments. Cloud architecture. Scalability and Load Balancing. Microservices and Serverless Architectures. Cloud application development.

Course: Undergraduate Thesis
Class hours: 160
Syllabus: Introduction: Conceptualization of project. Scientific research and applied research. Administration and management of projects. Project requirements definitions. Systemic view of the project. Planning: Formation of the team-work. Structure, activities, resources and project budget. Management: Decision. Negotiation processes. Monitoring techniques (chronograms). Technical Report and Monograph: concept, characteristics, planning and preparation. Formal presentation: Public presentation skills. Attitudes and behaviors. Use of audiovisual resources. Public exposition at Eureka.

Course: Economics
Class hours: 80
Syllabus: Concepts and economic relations: definition of economics. Object of the economy and basic economic problems. Theory and economic analysis: a new microeconomics. Notions of macroeconomics: concept, measures of economic activity and economic policy instruments. International Economics: Balance of Payments and current economic analysis. Brazilian Economy and Contemporary World.

Course: Business Law
Class hours: 40
Syllabus: Fundamentals of Law. Civil Law. Business Law. Trademarks and patent. Labor Law. Tax Law. Environmental Law. Consumer Law. System CONFEA/CREA.

Course: Hygiene and Work Safety
Class hours: 40
Syllabus: Prevention; Accidents at work; Diseases of work; Notions of occupational hygiene; Specific themes; FOODS: biological agents: assessment and control measures; biosafety; security in cold rooms; AUTOMATION AND CONTROL: ionizing and non-ionizing radiation; dangerousness; ELECTRICAL: low, medium and high voltage, electrical and fire safety. MECHANICS: occupational vibration: evaluation and measures control; safety in machinery and equipment; safety in boilers and pressure vessels; safety in welding; PRODUCTION: transportation safety and handling; warehousing and material handling; safety in layout; risk management; accident investigation. CHEMISTRY: chemical agents: assessment and control measures; safety in laboratories and transportation of hazardous materials; safety signage and labeling; Hazard and Operability Study - HAZOP.

Course: Supervised Internship
Class Hours: 160

ELECTIVE COURSES

Course: Hybrid Application Development
Class Hours: 40
Syllabus: Understand the difference between native and hybrid applications. Manage the difference between hybrid applications that generate native code and those that run as WebApps. Process of installing development tools. Process for creating an application using Boiler Code Templates. Input and output of data with the user. Hardware resource access (camera and geolocation). Applications with multiple screens. Loading of ListViews. Positioning and conventions for developing user interfaces. How to receive and handle notifications. Build the application for many operating systems (iOS and Android).

Course: Advanced Topics in Back-End
Class Hours: 40
Syllabus: Advanced development concepts focused on server-side (back-end) systems: Web services using GraphQL; Authentication system; OAuth 2.0; Json Web Token; Back-end integration with external services; Alternative languages for backend (JS and Python).

Course: Functional Programming
Class Hours: 40
Syllabus: Introduction to the Functional Paradigm. Purely functional languages. Multiparadigm approach. Functional Paradigm compared to other Programming Paradigms. Notions of Calculation Lambda. Data Oriented Programming. Construction of programs with functions. List Handling. Immutability of data. Higher order Functions. Functions as arguments. Referential Transparency. Applications with the use of Functional Languages. Project using Functional Languages.

Course: Course: Devops: Software Development Methodology
Class Hours: 40
Syllabus: DevOps concepts, objectives, evolution and applications. Pillars of DevOps - Agile Software Development, Continuous Integration, Continuous Delivery. Devops Culture and Practice. DevOps support tools: GIT, Jenkins, Docker and Puppet.

Course: Computer Vision Algorithms with Artificial Intelligence
Class Hours: 40
Syllabus: Introduction to A.I. to solve problems of objects location and classification. Data processing using deep neural networks. Commercial architectures for the application of classification and localization algorithms. Embedded systems with deep neural networks. Comparison of the results obtained with conventional algorithms and with deep neural networks.

Course: Non regular Databases
Class Hours: 40
Syllabus: Non-conventional applications; Semi-structured data, XML documents; Query Languages, Object-Relational Database; Object-Oriented Banking Concepts; Object-Relational Modeling; Geographic Databases, Database Security and Transactions; Non-Relational Databases; Distributed database; Databases based on data model: document, key-value, column, graph

Note: The student may apply for enrollment in any course offered by the CEUN-IMT, as an elective to complement the required workload, provided it has the approval of the Course Coordinator.