CONTROL AND AUTOMATION 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 graphical representations 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 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.

THIRD YEAR

Course: Machine Elements Design
Class hours: 160
Syllabus: Machine Design. Development stages of a Project Engineering. Project Development. Drawings and Calculations. The Design of Machine Components. Tolerances and Adjustments. Surface Finishes. Methodology for Troubleshooting. Machine Components. Work. Energy. Power. Analysis of Forces. Balance. Bearings. Main types of bearings and sliding bearings.

Sizing. Elements of Power Transmission: Belts and Pulleys. Selection of belts. Sizing. Sizing Machines Elements. Typical Applications for Machine Elements. Sizing criteria. Allowable stresses. Stress concentrations. Fatigue. Threaded elements. Unions Joints. Bolts and Nuts. Screws Movement. Yield. Sizing. Fasteners. Springs. Application. Materials. Sizing.

Course: Mechanical Construction Materials I
Class hours: 80
Syllabus: Materials science. Metal alloys. Equilibrium diagrams. Introduction to mechanical construction steels. Fe-C equilibrium diagram. TTT diagrams. Heat treatment of steels. Thermochemical treatments. Stainless steels. Aluminum alloys. LAB: Study and realization of the main mechanical tests: tensile, hardness, impact. Penetrant and magnetic particles. Metallography of steels and aluminum. Fatigue test.

Course: Modeling and Analysis of Dynamic Systems
Class hours: 160
Syllabus: Mathematical modeling of mechanical, electrical, thermal and hydraulic physical systems. System models described by transfer functions and state space equations. Linearization of nonlinear systems. Functions of complex variables. Laplace Transform. Solution of ordinary differential equations using Laplace Transform. Transient response of first, second and high order systems. Stability of dynamical systems. Response of linear systems to sinusoidal inputs. Fourier Series. Fourier Transform. Frequency spectrum.

Course: Thermal Sciences
Class hours: 80
Syllabus: Introduction to thermal sciences (thermodynamics, heat transfer and fluid mechanics). Definitions and thermodynamic concepts. Thermodynamic properties and transport of matter. Principles of mass conservation, energy, and the second law of thermodynamics applied to systems and control volumes. Thermodynamic cycles and their thermal and fluid dynamics equipment.

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: Analog Electronics
Class hours: 160
Syllabus: Diodes and their applications: circuits, rectifiers and limiters. Zener and special diodes. Bipolar junction transistors (BJT) and applications:using transistor as key drives, signal amplifiers, power amplifiers and differential amplifiers. Regulated power supplies and voltage regulators. Constant current source. MOSFET and its applications. Introduction to power electronics: thyristor, TRIAC and DIAC. Voltage comparators. Operational amplifiers and their applications: filters, PID controllers, adders, differential amplifier, voltage follower. Electric Motor Drive: H bridges and pulse width modulation (PWM). Design and simulation using CAD software.

Course: Digital Electronics
Class hours: 160
Syllabus: Encoder e decoders circuits; multiplexers and demultiplexers circuits; adders and subtractors circuits; carry look ahed adder (CLA); RAM and ROM memories; association of memories; finite state machine; microprocessors and microcontrollers; arithmetic logic unit (ALU); programmable logic devices (PLD); state machines for PLDs; microprocessor architecture; fetch cycle; instructions; microcode; Von Neumann architecture and Harvard. Laboratory: simulation of digital circuits in Multisim; encoder / decoder; multiplexer / demultiplexer; adders; projects with state machines; digital timer project; Introduction to CPLD - Altera; multiplexed display (CPLD); VHDL language; FPGA. Advanced projects with Arduino.

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 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.

FOURTH YEAR

Course: Microcontrollers and Systems
Class hours: 80
Syllabus: Analysis and design of sequential circuits. Microprocessors and microcontrollers architectures. Von Neumann and Harvard Architectures. Microprocessor and microcontrollers systems design. Assembly Language. Lab: Environment for design and implementations with microcontrollers. Design and implementations using digital inputs and outputs, push-buttons, keyboards, LEDs, displays, timers, interrupts, PWM, EEPROM, D/A and A/D converter.

Course: Object Oriented Programming and Database
Class hours: 80
Syllabus: Software engineering concepts. Paradigm concepts of object orientation: class, object, attribute, method, state, inheritance, polymorphism, virtual methods. Concepts of object-oriented modeling with UML. Database modeling with entity-relationship diagrams. Databases: concepts, standardization, creation and manipulation of databases with SQL. Implementation of client-server systems.

Course: Control Systems I
Class hours: 160
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: Instrumentation
Class hours: 80
Syllabus: Basic concepts of industrial instrumentation. Symbologies and nomenclatures of instrumentation. Position sensors commonly used in industry. Practical applications with position sensors. Study of temperature, pressure and flow measurements. Sign conditioning. Signal aquisition and computational processing. Industrial signal transmissions. Final control elements: valves, pneumatics, electropneumatics and motors. Applications with motors.

Course: Design of Machinery and Mechanisms
Class hours: 80
Syllabus: Introduction to mechanisms. Project Considerations. Graphical synthesis of mechanisms. Kinematics of mechanisms. Position, velocity and acceleration analysis. Dynamics of mechanisms. Analysis of forces and torques. Mechanism balancing and inertia flywheels calculation. Gearing: gearing of spur gears, cylindrical spur and helical gears, gear geometry and kinematics, transmission and modulus normalizations, interference and degree of recoating, geared torque correction. Recommendations for materials for the manufacture of gears. Sizing of gears by criteria of flexural strength and contact pressure. Reducers. Brakes and clutches. Practical work and projects. Application of CAE tools for mechanism analysis.

Course: Hydraulics and Pneumatics
Class hours: 80
Syllabus: Introduction to pneumatic and hydraulic automation. Physical Fundamentals of pneumatics and hydraulics. Mixing air-water vapor. Hydraulic fluids and their properties. Components of pneumatic and hydraulic circuits: valves, linear and rotary actuators, pumps, compressors. Graphic symbols. Analysis and design of pneumatic and hydraulic circuits. Electro-pneumatic and electro-hydraulic. Practical lessons in didactics benches.

Course: Automation & Industrial Systems
Class hours: 80
Syllabus: Sequential systems: terminology, definitions and history. Development of mathematical models and simulation of sequential systems. Petri Nets. Controllers for sequential systems. Programmable Logic Controllers (PLC). PLC programming and languages of sequential systems. Ladder language. Statement List Language. Grafcet language and SFC (Schematic Flow Chart). Supervisory control and data acquisition (SCADA). Development of practical projects of sequential systems. Communication networks used in industrial automation: types of networks (Fieldbus, Profibus, Ethernet etc), topology and protocols.

Course: Manufacturing Processes and Manufacturing Laboratory
Class hours: 160
Syllabus: Theory: Introduce the student to the concepts of mechanical manufacturing processes enabling him to identify and differentiate the characteristics of each process: Sand casting, shell-molding, lost wax and pressure casting; Plastic forming processes, Lamination, Open and closed die forging, Stamping, Drawing and Extrusion; Material removal processes by machining, turning, milling, drilling, boring and threading; Flat and cylindrical grinding; Sintering processes; Union processes by welding; Special manufacturing processes by Electro-eletrode, laser and high pressure water jet. Laboratory: Allow the student practical contact to machining technology with conventional machines as lathe, milling machine, drilling machine and with CNC machines, lathe and milling machine. Present to the student concepts related to the tools geometry, creation of process sheets and choice of operational parameters. Introduce the concepts of the ISO-G programming language for CNC machines through manual programming with software simulation and with the aid of specific CAM programming software.

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 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.

FIFITH YEAR

Course: Control Systems II
Class hours: 80
Syllabus: State space representation of dynamical systems. Linearization of nonlinear dynamical systems. Systems analysis in the state space form. State regulators. Servo controller using state feedback. Control by state feedback with integrators. State observers. Introduction to optimal control. Analysis and design of controllers for nonlinear systems.

Course: Computer Aided Engineering ¿ CAE
Class hours: 80
Syllabus: Review of Solid Mechanics. Introduction to the Finite Element Method: formulation of 1D, 2D and 3D elements. Numerical problem solving techniques in permanent, transient and eigenvalue regimes. Convergence criteria. Applications of computer-aided engineering (CAE): computer concept as a development and evaluation tool and design optimization. Computer aided machine components design. Stresses, strain and deformation analysis from applied loads on a mechanical part obtained from simulation software. Comparison of the numerical method with the experimental method through the use of strain gages.

Course: Industrial Robotics
Class hours: 80
Syllabus: Study and analysis of industrial robots and manipulators. Classification, types, mechanical structure, main components, sensors and actuators. Coordinate transformation. Kinematics of robot manipulators. Programming of industrial robot manipulators. Laboratory using FANUC industrial robot.

Course: Undergraduate Thesis
Class hours: 160
Syllabus: Introduction: Conceptualization of project. Scientific research and applied research. Project definition: Theme, necessity and justification. 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. Technical Report and Monograph: concept, characteristics, planning and preparation. Formal presentation: Public presentation skills, attitudes and behaviors, use of audiovisual resources. Public exposition at the EUREKA fair.

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: Drives and Eletrical Instalations for Industrial Plants
Class hours: 80
Syllabus: Fundamentals of electromagnetics; Analysis of ac circuits; Single-phase and three-phase iron-core transformers; Induction and synchronous motors; Brushless permanent magnet motors; AC Adjustable Speed Drives; DC Motors; DC Adjustable Speed Drives; Moto-Generators-Sets; Fundamentals of generation, supply and distribution of electrical energy; Public Electric Networks; Electric Circuits for industrial plants; Simplified design of one industrial electrical plant.

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: 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: Control and Automation of Indusutrial Processes
Class hours: 80
Syllabus: Presentation of concepts of supervisory systems and the architectures of existing automation systems. Presentation of the supervisory system development tool. Application of the software tools in the development of industrial HMI. Introduction of the basics of industrial network and network topologies. Presentation of concepts of supervisory systems and the architectures of existing automation systems. Presentation of industrial networks, noise, interference, grounding system and shielded cable, Serial communication. Presentation of the model of HART, ASI, DeviceNet, Profibus PA/DP/ FMS. Introduction of the Profibus protocol, Foundation Filedbus, Industrial Ethernet and OPC (Ole for Process Control). Presentation of the concepts of network design in classified area and wireless sensor networks.

Course: Supervised Internship
Class Hours: 160

ELECTIVE COURSES

Course: Fundamentals of Machine Learning
Class Hours: 40
Syllabus: Definition of machine learning. Supervised and unsupervised learning. Review of probability and statistical concepts: random numbers, probability distributions, conditional probability, chain rule for conditional probability. Regression and classification: approximation of functions, linear regression, polynomial regression, logistic regression. Clustering and similarity: support vector machines, kernel methods, k-means method. Similarity reduction: principal component analysis (PCA). Carrying out practical programming activities during

Course: Artificial Intelligence Applied to Robotics and Computer Vision
Class Hours: 80
Syllabus: Basic concepts and introduction to artificial neural networks. Main network architectures. The back-propagation algorithm. Configuration, training and use of fully connected neural networks: configuration of data, initialization of network parameters, techniques of analysis of results. Mechanism of digital image formation. Image sensors. Image color representation. Processing of images using filters: convolution method. Neural networks used for image and video processing. Examples of applications and practical activities of neural networks development using the Python language. Carrying out practical programming activities during class.

Course: Autonomous Mobile Robot
Class Hours: 80
Syllabus: Study and analysis of autonomous mobile robots. Classification, locomotion types and sensors for mobile robots. Reactive, deliberative, hierarchical and hybrid control architectures. Kinematics, localization and motion planning. Practical experiments using tools such as MATLAB, V-REP and Robot Operating System (ROS).

Course: Robotics in Virtual Environments
Class Hours: 40
Syllabus: Structure of ROS (Robot Operating System): topics, messages, services and actions. Execution of simulations in ROS. ROS packages. Creating programs to control robots. Creating custom ROS packages. Creating Topics. Creating Services. Creating Actions. Debugging tools. Simulation of mobile robots. Simulation of industrial robots. Carrying out practical programming activities during class.

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.

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.