

Transilvania University of Braşov, Romania

Study program: Building services

Faculty: Civil Engineering

Study period: 4 years (bachelor)

1st Year

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Mathematical analysis	AMP01	6	4	3	-	-

Course description (Syllabus): 1. Sequences and Series of Real Numbers. 2. Functions of a Real Variable. 3. Functions of Several Real Variables. 4. Indefinite Integrals. 5. Definite Integrals. 6. Area of a Bounded Region. Arc length of a Plane Curve. Volume of Solid. 7. Improper Integrals. 8. Line Integrals and Green's Theorem. 9. Double Integrals. 10. Surface Integrals. 11. Triple Integrals

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Linear Algebra, Analytic and Differential Geometry	ALGADO 1	4	2	2	-	-

Course description (Syllabus): Vector spaces. Euclidean spaces. 2. Linear transformations. Eigenvalues and eigenvectors. Bilinear forms and quadric forms. 3. The vector space of free vectors. 4. Plane and straight line in space. 5. Transformations of coordinates. Translation and rotation. 6. Conics. 7. Quadrics. 8. Generated surfaces. 9. Plane curves. 10. Curves in \mathbb{R}^3 . 11. Surfaces.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Computer programming and programming languages I	PC01	4	1	-	2	-

Course description (Syllabus): IBM-PC compatible computer knowledge, physical and functional.

Forming algorithmic thinking, understanding the issues of domain specific engineering and translate them into format appropriate for their proper resolution by computer. Computing facilities offered by learning environment MS Excel.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Descriptive Geometry	GDO1	4	2	1	-	-

Course description (Syllabus): This course introduces fundamental principles in developing graphical solutions to engineering problems. It develops the ability to visualize spatial relationships; develop sequential thinking; set patterns of analysis; and spatial visualization through problem-solving. **Topics include:** Basic Concepts of 3-Dimensional Descriptive Geometry: Points; Projection Planes; Orthographic Projection; Views; Auxiliary View. Lines in 3-Dimensional Geometry: Intersecting lines; Skewed lines; Parallel lines; Perpendicular lines; True Length of a line. Planes in 3-Dimensional Geometry: Points and lines on a plane; Dip of a plane; Spatial Relations of Lines and Planes. The methods of the descriptive geometry: Method of replacing projection planes; method of revolution. Solids and Surfaces: Basic techniques for locating points, piercing points, and tangent planes for common solids (prism, pyramid, cone, cylinder, sphere); Development of surfaces; Intersection of geometric surfaces and solids. Descriptive Geometry Applied to Civil Engineering Problems: Roof geometry; Earthworks geometry.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Mechanics	MECI01	5	2	2	-	-

Course description (Syllabus): Fundamental principles & concepts: Newton's laws, gravitation, force (external and internal, transmissibility), couple, moment (about point and about axis), Varignon's theorem, resultant of concurrent and non-concurrent coplanar forces, static equilibrium, free body diagram, reactions.. Also kinematics and dynamics of solid bodies

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Chemistry	CH01	3	2	-	1	-

Course description (Syllabus): Fundamental concepts of chemistry related to the structure (chemical composition, chemical and physical bonding) and properties (physical and chemical) of materials (lime, plaster, cement, metals and alloys, polymers, ceramics, composites) with applications in civil engineering domain; Developing the skills to correlate and integrate the theoretical knowledge of chemistry with/in experimental and numerical applications, including solutions concentrations, chemical reactions, water hardness, metals and corrosion etc.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Scientific writing	SA01	2	1	-	-	-

Course description (Syllabus): The course is designed to teach students some specific writing strategies and to help them see "learning to write" as an engaged, lifelong learning process. Students study the practice and conventions for writing about science and also about the models of science communication that support that work.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Academic ethics and integrity	EIA01	2	1	-	-	-

Course description (Syllabus): Knowledge of the ethical aspects at institution level and individual level; the need to maintain a culture of honesty in all aspects of teaching and research: discourage the plagiarism and student dishonesty (cheating, copying, fabrication or inventing false data), promoting integrity.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
English Language I (sem I)	LS01	2	1	1		

Course description (Syllabus): The course covers the core language and skills that the students need to communicate successfully in all technical and industrial specializations. It is for students with a basic knowledge of general English who now require an elementary course in English for specific purposes.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Environment protection	ECI03	4	2	1	-	-

Course description (Syllabus): General notions about live world systemic structure, Ecosystem, Ecosphere, etc; applied ecology elements: environmental pollution and environmental factors protection, biosphere resources limits, ecosphere protection methods, ecological house; environmental norms and legislation

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physics	FIZ02	5	2	1	1	-

Course description (Syllabus): 1. Introduction: Dimensional analysis. The least squares method.2. Cinematic: trajectory, speed and acceleration.3. Dynamics of the material point. The principles of dynamics. Momentum. 4. Ideal

oscillations, damped and forced. The resonance phenomenon. Resonance effects for buildings, bridges, etc. 5. Waves. Classification. Flat and spherical waves. Seismic waves. Properties. Applications. 6. Thermodynamics - introductory notions. Temperature. 7. Principles of thermodynamics. Consequences. Entropy. The laws of ideal and real gas. 8. Thermal properties of bodies. Thermal transfer through conduction, convection and radiation. 9. Electromagnetism. Electrostatic field. The laws of Ohm, Joule and Kirchhoff. Magnetic field. Magnetic induction, force electromagnetic and Lorenz force. Electromagnetic waves. 10. Geometric optics. Optical devices: Optical diopter, mirrors, lenses, optical prisms and telescopes. Applications of optical devices in measurements, topometry and building surveying.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Topography	TOP02	3	2	-	2	-

Course description (Syllabus): The course aims to familiarize the students with the notions of topography, having as final objectives two main aspects: understanding of a topographic plan, including the requirements for its drawing (content, significant details, projection and reference system) and the limits of the content of a plan (errors, accuracy, precision).

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Engineering drawing and computer graphics	DTI02	4	-	-	4	-

Course description (Syllabus) : The course of the TECHNICAL AND INFORMATIC DESIGN, through its content and level of problem approach, falls within the category of specialized disciplines and it is useful for those who will study and will continue to work in the field of constructions. The technical drawing is the activity of representation on a single plane, according to certain norms and conventions of the objects in the three-dimensional space using the techniques and methods of the descriptive geometry. The technical concept is the only means of representing a conceptual or technical idea and is the main means of linking conceiving and realizing the engineering works. In the course are presented, in accordance with the standards and norms in force, aspects regarding the graphic representation of the resilience plans and the architecture for the civil and industrial buildings.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Strength of the materials	RMIO2	5	3	2	-	-

Course description (Syllabus): Internal forces in a mechanical system. Revision of some mechanical properties of common materials. Normal effort. State of stress and deformation at a point of a charged solid. Moment of bending and shear force in long beams, deflection, bending of unsymmetrical beams, curved beams. energy methods Beams in compression: buckling.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Materials for installations	MIO2	5	3	-	2	-

Course description (Syllabus): The course provides the knowledge necessary for future systems engineers the materials used to build and repair facilities that equip buildings. Strength, operational safety and durability facilities depend on the quality of materials used in their realization. Technical characteristics of the materials, their behavior under the influence of chemical and physical aggressive at implementing work are determined by their physical, chemical and physico-mechanical properties.

Therefore, a thorough knowledge of construction materials for installation, correct for release in work can not be done without an adequate knowledge of their properties and behavior while under the influence of environmental factors.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
English Language	LS02	2	1	1		

Course description (Syllabus): The course covers the core language and skills that the students need to communicate successfully in all technical and industrial specializations. It is for students with a basic knowledge of general English who now require an elementary course in English for specific purposes.

2st Year

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Thermotechnics I	TTI03	5	2	2	1	-

Course description (Syllabus): Defining macroscopic variables related to average properties of material bodies, thermodynamics study the heat, work, energy and their transformations. The course covers the first and the second law of thermodynamics being applied to mechanical engineering as the psychometrics, or refrigeration cycles, irreversible processes e.a.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Hydraulic services I	HI03	5	3	1	1	-

Course description (Syllabus): The course aims learning by students of the concepts and basic laws of hydraulics with applications in civil engineering. Addressing to the students who specialize in buildings services, the course detail knowledge of hydraulic engineering to solve problems in the field. Thus, in Part I of the course are presented: fluid properties, hydrostatics, laws of hydrodynamics, calculations for sizing and verification of hydraulic piping systems under pressure, as a permanent move.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Electrotechnics I	EIC03	5	3	2	-	-

Course description (Syllabus): 1. Voltage and Current. 2. Resistance. 3. Ohm's Law, Power, and Energy. 4. Series Circuits. 5. Parallel Circuits. 6. Series-Parallel Circuits. 7. Methods of Analysis. 8. Network Theorems. 9. Capacitors and Capacitance. 10. Capacitor Charging, Discharging. 11. Magnetism. 12. Magnetic Circuits. 13. Inductance and Inductors. 14. Inductive Transients.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Special mathematics	MS03	4	2	1	-	-

Course description (Syllabus): 1. Differential equations. 2. Symmetric Systems. First Order Partial Differential Equations. 3. Vector Analysis. 4. Complex analysis. 5. Fourier Series. 6. Partial Differential Equations. 7. Laplace Transforms

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Applied computer science I	IGI03	4	2	3		-

Course description (Syllabus): The discipline provides training to students in 2D design with AutoCAD computer program. The students learn workspace organization, general information and creation of the first drawing, draw entities and view commands, editing commands, working with Layers and Draw Order, working with hatches, Texts, draw dimensioning, line indications, blocks and attributes, external references, ordering information and editing polylines, QuickCalc utility and CAL command, Match Properties and Quick Select and to plot drawings.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Basics of architecture(elective)	ARH03	2	1	-	-	-

Course description (Syllabus): Introducing the students to the essential elements that define the basics of the Architecture. Studying the connections between Function, Structure and Shape. Elements of Aesthetics and Architectural Composition. Elements of urban planning and development. The course defines theoretical topics for applied architecture, and essential subjects for understanding the relations between spatial organization and projecting process in the constructions and buildings services fields.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
English Language III	LS03	2	1	1		

Course description (Syllabus): The course covers the core language and skills that the students need to communicate successfully in all technical and industrial specializations. It is for students who have completed Level I, or have an elementary knowledge of general English, and now require a pre-intermediate course in English for specific purposes.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Thermotechnics II	TTI04	5	3	1	1	-

Course description (Syllabus): As an introductory course in heat transfer for engineering students it covers one/two dimensional heat conduction, transient heat conduction, convection, non-black body radiation and basics for heat exchangers. Including solved heat transfer problems in SI units the course should be a useful aid to engineering students.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Hydraulic services II	HI04	5	3	1	1	-

Course description (Syllabus): The course aims learning by students of the concepts and basic laws of hydraulics with applications in civil engineering. Addressing to the students who specialize in buildings services, the course detail knowledge of hydraulic engineering to solve problems in the field. Thus, in Part II of the course are presented: non-permanent move in pipelines under pressure, effluent moves and all types of free surface movement.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Electrotechnics II	EIC04	5	3	2	-	-

Course description (Syllabus): 1. AC Fundamentals. 2. R, L, and C Elements and the Impedance Concept. 3. Power in AC Circuits. 4. Impedance . 5. AC Series-Parallel Circuits. 6. Methods of AC Analysis. 7. AC Network Theorems. 8. Resonance. 9. Three-Phase Systems. 10.Transformers and Coupled Circuits. 11. Asynchronous motors. 12.Synchronous motors. 13.Feedback devices: encoders, resolvers. 14.Remote Positioning Systems.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Civil buildings	CONI04	3	2	-	-	-

Course description (Syllabus): The general objective of this course is to acquire the knowledge regarding the structure, role and functionality of constructions, sub-assemblies and their component parts.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Applied computer science II	IA04	3	-	-	-	4

Course description (Syllabus): At this laboratory, students use CAD software and apply the knowledge gained in Infographics I in the field of Building Services. The students receive a building and they have to draw the building services for it. The lab is divided in three main parts: drawing sanitary and plumbing, drawing heating systems and electrical drawings.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
English Language IV	LS04	2		2		

Course description (Syllabus): The course covers the core language and skills that the students need to communicate successfully in all technical and industrial specializations. It is for students who have completed Level I, or have an elementary knowledge of general English, and now require a pre-intermediate course in English for specific purposes.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratoy	project
Building thermotechnics	TC08	3	2	2	-	-

Course description (Syllabus): General notions of thermotechnics; thermal transfer; construction elements of the buildings; heat losses of a building; heat gains of a building; the annual energy need for heating a building; energy certificate of building; technical solutions for building a house with reduced energy consumption and a passive house.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Technological practice (90 hours/semester)	PRAC04	4	3 weeks x 30 hours -			

Course description (Syllabus): The discipline, within 90 hours, aims to enable the student to appreciate the execution of a building services from technical and quality point of view, to understand the technological organization and works mechanization, to know building site organization and management. Verification of accumulated knowledge is done through oral exam - presentation by the student of the activity carried out on the building site

3rd Year

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Hydraulics systems	MAH05	4	2	-	1	-

Course description (Syllabus): 1. Basic of hydraulic machines: definitions, fundamental, parameters, classification, examples. 2. Positive displacement machines - flow rate and driving power calculation: hydraulic elevators, pumps (reciprocal pumps, gear pumps, liquid annulus pumps and peristaltic pumps). 3. Reciprocal compressors: ideal, technic and indicated diagrams. Efficiency, maximum delivery pressure. Multistage compressors. 4. Hydrodynamic pumps. Basic parameters, classification. Fundamental equations of the hydrodynamic machines. Typical characteristic curves of centrifugal pumps: head capacity, power consumption and energetic efficiency function of capacity and speed, complete characteristics. Axial pumps: hydrodynamic profiles, typical characteristics. 5. Set point of a pump in piping system. Set-point control (capacity regulation): control throttle, bypass, hydro pneumatic storage tank pressure control, speed control. Series and parallel pumps arrangement. 6. Hydrodynamic pump suction characteristic. Maximum suction head. Practical configurations. 7. Fans. Construction, classification, typical characteristics. Capacity regulation of a fan in an air channel.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Plumbing installations I	INSA05	4	3	-	-	-

Course description (Syllabus): The purpose of plumbing installations is to ensure the rational use of water under sanitary and sanitary comfort and domestic and rainwater discharges, respecting restrictions in environmental protection legislation.

The plumbing installations course provides basic knowledge on the design, construction and operation of sanitary installations in residential, social, cultural and industrial buildings, as well as water supply systems for fire fighting.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Heating systems I	ININ05	4	3	-	-	-

Course description (Syllabus): The discipline ensures in preparing students to design, build, and operation of heating systems used in the buildings: calculus of heat load, clasifications, design and structure of heating systems , methods to design heating systems for buildings using hot water and radiators , design of equipments to produce heat: boilers, pumps, pipes, valves, etc

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Measurements in instalations	MSI05	5	2	2	-	-

Course description (Syllabus): Presentation of equipment and the extent necessary for the proper functioning thereof and correct settlement in relation to suppliers.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Heat exchangers	APT05	5	2	-	-	-

Course description (Syllabus): The course includes subjects about: fuels, fuels burners, hot water and steam generators, elements for their thermal balance, thermal calculation and verification of the heat transfer for surfaces in the thermal devices, air/gas and hydraulic calculation, heat exchangers, heating design elements and verification, and special thermal equipment for HVAC.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratoy	project
General economy	EC05	2	1	-	-	2

Course description (Syllabus): Fundamental principles of economic theories; the notion of property and its role in the functioning of the economy; market, competition and economic balance; specific markets; production process and factors of production; consumer behavior; significant aspects of the international economic environment.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Heating systems II	ININ06	5	2	-	-	2

Course description (Syllabus): The discipline ensures in preparing students to design, build, and operation of heating systems used in the buildings.:heating systems by low temperature radiation, heat systems with hot air, electrical systems for heat , heating systems using steam at low temperature and pressure.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratoy	project
Air conditioning systems I	INVC06	5	2	-	-	2

Course description (Syllabus): Outdoor climatic demands on climate-controlled buildings; thermal confort; indoor air quality; thermal balance of climated rooms; humidity balance of rooms; air flow for ventilation of rooms; air treatment processes.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Electrical installations I	INEL06	5	2	-	-	2

Course description (Syllabus): 1. Choosing lighting solutions for various type of buildings and requirements; 2. Perform sizing calculations for lighting; 3. Conception and design of technologically and economically lighting systems; 4. Application of quality requirements, energy conservation and environmental protection for lighting systems.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Refrigeration	INFR06	4	3	-	-	2

Course description (Syllabus): The course includes subjects about: fuels, fuels burners, hot water and steam generators, elements for their thermal balance, thermal calculation and verification of the heat transfer for surfaces in the thermal devices, air/gas and hydraulic calculation, heat exchangers, heating design elements and verification, and special thermal equipment for HVAC.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Plumbing installations II	INSA06	3	2	-	-	2

Course description (Syllabus): The purpose of plumbing installations is to ensure the rational use of water under sanitary and sanitary comfort and domestic and rainwater discharges, respecting restrictions in environmental protection legislation.

The plumbing installations course provides basic knowledge on the design, construction and operation of sanitary installations in residential, social, cultural and industrial buildings, as well as water supply systems for fire fighting.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Cogeneration and energy transport	CTET06	3	3	2	-	-

Course description (Syllabus): The discipline ensures in preparing students to acquire theoretical basis for cogeneration and transport energy. 1. Cogeneration systems. 2. Equipments for cogeneration.3. Reducing the energy consumption of cogeneration systems. 4. Heat energy transport.5. Isolation of the transport pipes of the thermal agent

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Practical placement	PRA06	4	3 weeks x 30 hours -			

Course description (Syllabus): At the end of Year 3 of courses we are intended to supplement theoretical knowledge with practice in companies in the field. Students will be assigned to companies that collaborate with faculty, or companies selected by students who have their acceptance in practice. To verify knowledge gained practical books are prepared showing the work performed and knowledge gained in the society where they performed work practice

4th Year

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratoy	project
Air conditioning systems II	INVC07	6	3	-	-	3

Course description (Syllabus): Complex air treatment for room air conditioning; diffusing air in the rooms, performing the ventilation process; air ducts and accessories; air treatment plant and its components (heating/ cooling exchangers, heat recovery, fans, air filters); automatic regulation of ventilation and air-conditioning systems; smoke exhaust installations; execution of ventilation and air conditioning systems, aeration regulation during commissioning.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Electrical installations II	INEL07	6	3	-	-	3

Course description (Syllabus): 1. Choosing of power supply solutions for various type of buildings and requirements; 2. Perform sizing calculations for low voltage electrical distribution systems; 3. Conception and design of technologically and economic electrical installations, lighting and power distribution; 4. Application of quality requirements, energy conservation and environmental protection systems for electrical installations.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Natural gas supply systems	SAG07	4	3	-	-	2

Course description (Syllabus): Discipline of natural gas fuel systems deals with the transport, distribution and use of combustible natural gas. The aspects concerning the design and operation of the distribution and use transport schemes as well as the methodologies for the calculation and sizing of the distribution and use systems are highlighted.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Automatics I	AIC07	4	2	-	2	-

Course description (Syllabus): 1. Contacts and relays. 2. Digital logical signals. 3. Automatic protection. 4. Multi-level adjustment. 5. Programmable automata. 6. Synthesis of the combined logic systems 7. Components of automation installations. 8. Controllers. 9 Converters. 10. Actuators (Elements of execution). 11. Command for starting of the electric motors . 12. Stationary analysis of automated systems. Block diagram. Operating regimes. 13 Performances of automated systems. 14. Command of an elevator

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Hydro-municipal installations	INHIO7	4	2	-	-	2

Course description (Syllabus): The aim is to know the basic concepts and theories of the hydro-hydraulic installations, to develop professional projects using the established principles and methods in the field of water supply installations and sewage networks of the domestic and rainwater of localities.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Water management (elective)	GA07	4	2	-	-	2

Course description (Syllabus): The course aims learning by students of the basic concepts of hydrology and water management. Are presented a number of aspects of planning, developing and managing the optimum use of water, such as: water resources, water management for users, larger water management and water quality. Also, are presented aspects of legislation in the field of water management.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Hydronic heating systems	RT07	5	2	-	-	2

Course description(Syllabus): The discipline ensures in preparing students to design, build, and operation the transport and distribute heat to the urban and industrial consumers, sizing pipes and equipments of thermal networks, hydraulic calculus of thermal networks, thermal calculus of thermal networks and strenght calculus of thermal networks.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Automatics II	AI07	4	2		1	-

Course description (Syllabus): 1.Sensors. 2.Temperature Transducers. 3.Pressure Transducers 4.Vibrations Transducers . 5.Level Transducers. 6.Speed Transducers. 7.Acceleration Transducers. 8.Transducers for Force. 9. Transducers for Humidity. 10.Transducers for Flow.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratoy	project
Heat pumps	PC08	4	2	-	1	

Course description (Syllabus): HVAC engineers need to be familiarized with the possibility of using low entropy energy in order to accomplish the desired transfer of thermal energy from source to sink. Any experienced HVAC engineer is faced with challenges including cost constrains, indoor air quality, legal liability, and rapidly expanding building code complexity. In this context the course is intended to present the main problems related to the installation of heat pumps in the building sector.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratoy	project
Technique and fittings of building facilities	TMIO8	4	2	-	2	

Course description (Syllabus): The technological process definition for each category of equipment separately and the breakdown of the process technology in phases and technological operations.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Quality in installations	ACIO8	2	2	-	-	-

Course description (Syllabus): The discipline ensures in preparing students to design, certification, management and implementation of specific quality assurance systems for constructions works and buildings services activities.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Economic and financial management of enterprises and marketing elements	GEF08	2	2	1	-	-

Course description (Syllabus): It aims to know and understand the economic and financial mechanisms that coordinate the activity of the construction companies. The aim is to understand the functional mechanisms and the influence of the technical compartments in the structure of the production costs.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratoy	project
Management in buildings and buildings services	EIO8	2	2	1	-	2

Course description (Syllabus): Study of peculiarities of organization, planning and tracking activities in instalation for construction, as: execution time, budget and quality parameters should be monitored continuously; the construction project is not a self-regulating mechanism; working conditions, activitie durations and costs are changing.