Transilvania University of Braşov, Romania
Study program: Building services

Faculty: Civil Engineering
Study period: 4 years (bachelor);
Study program: Building services

1st Year

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Mathematical analysis I	AMP01	3	2	1		

Course description (Syllabus): aims to develop comprehensive knowledge in differential and integral calculus as essential mathematical foundations for engineering applications. The discipline encompasses theoretical frameworks for sequences, series, and univariate/multivariate real functions, combined with integral calculus theory and geometric applications. Core competencies include mastery of indefinite and definite integrals, improper integrals, and computational methods for areas, arc lengths, and volumes. The course addresses advanced integration topics including line integrals with Green's Theorem, double integrals, triple integrals, and surface integrals, with particular attention to mathematical reasoning, computational proficiency, and practical applications within construction and building systems engineering.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Linear Algebra, Analytic and Differential Geometry	ALGAD01	4	2	2		

Course description (Syllabus): provides comprehensive theoretical foundations and practical applications of linear algebra, analytic geometry, and differential geometry essential for engineering specialization. The discipline introduces fundamental concepts including vector spaces, linear transformations, eigenvalues and eigenvectors, and quadratic forms, with emphasis on matrix computation methods and their engineering applications. The course integrates analytic geometry techniques for analyzing curves, surfaces, and geometric transformations in both planar and spatial contexts. Through systematic treatment of differential geometry concepts including the Frenet frame, curvature, and torsion, students develop analytical thinking necessary for solving complex problems encountered in building systems, construction geometry, and advanced mathematical modeling relevant to installations engineering.

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

Course description (Syllabus): and IBM-PC Compatible Computer Knowledge develops foundational algorithmic thinking and computational problem-solving methodologies specifically oriented toward engineering applications in construction and installation systems. The discipline covers algorithm design, problem decomposition, logical reasoning, and implementation of programming solutions using MS Excel environments and programming platforms. Students will learn to analyze engineering problems, develop algorithmic procedures and flowcharts, and implement code-based solutions for practical construction and installation challenges such as system design calculations, performance modeling, and automated data processing. The course bridges theoretical computer science concepts with engineering problem contexts, enabling students to automate design tasks, perform numerical simulations, and optimize installation systems through computational approaches.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Descriptive Geometry	GD01	4	2	2		

Course description (Syllabus): cultivates systematic competencies in spatial visualization and technical drawing necessary for engineering problem-solving in construction and installations. The discipline integrates orthographic projection theory, including point projections, reference systems, and auxiliary views, with comprehensive analysis of lines, planes, and their spatial relationships. Students master fundamental representation techniques for geometric solids and surfaces—prisms, pyramids, cones, cylinders, spheres, ruled surfaces, and complex forms—utilizing methods of plane projection transformation and rotation. Emphasis is placed on practical applications including locating piercing points, determining tangent planes, developing surface representations, and analyzing intersections of geometric bodies. The course develops sequential analytical thinking through progressive problem-solving, enabling students to represent complex three-dimensional structural and installation elements in technical drawings and conversely, to reconstruct spatial configurations from orthographic projections, skills essential for design documentation and construction execution.

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

Course description (Syllabus): develops foundational competencies in force analysis, equilibrium, and dynamics essential for solving engineering problems in construction and installation systems. The discipline covers Newton's laws, force concepts (external/internal, transmissibility), couples, moments, Varignon's theorem, and methods for analyzing concurrent and non-concurrent coplanar force systems. Students acquire systematic proficiency in equilibrium analysis through free body diagrams, reaction determination, and constraint evaluation. The course progresses to kinematics and dynamics of rigid bodies—including analysis of translational, rotational, and plane motion—with emphasis on force-moment relationships, moments of inertia, and energy principles. Practical applications to structural loading, equipment dynamics, and installation system design are integrated throughout, providing the mathematical and physical foundation necessary for advanced structural analysis and mechanical system design.

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

Course description (Syllabus): develops foundational knowledge of materials science and chemical principles applicable to construction and installation engineering. The discipline covers atomic structure, chemical bonding, aggregation states, and fundamental chemical laws, complemented by systematic analysis of inorganic compounds and chemical reactions. Students master aqueous chemistry including water properties, electrolytic systems, pH theory, and molecular disperse systems with technical applications to building systems. The course addresses metallic materials, corrosion mechanisms and types, and anti-corrosion protection methods. Core content encompasses inorganic construction materials—binders, lime, cements, glass, ceramics—covering composition, properties, and applications, as well as organic-based materials including polymers and composites used in modern construction. Emphasis on composition-property relationships enables students to select appropriate materials for specific building applications and predict material behavior in service environments.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physics	FIZ01	4	2	1	1	

Course description (Syllabus): develops foundational knowledge of mechanics, thermodynamics, waves, and electromagnetism applicable to engineering problems in construction and installation systems. The discipline covers dimensional analysis and measurement methodologies, kinematics and dynamics of material points, oscillatory phenomena, and wave propagation with applications to building acoustics and vibrations. Students master fluid

mechanics principles including flow analysis, pressure, and viscosity relevant to plumbing and ventilation systems. Core thermodynamic concepts include temperature, heat, mechanical work, calorimetry, and thermodynamic principles with emphasis on thermal behavior of building materials, energy efficiency, and solar thermal systems. The course addresses electromagnetic phenomena and optical properties of materials, including light-matter interaction, thermal radiation, and solar radiation effects on construction elements. Problem-solving emphasizes dimensional consistency, experimental measurement, least-squares analysis for data processing, and practical engineering applications throughout.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physical education and sports I	EFZ01	1		1		

Course description (Syllabus): cultivates physical fitness competencies and sporting skills necessary for maintaining health and active living as an integral component of engineering education. The discipline combines theoretical foundations of fitness training principles with practical instruction in movement techniques and sport-specific skills. Students develop fitness through systematic training in fundamental elements—strength, speed, endurance, flexibility, and coordination—and apply these through practical engagement in at least one selected sport discipline. Core content includes basic technical and tactical skills in the chosen sport, movement fundamentals, postural awareness, and principles of training and exercise. Health-related topics including nutrition, stress management, and injury prevention are integrated throughout. The course fosters values of discipline, teamwork, ethical behavior in sports, and commitment to personal fitness and well-being.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
O1.English Language I O1.German Language I O1.French Language I O1.Spanish Language I	LS01	2	1	1		

Course description (Syllabus): develop foundational communicative competencies in technical and professional English, German, French, and Spanish respectively, necessary for successful academic and workplace interactions in engineering specializations. The disciplines integrate systematic instruction in core language skills—listening, speaking, reading, and writing—with emphasis on technical vocabulary and industry-specific terminology relevant to construction and installation engineering contexts. Students master fundamental grammar structures, sentence construction, and language mechanics essential for clear technical communication in each respective language. The courses address practical professional communication including formal correspondence, technical documentation, report writing, and basic presentation skills. Content emphasizes vocabulary development across engineering domains, comprehension strategies for technical texts, and development of confidence in oral communication. Throughout, authentic engineering-related materials and contexts enhance relevance and applicability to students' professional development and future workplace communication demands in their chosen language.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Mathematical analysis II	AMP02	4	2	2		

Course description (Syllabus): develops advanced calculus competencies encompassing integral calculus and ordinary differential equations necessary for solving engineering problems in construction and installation specializations. The discipline covers antiderivatives, definite integrals, computational techniques, improper integrals, and integrals with parameters. Students master fundamental theorems connecting differentiation and integration, and systematically study ordinary differential equations of first and higher orders, including linear equations with constant coefficients. Multiple integral calculus topics—double integrals, triple integrals, line integrals, surface integrals—are presented with systematic methods for coordinate transformations and applications to area, volume, mass, and work calculations. Core theorems including Green's formula, divergence theorem, and Stokes' theorem connect local and

global properties of vector fields. Practical emphasis on applications to geometry and mechanics, particularly relevant to structural analysis, fluid mechanics, and thermal problems in building systems, prepares students for advanced specialized courses

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Ecology and environment	ECI02	4	2	1		

Course description (Syllabus): develops foundational understanding of ecological systems and environmental protection strategies applicable to construction and installation engineering. The discipline covers systemic organization of living systems, ecosystem structure and function including energy flow and nutrient cycling, and population ecology concepts such as growth dynamics and resource limits. Students master environmental pollution sources and types across atmospheric, aqueous, and terrestrial domains, and acquire knowledge of prevention, mitigation, and remediation techniques. Core topics include biosphere resource sustainability, ecological design principles for buildings and infrastructure, and environmental assessment methodologies. The course emphasizes environmental legislation, regulations, and management systems applicable to construction projects, complemented by study of sustainable development principles. Integration of environmental considerations into engineering planning and design processes prepares students for professional practice balancing technical requirements with environmental stewardship and long-term ecological sustainability.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Topography	TOP02	5	2		2	

Course description (Syllabus): develops competencies in surveying measurements and geodetic methods necessary for producing and interpreting topographic plans in construction and installation engineering. The discipline covers surveying principles, measurement techniques using various instruments, and geodetic coordinate systems including projection methods and reference systems. Students master accuracy and precision concepts, error sources and corrections, and quality control procedures essential for engineering surveys. Core topics include establishment of survey control networks, computational methods for coordinate determination, and creation of topographic plans with specified accuracy standards. The course emphasizes understanding topographic plan content—significant details, contour intervals, scale appropriateness—and plan limitations including positional and elevation errors. Practical applications to construction site planning, earthworks calculations, and setting out procedures prepare students for field and design roles in building systems installation and construction execution.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Technical drawing I	DTCI02	4			3	

Course description (Syllabus): I develops foundational technical communication skills through graphical representation for construction and installation engineering. The discipline covers geometric construction principles, descriptive geometry, orthographic projection, and standard drawing conventions. Students master geometric construction in plane and solid geometry, orthographic projection with multiview drawings, sectional and auxiliary views, and pictorial representation methods. Core content includes proper use of technical tools and equipment, line work conventions, lettering standards, dimensioning techniques, and scale applications. The course emphasizes spatial visualization through progressive practice from simple geometric shapes to complex building and mechanical components. Applications to construction details, structural elements, and installation systems—including piping layouts and electrical configurations—connect theory to professional practice. Introduction to computer-aided design (CAD) software basics prepares students for advanced digital design tools. The course develops technical communication competency essential for design documentation, construction execution, and interdisciplinary engineering collaboration in building systems and installations.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Strength of the materials	RMI02	5	3	2		

Course description (Syllabus): develops competencies in analyzing stress, strain, and deformation essential for structural and mechanical design in construction and installation engineering. The discipline covers fundamental concepts of internal forces, stress and strain tensors, and constitutive relationships for common engineering materials. Students master uniaxial loading conditions—tension, compression, shear—and their effects on material behavior, complemented by study of multiaxial stress states, stress transformation, and principal stress analysis using Mohr's circle. Core content encompasses systematic treatment of beam flexure including shear force and bending moment diagrams, normal and shear stress distributions, slope and deflection calculations using multiple computational methods, and analysis of unsymmetrical sections and curved beams. The course addresses elastic stability and buckling of compressed members, and includes torsion analysis for circular and thin-walled cross-sections. Energy methods for calculating deflections and strain energy are integrated throughout. Material selection, mechanical properties, and design safety criteria ensure practical relevance to construction and installation applications. The discipline provides essential foundation for structural design and advanced analysis courses.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Materials for installations	MI02	5	3		2	

Course description (Syllabus): develops competencies in materials science and practical material selection for construction and installation systems. The discipline integrates theoretical foundations—material structure, properties, thermodynamics, corrosion—with laboratory and case study analysis of installation materials. Part I covers theoretical concepts connecting physics and chemistry to material behavior. Part II systematically addresses installation materials: binders, concrete, metallic systems, ceramics, and polymers, including composition, properties, durability, and environmental behavior. Practical components include: sample identification and comparative analysis of metallic, plastic, composite, and insulating materials; joining and assembly techniques for sanitary piping (PVC, PPR, copper), thermal piping, and electrical systems; analysis of materials and accessories for lighting and outlets; fire protection materials; and standards and regulations review. Case studies develop practical judgment in material selection for sanitary/thermal and electrical installations. Laboratory demonstrations, comparative property analysis, assembly technique practice, and application-based problem-solving ensure students can select appropriate materials, understand installation methods, and predict performance. The course prepares students for material specification and quality control roles in building systems installation and maintenance.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
O2.English Language II O2.German Language II O2.French Language II O2.Spanish Language II	LS02	2	1	1		

Course description (Syllabus): advance technical language and professional communication competencies essential for specialized engineering work in construction and installation specializations. The courses build upon Level I foundations, integrating advanced listening, speaking, reading, and writing skills with emphasis on specialized technical vocabulary, professional discourse, and industry-specific terminology. Students master advanced grammar structures and complex sentence construction for technical communication, technical report and proposal writing, professional presentations, and technical discussion facilitation. Specialized vocabulary development across advanced engineering fields, comprehension of complex technical documents and research materials, and advanced oral communication confidence for professional contexts are emphasized. Practical applications include preparation and delivery of technical presentations, technical writing for professional purposes, critical discussion of specialized topics, and participation in professional engineering forums. The disciplines prepare students for advanced academic work, specialized professional roles, and international technical collaboration in their respective language specializations.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physical education and sports II	EFZ02	1		1		

Course description (Syllabus): advances athletic performance and fitness specialization, building upon foundational Level I competencies. Students develop specialized fitness competencies through sport-specific conditioning—advanced strength training, speed and power development, endurance optimization—with emphasis on periodization and scientific training planning. Advanced technical and tactical skill development in selected sport disciplines progresses from Level I fundamentals to competitive performance levels. Exercise physiology topics—cardiovascular adaptation, energy systems, muscular adaptation to training—support understanding of physiological demands of sport and training optimization. Biomechanical principles enhance sport performance analysis and injury prevention. Ethics, fair play, and values development through sport competition are emphasized, complemented by personal discipline and leadership skill development. The course prepares students for competitive participation at higher performance levels while establishing habits of lifelong physical activity and personal fitness management for ongoing health and wellnes.

2nd Year

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Special mathematics	MS03	5	2	1		

Course description (Syllabus): develops advanced mathematical competencies for modeling and solving engineering problems in construction and installation systems. The discipline covers ordinary and partial differential equations—including first-order equations, higher-order linear equations, characteristic method solutions, and numerical methods—complemented by systematic study of vector analysis, complex analysis, and Fourier methods. Students master fundamental theorems for existence and uniqueness of solutions, general solution techniques including separation of variables, and numerical approximation methods. Core topics include Fourier series for periodic function representation, partial differential equations of second order (heat, wave, Laplace equations) with boundary value problem solutions, and Laplace transforms for solving differential equations. Vector analysis topics encompass gradient, divergence, curl, and integral theorems—Green's, Stokes', divergence theorem—with applications to field analysis. Complex analysis and harmonic analysis enhance computational capabilities. Practical emphasis on applications to heat transfer, vibrations, fluid dynamics, and other building system phenomena ensures relevance to specialization. The course provides essential mathematical foundation for advanced engineering analysis and design.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Thermotechnics I	TTI03	5	3	1	1	

Course description (Syllabus): develops foundational thermodynamic competencies for analyzing and designing thermal systems in construction and installation engineering. The discipline covers fundamental thermodynamic concepts—thermodynamic properties, state equations, macroscopic variables—with systematic development of the first law (energy conservation) and second law (entropy, irreversible processes) of thermodynamics. Students master thermodynamic analysis of open and closed systems, work and heat interactions, and evaluation of process and cycle efficiency. Practical applications include psychrometric analysis for building comfort systems, thermodynamic cycles for refrigeration and heat pump systems, and analysis of irreversible processes in real thermal systems. The course develops competency in applying thermodynamic principles to predict system performance, analyze component behavior, and evaluate energy efficiency. Core applications to heating and cooling installations, thermal energy systems, and installation equipment ensure practical relevance to specialization. The course provides essential foundation for advanced thermal system courses and professional thermal system design and analysis.

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): develops foundational competencies in hydraulic principles for designing and analyzing water distribution and piping systems in building installations. The discipline covers fluid properties (density, viscosity, compressibility), hydrostatic principles including pressure distribution and hydrostatic forces, and hydrodynamic laws including continuity, Bernoulli's equation, and energy losses. Students master systematic methodology for calculating and verifying pressurized piping systems under steady-state (permanent) conditions—pipe sizing, pressure drop analysis, diameter selection, and code compliance verification. Core applications include water supply networks, sanitary systems, and industrial process water systems typical of building installations. Flow measurement techniques and practical design constraints ensure relevance to professional practice. Energy conservation principles are emphasized throughout. The course provides essential foundation for hydraulic system design and prepares students for advanced courses addressing complex transient phenomena and specialized system components.

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

Course description (Syllabus): develops foundational DC circuit competencies essential for analyzing and designing electrical installation systems. The discipline covers voltage, current, resistance, and Ohm's Law fundamentals, complemented by systematic analysis of series, parallel, and series-parallel circuits with emphasis on practical power and energy calculations. Students master analysis methods including nodal and mesh analysis, and network theorems—Thévenin, Norton, superposition, maximum power transfer—for efficient problem-solving. Capacitive elements are studied including charging and discharging transient analysis. Electromagnetic fundamentals including magnetism principles, magnetic circuits, magnetomotive force, reluctance, and magnetic flux support understanding of electrical equipment operation. Inductance and inductive transients complete the DC analysis framework. Practical applications to electrical installation systems throughout ensure relevance to building electrical installations. The course provides essential foundation for advanced AC circuit analysis and specialized electrical installation courses.

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

Course description (Syllabus): develops 2D CAD competencies using AutoCAD for producing technical construction drawings and installation documentation. The discipline covers AutoCAD workspace organization, interface fundamentals, and systematic development of drawing and editing capabilities. Students master drawing entity creation (lines, circles, polygons, arcs, rectangles, polylines), view commands (zoom, pan, view management), and comprehensive editing operations (copy, move, rotate, scale, stretch, trim, extend, fillet, chamfer). Core competencies include layer management and drawing order control, text insertion and formatting, dimensioning with dimension styles, and line indication methods (centerlines, section lines). Advanced topics encompass block creation and attributes, external references for drawing assemblies, polyline editing and optimization, and utility features (QuickCalc, CAL command). Property matching and quick selection tools enhance efficiency. The course systematically develops plotting and printing procedures for professional-quality construction document production. Practical applications to architectural and installation system drawings ensure specialization relevance. The course provides essential foundation for advanced 2D and 3D CAD applications.

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

Course description (Syllabus): develop pre-intermediate technical language and professional communication competencies for installation engineering specializations. The courses build upon Levels I and II foundations, integrating listening, speaking, reading, and writing skills with emphasis on specialized technical vocabulary and professional discourse specific to installation systems. Students master pre-intermediate grammar structures and complex sentence construction for technical documentation, specialized reports, and professional correspondence. Specialized vocabulary development in installation engineering domains—piping, HVAC, electrical, thermal systems—combined with comprehension of technical specifications and engineering documentation ensures practical relevance. Oral communication confidence for professional meetings, site discussions, and technical presentations is developed. The disciplines prepare students for intermediate-level professional roles and technical collaboration in installation engineering and building services.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physical education and sports III	LS03	1		1		

Course description (Syllabus): advances athletic specialization and training science, building upon Levels I and II. The discipline integrates advanced exercise physiology, biomechanical analysis, and training methodology for high-performance athletic development. Students master kinesiology and biomechanics of human movement, physiological responses to varying exercise intensities and training, and metabolic processes supporting athletic performance. Training science encompasses periodization, program design, and advanced conditioning for specialized fitness components—strength, power, speed, endurance, flexibility. Injury prevention through understanding injury mechanisms and rehabilitation principles ensures safe participation. Advanced sport-specific technical and tactical performance optimization at competitive levels is emphasized. Nutritional support for athletic performance and recovery is integrated. The course develops application of exercise science knowledge to training design and performance enhancement, critical thinking regarding training principles, and scientific approach to athletic development. Long-term sustainable athletic participation and injury prevention are emphasized throughout.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
O1. Basics of architecture	ARH03	2	1			

Course description (Syllabus): introduces fundamental architectural concepts essential for understanding spatial organization and installation system integration in building design. The discipline covers functional analysis of spaces, structural systems, aesthetic and compositional principles, and urban context with emphasis on implications for building services systems. Students develop competency in reading architectural documents, understanding spatial relationships, and recognizing constraints for installation system routing and placement. Structural-spatial relationships and load-bearing systems support understanding of support requirements for equipment and piping systems. Aesthetic and compositional principles ensure integration of visible installation elements with architectural design intent. Urban planning context and site infrastructure provide foundation for understanding building systems relationships. Special emphasis on spatial organization for building services—mechanical spaces, piping/ductwork routing, equipment placement, system coordination—ensures relevance to installation engineering. The course provides foundation for advanced building systems integration and technical design coordination courses.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
O1. Earthquake Engineering	INGSEI03	2	1			

Course description (Syllabus): develops seismic competencies for designing safe building systems and installation equipment in earthquake-prone regions. The discipline covers structural dynamics fundamentals—degrees of freedom, natural frequencies, damping, mode shapes—and systematic analysis of SDOF and MDOF systems under dynamic loading. Students master seismic ground motion characterization, response spectra, seismic hazard assessment, and building response analysis. Seismic analysis methods including equivalent lateral force, modal response spectrum, and time-history analysis enable systematic evaluation of earthquake effects. Code-based seismic design principles (P100 standard) and post-elastic behavior—ductility, energy dissipation—ensure

understanding of structural response and damage control. Particular emphasis on implications for building services—equipment support, piping restraint, system coordination, functional continuity—ensures relevance to installation engineering. The course develops competency in evaluating seismic demands on installation systems, designing appropriate restraints and supports, and ensuring building service resilience to seismic events.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
O2. Academic Writing	SAC 03	2	1			

Course description (Syllabus): develops technical writing competencies essential for engineering academic and professional success. The discipline covers fundamental principles of effective writing including audience analysis, purpose, style, and organization, with systematic practice in sentence-level writing, paragraph development, and document structure. Students master engineering-specific writing genres including technical descriptions, lab reports, proposals, and specifications through guided practice and feedback. Research methodology, source integration, and citation conventions (IEEE) support academic writing. Document design and formatting ensure professional presentation of technical information. Students practice adapting writing to different audiences—colleagues, supervisors, clients, agencies—and develop awareness of ethical writing responsibilities. Revision and editing processes including peer review and self-assessment develop ability to improve draft documents. The course emphasizes clear, concise, accurate communication of complex technical information. Upon completion, students demonstrate professional-quality technical writing competency for engineering contexts.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
O2. Academic Ethics and Integrity	EIAC 03	2	1			

Course description (Syllabus): develops understanding of ethical principles and academic integrity standards essential for higher education and professional engineering practice. The discipline covers core ethical values—honesty, fairness, responsibility, transparency—with application to academic and professional contexts. Students master recognition of academic misconduct including plagiarism, collusion, fabrication, and falsification, with understanding of consequences. Research ethics fundamentals include responsible conduct, data integrity, authorship ethics, and conflict of interest management. Professional ethics in engineering addresses engineer's responsibilities to public safety, professional codes of conduct, and ethical decision-making frameworks. Institutional mechanisms including university codes of ethics and conduct procedures establish understanding of student rights and responsibilities. Emerging technologies including AI use in academic and professional contexts is addressed. Case-based learning and discussion develop ethical reasoning and decision-making competencies. Upon completion, students demonstrate commitment to academic integrity and professional responsibility, with capacity to recognize and address ethical violations appropriately.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Thermotechnics II	TTI04	6	3	1	1	

Course description (Syllabus): develops heat transfer competencies essential for analyzing and designing thermal installation systems. The discipline covers three heat transfer modes: conduction through solid materials and building envelopes including one-dimensional steady and transient analysis in planar, cylindrical, and spherical geometries; convection including forced and natural convection in pipes and ducts, and boiling/condensation phenomena; radiation including non-black body surfaces, view factors, and gray body radiation. Students master thermal resistance networks, transient response analysis with practical methods, convection correlations for pipes and ducts, and radiation heat transfer calculations. Heat exchanger fundamentals encompass types, effectiveness-NTU method, and thermal-hydraulic analysis for sizing and performance evaluation. Practical problem-solving using SI units and real installation applications throughout ensures relevance to thermal and refrigeration system design. The course provides essential foundation for advanced thermal system design and professional installation engineering practice.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Hydraulic services II	HI04	6	3	1	1	

Course description (Syllabus): addresses transient (non-permanent) flow phenomena in pressurized and open-channel systems essential for designing and analyzing complex water distribution, wastewater, and drainage installations. The discipline covers water hammer and pressure surge in pipelines including analysis methods, characteristic method for transient flow simulation, and protective measures (air valves, surge tanks). Open-channel flow encompasses gradually-varied flow, hydraulic jump, critical flow conditions, and free-surface flow analysis in channels and open conduits. Wastewater system hydraulics including sewerage and storm drainage design are addressed. Network analysis for piping systems covers serial/parallel arrangements, branched and looped networks, and system balancing. Computational transient simulation methods support analysis of realistic installation system behavior. Students master analysis of transient events, prediction of pressure surges and water hammer, protection measure design, and network optimization. The course provides essential foundation for advanced installation system design addressing dynamic conditions and complex system interactions.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Electrotechnics II	EIC04	6	3	2		

Course description (Syllabus): develops AC circuit analysis competencies and electrical equipment understanding essential for building electrical installations. The discipline covers AC fundamentals, impedance concept with R/L/C elements, and power calculations including real, reactive, and apparent power. Series and parallel AC circuits are analyzed using phasor methods, complex impedance, and network analysis techniques. AC network theorems and resonance phenomena support systematic problem-solving. Three-phase systems encompass balanced/unbalanced configurations, power calculations, and distribution applications. Transformer fundamentals address ideal/real behavior, equivalent circuits, and voltage transformation for installation use. Induction motor principles including rotating field, slip, and torque production are comprehensively covered with speed control methods. Synchronous motors and their constant-speed characteristics are addressed. Feedback devices—encoders, resolvers—and their use in remote positioning and installation automation systems conclude the core content. Practical applications throughout ensure relevance to building electrical installation design and operation.

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

Course description (Syllabus): advance to upper-intermediate technical language and professional communication competencies for advanced installation engineering roles. The courses build upon Levels I-III foundations, integrating advanced listening, speaking, reading, and writing skills with emphasis on complex technical vocabulary and sophisticated professional discourse specific to advanced installation systems. Students master upper-intermediate grammar structures and sophisticated sentence construction for advanced technical documentation, specialized reports, and professional correspondence. Advanced specialized vocabulary in installation engineering domains—complex piping, advanced HVAC, specialized electrical systems, thermal optimization, automation—combined with comprehension of advanced technical standards and international codes ensures deep professional relevance. Oral communication confidence for advanced professional contexts—technical presentations, negotiations, team leadership, international collaboration—is emphasized. The disciplines prepare students for upper-intermediate to advanced professional roles, international technical partnerships, and specialized expertise in installation engineering and building services.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Civil buildings	CONI04	3	2			1

Course description (Syllabus): develops understanding of building structures, components, and systems essential for coordinating installation systems with structural and architectural elements. The discipline covers building structural systems including load paths, bearing walls, skeleton structures, and contemporary systems, complemented by study of building elements including foundations, beams, columns, and lateral systems. Building assembly components—exterior walls, roofing, flooring, partitions—are presented with emphasis on service routes and penetrations for installations. Building materials including masonry, concrete, steel, timber, and composites are addressed with attention to construction implications. Damp-proofing, thermal insulation, and sound insulation systems are studied. Building details including expansion joints, settlements joints, and specialized details address practical construction considerations. Systems integration emphasizes relationships between structural elements and installations including mechanical spaces, routing, equipment support, and coordination zones. Students develop competency in reading building drawings, understanding structural design, recognizing constraints for installation systems, and coordinating installation work with structural requirements. Construction methods and site coordination knowledge ensure effective professional practice. The course provides foundation for understanding building-installation integration and professional coordination in construction projects.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Infographics II	IGI04	3	2		3	

Course description (Syllabus): develops CAD application competencies for producing installation system drawings and design documentation. The discipline builds on Infographics I skills with practical application to sanitary/plumbing, heating, and electrical installation systems. Students master creation of sanitary and plumbing drawings including water supply networks, drainage layouts, and fixtures using standard symbols. Heating system documentation encompasses piping circuits, equipment placement, flow/return lines, and controls using thermotechnical symbols. Electrical installation drawings cover power distribution, lighting circuits, outlets, protection devices, panels, and control wiring. Multi-system coordination addresses spatial conflicts, code compliance, and constructability. Practical project work involves complete installation system documentation for a representative building addressing all three systems with professional inter-system coordination. CAD techniques include layer management, symbol libraries, dimensioning, and standards compliance. Introduction to BIM concepts and integrated MEP design provides advanced context. Upon completion, students produce professional installation system drawings suitable for design, permitting, construction, and trade coordination.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physical education and sports IV	EFZ04	1		1		

Course description (Syllabus): culminates advanced specialization in strength and conditioning, athletic performance development, and professional coaching. The discipline integrates advanced biomechanics and movement analysis, elite training methodologies, and coaching expertise. Students master advanced periodization and program design for peak performance, strength and conditioning principles for specific sports, and special population coaching considerations. Advanced physiology addresses neural and metabolic adaptations to training; psychology addresses motivation, confidence, and performance enhancement. Nutrition and recovery strategies optimize athletic development. Coaching competencies develop program evaluation, decision-making, and athlete-centered leadership. Capstone project demonstrates comprehensive athlete assessment and individualized program implementation. Upon completion, students demonstrate expertise qualifying for professional strength and conditioning coaching, elite athlete development, or specialized performance training roles.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Technological practice 3 weeks x30hours	PRAC04	4				

Course description (Syllabus): provides 90-hour work-integrated learning experience in building services installation projects. Students participate in practical installation execution including sanitary/plumbing, thermal, and electrical systems with emphasis on technical and quality aspects. Technological organization experience addresses work sequencing, trade coordination, logistics, and scheduling. Works mechanization encompasses equipment selection, operation, and productivity analysis. Building site organization experience covers layout, safety, quality assurance, material management, and professional standards. Students document site activities and observations demonstrating practical understanding of installation engineering. Safety protocols, regulatory compliance, and environmental responsibility are emphasized. Comprehensive oral presentation documenting site experiences, technical observations, and learned lessons demonstrates synthesis of accumulated practical knowledge and professional competency. Upon completion, students have direct professional experience with installation systems execution, understanding of site management, and enhanced preparedness for professional engineering practice.

3rd Year

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Hydraulics systems	MAH05	5	2		2	

Course description (Syllabus): develops competencies in hydraulic and pneumatic machinery essential for designing and operating fluid power systems in building services. The discipline covers fundamental machine parameters and classifications, positive displacement machines (reciprocating pumps, gear pumps, compressors) with discharge and power calculations, and hydrodynamic machines (centrifugal and axial pumps). Students master fundamental equations, characteristic curves including head-capacity and efficiency relationships, performance analysis, and practical characteristics. Pump system integration encompasses set-point control methods (throttle, bypass, pressure control, speed control), series/parallel arrangements, and suction characteristics including cavitation and NPSH. Compressor theory addresses compression processes, efficiency, and multistage designs. Fans including centrifugal and axial types and capacity regulation complete the machine portfolio. The course develops competency in machine selection, performance prediction, and system design for water supply, thermal, and air handling applications typical of building services.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Plumbing installations I	INSA05	5	3			2

Course description (Syllabus): develops foundational competencies in water supply and sanitary drainage systems for buildings. The discipline covers water supply fundamentals including sources, demand calculations, treatment methods, storage and distribution, and fire protection systems. Students master piping material selection, fixture design, water pressure management, backflow prevention, and domestic hot water generation. Sanitary drainage systems encompass wastewater disposal principles, fixture drainage calculations, drainage types, pipe sizing using self-cleaning velocities, and testing. Treatment and disposal methods including septic tanks and sewer connections ensure environmental protection. Rainwater and storm water management including roof gutters and rainwater harvesting support sustainable design. Application to residential, public, and industrial buildings ensures practical relevance. Students develop competency in designing complete water supply and sanitary systems, material selection, component sizing, and regulatory compliance for safe and sustainable plumbing installations.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Heating systems and equipements I	ININ05	5	3			2

Course description (Syllabus): develops competencies in hydronic heating system design, construction, and operation for buildings. The discipline covers heat load calculation methods including envelope losses, ventilation, and infiltration for diverse building types. Heating system classifications encompass one-pipe, two-pipe, and zone-controlled systems with selection based on application requirements. Boiler types including fire-tube and water-tube boilers are studied with understanding of operating principles, efficiency, combustion, and safety equipment. Thermal energy distribution encompasses piping design, sizing, pressure drop analysis, and thermal insulation. Circulation equipment including pumps and control valves enables system operation and regulation. Terminal units including radiators, convectors, and panel heating systems are addressed with performance characteristics. System design methodology integrates heat load, component sizing, pump selection, boiler capacity, and system balancing. Control systems including thermostatic valves and zone thermostats support comfort and efficiency. Application to residential, institutional, and commercial buildings ensures practical relevance. Students develop competency in heating load calculation, equipment selection, system design, and component sizing for complete heating system design.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Thermal Equipments	APT05	5	3			2

Course description (Syllabus): develops competencies in thermal device design, heat transfer analysis, and thermal system performance. The discipline covers fuel types, combustion principles, and burner design for complete combustion. Hot water and steam generators are addressed with design fundamentals and efficiency characteristics. Thermal balance calculations encompassing energy conservation and loss accounting establish equipment performance. Heat transfer verification addresses conduction, convection, and radiation through thermal devices. Air/gas and hydraulic calculations ensure adequate flow and pressure conditions. Heat exchanger types, design methodologies, LMTD and effectiveness-NTU methods, and pressure drop analysis enable complete design and analysis. Heating system design elements and verification including equipment selection, sizing, and commissioning ensure systems meet performance requirements. Special HVAC equipment including expansion tanks, accumulators, and thermal storage are addressed. Throughout, practical problem-solving develops competency in thermal calculations, equipment design, performance verification, and complete thermal system design for buildings.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Computer-Aided Engineering Design	PAC05	3	1		3	

Course description (Syllabus): develops advanced competencies in CAE, simulation, and virtual prototyping for engineering design optimization. The discipline covers CAE fundamentals including discretization and meshing, with systematic development of FEA proficiency. Structural analysis encompasses linear static, nonlinear geometry, nonlinear materials, and contact analysis. Modal analysis addresses vibration and frequency response. Thermal analysis covers steady-state and transient heat transfer including coupled thermal-structural problems. Computational Fluid Dynamics (CFD) addresses flow analysis, heat transfer, and pressure drop in pipes and equipment. Professional software tools (ANSYS, CATIA) are utilized for geometry preparation, meshing, solver setup, boundary conditions, and results interpretation. Design optimization methods employ parametric design for weight and stress optimization. Practical projects address installation system components, piping analysis, thermal optimization, and system integration. Upon completion, students demonstrate effective CAE use, critical result interpretation, computational validation, and data-driven engineering decisions for equipment and installation system design.

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

Course description (Syllabus): develops foundational economic competencies for professional decision-making. The discipline covers fundamental concepts—scarcity, choice, opportunity cost—and economic problem solving. Market fundamentals encompass supply, demand, price determination, and equilibrium analysis with application to diverse

market structures including perfect competition, monopoly, and oligopoly. Property and property rights are addressed as fundamental to economic functioning and capital formation. Consumer behavior theory addresses utility maximization, budget constraints, and individual demand. Production fundamentals including factors of production, production functions, and cost structures support understanding of firm behavior. Market competition and economic balance are systematically analyzed with emphasis on efficiency and resource allocation. International economic environment encompasses trade, comparative advantage, exchange rates, and global markets. Students develop critical thinking and analytical skills for interpreting economic data, applying economic models, and making informed economic decisions. Upon completion, students demonstrate understanding of core economic principles and ability to apply economic reasoning to real-world scenarios.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
O1.Building thermotechnics	TC05	5	2	2		

Course description (Syllabus): develops competencies in building thermal behavior, energy efficiency design, and low-energy building solutions. The discipline covers fundamental thermotechnical concepts and heat transfer mechanisms applicable to building elements. Construction element analysis encompasses walls, roofs, floors, windows, and thermal performance evaluation. Heat transfer analysis addresses steady-state conduction through multilayer elements using U-values and thermal resistance, and transient effects accounting for thermal mass. Heat loss calculations encompassing envelope conduction, ventilation, infiltration, and thermal bridges are systematically determined. Heat gain calculations addressing solar radiation and internal sources enable complete energy balance. Annual energy need calculations determine heating and cooling requirements using energy balance approaches. Energy certificate preparation addresses standardized performance assessment and regulatory compliance. Low-energy design solutions encompass envelope optimization including insulation, windows, and thermal bridge elimination; passive solar strategies; and ventilation with heat recovery. Passive house principles including superior insulation, airtightness, high-performance windows, and mechanical ventilation represent advanced efficient building design. Upon completion, students demonstrate competency in building thermal design, energy demand prediction, and energy-efficient building solutions including passive house design.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
O1. Elements of Building Physics	EFC05	5	2	2		

Course description (Syllabus): develops understanding of physical phenomena in buildings for ensuring thermal, acoustic, and natural lighting comfort while optimizing energy efficiency. The discipline covers hygrothermal comfort theory including thermal sensation and comfort indicators (PMV, PPD), with systematic analysis of heat transfer through building elements using U-values and thermal resistance. Thermal bridges and transient effects accounting for thermal mass and diurnal variations are addressed. Water vapor diffusion and condensation prevention ensure durability. Acoustic fundamentals address sound propagation, absorption, and insulation with practical protection measures against external and internal noises. Natural lighting encompasses daylight availability, illumination calculations, and glare control. Solar radiation analysis using sun-building geometry, solar diagrams, and shadow masks informs solar control strategies balancing winter gains and summer protection. Energy efficiency standards including nZEB and passive house design principles support sustainable solutions. Throughout, integration of all physical domains (hygrothermal, acoustic, lighting, solar) with comfort and energy performance supports comprehensive design approach. Upon completion, students demonstrate competency in building physics analysis, comfort optimization, and sustainable design implementation.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Heating systems and equipements II	ININ06	3	2			

Course description (Syllabus): addresses specialized heating system types and emerging technologies for advanced building applications. The discipline covers low-temperature radiant heating including underfloor systems, suspended

radiant panels, and thermally activated building systems (TABS) with comprehensive design methodologies. Radiant system advantages including comfort, efficiency, and silent operation are balanced against design considerations. Hot air heating systems encompassing furnace design, ductwork, and air distribution are addressed with system comparison to other technologies. Electrical heating systems including resistance heaters, infrared radiant heaters, and heat pumps are systematically covered with safety and efficiency considerations. Low-temperature steam systems distinguish low-pressure condensing steam from industrial high-pressure systems, with focus on steam trap operation, heat exchanger design, and condensate return. Domestic hot water heating through steam heat exchangers ensures potable water safety. System controls and integration ensure reliable efficient operation of specialized systems. Applications to diverse building types including large unheated spaces and institutional facilities demonstrate practical relevance. Upon completion, students demonstrate competency in designing specialized heating systems, selecting appropriate technologies for specific applications, and understanding advanced heating system operation and control.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Heating systems and equipements II-Project	PININ06	2				2

Course description (Syllabus): provides practical project-based design experience in specialized heating systems. Students work in teams to design complete heating systems for realistic building scenarios. Project scope encompasses systematic heating load calculation including envelope losses, gains, ventilation, and psychrometric analysis; system type selection from advanced options; component sizing including equipment, piping, ductwork; design drawing and technical specification preparation; and energy/cost analysis. Design tools including CAD, spreadsheets, and HVAC software support systematic design process. Projects address diverse building types and heating technologies (radiant, hot air, electrical, steam) with emphasis on practical problem-solving. Energy efficiency analysis, alternative design comparison, and optimization studies develop decision-making competency. Final presentations and technical reports demonstrate synthesis of theory and practical design competency. Upon completion, students demonstrate comprehensive heating system design capability suitable for professional engineering practice.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Plumbing installations II	INSA06	4	2			

Course description (Syllabus): addresses advanced sanitary systems, wastewater collection, treatment, and environmental protection. The discipline covers drainage system classification and design including stack sizing, self-cleaning velocities, and trap function ensuring proper operation. Wastewater collection systems encompassing sewer types (combined, separate, selective), pipe sizing following gradient requirements, and inspection chamber design support infrastructure reliability. Stormwater management including gutters, retention, and green infrastructure (constructed wetlands, permeable pavements) addresses sustainable drainage. Wastewater treatment encompasses primary and secondary biological processes (activated sludge, trickling filters, constructed wetlands), and tertiary advanced treatment. Decentralized treatment (septic tanks with drainage fields) and centralized treatment plants address diverse applications. Treatment effluent reuse for irrigation (refolosire apă epurată) and industrial applications supports water conservation. District water systems (Hidroedilitare) provide integrated collection and treatment. Regulatory compliance (NTPA 011/2002) ensures environmental protection. Application to residential, public, and industrial buildings demonstrates practical relevance. Upon completion, students demonstrate competency in designing comprehensive sanitary systems with appropriate treatment and environmental responsibility.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Plumbing installations II - Project	PINSA06	2				2

Course description (Syllabus): provides practical project-based design experience in advanced sanitary and wastewater systems. Students work in teams to design complete plumbing and treatment systems for realistic building scenarios. Project scope encompasses systematic drainage design with self-cleaning velocity calculations; wastewater treatment technology selection (septic systems, activated sludge, constructed wetlands—ZUC); treatment plant sizing and process design; stormwater management including green infrastructure; and water conservation with reuse opportunities. Professional CAD (AutoCAD, Revit), hydraulic analysis software, and cost estimation tools support systematic design process. Environmental impact assessment ensures compliance with NTPA 011/2002 and sustainability objectives. Projects address diverse building types (residential, commercial, institutional, industrial) with emphasis on practical problem-solving. Final presentations and technical reports demonstrate synthesis of theory and practical design competency for professional engineering practice. Water safety design including legionella risk assessment and control strategies ensure public health protection

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Air conditioning systems I	INVC06	4	3			3

Course description (Syllabus): develops understanding of air conditioning principles, thermal comfort, indoor air quality, and air treatment processes. The discipline covers outdoor climatic design conditions and their impact on system requirements. Thermal comfort fundamentals address physiological heat exchange, comfort indices (PMV, PPD), and operative temperature ensuring human comfort specification. Indoor air quality encompasses identification of pollutants, concentration limits, and outdoor air requirements per ASHRAE 62.1. Thermal balance calculations systematically determine heating and cooling loads including envelope conduction, solar gains, and internal sources. Humidity balance addresses moisture generation, dehumidification requirements, and condensation prevention. Psychrometric analysis enables systematic evaluation of air state changes through treatment processes. Air flow for ventilation encompasses mixed ventilation, displacement ventilation, and personalized systems with distribution design ensuring both comfort and IAQ. Air treatment processes for summer and winter operation address sensible and latent load removal through filtration, heating, cooling, humidification, and dehumidification. Energy recovery ventilation minimizes energy penalties of outdoor air supply. Application to diverse building types demonstrates practical relevance. Upon completion, students demonstrate competency in comfort, load calculations, and air conditioning system design fundamentals.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Electrical circuits for buildings I	INEL06	4	3			3

Course description (Syllabus): develops competencies in lighting system design and selection for diverse building types. The discipline covers lighting fundamentals including photometric quantities (lumens, lux, luminous intensity, luminance), efficacy, and visibility principles. Lamp technologies—incandescent, fluorescent, HID, LED—are systematically studied with emphasis on luminous output, efficacy, color properties (CRI, CCT), and lamp life enabling informed selection. Control equipment including ballasts and LED drivers ensure appropriate lamp operation. Lighting design methods including point-to-point calculations and lumen method enable systematic illuminance determination and fixture sizing. Design calculations address diverse building types (residential, offices, schools, healthcare, industrial) with appropriate illuminance standards. Visual comfort addresses glare control and color rendering quality. Daylighting integration reduces artificial lighting loads. Control systems including occupancy sensors, dimming, and daylight harvesting enable adaptive energy-efficient operation. Energy conservation measures and environmental protection through reduced consumption and sustainable technologies support responsible design. Upon completion, students demonstrate competency in lighting calculations, technology selection, and energy-efficient illumination system design for various building applications.

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

Course description (Syllabus): develops competencies in refrigeration system design and component selection for diverse applications. The discipline covers refrigerant selection addressing thermodynamic properties, environmental impact (ODP, GWP), and regulatory compliance. Compression refrigeration cycles including single-stage, two-stage, three-stage, cascade, and ejection systems are systematically analyzed with pressure-enthalpy diagrams. Absorption systems using ammonia-water and lithium bromide-water solutions address heat-driven thermodynamic cycles. Equipment selection and sizing encompasses compressors (displacement calculation, efficiency), condensers (air/water-cooled with heat transfer analysis), evaporators (sensible/latent cooling design), and auxiliary equipment (expansion devices, separators, accumulators). Thermal balance calculations determine refrigeration capacity and energy requirements. Heat transfer analysis for condenser and evaporator surfaces using overall heat transfer coefficients and LMTD ensures proper sizing. Refrigerant distribution piping design addresses adequate flow, pressure drop minimization, and oil return. System installation, testing, and commissioning procedures ensure correct startup and optimization. Diverse applications (air conditioning, skating rinks, concrete cooling, industrial freezing) demonstrate practical relevance. Upon completion, students demonstrate competency in refrigerant selection, thermodynamic analysis, equipment sizing, heat transfer design, and refrigeration system operation.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Unconventional sources of energy	SNE 06	3	2	2		

Course description (Syllabus): develops competencies in renewable energy technologies and nearly zero-energy building (nZEB) design addressing EU energy policy objectives. The discipline covers solar thermal systems for space heating and domestic hot water, with collector design, thermal storage, and seasonal energy storage optimization. Photovoltaic systems encompassing module technologies, inverters, and battery energy storage enable electricity generation and storage. Geothermal and air-source heat pump systems with COP/SCOP performance metrics address heating and cooling integration with thermal storage. Biomass systems including pellet and chip boilers with sustainable sourcing, small wind turbines, and hydroelectric systems provide diverse renewable options. Thermal energy storage systems (sensible, latent, thermochemical) and battery systems enable temporal renewable generation-demand matching. The nZEB design hierarchy—reduce demand through envelope optimization, apply on-site renewable energy, minimize grid consumption—addresses EPBD requirements. National nZEB transition plans reflecting climate and regional conditions ensure practical implementation. Lifecycle assessment and economic analysis guide sustainable technology selection. Complete nZEB projects demonstrate 80-90% energy reduction versus conventional buildings. Upon completion, students demonstrate competency in renewable technology assessment, system sizing, nZEB integration strategy, and sustainable building services engineering meeting EU climate objectives.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Technological practice	PRA06	4				

Course description (Syllabus): provides work-integrated learning supplementing theoretical knowledge with practical experience in building services and HVAC-R industry. The discipline encompasses structured company-based learning through three phases: (1) Company Orientation establishing understanding of organizational structure, products/services, technical processes, and competitive positioning through personnel meetings and SWOT analysis. (2) On-the-Job Engineer Training (OJET) providing hands-on experience in system design, installation, commissioning, and troubleshooting under mentorship, developing practical competencies in equipment selection, thermal/hydraulic calculations, performance verification, and safety/quality standards. (3) Professional Development incorporating soft skills, workplace communication, and organizational awareness. Practical Knowledge Verification through comprehensive Practical Record Book documents daily work activities, applied theoretical knowledge, equipment specifications, technical analysis, problem-solving approaches, and supervisor feedback, verified by faculty mentor. Diverse Placements through faculty-industry collaborations or student-selected companies ensure experience with diverse building types and system configurations. Learning Integration links practical experience to core competencies: thermal/hydraulic design application, equipment selection, commissioning procedures, troubleshooting, energy

efficiency, IAQ/comfort, and regulatory compliance. 360-Degree Assessment integrating supervisor evaluation, practical notebook documentation, student reflection, and faculty assessment ensures comprehensive competency evaluation. Upon completion, students demonstrate competency in applied engineering practice, professional problem-solving, and readiness for independent building services engineering practice.

4th Year

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Air conditioning systems II	INVC07	4	2			

Course description (Syllabus): develops competencies in design, installation, and commissioning of complete ventilation and air conditioning systems. The discipline addresses complex air treatment for comfort and health: filtering, heating, cooling, humidification/dehumidification with treatment sequencing optimizing efficiency. Air diffusion in rooms encompasses mixed ventilation, displacement ventilation, and personalized systems with diffuser selection ensuring comfort and performance. Ductwork design systematically sizes supply/return ducts for calculated airflows, with duct layout accounting for spatial constraints and minimizing pressure drop. Air handling unit (AHU) components including outdoor air intake, multi-stage filtration, heating/cooling coils, heat recovery systems (73-80% efficiency), fans (optimized specific fan power), and control instrumentation enable integrated operation. Diverse applications (residential, commercial, institutional, healthcare) demonstrate practical relevance. Upon completion, students demonstrate competency in AHU design, ductwork sizing, system integration ensuring complete climate control systems meeting design performance**.**

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Air conditioning systems II - Project	PINVC07	2				3

Course description (Syllabus): - Project develops engineering competencies through team-based design and analysis of complete ventilation and air conditioning systems integrating coursework theory with practical problem-solving. Students perform building thermal load analysis using steady-state heat transfer (conduction, convection, solar radiation, infiltration) with thermal resistance network analysis determining seasonal heating and cooling requirements. Psychrometric analysis systematically traces air state changes through treatment processes (heating, cooling, humidification, dehumidification) on psychrometric charts, calculating sensible/latent/total energy requirements. Equipment sizing integrates load calculations with manufacturer datasheets, ensuring proper capacity selection: heating/cooling coil area and surface determination; fan sizing from airflow and system pressure; and auxiliary component selection. Ductwork design applies ASHRAE friction analysis and Bernoulli equation for pressure drop calculation, thermal gravity effect analysis, and system balancing ensuring adequate airflow distribution. Control system design specifies heating/cooling valve sequencing, humidity control, and outdoor air modulation maintaining design conditions. Technical documentation including calculations, process diagrams, system drawings, and design justification demonstrates engineering communication. Assessment integrates project deliverables, technical report quality, team presentation, and individual contribution evaluation. Projects emphasize fundamental engineering analysis (hand calculations, psychrometric charts, thermal principles) rather than commercial software, enabling understanding of underlying design principles. Upon completion, students demonstrate competency in thermal analysis, psychrometric design, systematic component sizing, ductwork design methodology, and professional communication of engineering solutions.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Electrical circuits for buildings II	INELO7	4	2			

Course description (Syllabus): develops competencies in low-voltage electrical distribution system design for buildings. The discipline addresses power supply selection (utility, backup systems), load estimation applying demand and coincidence factors, conductor sizing per IEC 60364, voltage drop analysis ensuring VD ≤ 3% main / 5% final circuits,

and overcurrent protection coordination. Earthing system design ensures electrical safety with earthing resistance <4 Ohms and ELCB selection (30 mA wet areas, 100-300 mA dry). Distribution system architecture progresses from main supply through intermediate boards to final circuits. Power quality measures including power factor correction (cos φ ≥ 0.9) and harmonic distortion (THD <5%) comply with IEC 60364-8-1 and EU Directive 2012/27/EU energy efficiency requirements. Upon completion, students demonstrate competency in load calculation, conductor sizing, protection design, and safe electrical distribution system specification.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Electrical circuits for buildings II - Project	PINEL07	2				2

Course description (Syllabus): - Project provides practical project-based learning integrating theoretical knowledge from Electrical Circuits for Buildings II with systematic design and analysis of complete low-voltage electrical distribution systems. The discipline develops core engineering competencies through team-based design projects addressing realistic building electrical requirements. Students progress through scaffolded design stages: (1) Concept Design establishing system architecture, main switchboard location, and distribution strategy based on building layout and load requirements; (2) Schematic Design refining distribution boards, confirming equipment sizing, and developing preliminary protection coordination; and (3) Detailed Design performing conductor sizing with voltage drop verification, circuit breaker selection with short-circuit analysis, final switchboard layout, and comprehensive coordination studies ensuring selectivity and safe operation. Upon completion, students demonstrate competency in load estimation, conductor sizing methodology, protection design, system architecture development, and professional documentation of electrical distribution solution

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): develops competencies in natural gas transport, distribution, and utilization system design and operation. The discipline addresses gas properties and thermodynamic characteristics affecting system behavior, system operating pressure classification (low, medium, high-pressure), pipeline sizing through pressure drop analysis using standardized design methodologies, pressure regulation systems ensuring safe end-user operation, and piping material selection per regulatory standards. Safety systems including pressure relief, shut-off devices, and leak detection protocols ensure system integrity. Network design methodologies optimize supply reliability and load distribution. Metering systems enable consumption monitoring and billing. Complete system design documentation includes network schematics, pipe schedules, regulator specifications, and operating procedures. Applications address diverse building types from residential to institutional facilities. Upon completion, students demonstrate competency in gas system design, sizing calculations, equipment selection, safety implementation, and regulatory compliance for natural gas supply systems.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Building Automation Systems I	AI07	4	2	2		

Course description (Syllabus): develops competencies in automatic control systems for building services. The discipline covers electrical contacts and relays as fundamental switching elements, digital logical signals and Boolean operations, automatic protection mechanisms (overload, short-circuit, emergency stop) ensuring safety, and multi-level PID control principles enabling continuous process regulation. Programmable Logic Controllers (PLCs) provide automation platform with processor, memory, I/O modules, and ladder logic programming. Combined logic synthesis integrates multiple functions into cohesive control strategies: combinational logic for input-dependent outputs and sequential logic incorporating system memory. Complete automation installations encompass sensors (temperature, humidity, pressure, occupancy), controllers with communication protocols (BACnet, Modbus), analog-to-digital and digital-to-analog converters enabling sensor-controller-actuator integration, and actuators (solenoid valves, motors, dampers, variable frequency drives) executing control commands. Electric motor starting encompasses direct-on-line,

soft starters, and variable frequency drive control with protection and safety provisions. System analysis using block diagrams clarifies component interactions and signal flow; steady-state and transient analysis determine system performance. Performance characteristics (response time, stability, accuracy, sensitivity) guide design optimization. Elevator control integration demonstrates practical synthesis of control principles. Upon completion, students demonstrate competency in control logic design, PLC programming, system architecture, component selection, and safe automation implementation.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
District Heating Systems	RT07	5	2			2

Course description (Syllabus): develops competencies in design and operation of centralized thermal energy distribution systems for urban and industrial consumers. The discipline addresses thermal network architecture from generation through primary transport and secondary distribution to end-user connection, systematic thermal and hydraulic load calculation determining pipe sizing and equipment requirements, pressure regulation and thermal control systems maintaining performance, thermal loss calculation and minimization through proper insulation and design, and structural integrity verification ensuring safe long-term operation under pressure and thermal stress. Thermal substations adapt central system parameters to diverse building requirements. Network design accounts for geographic constraints and redundancy requirements. Hydraulic analysis determines flow distribution and pressure drop using standardized methods ensuring adequate circulation. Thermal analysis quantifies heat losses during transport and distribution. Strength calculation verifies pipe wall thickness and structural integrity. Applications to residential district heating, industrial thermal networks, and emerging low-temperature systems for energy-efficient buildings demonstrate practical relevance. System operation addresses load variation management, emergency procedures, and maintenance protocols ensuring reliability. Upon completion, students demonstrate competency in thermal load assessment, network design methodology, hydraulic and thermal calculation, equipment specification, structural verification, and operational management of district heating systems serving diverse consumer requirements.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
O1. Urban Hydraulic Systems	INHI07	5	2			2

Course description (Syllabus): develops competencies in design and operation of water supply and sewage systems for urban localities. The discipline addresses water supply system architecture from sources (groundwater boreholes, surface water) through treatment ensuring potable quality per Directive 98/83/CE, aduction transport, storage reservoirs for regulation, and distribution networks to consumers. Characteristic flow calculation applies demand coefficients (Kh daily, Kh' hourly) determining peak requirements and fire-fighting reserve integration. Hydraulic design applies flow and pressure drop calculations ensuring adequate service pressure and self-cleaning velocities throughout networks. Sewage systems encompass wastewater collection, rainwater drainage, and combined configurations. Wastewater network sizing from sanitary and storm flows with proper gradient ensuring self-cleaning conditions. Rainwater management addresses design storm intensity and peak flow accommodation. Treatment systems per Directive 98/15/CE requirements ensure wastewater quality before discharge. Distribution and sewage network design includes pipe sizing, elevation/pressure calculations, and layout optimization respecting topographic constraints. System operation addresses pressure maintenance, flow distribution, emergency procedures, and leak detection. Regulatory compliance per EU directives and national standards ensures safe public water supply and environmental protection. Applications to urban localities of varying scales demonstrate practical relevance. Upon completion, students demonstrate competency in hydraulic load calculation, network design and sizing, system verification, operational management, and professional design of integrated urban water supply and sewage systems.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
O1. Water Management	GA07	5	2			2

Course description (Syllabus): course provides a comprehensive introduction to the fundamental concepts of hydrology, water resources, and integrated water management, essential for engineers specializing in building installations and municipal infrastructure systems. The course encompasses key aspects of water management at multiple scales, including resource planning, distribution systems, demand management, and water quality preservation. The course addresses hydrological foundations and water resources assessment, understanding fundamental hydrological processes, water availability, water resource characterization, and sustainable utilization principles. Additionally, the course covers water supply systems management, including design, optimization, and operation of drinking water distribution networks, user demand analysis and allocation strategies, and technical and economic considerations in system planning. Water quality management is presented through methods for assessing and maintaining water quality standards, treatment technologies, and monitoring protocols. Large-scale water management principles are explored, including integrated water resource management approaches, water governance considerations, and basin-level planning and administration.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Building Automation Systems II	AI08	4	2	1		

Course description (Syllabus): is addressing the fundamentals and applications of sensors and transducers essential for modern building automation systems. The curriculum systematically covers temperature transducers including thermocouples, resistance temperature detectors and thermistors; pressure transducers utilizing strain gauge and piezoresistive technologies; vibration transducers for structural monitoring and equipment diagnostics; level transducers employing capacitive, ultrasonic and float-based principles; speed transducers based on tachometric and inductive measurement methods; acceleration transducers for dynamic response analysis; force transducers incorporating load cells and strain gauge configurations; humidity transducers using capacitive and resistive sensing elements; and flow transducers featuring turbine, vortex and ultrasonic measurement technologies. The course emphasizes sensor operating principles, static and dynamic performance characteristics, signal conditioning requirements, environmental compensation techniques, and integration strategies within building management systems for HVAC, lighting, security and water distribution applications. Students acquire competency in selecting appropriate transducer technologies for specific automation requirements, evaluating measurement accuracy and reliability under operational conditions, and implementing sensor networks in distributed control architectures typical for intelligent building environments.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Installation Technology and Assembly	TMI08	4	2	2		

Course description (Syllabus): is addressing the systematic definition and decomposition of technological processes specific to building installation systems. The course covers the fundamental principles of technological process definition for each equipment category, including the breakdown of execution and assembly procedures into distinct technological phases and elementary operations. The curriculum encompasses material characterization and selection for installation applications, examination of material properties including physical, mechanical, and technological characteristics, and evaluation methods for determining suitability of materials under operational conditions. The course examines fundamental assembly technologies including demountable and non-demountable joining methods, material preparation operations such as cleaning and cutting, and finishing techniques. Practical applications include technological solutions for pipe assembly and connections in mechanical installations, installation of electrical wiring and components, mounting of electrical apparatus and control panels, and implementation of connection and junction techniques in building systems. The course emphasizes systematic documentation of technological procedures, adherence to quality standards and safety requirements, and the coordination between design and execution phases in installation projects. Students develop competency in designing installation technology procedures, selecting appropriate assembly methods for specific equipment types, planning execution phases and technological operations, and ensuring quality control throughout the installation process.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Management in buildings and buildings services	EI08	3	2	2		

Course description (Syllabus): is addressing the fundamental principles of organization, planning, monitoring and control of building installation projects from conception through completion. The course covers the peculiarities and specific requirements of managing installation activities within the construction context, emphasizing that execution parameters including time schedules, budgets and quality specifications must be continuously monitored and controlled throughout project implementation. The curriculum addresses the dynamic nature of construction projects, recognizing that building systems are not self-regulating mechanisms and that project conditions, activity durations, resource allocation and costs are subject to continuous change and adaptation. The course examines strategic project organization, development of comprehensive project planning methodologies, and establishment of effective tracking and monitoring systems. Students study resource management including allocation of human resources, material procurement and financial budget control; scheduling techniques and implementation of construction sequences for installation systems; quality assurance and quality control procedures ensuring compliance with design specifications and regulatory requirements; risk identification and mitigation strategies specific to building installation works; and communication protocols among project stakeholders. The course emphasizes systematic documentation, decision-making processes under variable conditions, and integration of management functions with technical installation requirements. Students develop competency in managing complex installation projects, responding to changes in operational parameters, maintaining schedule and budget performance while ensuring quality standards throughout project execution.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Bachelor's Thesis Preparation	PPD08	5				

Course description (Syllabus): is addressing the systematic development and completion of a comprehensive research and design project that demonstrates the student's mastery of knowledge, methodology, and practical competencies acquired during undergraduate studies in building installation systems engineering. The course encompasses the fundamental aspects of thesis preparation including topic selection within installation engineering domains, scientific supervision and guidance throughout the project, and development of research methodologies appropriate to the chosen theme. The curriculum covers the structured planning and documentation of thesis content, incorporating theoretical foundations, state-of-the-art literature review, technical analysis and calculations, practical or experimental components where applicable, and technical-economic evaluation of proposed solutions. Students acquire competency in conducting independent scientific investigation, synthesizing theoretical knowledge with practical applications, technical writing and documentation in academic format, and presentation of research findings in multimedia formats. The thesis preparation process includes development of a comprehensive project plan in consultation with the scientific advisor, documentation and research activities, practical implementation or simulation studies, drafting and formatting the thesis document according to institutional standards, and preparation of oral defense presentation. The final thesis integrates technical knowledge, demonstrates the student's capacity for independent problem-solving and design implementation in building installation systems, and includes personal contributions and recommendations for future developments in the investigated field.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Diploma Project Practice	PD08	2				

Course description (Syllabus): is addressing the practical realization and completion of the diploma project through systematic implementation of research, design, and technical work under scientific supervision. The course encompasses the structured execution phases of the project including detailed planning in consultation with the scientific advisor, literature documentation and bibliographic research, development of the theoretical and state-of-the-art foundation, and practical implementation of design or experimental components specific to the chosen theme.

The curriculum covers technical documentation preparation including technical memoranda, calculations and verifications, technical drawings and schemes, technological process sheets, and other supporting documentation required for project completeness. Students develop competency in independent execution of engineering tasks, integration of theoretical knowledge with practical implementation, systematic analysis and interpretation of results obtained through calculations or experiments, and articulation of personal contributions and technical solutions developed within the project scope. The practical work includes development of detailed project documentation in compliance with institutional standards and formatting requirements, production of technical graphics and supporting materials, preparation of comprehensive project report integrating all components, and arrangement of oral presentation materials. The diploma project practice demonstrates the student's capacity to systematize knowledge acquired during undergraduate studies, solve complex technical and techno-economic problems relevant to building installation systems engineering, and present professional-level work products suitable for evaluation and defense in academic and professional contexts.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
O2. Heat pumps	PC08	4	2		1	

Course description (Syllabus): is addressing the main problems related to the installation of heat pumps in the building sector, familiarizing HVAC engineers with the utilization of low-entropy energy for efficient thermal energy transfer from source to sink. The course covers thermodynamic principles and heat pump classification for building applications. Additionally, the curriculum addresses critical challenges including cost constraints, indoor air quality, legal liability, and building code complexity. Students develop competency in evaluating heat pump feasibility, designing proper system configurations, and addressing technical, economic, and regulatory requirements specific to building sector heat pump installations.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
O2. Installations for Using Unconventional Energy Forms	IPUFNE08	4	2		1	

Course description (Syllabus): is addressing the systematic utilization of renewable and non-conventional energy sources for building installations, responding to increasing energy consumption, fossil fuel costs, and environmental concerns. The course covers low-potential thermal energy sources including air, water, and soil, and their recovery techniques for heating and cooling applications. The curriculum encompasses solar energy systems including collectors and photovoltaic technology for electricity generation; geothermal energy systems for heating and cooling; heat pump technology utilizing various heat sources including soil, air, and groundwater; and waste heat recovery applications. Students study design methodologies for unconventional energy systems, energy balance calculations, feasibility assessments comparing conventional and renewable solutions, and integration of renewable energy installations with building systems. The course emphasizes practical applications including system design, performance analysis, and technical-economic evaluation of unconventional energy installations for building sector applications.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
O3.Marketing	MAR08	2	1			

Course description (Syllabus): is addressing the fundamental concepts and applications of marketing strategies specific to the building installations engineering sector. The course develops competencies in understanding installation engineering activities as products destined for sale in dynamic markets, including design projects, technical consultancy, execution of works, operation and maintenance services, and trade in installation materials, equipment, and utilities. The curriculum covers methods for pricing installation engineering products including design services, maintenance and operation work, and material trade, with emphasis on preparing detailed technical documentation, cost estimates, and commercial proposals. Market analysis methodologies specific to installations engineering are

examined, including strategic and operational analyses utilizing databases related to urban development permits and public procurement systems. The course addresses product promotion strategies including public relations, advertising, and appropriate communication channels for installation engineering services. Students develop competency in identifying market opportunities for installation engineering activities, formulating competitive pricing strategies, preparing commercial proposals and technical documentation aligned with market requirements, and implementing effective communication strategies for marketing installation engineering services and products in building construction sector.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
O3.Management	GEF08	2	1			

Course description (Syllabus): is addressing the fundamental principles and practices of management applicable to engineering organizations and installation enterprises. The course covers core management functions including planning, organization, direction, and control of resources and activities within building installations sector. The curriculum encompasses organizational structures, decision-making processes, and strategic planning methodologies relevant to installation engineering enterprises. Additionally, the course addresses resource management including human resource organization, personnel coordination, and team leadership; financial aspects including budgeting, cost control, and economic evaluation of management decisions; and operational management of installation activities. Students develop competency in applying management principles to installation engineering activities, planning and organizing work teams, making effective decisions under operational constraints, and coordinating technical and administrative functions within installation enterprises.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
O4.Quality in building servicies	ACI08	3	2	2		

Course description (Syllabus): is addressing the preparation of students to design, certify, manage and implement quality assurance systems specific to construction works and building installation service activities. The course covers quality management fundamentals including principles, planning, quality assurance procedures, and control mechanisms applicable to the installations engineering sector. The curriculum encompasses the ISO 9000 family of standards and their application to installation systems; development and implementation of quality management systems tailored to building installations; quality auditing procedures; and certification processes. Additionally, the course addresses determination of investment importance categories, development of quality control programs, identification and classification of key control phases, establishment of quality control procedures, and preparation of technical instructions and quality management documentation. Students develop competency in designing quality assurance systems for installation projects, conducting quality audits and inspections, preparing quality control and management documentation, ensuring compliance with quality standards throughout installation execution, and implementing effective quality management systems within building installation enterprises.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
O4.Project Management	PM08	3	2	2		

Course description (Syllabus): is addressing the fundamental concepts, methods, and tools for effective planning, organization, monitoring, and control of construction and installation projects. The course covers the project life-cycle including project initiation, planning, execution, monitoring, and closure phases. The curriculum encompasses project organization and team structure, work breakdown structure (WBS) development, project scheduling methodologies including critical path analysis and Gantt charts, and resource allocation planning. Additionally, the course addresses cost estimation, budget management, schedule control, quality management within projects, risk identification and management, and stakeholder communication strategies. The course emphasizes practical tools and techniques for project managers including feasibility assessment, objective setting, detailed planning, progress monitoring, performance evaluation, and adaptation to changing conditions. Students develop competency in applying project

management principles to installation works, planning and controlling project execution, managing project resources and budgets, ensuring quality standards throughout project implementation, and communicating effectively with all project stakeholders throughout the project lifecycle.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
O5. Measurements in Installations	MSI08	3	2	2		

Course description (Syllabus): is addressing the presentation of equipment and instruments necessary for proper functioning of installation systems and their correct settlement and verification in relation to suppliers and regulatory requirements. The course covers measurement principles and objectives within building installation systems, including performance verification, commissioning procedures, and compliance with technical specifications. The curriculum encompasses measurement instruments and equipment for various installation types including pressure, temperature, flow, humidity, vibration, and electrical quantity measurements. Additionally, the course addresses calibration procedures, accuracy assessment, measurement protocols, documentation requirements for acceptance of works, and verification methodologies for installation performance against design specifications. Students develop competency in selecting appropriate measurement equipment, performing measurements on installation systems, interpreting measurement results, verifying equipment functionality, completing acceptance documentation, and ensuring correct settlement and technical verification between installation contractors and suppliers.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
O5. Domotics	DOM08	3	2	2		

Course description (Syllabus): is addressing the integration of automated control systems for residential and building environments, commonly known as home automation. The course covers the fundamental concepts of domotics including intelligent building control systems that manage various installation systems through centralized or distributed architectures. The curriculum encompasses control protocols and standards such as KNX, Z-Wave, Zigbee, and BACnet; hierarchical structures including management, automation, and field levels; and system architecture principles for home automation installations. Additionally, the course addresses integration of multiple building systems including HVAC, lighting, security, access control, energy management, and multimedia systems through unified control platforms. Students study design methodologies for domotics systems, selection of appropriate control devices and sensors, network configuration and communication protocols, automation logic programming, user interface development, and system maintenance. The course emphasizes practical applications and technical considerations for implementing functional and reliable home automation systems in modern buildings.