Transilvania University of Brașov, Romania
Study program: Facilities for energy efficient buildings

Faculty: Civil Engineering
Study period: 2 years

1st Year

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Ethics and integrity in scientific research	EISR01	4	2	2		

Course description (Syllabus): acquiring and applying in the professional career the specific concepts of ethics and academic integrity; deontology and integrity in university and scientific research and, implicitly, the development of a culture of responsibility in terms of involvement in the joint effort to prevent, identify and combat possible academic fraud, especially plagiarism. developing the capacity to know and master the main points of view regarding academic ethics; acquiring the necessary knowledge to understand, respect, develop and implement codes of ethics and academic integrity.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
The NZEB concept in building services design	CNPI	4	2	2		

Course description (Syllabus): The NZB concept; European Directives on the imposition of the NZB Concept on housing; National legislation on NZB; Principles of NZB building design; NZB building construction techniques; Operation and maintenance of NZB buildings; Home automation buildings and ways of monitoring and certification of NZB buildings; Energy saving and reduction of pollutant emissions in NZB buildings.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
NZEB integrated sanitary systems	SSIN	6	2			2

Course description (Syllabus): Design, technical and economic optimization of sanitary installations integrated in simple and complex systems of installations for passive buildings with various destinations and functions. Evaluation of the functional and energy efficiency of sanitary installation systems for energy efficient buildings.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Heating systems for passive houses and NZEB	SICPN	4	2			2

Course description (Syllabus): This course aims the training of students in designing and executing heating installations specific for passive building and Nearly Zero-Emission Buildings (NZEBs). It presents particular calculations for heating loads and heating systems specific for these types of buildings (heating through low temperature radiation, with hot air). Another important direction of this course is presenting modern hydraulic equilibrium systems for heating installations.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Internship 1	SP01	6				8

Course description (Syllabus): The internship presents national and international legislation according to the domain of reducing energy consumption in the construction sector, especially for buildings with reduced energy consumption or NZEBs with different roles.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Building facilities design in BIM system (Building Information Modelling)	MIC	4	2	2		

Course description (Syllabus): The course has the purpose to understand the basic notions regarding BIM concept, knowledge, use and implementation of BIM technology. It also deepens the methods of applying the BIM concept but also the establishment of solutions for easy use of BIM technology.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Simulation of energy consumption in building design	SCEDC	4	2	2		

Course description (Syllabus): Introduction to numerical simulation Numerical simulation of thermal conduction through uniform multilayer walls. Particular case: The wall of a house; Numerical simulation of thermal conduction through non-uniform walls; Numerical simulation study. Free convection; Numerical simulation study. Numerical simulation of thermal radiation and natural convection; Numerical simulation study. Numerical simulation of heat transfer through the envelope elements of buildings in contact with the ground; Numerical simulation study. Numerical simulation of the heat transfer through the ground to the installations for taking heat from the ground; Numerical simulation study. Numerical simulation of energy consumption for a building.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Ventilation/air conditioning systems for passive and NZEB houses	SVCCPN	6	2			2

Course description (Syllabus): The course ensures the preparation of students for the design, execution and operation of ventilation / air conditioning installations, used in the built environment; ensures the preparation of students in order to implement the NZEB and passive concept in the design of ventilation / air conditioning installations.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Energy efficient lighting systems	SEICRE	6	2			2

Course description (Syllabus): The course has the porpouse to understand of basic concepts, theories and methods in the implementation of intelligent lighting systems with high energy efficiency, elaboration of professional projects with the use of principles and methods dedicated to the energy efficiency of the elimination systems in buildings.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Internship 2	SP02	6				8

Course description (Syllabus): The internship presents and analyses installation projects for NZEBs with different destinations and overseeing the implementation of these through vising sites.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Hydrogen as an energy carrier	HVE	4	2			2

Course description (Syllabus): The course explores hydrogen as a sustainable energy carrier, covering production, storage, and utilization technologies in building systems, supporting the transition toward efficient, low-emission energy infrastructures.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Superior energy valorification in built environment	VSEMU	4	2			2

Course description (Syllabus): The course will asure students with the folowing: Knowledge of the current energy situation for urban centers; Knowledge of the types of renewable energies that can be used efficiently in urban centers; Knowing the advantages / disadvantages of the types of renewable energies; Knowledge of energy saving methods.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Centralized energy production in urban environments	SPCEMU	4	2			2

Course description (Syllabus): This course presents the implementation of cogeneration (CHP) and trigeneration (CCHP) systems in NZEBs and the capacity of these systems to reduce gas emissions with greenhouse effects. Among the studied cogeneration systems, it focuses on low power CHP and CCHP, biomass based CHP and CCHP.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Modern heating networks in the urban environment	RTMMU	4	2			2

Course description (Syllabus): This course presents cogeneration and trigeneration systems and modern thermal agent distribution and transport systems. This course will also focuses on the design of new networks and retrofitting the existing ones. Economic aspects of the retrofit process are also studied regarding of supply and long distance transport systems, and also the impact these systems have on the environment.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Use of renewable energy sources in buildings	USERC	5	2		1	1

Course description (Syllabus): The course presents the efficient utilization of energy systems with regenerable sources and implementing those in the built environment. A series of aspects about designing these systems, devices, installations and environmental energy intake systems used in construction, are presented.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Energy management in buildings (BMS)	MEC	5	2		1	1

Course description (Syllabus): Course ensures knowledge of engineering products and services for automatic control, monitoring, optimization and intervention to achieve energy efficiency and safe operation of building services. Thus it is possible to achieve the design and optimized operation of ventilation and air conditioning systems, in order to ensure system maintenance and reduce energy consumption.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Analysis of resources and energy use in buildings	ARUE	5	2	2		

Course description (Syllabus): Understanding of basic concepts, theories and methods for assessing the use of resources in buildings. Identification of the resources needed to build and operate energy efficient buildings. Establishing energy consumption and carbon emissions in the construction and operation of energy efficient buildings. Studying the resources used in the life cycle of energy efficient buildings.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Project management for building installation services	MPLIC	5	2	2		

Course description (Syllabus): This course presents the role of the project manager in development and implementation filed and aims the following aspects. The stages of development of installation services and constructions; Time management in implementing installations and constructions project; Cost management in implementing installations and constructions; Human resource management in implementing installations and constructions; Risk management in implementing installations and constructions; Quality management in implementing installations and constructions.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Internship 3	SP03	10				12

Course description (Syllabus): eaching to the students the concept of building low-energy buildings and NZEB buildings and overseeing the implementation of these through vising sites.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Practical Activity for the Preparation of Dissertation Thesis	PID	12				12
Elaboration of the Dissertation Thesis	ED	18				16

Course description (Syllabus): these two disciplines are designed to assist students in the preparation of their thesis or dissertation research proposal in the field of their research proposal.