WP1 Current Programmes in EU and Partner HEIs - State of the Art

ACT 1.4 Creation of the learning outcomes

DELIVERABLE 1.4 CREATION OF THE LEARNING OUTCOMES BASED ON THE NEEDS FROM LABOUR MARKET AND INDUSTRY

CASE STUDY OF THE REPUBLIC OF ARMENIA

NATIONAL UNIVERSITY OF ARCHITECTURE AND CONSTRUCTION OF ARMENIA

PROJECT INFORMATION	
Project title	Transforming Architectural and Civil Engineering Education towards a Sustainable
Project acronym	TACEESM
Project reference number	618883-EPP-1-2020-1-IT-EPPKA2-CBHE-JP
Funding scheme	Erasmus+ Capacity building in the field of higher education
Web address	
Coordination institution	University “G.d’Annunzio” of Chieti-Pescara
Project duration	November 2020 - October 2023

DOCUMENT CONTROL SHEET	
Work package	WP1 Current programmes in EU and partner HEIs - State of the Art
Ref. no and title of activity	ACT 1.4 Creation of the learning outcomes
Title of deliverable	D 1.4 Creation of the learning outcomes based on the needs from labour market and industry
Lead institution	University of Maribor (Faculty of Civil Engineering, Transportation Engineering and Architecture) - UM (FGPA), Slovenia
Co-Lead	Brest State Technical University, Belarus
Author(s)	National University of Architecture and Construction of Armenia (NUACA)
Document status	Report
Document version and date	
Dissemination level	Institution; National; International

VERSIONING AND CONTRIBUTION HISTORY			
Version	Date	Revision description	Partner responsible

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1. Introduction

Within the framework of the TACEESM Erasmus+ project the survey of employers in the field of architecture and civil engineering was conducted, based on the results of which the general and professional competencies needed for the graduates have been figured out. By the opinions of employers these competences will help graduates to meet the requirements of the labor market and will simplify the job obtaining process.

The matrix of general and professional competencies for students of architecture/civil engineering is presented below:

General	Professional
Critical thinking	Digital skills
Dealing with complexity	Research skills
Decision making	Professional knowledge, skills and abilities
Endurance (e.g. working under pressure, handling stress and deadlines)	Acquisition of BIM technology
Work ethic (e.g. self-discipline, willing to work hard)	Qualified design development
Dealing with uncertainty	Acquisition of IT technologies
Determination (e.g. commitment, persistence, willingness to achieve)	Business ethics
Handling criticism	Design norms knowing
Working with clients	Computer skills
Working with clients	Economic fundamentals in design
Business management skills	Foreign languages for architecture and civil engineering
Collaboration skills/team work	
Presentation skills	
Mediating skills (e.g. negotiation, conflict mediation)	
Project management skills	

Based on the competences presented in the table above the learning outcomes for the study programs listed below have been updated:

a/ “073201.01.6 – Industrial and Civil Engineering” Bachelor Program,

b/ “073101.01.7 - Architecture” Master Degree Program

c/ “073102.02.7- Heat and Gas Distribution and Ventilation”

1. Updated Learning Outcomes for the “073201.01.6 – Industrial and Civil Engineering Construction” Bachelor Program

A. Professional Knowledge

Upon successful completion of this program the student will be able to:

A1. demonstrate general knowledge on the advanced experience of industrial-civil construction, modern research-practical works, design of construction objects in the Republic of Armenia, peculiarities of construction production;

A2. provide basic knowledge on the fundamental of architectural design, basic regulations and models on theoretical and construction mechanics, types and characteristics of modern construction structures, properties of building materials and technologies for development of structures from them, basic principles of design of engineering networks, economic indicators of construction;

A3. demonstrate basic knowledge of building design principles, norms and standards framework, composition of technological processes, building construction methods;

A4. demonstrate a systematic knowledge of the requirements on the safety work, and preservation of environment, architectural and cultural heritage.

B. Practical Professional Skills

Upon successful completion of this program the student will be able to:

B1. discover the of the problems that have arisen in the field of professional activity, to apply the appropriate physical and mathematical methods effectively for their solution;

B2. possessing the basic standards of geometric formation, construction, intersection of spaces, make structural designs of buildings and structural elements of other structures according to the required standards, in order to prepare design documents within the scope of his / her authority;

B3. effectively use specialized software complexes, automated systems with the purpose to design of details and structures;

B4. select correctly the types of required construction machines and mechanisms based on the technical-economic parameters and nature and volumes of works performed;

B5. demonstrate basic skills in calculating the volume of construction and assembly works, discovering the

technological sequence of works, determining the construction labor intensity and duration, as well as development of calendar schedules and master plans of the construction site of simple objects, analyzing their efficiency;

B6. extensive use of computer technology as a means of managing information to use databases, to present information in the required format, to use information and network capabilities;

B7. in native and at least in one foreign language communicate, negotiate effectively, present and explain information, problems, facts and decisions to the professional and non-professional community;

B8. analyze and present a series of events based on relevant information, draw simple conclusions, demonstrate teamwork and needed skills of interpersonal communication.

C. General (transferable) capabilities

Upon successful completion of this program the student will be able to:

C1. work in a team, to realize the ethical-environmental responsibility, to understand the role of the leader in the team, the principles of management;

C2. objectively observe the opinions of experts, formulate process documents and reports, demonstrate critical and self-critical thinking;

C3. identify his /her educational needs, make his /her own decision on further learning, be creative in the process of identifying and solving problems;

C4. carry out activities within his/her authority, make operative decisions and take responsibility for the team members and for their professional development, to perceive the interactions of technical and environmental issues;

C5. develop separate parts of the projects and organizational-technological sections of the objects in accordance with the technical-normative requirements presented within the scope of his/her authority in the design group;

C6. express one's civic position, promote through personal activities the spread of national and human values, preservation of the historical and cultural heritage;

C7. provide relevant information within the scope of his/her authority, in particular provide necessary information to specialists implementing other project sections, cooperate with construction supervisors.

2. Updated Learning Outcomes for the "073101.01.7 - Architecture" Master Degree Program

A. Professional Knowledge

Upon successful completion of this program the student will be able to:

A1. demonstrate comprehensive knowledge of architecture, urban planning (spatial planning), preservation and restoration of historical and architectural heritage, zoning of areas, design of architectural environment, modern theories, research and design methods of energy-saving and passive systems;

A2. master the knowledge about the design, planning and implementation of construction processes;

A3. demonstrate the knowledge of domestic and international requirements, norms and conventions;

A4. master general knowledge of local and global demographic resources links with urban development and architecture, and the use of innovative technologies in the field.

B. Practical Professional Skills

Upon successful completion of this program the student will be able to:

B1. based on theory and practice, be able to conduct research, integrate knowledge and apply it in the condition of limited information, as well as in a new or unfamiliar environment, including in the context of international programs;

B2. be able to apply the latest scientific results and develop practical knowledge based on contemporary literature and other sources of information;

B3. apply innovative methods of solving theoretical and practical problems in the architecture and interdisciplinary fields, in the conditions of limited information;

B4. know the principles of business management and apply them in project management and during professional activities;

B5. be able to act based on professional, practical, financial and legal knowledge;

B6. be able to use professional means of communication to communicate with professional and non-professional audiences at national and international levels with the purpose to transfer conclusions and research results;

B7. be able to apply advanced information and communication technologies to solve new, complex problems and to conduct research in the relevant field;

B8. be able to analyze, synthesize and evaluate information from different sources;

B9. demonstrate organizational skills for human resource management and planning, be able to provide project management and assign roles in teamwork, take professional and legal responsibility for others' work in team;

B10. research, formulate and justify new ideas related to the architecture and other neighboring fields, and propose innovative / creative approaches to solving theoretical or practical problems in the field;

B11. be able to present arguments, problems and solutions to both professionals and society during discussions and debates of projects related to architecture and neighboring projects;

B12. demonstrate an ability to propose, analyze, critically evaluate esthetic, technical and technological solutions.

C. General (transferable) capabilities

Upon successful completion of this program the student will be able to:

C1. be able to conduct research, develop conceptual, design and working documents in the fields of architecture, urban development (spatial planning), landscape architecture, preservation and restoration of historical and architectural heritage, zoning of areas, energy-saving and passive systems,

architectural environment design;

C2. be able to make decisions based on professional, social, environmental and ethical factors;

C3. be able to independently identify his / her further education needs and undertake continuous development of his / her skills and abilities.

C4. be able to meet the requirements of the customer, taking into account the factors and restrictions of construction norms affecting the construction and operation costs,.

3. Updated Learning Outcomes for the "073102.02.7- Heat and Gas Supply and Ventilation" Master Degree Program

A. Professional Knowledge

Upon successful completion of this program the student will be able to:

A1. recognize the contemporary principles and concepts of thermal-technical calculation methods, design, construction, operation and management of heat and gas supply and ventilation (HGSV) systems of different kind of buildings, structures, settlements engineering-infrastructures;

A2. formulate and classify the issues of design, construction, reconstruction and safe operation of HGSV systems;

A3. know the principles of choosing and designing heat and cold sources of buildings;

A4. fully master the methods of software calculation and computer design;

A5. explain the peculiarities of calculation, design and construction of energy efficient buildings;

A6. master the application of computational methods for energy saving of HGSV engineering systems, use of renewable energy sources, protection of the environment;

A7. predict the threats to the security of HGSV systems at the design stage.

B. Practical Professional Skills

Upon successful completion of this program the student will be able to:

B1. apply in practice the principles and methods of design of HGSV systems of buildings and structures, installation of engineering systems;

B2. carry out research work based on the results of laboratory experiments and heat-technical calculations;

B3. outline the spatial diagrams of the heating and ventilation systems of the buildings, perform their hydraulic and aerodynamic calculations;

B4. analyze and evaluate the energy efficiency criteria of buildings;

B5. compare, analyze and evaluate the design solutions of HGSV systems, substantiate the best option to select, install and assemble of systems;

B6. identify, substantiate and formulate obtained scientific research results;

B7. control the assembly of HGSV systems at the construction site, coordinating its work with various

specialists;

B8. offer and organize modern and effective solutions to practical problems;

B9. solve complex professional tasks during design and construction installation work;

B10. control the compliance of design and construction works with construction safety norms, and other normative regulations and documents;

B11. implement testing, technical inspection and condition assessment of internal and external engineering systems of buildings;

B12. implement an energy audit of buildings, develop an energy passport.

C. General (transferable) capabilities

Upon successful completion of this program the student will be able to:

C1. use both local and international professional literature, construction normative documents and other sources of information;

C2. predict and independently analyze the problems arisen during the design/construction, as well as assess the technical means necessary for their solution;

C3. present his/her professional knowledge and abilities at the labor market;

C4. effectively plan the working hours of its subordinates, as well as take responsibility for decision-making based on the relevant professional and ethical norms and human values;

C5. independently assess the resources required for effective work, demonstrate teamwork skills.