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Voronezh, Russia**

**Master in
Buildings of Energy-Efficient Life Cycle**

Table 1 – Coherence Educational needs / Educational objectives (Competences)

General Note

Aim of the MARUEEB competences established in the Genoa meeting is the consistency of the educational objectives, expressed in terms of competences, of the MARUEEB study programmes (SPs) with the educational objectives of engineering programmes required and shared at European level. This means that, in order to be consistent with the educational objectives, expressed in terms of competences to be developed and obtained by the students at the completion of the educational process, of engineering programmes required and shared at European level, the educational objectives of the MARUEEB SPs should be consistent with the MARUEEB competences, which have to be intended as a minimum set of competences.

Necessarily, the statements of the MARUEEB competences are very general, and should be made specific for each MARUEEB SP taking into account the identified educational needs of the labour market of reference and on the basis of the available resources. This means that each MARUEEB SP should establish its educational objectives, expressed terms of competences, having as general reference the MARUEEB competences, but adapting/adjusting them according to the identified educational needs of the labour market of reference and to the available resources, and eventually adding other competences required by its stakeholders.

Alternatively, if the educational objectives are defined in a very general way, as in the case of the MARUEEB competences, the identified educational needs should be taken into account in the definition of the programme learning outcomes.

Educational needs	Corresponding Competences	Notes
To understand the basic philosophical problems of science and technology arising from the implementation of the concept of energy saving and conservation of natural resources.	Knowledge and understanding Ability to apply knowledge and understanding of mathematics, sciences and engineering disciplines underlying Energy Efficient Buildings subject area to solve / design / investigate / conduct complex problems / products, processes and systems / issues / activities.	<i>The established competence might be adapted/adjusted according to the identified educational needs. Otherwise, the identified educational need should be taken into account in the definition of the programme learning outcomes.</i>
To conduct research assess of the condition of natural and man-made objects.	Investigations Ability to investigate complex issues in Energy Efficient Buildings subject area.	<i>The meaning of the first educational need is not clear.</i>
To acquire experimental and computational skills.		<i>The corresponding competence might be “(Investigation) Ability to carry out simulation and conduct research and experiments in Energy Efficiency and Energy Saving subject area”.</i>
To define the initial data for the design and design studies of monitoring of objects, patent research.	Engineering design Ability to design complex products (devices, artefacts, etc.), processes	<i>The established competence might be adapted/adjusted according to the identified educational needs.</i>

To prepare all necessary design documentation, using energy-savings codes and regulations.	and systems in Energy Efficient Buildings subject area.	<i>Otherwise, the identified educational needs should be taken into account in the definition of the programme learning outcomes.</i>
To know methods of design energy efficient buildings and structures, their structural elements, including methods of calculation and justification, including the use of general-purpose and specialized software and computer systems and computer-aided design.		
To enter new fields, by using the knowledge in mathematics and physics.	Lifelong learning Ability to engage in independent lifelong learning and to follow developments and undertake further studies in science and technology autonomously.	
To work in teams, using principles and methods of collective work and time management.	Team-working Ability to function effectively in (national and international contexts as leader of) a team that may be composed of different disciplines and levels.	
To have communication skills (also with non-experts and using ICT).	Communication Ability to use diverse methods and tools to communicate clearly and unambiguously with specialist and non-specialist audiences (in national and international contexts).	
To have ethical commitment.	Decision Making Ability to manage complex work contexts, to take decisions and to formulate judgments reflecting on ethical and social responsibilities.	
	Problem solving Ability to solve complex problems in Energy Efficient Buildings subject area.	
	Engineering practice Ability to use and apply practical knowledge and understanding to solve / design / investigate / conduct complex problems / products, processes and systems / issues / activities in Energy Efficient Buildings subject area.	

Table 2 – Coherence Educational objectives / Programme learning outcomes

General Note

The programme learning outcomes should be specific (they should adequately reflect the context, level, scope and content of the programme) and measurable (they should be easily understandable and verifiable in terms of what the student has actually achieved at the end of the programme).

According to the ECTS Users Guide 2015, in order to be measurable the programme learning outcomes should specify the way of demonstrating their achievement (e.g.: 'to give an overview of the materials most often used in electro-engineering'; 'to develop a research design by applying up-to-date scientific methods', etc.).

Competences	Programme Learning Outcomes that contribute to developing and obtaining of the competence	Notes
<p>Knowledge and understanding Ability to apply knowledge and understanding of mathematics, sciences and engineering disciplines underlying Energy Efficient Buildings subject area to solve / design / investigate / conduct complex problems / products, processes and systems / issues / activities.</p>	<p>To know and understand the fundamentals of contemporary environmental issues and ecological system theory.</p> <p>To understand the main philosophical problems of science and technology in connection with environmental system theory, in order to broaden their world-view.</p>	<p><i>Probably a learning outcome relative to the knowledge and understanding of some engineering disciplines underlying Energy Efficient Buildings subject area.</i></p>
<p>Problem solving Ability to solve complex problems in Energy Efficient Buildings subject area.</p>	<p>To analyze requirement for building materials according energy efficient side.</p> <p>To determine the strength characteristics of building materials.</p> <p>To know about the methods of examination of structures and buildings.</p> <p>To know and determine the energy efficiency the building envelope.</p> <p>To conduct technical examination of construction objects.</p>	<p><i>All these learning outcome should be more properly defined as module learning outcomes than as programme learning outcomes. A more general programme learning outcome should be defined.</i></p>
<p>Engineering design Ability to design complex products (devices, artefacts, etc.), processes and systems in Energy Efficient Buildings subject area.</p>	<p>To apply standards of project documentation in design energy-efficient buildings.</p> <p>To acquire basic knowledge of architectural eco-friendly design and analyses.</p>	<p><i>All these learning outcomes should be more properly defined as module learning outcomes than as programme learning outcomes. A more general programme learning outcome should be defined.</i></p>
<p>Investigations Ability to investigate complex issues in Energy Efficient Buildings subject area.</p>	<p>To acquire skills of inspection of building structures.</p>	<p><i>O.K., if inspection of building structures is the only investigation to be carried out.</i></p>

<p>Engineering practice Ability to use and apply practical knowledge and understanding to solve / design / investigate / conduct complex problems / products, processes and systems / issues / activities in Energy Efficient Buildings subject area</p>	<p>To justify the choice of resource-efficient technologies in the construction and operation of buildings.</p> <p>To synthesize the received data in correlation with environmental philosophical problems of science and technology.</p>	<p><i>All these learning outcome should be more properly defined as module learning outcomes than as programme learning outcomes.</i></p> <p><i>A more general programme learning outcome should be defined.</i></p>
<p>Decision Making Ability to manage complex work contexts, to take decisions and to formulate judgments reflecting on ethical and social responsibilities.</p>		<p><i>No learning outcome refers to the competence under consideration.</i></p>
<p>Team-working Ability to function effectively in (national and international contexts as leader of) a team that may be composed of different disciplines and levels.</p>	<p>To acquire skills of team work and to know team management regulations.</p>	<p><i>This learning outcome covers only partially the established competence.</i></p>
<p>Communication Ability to use diverse methods and tools to communicate clearly and unambiguously with specialist and non-specialist audiences (in national and international contexts).</p>	<p>To participate in class discussions with colleagues and with teachers.</p>	<p><i>This learning outcome covers only very partially the established competence.</i></p> <p><i>Furthermore, it should be more properly defined as module learning outcome than as programme learning outcome.</i></p>
<p>Lifelong learning Ability to engage in independent lifelong learning and to follow developments and undertake further studies in science and technology autonomously.</p>		<p><i>No learning outcome refers to the competence under consideration.</i></p>

Table 3 – Coherence Programme Learning Outcomes / Curriculum

General note

The programme learning outcomes have to be intended as the ‘key’ learning outcomes of the programme. Each course unit should contribute to the achievement of at least one programme learning outcome. This does not mean that it is not possible to establish module learning outcomes not consistent with the established programme learning outcomes (and not to be considered as ‘key’ learning outcomes for the programme), but in addition to module learning outcomes consistent with the programme learning outcomes.

Programme Learning Outcomes	Course Units whose learning outcomes contribute to the achievement of the Programme Learning Outcomes
to apply standards of project documentation in design energy-efficient buildings	
to analyze requirement for building materials according energy efficient side	
to justify the choice of resource-efficient technologies in the	

construction and operation of buildings	
to know and understand the fundamentals of contemporary environmental issues and ecological system theory	
to synthesize the received data in correlation with environmental philosophical problems of science and technology	
to understand the main philosophical problems of science and technology in connection with environmental system theory, in order to broaden their world-view	
to participate in class discussions with colleagues and with teachers	
to determine the strength characteristics of building materials	
to know about the methods of examination of structures and buildings;	
to know and determine the energy efficiency the building envelopes;	
to conduct technical examination of construction objects;	
to acquire skills of inspection of building structures	
to acquire skills of team work and to know team management regulations	
to acquire basic knowledge of architectural eco-friendly design and analyses	

Table 4 – Comments on Course Units

General for all course units	
Specific for course unit	