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ECO-MATRIX

Result 3

COMPETENCE MATRIX

in

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C O N T E N T S

I. VQTS model

The VQTS model can be used for

- the transfer of vocational competences acquired abroad (mobility in VET)
- the transfer and recognition of competences acquired within the official VET system as well as competences achieved through non-formal or informal learning
- the development of qualifications
- composing job profiles as well as personnel (human resources) planning
- enhancing the visibility of differences in qualifications, therefore for use in the development of the EQF http://ec.europa.eu/

The VQTS model is a proposal for a structured description of work-related competences.

The core elements are the Competence Matrix and Competence Profiles:

A Competence Matrix displays competences structurally in a table according to core work tasks in a specific occupational field and the progress of competence development.

Competence Profiles (including Credit Points) are formed from individual parts of this Competence Matrix. This is done by identifying the competences that are relevant for a certain training programme or qualification ("organisational profile") or by identifying the competences acquired so far by a person in training ("individual profile").

Target Groups and Areas:

- General information on the creation of the Competence Matrix and Competence Profiles (II Competence Matrix).

  This part is especially addressed to responsible authorities who are planning to create a Competence Matrix for a specific occupational field.

- Information on the implementation of the VQTS model in mobility processes (III Mobility Procedure).

  This part is especially addressed to training providers; the procedure described should facilitate the transfer of vocational competences acquired abroad by using the VQTS model.

- Information on creating a specific Competence Profile http://www.vocational-qualification.net

  Specific organisational and individual profiles can be formulated by using the Competence Matrix developed for the field of "Mechatronics".

The VQTS model was developed for the Leonardo da Vinci pilot project VQTS: Vocational Qualification Transfer System www.vocationalqualification.net

II. Competence Matrix

II.1 Introduction

A Competence Matrix displays competences in a table according to core work tasks ("competence areas") and the progress of competence development ("steps of competence development").

A Competence Matrix is developed via a moderated workshop with experts from the respective areas. The workshop focuses on an empirical investigation of work-related competences within a specific occupational field.

A Competence Matrix can be developed for the national level, or in cooperation between two or more partner countries (international level). In any case, the development is based on the same principles: The goal of a common formulation of a Competence Matrix is NOT to harmonise the training and qualification programmes on offer by different VET providers. However, the (international) transparency and comparability of qualifications and training offers will be increased.

Examples:

The field of "Mechanical Engineering" (or "Mechatronics") was chosen for the purpose of the VQTS project and the development of a pilot Competence Matrix. The illustrative examples arise from this particular field; however, the VQTS model can also be used for describing and comparing competences in other fields.

II.2 Principles for Creating the Competence Matrix

How is the Competence Matrix table structured?

Competence areas and steps of competence development are described in the table: The left column of the table contains competence areas, based on the various core work tasks. The acquisition of each competence, from beginner level to the "skilled worker" level, is described for each competence area. Each competence described is a "step of competence development".

What do we mean by competences?

When speaking of "competence", we adopt a broad understanding of the term: we mean cognitive competences (knowledge), functional competences (skills) as well as social competences (behavior).

What are competence areas?

One competence area comprises various forms of competences necessary for completing core work tasks in a certain occupational field. Based on core work tasks, a varying number

of competence areas are defined, depending on the complexity, range of activities or job opportunities within a certain occupation. We assume that 5-25 competence areas will be defined per occupational field.

We consider that a Competence Matrix describes a "dynamic" list of competence areas. This should allow authorities responsible for the development of a respective Competence Matrix (at the national or international level) to respond to major changes in occupational fields by adding or removing competence areas, or by restructuring the Competence Matrix.

How is the process of developing competences organised in the Competence Matrix?

For each competence area, 2-6 steps of the competence development process are described. The nature of the competence area determines whether it makes sense to differentiate more or fewer steps of competence development. Therefore, no concrete number of steps can be pre-determined. As a consequence, this means that the steps only make sense within one single competence area (horizontally), and that the numbers of steps of competence development for one different competence area does not necessarily correspond to the steps for any other area.

This "flexibility" of the steps also makes it possible to integrate already-existing descriptions of steps for competence development (e.g. Common European Framework for Languages).

Which dimensions are covered in the description of the development of competences?

It is not an easy matter to describe competences, because they depend on a variety of characteristics and may be localised in different dimensions (e.g. in the degree of independence or the assessment of the complexity of a task). Nevertheless, the descriptions of various steps must clearly express the difference from one step to the next for the development of competence within a competence area.

No specific determinants for differentiating the steps are given in advance, however, whenever it is reasonable, certain dimensions are included as reference points for the description of the competence development in addition to the context characteristics (tools, etc.). These dimensions are thought of as a continuum. The extent or the degree to which they are achieved by learners characterizes the various steps or enables the differentiation between steps. These are no competences in the stricter sense and also no meta- or key competences, but only dimensions belonging to the respective competence.

Contrary to existing taxonomy systems, the differentiation of vocational competences according to level requires holistic descriptions. In order to avoid isolated descriptions, those dimensions have to be expressed in relation to core work tasks. The following principles have to be taken into account:

- The description of a step of competence development includes not only the degree or specification of one or more dimensions, but must always be related to the work context.

The description should not be restricted to competences that can be formulated analytically (e.g. part-competences, isolated tasks), yet cannot be identified in the work context.

Several dimensions are provided as examples below. This enumeration is not complete; additional dimensions suitable for the differentiation of steps in competence development should supplement this partial list.

- Ability to perform independent work tasks: marks the degree of necessary support or instruction;
- Ability to deal with a certain complexity: e.g. "production of simple work pieces" - for example "simple prismatic wrench parts" is less complex than the "production of work pieces under the inclusion of elements of hydraulics, pneumatics and electronics";
- Ability to deal with quality standard demands: marks the degree to which demands and standards can be taken into consideration in fulfilling work tasks;
- Ability to deal with dynamic situations: for example, are the initial parameters of a problem/system changing or are they constant;
- Ability to deal with intransparency: measures the ability to deal with messy situations or with action situations, the variables of which are not visible from the outset.

How are competences described in relation to the work context?

The description of the competences on the various steps of competence development takes place in a context-related manner. The competences are consistently formulated in relation to the work process and always align with the core work tasks within the context of the occupational field. Core work tasks are comprehensive tasks within the work context a person with the respective occupational profile has to deal with. This means that work process-related competences are derived empirically from the work practice/work place.

The descriptions of the competences are designed to form a clear picture of how they can be applied in the work context. This is why the term "is able to" is used in the descriptions: Actions that can be carried out are described, or problems that can be solved (e.g. "He/she is able to install, adjust and repair mechatronic aggregates and components in production facilities"). Moreover, the descriptions include — wherever reasonable for the respective competence area or the step of competence development — work-related categories as context characteristics to clarify the work activities in a specific field.

Work-related categories are:

- Objects of (skilled) work: meaning the contents or processes of skilled work (e.g. "assembling complete mechatronic equipment")
- Tools (e.g. "wrench, drilling or milling machines"), methods (e.g. "test and adjustment methods") and organisation of skilled work
- Requirements for skilled work and technology in form of rules, norms and laws (e.g. "security requirements").

The description of competences in relation to core work tasks can be seen as an attempt to bridge the terminological and ideological gap between the world of education and the world of work:

A Competence Matrix does not in any way replace a national curriculum. The focus of the descriptions is on empirically derived work-related competences and not on the content of curricula ("in-put"). For this reason, it must be ensured that only those competences are described and differentiated that actually exist in practice. No subjects from the curriculum should be used in the Competence Matrix. Merely analytical descriptions of steps should also be avoided.
Descriptions of vocational competences gain significance only through their relation to the work context. However, the Competence Matrix should be used not only to make the competence profile of the acquirable competences within a training programme / qualification visible but the competence profile of a person in training as well (i.e. the competences acquired so far by a person in training). Therefore, the compilation of competence profiles solely oriented on occupational profiles (i.e. profiles of work tasks or competence profiles of skilled employees in a certain field of work) is not sufficient by itself because the steps of competence development also have to be made transparent.

How are examples used for describing competences?

Experience tells us that understanding between experts from the same skilled work area can be conveyed well by using examples. Thus, "good" examples are an efficient way to ensure the necessary practical relevance to the work context. Descriptions are therefore supplemented - wherever possible - by specific examples. These examples relate to the relevant categories. For this reason, examples are not simply illustrative elements of the description, they serve an essential purpose. Examples provide the necessary information for characterizing the different competence levels and various ways of assessing when an individual has achieved a certain level of competence.

How are soft skills included when describing competences?

Soft skills are inherent in the respective descriptions. They are not described as specific competence areas, but they are integrated in the context-related descriptions because of their relevance in this context. Communicative competences are, for example, expressed by phrases like: "He/she is able to explain… ».

How specific or general are the descriptions of competences?

The various competence areas should not be specified in an overly general way (e.g. "building machines"), nor should they be too detailed (e.g. "soldering cables"). They must be formulated so that they promote mutual understanding between skilled workers and practitioners in the respective occupational field.

What style of language is used to describe competences?

For the description of the competences on the various steps of competence development, complete sentences should be used (e.g. "He/she is able to perform basic maintenance tasks on mechatronic appliances and equipments in the production") and not merely catch phrases (e.g. "maintenance tasks").

Further remarks

By considering all these principles, it becomes evident how difficult it is to draw up a "good" competence description. Even the examples we have developed in the area of Mechatronics within the VQTS project have not yet completely achieved the necessary

requirements. It is also clear that - in particular with regard to the set of dimensions described - all aspects cannot always be considered in a competence description. Rather, pragmatic paths will have to be taken and the comprehensiveness of these descriptions will only become clear through practice. In addition, specific expert knowledge is needed, in particular methodological know-how has to be developed in order to moderate processes for drawing up competence descriptions.

II.3 Competence Profiles

- Competence Profiles are formed from particular parts of a Competence Matrix. They generally only cover a limited spectrum of the competences described in the Competence Matrix.
- Competence Profiles are formed by identifying competences that are relevant for a certain training programme or qualification (organisational profile) or are reflecting the competences acquired so far by a person in training (individual profile).
- Organisational profiles are developed from a Competence Matrix by the authorities responsible for the respective training programmes or qualification.
- Individual profiles are developed by the responsible training provider.

Organisational profiles are formed by:

- Indicating the relevant competences of the specific training programme or qualification on the Competence Matrix;
- Entering the corresponding number of credit points to be obtained in the table — credit points represent the time it takes for the student or apprentice to reach a certain stage of competence development; i.e. points reflect the duration of the competence acquisition; (II.4 Credit Points)
- Including important additional information on the training programme or qualification when necessary (i.e. specifics of the training).

Individual profiles are formed by:

- Checking which stage of competence development the student or apprentice has reached so far (at a certain point in the training);
- Indicating the already acquired competences of the student or apprentice on the table that also displays the organisational profile of the training programme qualification;
- Entering the corresponding number of credit points (which reflect the duration of the competence acquisition).

II.4 Credit Points

Why Credit Points?

Credit points are used as quantitative measurements of specific parts of a training programme or qualification. These quantitative elements are understood as additional information but should not be viewed independently of competence descriptions! Points are based on the "student workload" required to achieve the objectives of a programme (specified in competences to be acquired).

What does "student workload" mean?

Student workload refers to the notional time an average person in training might be expected to need to acquire the respective competences corresponding to a training programme or qualification, and includes all learning activities relevant for the acquisition of competences (i.e. directed study (attending lectures or seminars), practical work, information retrieval, independent study, homework, preparation for and the taking of examinations, etc.)

How are Credit Points calculated?

1 credit point equals about 30 hours of student workload. Within one year of typical training ("main tracks" of training) a maximum of 60 credit points can be achieved (specialised programmes - e.g. for people with special needs - must be quantified specifically). This means that in a three-year training programme, a maximum number of 180 credit points can be issued, 240 for a four-year programme, etc.

How are Credit Points assigned?

The total number of credit points for training is divided according to the average time it takes for an apprentice or student to acquire competences or to reach a step of competence development. The time it takes to reach a step of competence development (the duration of the competence acquisition) can be different within the steps of a competence area as well as between competence areas. Therefore, credit points present the individual "value" of a certain step of competence development within the competence profile of a training programme or qualification.

To determine credit points, one could allot a syllabus or class schedule to the organisational profile and use the notional time an apprentice or student spends on individual units to calculate the distribution percentages.

Many training programmes calculate not only vocational competences, but also other kinds of competences that are not directly relevant to the vocational profile. However, the Organisational Profile should really be devoted solely to those credit points that are fully relevant. The Competence Profile Certificate includes an area specifically for recording additional competences outside the vocational profile. The Certificate also contains information on which subject areas were studied outside the main vocational profile focus. The credit points awarded for these activities can then be calculated into the final total.

The allocation of credit points is undertaken by the authorities responsible for the respective training programmes or qualification (depending on national regulations).

Awarding Credit Points

Credit points are awarded when students or apprentices have acquired the competences that correspond to a step of competence development.

There is no guarantee for automatic recognition: The competent authorities (organisation responsible for the training / qualification) determine which credits to accept for a specific programme.

ECO-MATRIX Competence matrix							
Professional area: ARCHITECTURE							
No	Competence Area	Steps of Competence Development					
		A	B	C	D	E	F
1	Geological location	To be able to understand the impact of the site selection for the ecological footprint of the building	To be able to analyze the impact on the existing habitat at the building site	To be able to analyze transportation impact to and from the building site	To be able to analyze storm water and heat island impacts on the building site	To be able to analyze light pollution at the building site	To be able to design and develop an optimum solution to deal with various effects at the building site
2	Water efficiency	To be able to understand the impact of excessive water use on local and regional level	To be able to research various water management techniques	To be able to analyze the impact of water use for irrigation	To be able to research wastewater management systems available for the building site	To be able to design and develop a waste water management plan	To be able to design and develop a water usage reduction plan appropriate for the building requirements
3	Energy Efficiency	To be able to understand the impact of energy and waste heat resulting from the inefficiencies of buildings	To be able to review and understand local and regional codes for energy efficiency regulations	To be able to analyze building heating and cooling loads	To be able to know and select appropriate refrigerant for building mechanical systems and develop a measurement and verification plan for energy efficiency of the building	To be able to review, analyze and select renewable energy options for the building on and off-site	To be able to design and develop an energy performance plan to optimize energy efficiency of the building

4	Building Materials	To be able to understand the impact of building materials on local and regional ecology	To be able to research and review the available materials for reuse in the new development	To be able to research and review available recycled materials and their recycled content percentages to be selected for the new development	To be able to research and review rapidly renewable materials available for the building location	To be able to design and develop a material list to minimize the ecological footprint of the building	
5	Indoor Environmental Quality	To be able to understand the impact of indoor environmental quality on the lives of the building users	To be able to research and review low-emitting building materials for adhesives, sealants, paints, coatings , flooring systems, composite wood and agrifiber products	To be able to understand lighting and thermal comfort systems and their controllability for building users	To be able to develop a construction and a post construction indoor air quality plans		
6	Pollution / waste management	To be able to understand the impact of pollution / waste management during and after construction on the local and regional level	To be able to develop a construction waste management plan (to recycle or salvage)	To be able to develop a post construction waste management plan (to recycle or salvage)	To be able to design and develop a building envelop to minimize pollution and maximize waste management at the building site		

ECO-MATRIX Competence matrix							
Professional area: ARCHITECTURE							
Credit Points (CP)							
No	Competence area	Steps of competence development					CP
		A	B	C	D	E	F	
1	Ecological and environmental analysis	3	2	2	2	2	5	**16**
2	Ecological and environmental protection	3	2	2	2	2	5	**16**
3	Pollution control	3	3	3	2	2	5	**18**
4	Recycling	3	2	2	2	5		**14**
5	Industrial waste management	3	2	2	5			**12**
6	Waste water management	3	3	3	5			**14**
TOTAL								**90**

ECO-MATRIX Competence matrix							
Professional area: BIOLOGY							
No	Competence area	Steps of competence development					
		A	B	C	D	E	F
1	Studying ecology structural and integrative levels: population, community and ecosystems	To be able to explore and demonstrate the relationship between organic and inorganic matter, the relationship between living organisms and ecosystems, as well as the relationship of the natural environment with human society.	To be able to recognize and investigate the balance and proper functioning of ecosystems on the planet.	To be able to plan and conduct field research on industrial production, industrial ecology, population ecology, and environmental production or sustainability.	To be able to create and apply complex and dynamic mathematical models of population, community, ecological systems.	To be able to study and propose solutions for the proper management of ecosystems, i.e., a management preventing their destruction by human activities and, where possible, permitting their conservation.	To be able to indicate and deal professionally with issues of management of environmental pollution, ecosystem management and processing of natural resources and waste, renewable energy, environmental policy, regional development and environmental education.
2	Identifying, utilizing and maintaining biological diversity	To be able to develop methods and implement good practices of conserving or managing wildlife habitats and their elements to improve their chemical, biological, or physical characteristics.	To be able to plan and direct construction and maintenance of infrastructure facilities in compliance with biodiversity preservation regulations.	To be able to review and use information networks and databanks in the area of biodiversity.	To be able to elaborate and implement plans for management of biodiversity protection activities and prevent damage of protected resources.	To be able to develop and carry out projects for conservation of wildlife habitats, soil, natural waters, and design of nature and landscape.	To be able to provide consultations and conduct training to private persons and enterprises concerning biological diversity.

3	Exploring environmental problems and relationships	To be able to recognize and study living organisms, the biochemical relations between humans-animals-plants and the environment and the reaction of biotic factors to harmful environmental conditions affecting them.	To be able to design and carry out environmental assessments in accordance with applicable standards, regulations, laws.	To be able to monitor and analyze changes designed to improve the environmental performance of complex systems to avoid unintended negative consequences.	To be able to layout and conduct applied research on the effects of industrial processes on the protection, restoration, inventory, monitoring, and reintroduction of species to the natural environment; comprehend and deal with environmental problems caused by human activities	To be able to compile, edit, and evaluate environmental impact studies; conduct regular inspections to ascertain environmental problems and, if necessary, propose ways and methods to solve these problems.	To be able to develop and apply environmentally safe methods and strategies for controlling or eliminating harmful environmental factors; determine methods of improving environmental conditions including economic outputs.
4	Organizing and performance of waste treatment, reducing and bioremediation	To be able to establish, recommend and perform different methods for waste treatment, reducing and bioremediation: reforestation, forest renewal and controlled cutting; waste treatment and bioremediation activities with microorganisms.	To be able to respect and comply with national / international standards in waste treatment including and waste treatment facilities effectiveness.	To be able to develop and implement alternative processes to produce valuable substances from wastes.	To be able to select and introduce alternative ways for reusing of wastes.	To be able to indicate and deal professionally with issues of management and processing of natural resources and waste.	To be able to promote and direct use of environmental management systems (EMS) to reduce waste, to minimize environmental damage from industrial production practices or to improve environmentally sound use of natural resources.

5	Measuring, analyzing and monitoring pollutants and toxics	To be able to define and measure different types of pollutants and toxics.	To be able to monitor and analyze different types of pollutants and toxics.	To be able to assess and estimate the results of measurements in relation to existing standards.	To be able to design and apply protocols to measure or monitor different pollutants and toxics.	To be able to design and perform simulations or models to predict the impact of pollutants and toxics.	
6	Design and performance of testing of harmful effects of pollutants and toxics	To be able to plan and perform laboratory testing for chemical toxicity from minerals and other elements in the soil and underground water.	To be able to develop and execute biochemical tests to detect diseases, genetic disorders, or other abnormalities caused by pollutants.	To be able to monitor and perform microbiological tests on water, food, and the environment to identify and classify microorganisms in environmental specimens and detect harmful microorganisms.	To be able to assess and estimate the results of measurements in relation to existing standards.	To be able to (or to obtain information about) identify and characterize specific causes or sources of pollution, contamination, or infection.	To be able to design and perform simulations or models to predict the impact of pollution, contamination, or infection on environmental remediation efforts and public health.
7	Organizing environmental management	To be able to inform and sensitize the public on environmental issues; help institutions and companies to maintain the necessary files in order to verify compliance with environmental conditions.	To be able to design and evaluate environmental policies, environmental management systems, environmental education, information and communication.	To be able to interpret the technological, social, moral and managerial problems of the natural and manmade environment and contribute to their solution in practice, taking into account their diverse and global nature.	To be able to prepare and issue in-depth technical and research environmental impact reports, and communicate the results to individuals in industry, government, the general public.	To be able to elaborate and provide environmental quality checks; information and guidance with respect to the proper use of land and environmental restrictions that apply.	To be able to supervise and conduct the development of the environment in a specific area and ensure, within the framework of regulations and legislation, the protection of the environment and natural resources.

ECO-MATRIX Competence matrix								
Professional area: BIOLOGY								
Credit Points (CP)								
No	Competence area	Steps of competence development						CP
		A	B	C	D	E	F	
1	Studying ecology structural and integrative levels: population, community and ecosystems	1	1	3	3	2	3	**13**
2	Identifying, utilizing and maintaining biological diversity	1	1	2	2	3	2	**11**
3	Exploring environmental problems and relationships	2	2	2	2	2	3	**13**
4	Organizing and performance of waste treatment, reducing and bioremediation	3	2	2	2	3	3	**15**
5	Measuring, analyzing and monitoring pollutants and toxics	3	2	2	3	3		**13**
6	Design and performance of testing of harmful effects of pollutants and toxics	3	3	3	1	1	2	**13**
7	Organizing environmental management	1	3	2	3	1	2	**12**
TOTAL								**90**

ECO-MATRIX Competence matrix							
Professional area: CHEMISTRY							
No	Competence Area	Steps of Competence Development					
		A	B	C	D	E	F
1	Ecological and environmental analysis	To be able to conduct quality control chemical tests regarding chemical composition of environmental specimens and samples to ensure compliance with environmental specifications.	To be able to gather and analyze environmental specimens to determine chemical or physical properties, composition, structure, relationships or reactions by using specialized techniques.	To be able to gather environmental samples and perform pollutant analysis.	To be able to meter emissions occurring from radioactive waste.	To be able to measure chemical parameters of different environments to determine the relationship to their inhabitants.	To be able to compile and analyze test information to determine operating efficiency or to diagnose malfunction in order for chemical procedures to meet environmental standards.
2	Ecological and environmental protection	To be able to know national and international standards, regulations, and legislation of environmental protection.	To be able to know best practices and procedures for proper environmental protection.	To be able to perform environmental impact assessments and environmental audits.	To be able to develop environmentally safe methods and strategies for chemical production.	To be able to apply methods for improvement of environmental conditions.	To be able to apply soil remediation techniques.

3	Pollution control	To be able to evaluate and monitor pollutants.	To be able to apply techniques for air protection from pollution.	To be able to apply techniques for surface and ground water protection from pollution.	To be able to apply techniques for soil protection from pollution.	To be able to plan, develop and implement programs and policies regarding pollution prevention.	
4	Recycling	To be able to know techniques for recycling waste materials.	To be able to know chemical procedures for reuse of recycled materials.	To be able to apply chemical techniques for recovery of raw materials from waste.	To be able to know waste management legislation and regulations.	To be able to possess knowledge in the field of the ideal economic recycling of waste material.	
5	Industrial waste management	To be able to possesses knowledge in disposal techniques of industrial waste.	To be able to monitor and analyze waste production in the chemical industry.	To be able to apply thermal waste treatment techniques.	To be able to apply best practices and procedures for proper waste handling.	To be able to know industrial waste management legislation and regulations.	
6	Waste water management	To be able to evaluate and monitor pollutants in waste water.	To be able to know national and international standards for water quality.	To be able to apply chemical techniques in water purification plants.	To be able to possess waste water treatment techniques.	To be able to apply methods for waste water reuse.	

ECO-MATRIX Competence matrix								
Professional area: CHEMISTRY								
Credit Points (CP)								
No	Competence area	Steps of competence development						CP
		A	B	C	D	E	F	
1	Ecological and environmental analysis	3	3	3	2	3	2	**16**
2	Ecological and environmental protection	2	2	3	3	3	3	**16**
3	Pollution control	3	3	3	3	3		**15**
4	Recycling	3	3	3	3	3		**15**
5	Industrial waste management	3	3	3	3	2		**14**
6	Waste water management	3	2	3	3	3		**14**
TOTAL								**90**

ECO-MATRIX Competence matrix							
Professional area: Engineering							
No	Competence Area	Steps of Competence Development					
		A	B	C	D	E	F
1	Energy	To be able to know storage, supply, accounting and efficient use of energy	To be able to know about nonrenewable energy sources	To be able to know fuel techniques and power plants	To be able to know alternative energy sources	To be able to measure, monitor and design of energy systems	To be able to review structural, mechanical or electrical projects and specify to evaluate energy efficiency
2	Water	To be able to know the hydrologic cycle	To be able to know and calculates the movement of fluids in pipes, channels and underground	To be able to design water supply and distribution systems	To be able to know river basin management and flood protection	To be able to apply integrated water resources projects	
3	Waste water	To be able to know waste water collection, transportation and treatment	To be able to know surface and groundwater pollution	To be able to sample, measure and monitor of waste water	To be able to design and consult of waste water treatment plant	To be able to design reuse of treated water and side products	
4	Waste	To be able to know collection, separation and storage of waste	To be able to know reuse, recycle and waste management	To be able to know hazardous waste	To be able to sample, measure and monitor of waste	To be able to design and consult of waste storage and recycle facilities	To be able to design energy production at waste disposal site

5	Environment	To be able to know national and international standards, regulations, and legislation of environmental protection.	To be able to know the environmental cycles	To be able to gather environmental samples and perform pollutant analysis.	To be able to perform environmental impact assessments and environmental audits.	To be able to develop environmentally safe methods and strategies for engineering procedures.	To be able to apply methods for improvement of environmental conditions.

ECO-MATRIX Competence matrix								
Professional area: ENGINEERING								
Credit Points (CP)								
No	Competence area	Steps of competence development						CP
		A	B	C	D	E	F	
1	Energy	4	3	3	4	3	3	**20**
2	Water	3	4	3	3	3		**16**
3	Waste water	4	3	3	3	3		**16**
4	Waste	4	4	3	3	3	3	**20**
5	Environment	3	3	3	3	3	3	**18**
TOTAL								**90**