EDUWAT

Development of a Modern Higher Education System for Water Engineering in Syria

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Duration 10/2010 – 04/2015

PROJECT OUTCOMES

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Tempus

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Objective	The goal is an education of highly motivated scientists on the water sector as one of the priority sectors of Syrian economic system who correspond to the requirements of the modern labour market. New master and PhD study courses in water engineering for all universities will be established in Syria, using existing study courses of the faculty civil engineering and/or agriculture to overcome the fragmentation. The quality and competence of the Syrian graduates are enhanced by introduction of the Bologna system, e.g. module and ECTS. By the inter-disciplinarity and trans-disciplinarity of natural sciences and engineering new education and research fields can be created e.g. eco-technology.

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Summary

The EU seeks to develop a closer relationship to Syria.

The national priorities in TEMPUS for the partner country Syria are given by two focal points. The first is the focus of Ministry of Higher Education for modernizing of higher education in Syria by cooperation with national and international partners. The water sector requires fundamental reforms at the national level as second priority. Water is the base any life. The standard of living and the quality of life are determined primarily by the usable water. Water is the most valuable resource and limited in Syria. The careful use of water and water resources is politically, economically and socially important.

These two national priorities, water and education, the TEMPUS Structural Measure "Development of a Modern Higher Education System for Water Engineering in Syria" including the realisation of the triangle Education- Research-Innovation. To reach this goal the existing study courses in water engineering in the faculties of civil engineering, agriculture and/or mechanical sciences are reformed and modernized according to the Lisbon agenda and the Bologna process. The quality and the relevance of the graduates must appropriate to the requirements of the social and labour market needs. It includes the three level educations: Bachelor- Master-PhD, the development of modules and credit point systems.

The extension of university research is a key objective. The linking of research with practice is a driving force for innovations. On the other hand technical innovations are the basis for new educational knowledge. The universities must better link to the labour market. It is necessary to promote the outsourcing and the creation or support of business start-up.

The proposed structure measures are installed and validate under real conditions for selected universities and selected topics to reach the acknowledgement of the Syrian ministries and society.

1 Introduction

1.1 Goals

The goal of the project is the "reform of higher education in the field of Water Resources and Hydro Sciences", especially the development of new curricula or the modernization and expansion of existing curricula in the management of water resources and Hydro-sciences on the basis of the European three-stage system (introduction of European credit Transfer System, ECTS). In addition, in-service training for non-university employees, staff from authorities and businesses. They are trained in the field of sustainable integrated manage- loading of water resources, especially in Syria. Also, or even mainly, the Arab countries will be affected by global change and its major components of the climate-changer changes, changes in land use and population growth.

Efficient resource management turns to the question of survival under these conditions and to the expected changes. It is no longer a question of whether global change will occur; it's just a question of when and how it will happen. Evidence that Global Change ge happens, is already given. In addition, the Arab countries in the Middle East suffer under mismanagement of water resources, such as Overuse of groundwater. There are already many conflicts not only between the countries in this region, but also within countries caused the future of the need for access to water resources.

Water is the most important resource. It is necessary for

- Drinking water;
- Plant and animal production;
- The environment;
-the industrial production.

The challenge today and in the future is an effective sustainable integrated management of water resources-based on a modern water engineering. But only a high level of education and a high quality of student education may help to address this challenge. In parallel, a permanent training in the field of modern water engineering for employees in administrations and non-academic staff is required. Therefore the project with academic, political and economic issues of sustainable integrated management of water resources in the context of Climate Change is concerned. These include the improvement of higher education, including the renewal and strengthening of practical training in the areas of

- Water Engineering and Management,
- Waste Management
- Contaminated soil treatment,
- Hydrology and
- Hydro-science and engineering

including the transfer of knowledge from the EU, especially from Germany to Syria, taking into account the regional and cultural-differences. Therefore, the project is the introduction of the three points-cycle system (BSc, MSc, PhD), the modernization of curricula and the introduction of ECTS and recognition of qualifications and the higher education and training courses of Public Service (ministries, regional / local authorities.) directed particularly in Syria. The cooperation between universities and society itself is very important.

Approach - expected results
In order to achieve this point, it is necessary

- Training of non-university teachers,
- Development of partnerships with enterprises,
- Creation of a knowledge triangle Education Research Innovation,
- Training for the civil service (ministries, regional / local authorities)
- Development of lifelong learning in society at large.

The objectives of this proposal are based on former Tempus projects in Syria. The universities in Damascus and Homs have a great experience and good results in these earlier projects.

The new quality in the formation of the planned study results from the integration of natural sciences and engineering, as well as a large proportion of practical training and self-study courses, including the use of e-learning methods. This is a change from the school system to a separate education system.

1.2 Relevance

Under the condition of global change, water is the most important element of life both in Arab countries and in all the other countries of the world. Water is the most important resource for life, eg. As for drinking, for food and industrial production, to regulate the climate, the protection of flora and fauna, etc. The only way to get the problems in this area more effectively integrated sustainable water resources management and water engineering. This challenge can only be achieved by highly qualified personnel. This can be done by staff training students as well as through training of non-university staff. Under Global Change refers not only to climate change but also the changing population structure, changes in land use and other factors.

Syria is currently in a phase of political, economic and social changes. Also, the ratio of Syria to the US, EU and Germany is characterized by the opening. The government has launched an ambitious program of modernization. Since the introduction of modern techniques and technologies in the modernization process, require all economic sectors (private, public, mixed) in accordance with international standards, qualified graduates.

Weaknesses in the Syrian water are mainly in hydrological studies in the water distribution and construction of water and wastewater plants, in the monitoring of construction sites, in the operation of water systems and the procurement of spare parts. All these tasks are managed directly by ministries or central institutions.

Competition which may lead to a better quality in water management issues, missing more or less. There are large governmental consulting company, which are almost entirely responsible for the planning and monitoring. Ministry officials also take planning und supervisory work. The construction of water systems is almost exclusively carried out by government contractors. The liability of the state-owned enterprises is limited.

This System causes a slowing of the performance of most institutions that work in Syrian water sector and limits the quality of the work. the annual Investment budget of the Government in the field of water supply can not be issued. because too little power of construction and consulting company exists and it is further hampered by government little practical procurement regulations.

The entire Syrian water sector is in the near and medium future face enormous challenges. The actual situation has already led to an intermittent water supply in many areas. The quality of drinking water in some areas is not in accordance with WHO standards, particularly with regard to nitrate concentrations. The issue of sanitation is not answered in many areas. Quality in the design, construction and operation of water systems must be improved.

Many collaborations already exist between Syrian scientists and German universities. There are many Arab scientists who have completed German universities, especially at the Technical University of Dresden (TUD). A number of special arrangements have been between TUD and Syrian universities have in the past been completed, the. A support for teaching and research in the field of water as part of civil engineering At the international level, the higher education of engineers water is separated from the engineers, as certain scientific Basics necessary. Therefore, the public universities are subject to an ongoing process of modernization. The Syrian government wants to compensate for the deficiencies in the education system in the universities. There are several initiatives on the way to improve the quality of education at state universities.

1.3 Situation in the Water Sector in Syria

Under the condition of global change, water is the main basis for existence in the Arabic countries as in all other countries of the world. Water is the most important resource for existence, e.g. as drinking water, for food and industrial production, climate regulation, protection of flora and fauna, etc. The only way to deal with the problems in this field is effective sustainable integrated water resource management and water engineering. This challenge is only attainable by high qualified personnel. These personnel we can obtain by education of students as well as of qualification of non – university staff, too. Global change not only includes climate change but also the changing population, changing land use and other factors. Syria is currently undergoing a period of political, economical and social changes. Its government is implementing an ambitious program of modernization. Since the implementation of engineering in the modernization process, all economic sectors (private, public, mixed) require qualified graduates according to international standards.

Weaknesses in water management lie especially in hydrological investigations, water allocation, and design studies, construction of water schemes, supervision of construction sites, operation of water systems and the procurement of spare parts are all tasks of ministries or line institutions.

Competition, which may lead to a better quality in water management issues, is more or less missing. There exist large governmental consulting companies, which are almost entirely responsible for design and supervision tasks. Ministry staff also undertakes design and supervision work. The construction of water schemes is almost entirely undertaken by governmental construction companies. The liability of the governmental companies in due deliverance is limited. This system results in a slow performance of the majority of the institutions working in the Syrian water sector and to limited quality of the work performed.

The annual investment budget of the Government in the water sector cannot be spent in full due to the slow performance of consulting and construction companies and is additionally hampered by unpractical governmental procurement regulations.

The whole Syrian water sector is facing enormous challenges for the near and intermediate future. The actual situation has already resulted in an intermittent supply of drinking water in many areas. The drinking water quality in some areas does not conform to WHO standards, especially regarding nitrate concentrations.

The question of sewage disposal is not answered in many areas. Quality in design, construction and operation of the water systems needs improvement.

Water scarcity is the most important natural constraint to Syria's economic growth and development.

1.4 Situation of Higher Education in Syria

Many collaboration exist already between Syrian scientists and German as well as European universities. There are many Arabic scientists who graduated at German universities, especially at Technische Universitaet Dresden (TUD). A number of special agreements have been made between TUD and Syrian universities in the past, supporting teaching and research in the field of water of civil engineering as a small part of specialisation. On the international level, higher education of water engineering is separated from civil engineering, because certain natural basics are necessary. Public universities are subject to an ongoing modernisation process. The Syrian government wants to compensate shortcomings in the educational system of the universities. There are several initiatives on the way to improve the quality of education at public universities

The tradition in cooperation between Syria and Germany give the basic for a good cooperation with German universities in civil engineering esp. water resources management:

- In the eighties of the last century a lot of Syrian students make the PhD degree in the TU Dresden, also in the field of hydro sciences and engineering, civil engineering
- A lot of Syrian scientist and engineers have a big interest for further education in the field of environmental, water and soil.

2 Description of Partner Institutions and the Role in the Project

Partner 1

Technische Universität Dresden - TUD (Germany) http://tu-dresden.de	TECHNISCHE UNIVERSITÄT DRESDEN

The TUD, is the leader of the WP1 – Higher education in the field of water engineering.. On the base of the experience he analyses the education in the TUD and proposes new higher education structures. He jointly works with the other partner universities on the preparation of study courses of water engineering. Besides he organizes one of the workshops and takes part on the other workshops. He is involved in all deliveries.

Protection Law. Therefore he collaborates in all deliveries and workshops

TUD is one of eleven German universities that were identified as an “excellence university”. TUD has about 37.000 students, 4.400 publicly funded staff members – among them over 500 professors – and approximately 3.500 externally funded staff members, and, thus, is the largest university in Saxony, today.

Partner 2

Ministry of Higher Education - MHE (Syria) http://www.mohe.gov.sy	وزارة التعليم العالي MINISTRY OF HIGHER EDUCATION

MHE, is the most important partner for the acknowledgment of this project. Therefore he must be involved in all deliveries and must take part in all workshops. He organizes jointly with the DAM the Kick-off Meeting.

The Ministry of Higher Education is composed of 21 directorates and 4 councils with mission to create a high-quality education system that helps develop a national workforce capable of innovation and transfer of knowledge, of creating work opportunities and of contributing to comprehensive and sustainable development in the country.

The goal is to increase higher education opportunities for all, develop high-quality curricula and educational programs, establish a performance evaluation system at universities to ensure high-quality standards, create an enabling environment for higher education and scientific research, increase the productivity of the Syrian scientific research system and link it to the developmental needs of the country, encourage partnerships among universities on the national and international levels and improve and modernize intermediate education.

Since its foundation in 1966, the Ministry of Higher Education (MHE) has been striving to enhance and increase learning and research opportunities for students seeking tertiary educ::ation. The Ministry works on providing students with the knowledge they need to develop comprehensively their academic, intellectual, and social skills, and to reinforce the values of their society and culture so that they become active contributors to the process of comprehensive national development.

The Ministry promotes the advancement of academic research through the creation of the environments and the provision of the assets that ensure its success. The vision for academic research in Syria embodies the goal of keeping pace with the latest advancements in .the fjelds of knowledge, and meeting the challenges of modernity.

An important role of MHE lies in setting future plans and policies for the higher education system in Syria, mainly through the regulatory work of the Council of Higher Education.

Partner 3

University of Natural Resources and Life Sciences, Vienna – BOKU (Austria) http://www.boku.ac.at	

BOKU has competences in rural water engineering and in water resources management in teaching as well as in research; therefore he collaborates in all deliveries. Besides, BOKU organizes the third workshop in this WP. Jointly with all universities he analyzes and develops the education for water engineering in EU countries as well as Syria.

The **University of Natural Resources and Life Sciences** BOKU (derived from its German name, Universität für Bodenkultur Wien) founded in 1872, is an an education and research centre for renewable resources in Vienna There are currently around 12,000 students enrolled at BOKU.

The BOKU perceives itself as a teaching and research center for renewable resources, which are necessary for human life. It is BOKU's objective to help make a considerable contribution to the conservation and protection of resources for future generations by providing diversity in its fields of study. Connecting natural sciences, engineering and economic sciences, we wish to increase knowledge of the ecologically and economically sustainable use of natural resources, to provide a harmoniously cultivated landscape.

An important feature of BOKU's research lies in its recognition of future problems and our efforts to provide and stimulate practical relevance, internationality and among disciplines. Interdisciplinary cooperation of scientists on an international level should help create comprehensive questions about the future of our planet and lead to innovative problem solving.

BOKU's teaching is designed holistically and in a coordinated manner. It leads graduates to knowledge, understanding and flexibility. From this program, they gain the willingness to face future challenges and the capability to meet them in a competent way. Thay teach state of the art content and current issues that are based on dynamic research and a high level of practical relevance using modern didactic methods. This motivates students and graduates to develop their own ideas. Our cosmopolitan scientific vocational education and training enables them to understand complex interdisciplinary relationships.

Partner 4

University of Rostock - URO (Germany) http://www.uni-rostock.de/	Universität Rostock

URO has experience in the cooperation to Syria for a long time, especially in the organization of common conferences and training courses for non-university staffs; therefore he collaborates in all deliveries. Jointly with all universities he analyzes and develops the education in EU countries as well as Syria.

Tradition and innovation are the trademarks of our almost 600-year history. Today, with 2,200 employees and 15,000 students, the University of Rostock offers fascinating perspectives into nearly all scientific fields. With the four profile lines Life, Light and Matter / Maritime Systems / Aging Science and Humanities / Knowledge – Culture – Transformation, the University of Rostock has at its disposal excellent interdisciplinary research fields in the areas of natural and technological sciences, medicine, life sciences, humanities and cultural studies. The standard set for all our actions: we want to impress with our performance.

URO is the only university in Germany to combine agricultural and environmental sciences in a single faculty. Utilising and developing rural regions in compliance with sustainable ecological principles is the focal point of the interdisciplinary research and teaching at the four institutes of the Faculty of Agricultural and Environmental Sciences. Courses of study in agricultural ecology, as well as rural management and environmental protection, are orientated towards the development, use and improvement of rural areas as a whole.

In recent years, the University of Rostock has undergone significant conceptual and organisational changes, which included the bundling of competences and research activities in the interdisciplinary, cross-faculty departments of the Interdisciplinary Faculty. Scientific priorities of the faculties have improved by including the interdisciplinary-based research units: Collaborative Research Centres, Research Training Groups, and Research Units. The university cooperates with several independent research centres.

Partner 5

University of Applied Sciences Dresden - HTWD (Germany) http://www.htw-dresden.de/	

HTWD has experience: in applied research and teaching in the field of river bank infiltration and water management in EU and Asia, special by the project managing for EU project "EU-India River Bank Filtration Network". Therefore he collaborates in all deliveries. Jointly with all universities he analyzes and develops the education in EU countries as well as Syria.

HTW Dresden (FH) is t he second largest university ofthe $axon capital. Engineering, design, economy and "green" studies are t he four pillars on wh ich to build a total of 26 cou rses.With 8 faculties, 180 professors and more than 5,000 students, the university is large enough to practice successfully the integration ofdifferent disciplines with high synergy effects. On the other hand, it is still so limited that the personal dialogue can be conducted for an individual study.The organization ofthe teaching is the main task ofthe HTWD. In addition, it has established itself since its inception as a center of applied resea rch and development for the economy The teaching field of water sciences has a great tradition with international projects

Partner 6

Czech University of Live Sciences Prague - CULS (Czech Republic) http://www.czu.cz	

CULS has experience in IT projects for university education, E-Iearning projects, projects for the practice in the field of natural resources and environmental protection. CULS make international projects in semi-arid and in arid regions. Therefore he collaborates in all deliveries. Jointly with all universities he analyzes and develops the education in EU countries as well as Syria.

Czech University of Life Sciences is the third largest university in Prague. CULS has already a hundred years tradition. She offers students up-to-date facilities and cutting edge technologies, involvement in advanced scientific research (agriculture, forestry, ecology, technology as well as economics and management). She has modern laboratory facilities and operate two university farms (agriculture & forestry). CULS offers excellent opportunities for studies and research. Each year CULS organises many specialisation courses and several summer schools abroad (Vietnam, Indonesia, etc.).

The CULS consists of 5 faculties and 2 institutes (Faculty of Agrobiology, Food and Natural Resources, Faculty of Economics and Management, Faculty of Engineering, Faculty of Environmental Science, Faculty of Forestry, Wildlife and Wood Sciences, Institute of Education and Communication, Institute of Tropics and Subtropics.

The Department of Water Resources is oriented to subjects like Hydropedology, Soil Physics, Surface and Soil Hydrology, Hydrogeology, Hydrometeorology, Water Management in Agriculture and Water Resources. ln addition, the Department also specializes in water resources development in the arid and semi-arid regions of the developing countries (Africa).

Partner 7

University of Opole – UO (Poland) http://www.uni.opole.pl/	

UO has experiences in land and water protection and management. uo develop of training courses concerning hydrology and water management. Therefore he collaborates in all deliveries and workshops. Jointly with all universities he analyzes and develops the education in EU countries as well as Syria.

Opole University is a dynamically developing academic center. ln 1994, it began its activity offering courses at four independent departments and now there seven of them: Faculty of Philology; Faculty of History and Pedagogy, Faculty ofTheology, Faculty of Mathematics, Physics and Chemistry, Faculty of Natural and Technical Sciences, Faculty of Economics, Faculty of Law and Administration. At present there are 18,000 students doing 32 majors and 53 specializations. Established in 1999, the Faculty of Natural Sciences and Technology derived from the Institute of Biology and Environmental Protection and the Department of the Process Engineering. Main directions of research are monitoring of the change in the natural environment are linked, occurring due to human activities and geographical aspects of environmental protection.

Partner 8

Damascus University – DAM (Syria) http://www.damascusuniversity.edu.sy/	

DAM is one of the local coordinator of TEMPUS project "EDUWAT", the problem owner and target group of the proposed project. DAM has an international training program in border crossing water management. Jointly with all universities he analyzes and develops the education in EU countries as well as Syria. Therefore he collaborates in all deliveries and workshops.

DAM – Damascus University is the oldest Higher Education institution in Syria, and is considered the mother university of Syria's universities

Faculty of (ivil Engineering was founded in 1961 and includes the following sections:

- Structural Engineering.
- Management of engineering and construction industry.
- Geotechnical Engineering.
- Environmental Engineering.
- Water Engineering.
- Engineering topography.
- Transport Engineering and Transportation.

-Irrigation and drainage engineering.

The aims is Preparation of specialists in civil engineering and civil engineering in general, and irrigation and drainage and rehabilitation of students and provide them with a high level of knowledge in the area of competence in fine with recent developments in this area of the hand, and with the needs of the Syrian Arab Republic and the Arab world on the other.

Partner 9

Al-Baath University Homs – ALBA (Syria) http://www.albaath-univ.edu.sy	

ALBA is one the local coordinator of TEMPUS project "EDUWAT", the problem owner and target group of the proposed project. Jointly with all universities he analyzes and develops the education in EU countries as well as Syria. Therefore he collaborates in all deliveries and workshops.

Al-Baath University, is a public university located in the city of Homs, Syria, 180 km north of Damascus. It is Syria's fourth largest university The university was established in 1979.

AI-Baath University seeks to prepare graduates who are able to meet the needs of society, and to the development of scientific research, especially research related to national issues related to economic and social development, humanitarian and technical.

The University is keen to mirror the real Arab identity, often mystified by false stereotypes. Besides, it reflects its pioneering role in past knowledge and up-to-date research through an effective network of academic staff and students. Achieving such eminence involves equal educational opportunities regardless of gender, age or physical abilities. On the other hand, it encourages freedom of speech and creativity. Much of its success is due to the outreaching policy that targets local schools and universities and establishes strong connections with Arab and foreign research centres

The Faculty of Civil Engineering has Department of water engineering and management, which responsible for teaching water related subjects for undergraduate students, and running a master course and supervising master and PhD students. They were training the teaching staff, members of public authorities and companies in the field of water engineering.

Al-Baath University exerts genuine efforts to meet the needs of the local community both culturally and economically by providing highly qualified graduates. It is also committed to promoting scientific research in every field of national importance such as economic, social, humanistic and technical sustainability. In fact, it contributes to defining the human experience and adding up to world culture

Partner 10

Tishreen University Lattakia – TiU (Syria) http://www.tishreen.edu.sy	

TIU is one the local coordinator of TEMPUS project "Integrated Water Resources Management", the problem owner and target group of the proposed project. Jointly with all universities he analyzes and develops the education in EU countries as well as Syria. Therefore he collaborates in all deliveries and workshops.

Tishreen university is a public university located in Lattakia, Syria. It is the third largest university in Syria. It was established in 1971.

TIU has 14 facult ies.

Faculty of Civil Engineering has following departments:

-Dept. of Basic Sciences.

·Dept. of Structural Engineering.

·Dept. of Aquatic Engineering.

·Dept. ofTransportation and Tele-communications.

·Dept. of Engineering Management and (onstruction.

·Dept. of Environmental Engineering.

·Dept. of Geotechnical Engineering.

·Dept. of Topographical Engineering

Partner 11

Aleppo University – AU (Syria) http://www.alepuniv.edu.sy	

AU is one the local coordinator of TEMPUS project "EDUWAT", the problem owner and target group of the proposed project. By the AU the agriculture viewpoint of water engineering is reflected. Jointly with all universities he analyzes and develops the education in EU countries as well as Syria. Therefore he collaborates in all deliveries and workshops.

University of Aleppo is a public university located in Aleppo, Syria. It is the second largest university in Syria after the University of Damascus.

University of Aleppo is a public university located in Aleppo, Syria. It established in 1958, It is the second largest, after the University of Damascus, and oldest university in Syria. Aleppo University includes 24 academic faculties for different disciplines. In addition, it has 10 institutes, 6 Academic Teaching Hospital, a Nursing School, 16 Educational Centers, a University Journal, the Higher Institute of Languages, Publishing House, Press and Printed Materials Management and Central Library. It includes more than 100,000 students, over 1,500 of graduate students, 1,400 staff members (professors and associate professors), 2,500 assistant staff. Furthermore, the University of Aleppo continually strives for promoting academic and cultural ties with many Arab and foreign and advanced international institutes. Such accords encourage faculty and student exchange programs on the one hand and joint academic supervision on the other. Aleppo University seeks to meet the changing needs of society in achieving comprehensive and continued human resource development, promoting national, regional and international competition. The University played a leading role in providing the community with educated and experienced citizens who are essential for the progress of both Syria and its neighbouring countries. The university equipped its faculties with the most modern laboratories and scientific equipments.

The Faculty of Agricultural was founded in 1960, is at the forefront of advances in applied bioscience, food, nutritional and environmental sciences research and teaching. Today the Faculty of Agriculture includes 10 Departments that focus on Agriculture, Food, Natural Resources and the Environment.

The Department of Rural Engineering is recognized for its academic programs, It offers both undergraduate (B. agr. Eng) and postgraduate (M.Sc. and PhD.) degrees in fields of Water Resources Management (hydrology, irrigation, drainage and water quality), Ecological Engineering (ecosystem modeling, design and management), Waste Water Management and Agricultural Machinery. Researches are conducted at both, levels applied and basic.

There is a tight collaboration between Rural Engineering, Natural and Renewable Resources and Soil Sciences and Land Reclamation Departments.

Several international funded projects were conducted at the faculty of agriculture related to better use of water, using multi discipline and multi cultural or institutional approach.

Partner 12

Higher Institute for Water Management – HIWM Homs (Syria) http://hiwm.albaath-univ.edu.sy/	

HIWM is an institute for a special higher education and research for water engineering. Jointly with all universities he analyzes and develops the education in EU countries as well as Syria. Therefore he collaborates in all deliveries and workshops.

HIWM functions as a national (entre of excellence and networking in the water sector. HIWM main functions are applied research and t raining in water management. HIWM offers internationally accreclited postgraduate programmes (MSc and PhD in Water Management).

Partner 13

Saxon State Ministry of the Environment and Agriculture –SMUL (Germany) http://www.smul.sachsen.de	

SMUL has experiences in developing and institutionalizing the Environmental Administration as well as of manuals for risk assessment in hazardous waste management and water *I* groundwater; authority in European Environmental Protection Law. SMUL trains in European Environmental

The SMUL is the highest state authority in Saxony at the field of environment and agriculture. It is responsible for fundamental issues of agriculture, forestry, hunting and environmental policies, national and international affairs, agriculture, forestry, hunting and environmental law, environmental information, environmental education, forest education, applied agricultural, forestry, hunting and environmental water management, water protection, surface water, groundwater, water supply, sanitation, hydraulic engineering and flood control. The department - Groundwater protection and contaminated sites~ is responsible for the instruction ofthe Saxony State Bureaus for Environment regarding Groundwater Protection, waste disposalsite and contaminated sites.

Partner 14

Stadtentwaesserung Dresden GmbH – SEED (Germany) http://www.stadtentwaesserung-dresden.de	Stadtentwässerung Dresden WIR KLÄREN DAS FÜR SIE

SEED is an enterprise for urban drainage and has experiences in environmental tasks in the private and political sector, business and management in the field of water and waste water engineering. SEED make training of non-university staff in Syria. He formulates requirements for the quality of graduates. Therefore he collaborates in all deliveries and workshops.

Stadtentwaesserung Dresden GmbH is a joint venture of the city of Dresden and GELSENWASSER AG. The company offers environmental services in the field of waste water treatment and other related businesses. In the past 15 years the employees of Stadtentwaesserung Dresden could successfully prove t heir technical expertise during a major upgrade of the sewer system and sewage treatment works. This upgrade had become a necessity after the sewage treatment in Dresden had been neglected for many years. A major investment program over €500m had been initiated and eventually led to the now present environmentally sound and efficient state-of-the-art system.

Partner 15

M&S Umweltprojekt GmbH, Plauen – MUS (Germany) http://www.mus-umweltprojekt.de	M&S UMWELTPROJEKT GMBH www.mus-umweltprojekt.de

MUS is an example for a modern innovative engineering office in the field of water engineering with a lot branches outsides Germany, as well as Syria. He formulates requirements for the quality of graduates. Therefore he collaborates in all deliveries and workshops.

The M & S Environment Project Ltd was founded in 1991 and is engaged in the provision of engineering, laboratory and measurement services for the areas contaminated sites, Land / geotechnical, landfill /waste treatment, demolition, water /wastewater, Earthworks *I* Civil Engineering, sampling and analysis, alternative energy and EIS. It has 43 members of staff. 2006 in Aleppo was founded the German-Syrian environmental excellence center with a advanced environmental laboratory.

Partner 16

General Company of Engineering studies and Consulting GCEC Damascus (Syria) http://dirasat-syria.com/	

GCEC works as an enterprise for the private and public sector. He is the target group for the research results. At the same time GCEC order research from the universities. He formulates requirements for the quality of graduates. Therefore he collaborates in all deliveries and workshops.

GCEC specializes in the prevision of professional regional and urban planning, engineering design, site supervision, and management services for infrastructure development all Qver Syria and same middle east. Services are offered through more than (2490) employees operating in locations all aver Syria.

Dept. Water & wastewater Engineering:

Studying and drawing plans for the supply of drinking, domestic and industrial water to Syrian towns and cities.

Hydrological and hydro-geological studies for local water resources in planned projects.

Studies concerning the management of wastewater resulting from domestic and industrial usage, applying world standard wastewater treatment technologies

Partner 17

Arab Center for the Studies of Arid Zones and Dry Lands – ACSAD Damascus (Syria) http://acsad.info/index.php/ar/	

ACSAD is an institute for applied research in the field of arid and dry land. ACSAD organize trainings courses. ACSAD is important for the consortium to realize the research cooperation to the universities. He formulates requirements for the quality of graduates. Therefore he collaborates in all deliveries and workshops.

ACSAD was established in Damascus, Syria in 1968.

It is a specialized Arab organization working with in the framework of the League of Arab States with the objective of unifying the Arab efforts which aim to develop the scientific agricultural research in the arid and semi-arid areas, help in the exchange of information and experiences and make use of the scientific progress and the modern agricultu ral techniques in order to increase the agricultural production.

The work of ACSAD is supervised by a General Assembly composed of the ministers of agriculture from the member states of ACSAD and an elected Executive Council consisting of seven representatives of seven Arab states. ACSAD specialized divisions include Soil Studies and Water Uses, Water Studies, Animal Wealth Studies, Plant Studies, Economy and Planning and the Financial and Administrative Affairs. ACSAD's functional duties perta in.ing to research, studies, training dissemination of the technica l information

The main mission of ACSAD is to face the challenge imposed by the arid and semi-arid environments which are characterized by fragile farming systems through the provision of scientific and applied data and advanced techniques in a way that allows the large-scale implementation of the tasks of the agricultural and social development and the optimum exploitation of the renewable natural resources in the arid areas.

3 Higher Education in the Field of Water Engineering

Lead Partner: TUD	*Type of work package*	*Title of work package*	
WP.1	Development	**Higher education in the field of water engineering**	
1.1	Kick-off Workshop (with 1.3)	Events: Conferences and Seminars	DAM/MHE
1.2	Comparison of higher education systems	Report	
1.3	Workshop	Events: Conferences and Seminars	DAM/MHE
1.4	Development of higher education structure for Syria	Report	
1.5	Workshop	Events: Conferences and Seminars	TUD
1.6	Definition of the modules for the new education	Report	
1.7	Developing of teaching materials	Report	
1.8	Quality Management and Accreditation	Report	
1.9	Workshop	Events: Conferences and Seminars	CULS
1.10	Developing of professional training courses	Report	
1.11	Workshop (with WP 3.2)	Events: Conferences and Seminars	BOKU

- ***Related assumptions and risks***

Risks are in the decision making and implementation process in case that one important policy maker is not adequately involved. To overcome this risk, the Syrian partners are engaged to identify all stakeholders to involve. The new structures need a clear distribution of competences and must be acceptable nation-wide. The education must be in accordance with the new Syrian water master plan.

- ***Description of work package***:

In the WP1 the higher education in the field of water engineering should be developed in the form of new structures for Syria. The Kick-off-Workshop is assigned to the WP1. As a basis of the development a comparison is carried out between the education systems in Syria and this one in the involved and other countries the EU. Questions of the student academic self-government also play a big role. The requirement profiles from the practice and research are considered to the education. After the definition which courses of studies in which university will should be set up the modules of the study courses define according to the Bologna system (e.g., ECTS-credit points.). The aspects of faculty-crossing, interdisciplinary and trans-disciplinal should be included to the study courses. The study courses must consider the special requirement for a sustainable water resource management under the economical, c1imatic, population conditions of Syria. New teaching materials, Internet platforms and e-Learning should be developed for the preparation of the new education structures. Finally a system of the quality assurance and accreditation is to be developed. The results are summarized into suitable reports and are made available to the involved consortium members. In addition, this is held accessible in the Internet main entrance worldwide and is presented internationally to the final meeting. In the intermediate workshops the working groups tune her results. In addition to the workshop the involved institutions receive the possibility for bilateral working stays. Beside the education of young people strong attention is to be given to the further education and training courses of the graduates in practice. This happens by development of training courses by the universities for the society and by development of work accompanying further education program to the acquisition of other academic degrees. Also this is concluded with a workshop for the spreading of the results.

<u>1.2 Comparison of higher education systems</u>

The deliverable 1.2 is the report about different activities. In this one is include the analysis of the higher education structure at the cooperating Syrian as well as EU universities in Water engineering. In dependence from the analysis results a comparison of the different higher education systems will be described. Besides to the teaching process the student self-administration structure in the EU and Syria are investigated.

<u>1.4 Development of higher education structure for Syria</u>

This deliverable proposes a modern higher education structure for water engineering in Syria in compliance with the results of deliverable nr. 1.2. This modern higher education structure is equivalent to the structure of Lisbon agenda and the Bologna process. Second in this one a profile of requirements on a graduate in the field of water engineering/hydro sciences will be defined. These criteria are the requirements by practice and research. These structure is certify by the MHE and 4 Syrian universities

<u>1.6 Definition of the modules for the new education</u>

The modules of the different study courses from 1.4 describe the content (adapted to the subjects and applications in Syria) and load work (credit points) of the lectures, exercises and practical training. This one has an interface to the curricular which is outside of this project. These modules are equivalent to the Lisbon and Bologna. Assembling of the new modules, overall faculties, according to the requirements out of the development objectives for the water sector in Syria

1.7 Developing of teaching materials

A modern education structure is combined with a modern teaching material. The modern teaching methods are formed by working groups, team working, project study and a big part of self-study. ln this context teaching materials will be developed both in printed and in digital form. lmplementation of Internet based learning methods. This material would be developed for selected universities and selected study courses

1.8 Quality Management and Accreditation

To enhance the quality and relevance of higher education in Syria a quality management for the monitoring of the new study structure would be established. A very important point for acceptance of the new study courses by the EU countries is the accreditation and the permanent quality management of the education system. Special guidelines are written and supervise by the EU universities.

1.10 Developing of professional training courses

This deliverable content the developing of training courses by the universities for the society. Therefore a strong cooperation between the universities and the enterprises is necessary. Besides it is necessary to develop extra occupational specialist trainings programs for graduated students (achievement of additional academic degrees). This one goes in the direction to Life Long Learning. In this context it is possible to study different sciences.

3.1 Comparison of Higher Education Systems

The deliverable "Comparison of higher education systems" is the report about different activities. In this one is include the analysis of the higher education structure at the cooperating Syrian as well as EU universities in Water engineering. In dependence from the analysis results a comparison of the different higher education systems will be described. Besides to the teaching process the student self-administration structure in the EU and Syria are investigated.

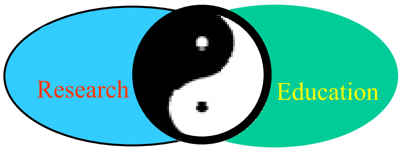
3.1.1 Status-quo-Analysis - Questionnaire

Introduction

The aims of this report (deliverable 1.2) are to present a status quo analysis to establish a common understanding of the different education approaches, to detect obstacles at an early stage and to compile the research approaches at partner institutions (deliverable 2.1). Based on this information the progress of curriculum development for the Syrian water sector is facilitated.

In accordance with the overall goal of EDUWAT, the specific objectives serves to analyse present teaching practises, to promote adequate teaching resources and to investigate on knowledge transfer into the higher education system (Table1).

Table 1: Specific goals

• Challenges of university education • Theory vs. practice orientation • Education vs. Training (Employability) • Academic Quality vs. Employability • Study as Education experience vs. Employability • Research- vs. Education scopes • Academic liberty vs. societal responsibilities • Tradition vs. Innovation • Nationality vs. Internationality • Disciplinary vs. Interdisciplinary	

For Syrian universities it is a big challenge to adapt to the Bologna system. This question has to be addressed form a national and an international point of view. With other words no national education system is isolated in our days and in a certain way a competitor at the global education market. Study duration is linked to efficiency of career planning. Starting later at a master level may be a disadvantage for Syrian graduates.

Another discussion point is the concept of broad education or the focus on specialisation. It is also important to keep in mind the employability. This is not important for the individual, but for the development of the water sector as well.

In this respect a good balance between research and education has to be found. Societal responsibility within academic liberty and tradition should also not be overlooked, from which new innovations are based.

Corresponding to the specific goals a questionnaire (Annex 1) was proposed and distributed to all partners. In the report, first general information is compiled (Table 2) to show a possible framework for the curriculum development in Syria according to the Bologna declaration. Question marks are used when a final decision is not made at present or a system is not existent. Some partners can not foresee the introduction of a bachelor-master system, therefore the curriculum is included in Table 2 (column MSc), but not included in the statistic of study duration (Figure 1). Table 2 may be especially valuable for the participants who are in a discussion process. The final thesis is also evaluated in terms of practical orientation vs. scientific work. Values in brackets are ECTS points awarded. The table may be seen as a continuing point and as work in progress, so everyone interested can use it as a reference for their own position.

The general information is followed by a section of processed answers of the questionnaires. The tables present the different approaches of education and topics treated in a qualitative and quantitative way

Processed questionnaire

At the beginning the main purpose is to compile the present education structures at all partner higher education institutions (Table 2). The bachelor degree may be a BSc (Bachelor of Science) or an equivalent (e.g. BE, bachelor of Engineering). For the readability when no detailed information is needed it is presented as Bx. For workload presentation and calculation it is agreed the ECTS (European Credit Transfer System) is used. In the first two workshops the ECTS was introduced in detail.

Main important cornerstones of ECTS are:

- 1 semester = 30 ECTS
- 1 year = 60 ECTS
- Workload 1 ECTS 25 – 30 working hours
- Working time is calculated for 1 year taking into account 6 weeks holidays
- Workload ≠ grading

Workload includes:

- Lecture (sitting in classrooms)
- Exercises (in classroom, laboratories or homework)
- Excursions (including reporting)
- Own studies (assignments, library, internet, home study etc…)

Table 2: Curriculum overview of partners

EDUWAT Partner summary							
					Final Thesis		
Name of Institution	Town, Country Code	Bx[)] years	MSc [1]) years	PhD years	Bx ECTS	MSc ECTS	PhD ECTS
Ministry of Higher Education	MHE						
Tishreen University Lattakia	TIU	4-5	2	3	-	50	120-180
Damascus University	DAM	4-5	2	2-3	5	60	120-180
Arab Center for the Studies of Arid Zones&Dry Lands	ACSAD						
Al-Baath University Homs	ALBA	5	2	3	-	60	120-180
Higher Institute of Water Management	HIWM	Not relevant	2	3	Not relevant	30	Not applied
University of Aleppo	AU	5	3-4	4	30/60	120/180	180/240
General Company for engineering Studies and Consulting	GCEC						
Czech University of Life Sciences Prague	CULS	3	2	4	18	20	Not applied
University of Opole	UO	3	2	Not defined	12	30	Not applied
M&S Umweltprojekt GmbH	MUS						
Hochschule für Technik und Wirtschaft Dresden	HTWD	Not relevant	5 Dipl-Ing	Not relevant	Not relevant	30	Not relevant
Stadtentwässerung Dresden-Gelsenwasser	SEED						
Sächsisches Ministerium für Umwelt und Landwirtschaft	SMUL						
Technische Universität Dresden	TUD	3	2	Not defined	10	30	Not applied
Universität für Bodenkultur Vienna	BOKU	3	2	3	12	30	160

Legend: Bx.........Bachelor
MSc......Master of Science
ECTS........credits awarded according to European credit transfer system
If B - MSc is not used state either no or year when it is proposed to be introduced
Non academic partner, without study programme

Processed answers of questionnaire

First all relevant programmes for further evaluation are compiled (Table 3). The programme names already indicate the complexity of the group. There may be great differences in content, but it should be possible to find a common structure for curriculum development. One observation is to be that like in many other cases there are two philosophies applied, a broader holistic approach vs. specialisation. The discussion should be addressed at what level specialisation is most appropriate. Question 1 and 2 the serve as first information of the importance of research in higher education and for the modernisation of curricula. Questions 3 and 4 are already a link to WP1 (deliverable 2.1; Comparison of research in quality and quantity).

1.A. Describe which programme(s) in the field of environment-water are offered at your faculty

Table 3a: Study programmes –Bachelor (Bx)

	Bachelor	Duration Years 1)	Start Age 2)	End Age 3)
TIU	Agricultural Faculty	5	18	23
TIU	Civil Engineering	5	18	23
TIU	Faculty of Science	4	18	22
DAM	Irrigation and Drainage	5	18	23
DAM	Civil Engineering	5	18	23
DAM	Rural Engineering	5	18	23
DAM	Forests and Environment	5	18	23
DAM	Agriculture Economy and Extension	5	18	23
DAM	Soil Sciences	5	18	23
DAM	Environmental sciences	4	18	22
DAM	Hydrogeology	4	18	22
ALBA	Water Resources, Engineering & Management	5	18	23
ALBA	Environmental Engineering	5	18	23
AU	Agrarian Engineering	5	18	24
AU	Water Engineering	5	18	23
CULS	Sustainable Use of Natural Resources	3	18+	21
UO	Environmental Protection	3	19	22
TUD	Water Management	3	18	21
TUD	Hydrology	3	18	21
TUD	Waste Management and Contaminated Site Treatment	3	18	21
BOKU	Environmental Engineering	3	18	21

Table 3b: Study programmes –Master level (MSc)

	Master	Duration Years [1]	Start Age [2]	End Age [3]
TIU	Faculty of Agriculture: Soil Sciences and Land Reclamation	2	23	25
TIU	Faculty of Civil Engineering: Hydrologic Engineering Environmental Engineering	2	23	25
TIU	Faculty of Science: Aquatic Environment Hydrology - Geology	2	23	25
DAM	Faculty of Civil Engineering: Water Engineering Environmental Engineering	2	23	25
DAM	Faculty of Agriculture: Rural Engineering Soil sciences/Pedology Forestry and Environment Agriculture Economy and Extension	2	23	25
DAM	Environmental Sciences - but not open yet	2	22	24
DAM	Hydrogeology - but not open yet	2	22	24
ALBA	Faculty of Civil Engineering: Water Resources, Eng. & Management Water Sanitation/Environmental Eng.	2	23	25
ALBA	Faculty of Agriculture Soil Sciences and Land Reclamation Rural Engineering	2	23	25
HIWM	Water Management	2	23	25
AU	Faculty of Civil Engineering: Water Engineering Environmental Engineering	3	24	28
AU	Faculty of Agriculture: Rural Engineering Soil Sciences and Land Reclamation	4	24	28
AU	Faculty of Technical Engineering: Environmental Engineering Technology	3	24	28
CULS	Natural Resources and Environment	2	22+	23
UO	Environmental Protection	2	22	24
HTWD	Transporting and Geotechnical Eng.	4	23	26
TUD	Water Management	2	21	23
TUD	Hydrology	2	21	23
TUD	Waste Management and Contaminated Site Treatment	2	21	23
TUD	Hydro Biology	2	21	23

TUD	Hydro Sciences and Engineering	2	21	23
BOKU	Environmental Engineering Water & Environment	2	21	23
Degree of specialisation **Diploma**				
HTWD	Civil Engineering	1	x	x

Table 3c: Study programmes –PhD level

	PhD	Duration Years 1)	Start Age 2)	End Age 3)
TIU	Agriculture	2-3	25	28
TIU	Civil Engineering:	2-3	25	28
TIU	Science	2-3	25	28
DAM	Irrigation and Drainage	2-3	25	28
DAM	Water Engineering	2-3	25	28
DAM	Environmental Engineering	2-3	25	28
DAM	Rural Engineering	2-3	25	28
DAM	Forests and Environment	2-3	25	28
DAM	Agriculture Economy and Extension	2-3	25	28
DAM	Soil sciences	2-3	25	28
DAM	Environmental sciences - but not open yet	2-3	24	27
DAM	Hydrogeology - but not open yet	2-3	24	27
ALBA	Water Sanitation	3	25	28
ALBA	Water Resources, Eng. & Management	3	25	28
HIWM	Water Management	3	25	28
AU	Dr. Agr. Eng	4	28	35
AU	Dr. Eng.	4	29	35
CULS	PhD,	4	24+	27-28+
UO	Dr. Eng,	not defined	23	any
BOKU	PhD der Bodenkulturwissenschaften	3	25	28-30
TUD	Dr.-Eng.; Dr. rer. nat.	not defined	23	any

x no static available

0 no comment

Remark: if degree is different, please specify (Acronym)

1) 1 Year = 60 ECTS (2 Semester á 30 ECTS)

2) Average student age when starting the programme

3) Average student age when finishing the programme

Figure 1 is a graphical presentation of average study durations Syrian partners and in Figure 2 for European partners. This information is compared with a previous study of European universities (Figure 3; ETNETENVIRONMENT-WATER, 2001). What is obvious is that study durations are much longer in Syria. This is even more pronounced when the average number of Syrian partners is considered only.

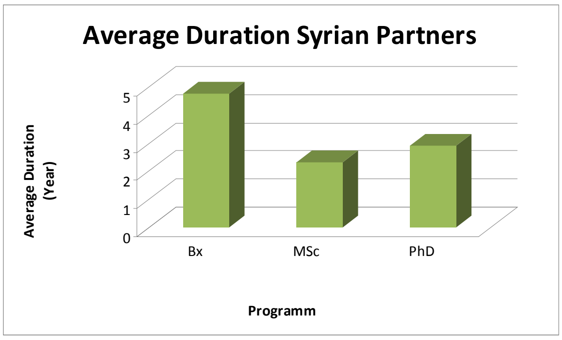


Figure 1: Average Duration of study programmes Syrian Partners

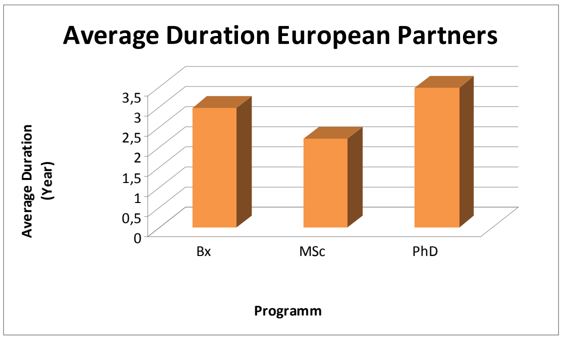


Figure 2: Average Duration of study programmes European Partners

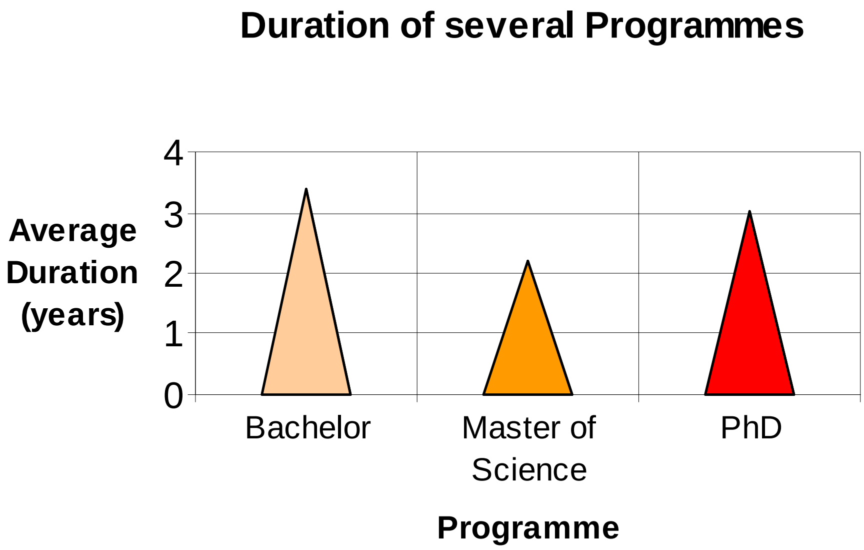
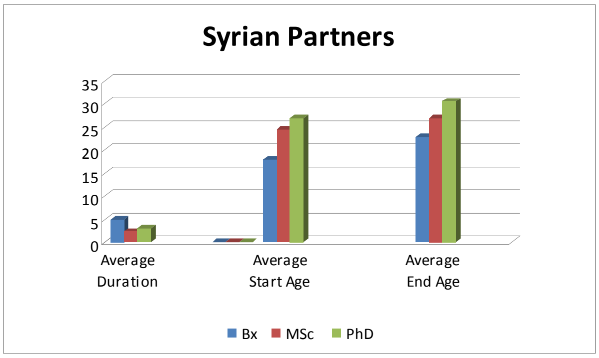


Figure 3: Average Programme duration of BSc, MSc and PhD programmes as derived from ETNET Water Environment 2001

Remark: Programme duration are stated as minimum time required, the real average duration may differ considerably. Longer study durations are most of the time correlated with a liberal and flexible curriculum, whereas very stringent time schedules of the academic year (e.g. fixed examination periods, continuation requirements etc.) enhance the possibility to finish in the minimum study time required.

The average entry age for higher education provides an overview of maturity of students in various programmes and is about 18 years (Figure 4 and 5). Due to different bachelor concepts (for example at a master level it varies from 22 to 25 years) the programme duration may be the more appropriate number (Figure 1 and 2) for following educational programmes. However the average ending age of students (Figure 4 and 5) provides planning information for policy makers.



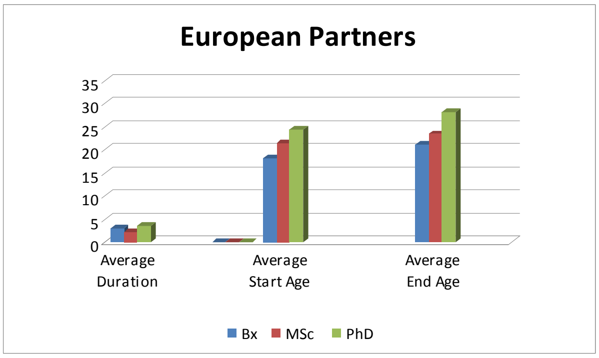


Figure 4: Average Students start and end age of Syrian students in the water sector	Figure 5: Average Students start and end age of European students in the water sector

To get an overview about workload distribution in a curriculum participants are asked to quantify the above named study programmes in lectures (theory), exercises (calculus, laboratory or field, computer etc.) and projects. Especially in engineering studies technical projects play an important role in training and also provide the link to industry.

1 B. Please weight the curriculum of your programme(s) with respect to the workload, in particular please distinguish in *lectures, exercises* (examples, laboratory, and field work), *and project* (in % of total workload).

Remarks: (lectures + exercises + project (including thesis work) = 100 %

Table 4: Workload in Lecture, Exercises and Project (in %) of several programmes

Degree of specialisation Bx	Lectures %	Exercise %	Project %
TIU	60	30	10
DAM	60	30	10
ALBA	60	30	10
AU	60	30	10
AU	60	20	20
CULS	40	40	20
UO	-	-	-
TUD	85	9	6
BOKU	60	23	17
Degree of specialisation MSc			
TIU	35	15	50
DAM	35	15	50
ALBA	-	-	-
HIWM	29	40	31
AU	25	10	65
AU	60	20	20
CULS	35	40	25
UO	35	50	15
HTWD	7	33	60
TUD	50	25	25
BOKU	63	15	22
Degree of specialisation Dipl.			
HTWD	40	25	35

The comparison of work load shows the same picture of all participating institutions (Figure 6 to Figure 9). Also the share of lectures decreases for all on master level. Besides the different study duration this is very beneficial for harmonisation of curricula development.

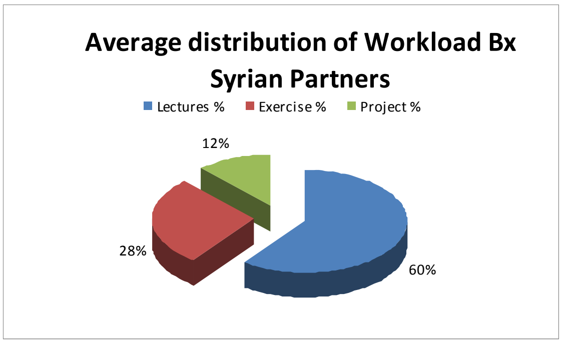


Figure 6: Average distribution and variability of work load Bx Syrian Partners

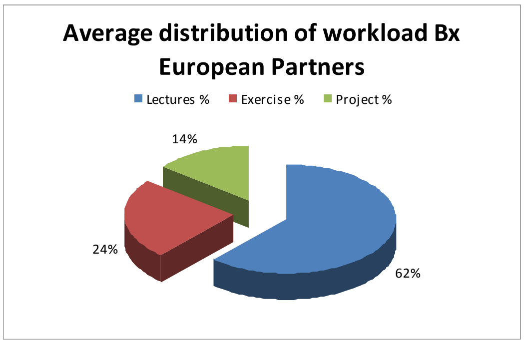


Figure 7: Average distribution and variability of work load Bx European Partners

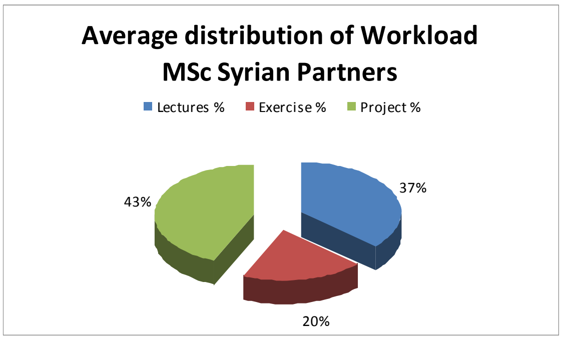


Figure 8: Average distribution and variability of work load MSc Syrian Partners

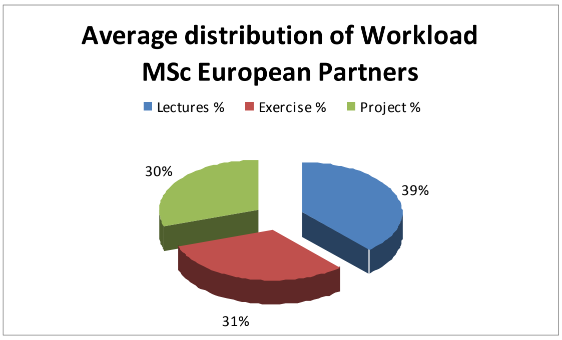


Figure 9: Average distribution and variability of work load MSc European Partners

For PhD studies the research part is naturally dominating. Lectures are only for BOKU assigned with ECTS. In Syria the classical concept of doctorate is present (Table 5).

Table 5: Workload in Thesis and Lecture in the PhD Program

Degree of specialisation PhD	Thesis work	Lecture
TIU	120 – 180 ECTS	No lecture
DAM	120 – 180 ECTS	No lecture
ALBA	120 – 180 ECTS	No lecture
AU	240 ECTS	0 ECTS
AU	240 ECTS	0 ECTS
CULS	No ETCS applied for the PhD studies	
UO	No ETCS applied for the PhD studies	
TUD	Not applied	Not applied
BOKU	160 ECTS	20 ECTS

1 C. What should be changed to this division, in your opinion, to improve the study curricula?

Table 6: Remark of participating Universities to improve the study curricula

TIU	The duration of study should be reduced and must change for all (BSc , MSc, PhD).
DAM	All these BSc degrees in DAM departments in different faculties should design one or two water programme/course(s) and share teaching while different MSc(s) and PhD(s) could be introduced according to research activities. Reducing the study period for BSc to 3 years, or 4 for diploma Making the study programme for MSc for 12-18 months max Selective criteria for the PhD Programme and enhancing industry involvement with the PhD research
ALBA	The duration of study should be reduced and must change for all (BSc, MSc, PhD).
AU	The duration of the study should be reduced for all (BSc, MSc, PhD). Also the ratio between lectures, exercises and field work must be changed, and to give the largest section of the practical and field trials. Many courses must be deleted, and many others must be replaced with modern ones
AU	The Duration of study must be changed for all (BSc, MSc, PhD)
CULS	Nothing, it follows Bologna process regulations and we cannot see any difficulties
UO	Bologna process is adapted
TUD	is already adapted to the Bologna Process
BOKU	Relevant for Syrian partners

In a curriculum one important element is thesis writing. This is differently weighted at under graduate and post graduate level and also at different institutions. This leads to the next question of workload of final projects. In table 7 the work load is stated in ECTS, but there is a mismatch with the definition o 30 ECTS per semester. Some numbers need to be interpreted as credits and the high numbers are in coincidence with the long study duration.

2.A. Please tell something more about the final projects (thesis works) carried out at your faculty. Is it compulsory to have a final project at the end of the programme(s)?

Table 7: Final Project and credits of several programmes

Degree of specialisation Bx	Yes	No	Credits
TIU	x		Regarded as one module of the final semester, so in ECTS = 32/6 (6=average number of module in one semester)
DAM	x		Regarded as one module of the final semester, so in ECTS = 30/6 (6=average number of module in one semester)
ALBA	x		12
AU	x		30
AU	x		60
CULS	x		18
UO	x		10
TUD	x		10
BOKU	x		12
Degree of specialisation MSc			
TIU	x		1 year (50 ECTS)
DAM	x		1 year (60 ECTS)
ALBA	x		1 year (60 ECTS)
HIWM	x		30
AU	x		120
AU	x		180
CULS	x		20
UO	x		30
HTWD	x		26
TUD	x		30
BOKU	x		30
Degree of specialisation Dipl.			
HTWD	x		30
Degree of specialisation PhD			
TIU	x		3 years (120 – 180 ECTS)
DAM	x		2 – 3 years (120 – 180 ECTS)
ALBA	(x)		
AU	x		180
AU	x		240
CULS	x		Not applied
UO	x		Not applied
BOKU	x		160
TUD	x		Not applied

After the information of the general workload the thesis is further more divided in skills and research work (Table 8). Also not surprising is that the research component increases with the higher level of studies.

2 B. Please weight the research activity in % of ECTS awarded to thesis.

Please noted: ECTS of total credits, e.g.BOKU Thesis 12 ECTS/180 0 7 ECTS + additional research = 10 % for BSx

Table 8: Research activities in % of ETCS of several programmes

Degree of specialisation Bx	**Research Activity in %**
TIU	50
DAM	Not necessary
ALBA	Not necessary
AU	10
AU	25
CULS	10
UO	?
TUD	100
BOKU	10
Degree of specialisation MSc	
TIU	60
DAM	30 - 50
ALBA	40
AU	70
AU	75
CULS	60
UO	100
TUD	100
BOKU	40-50
Degree of specialisation Dipl.	
HTWD	12,5
Degree of specialisation PhD	
TIU	100
DAM	Above 60
ALBA	100
AU	100
AU	100
CULS	85
UO	100
TUD	100
BOKU	100

Figure 10 up to Figure 15 shows the research activities in % of ECTS awarded to theses and different study Programmes for the Syrian and European Partners.

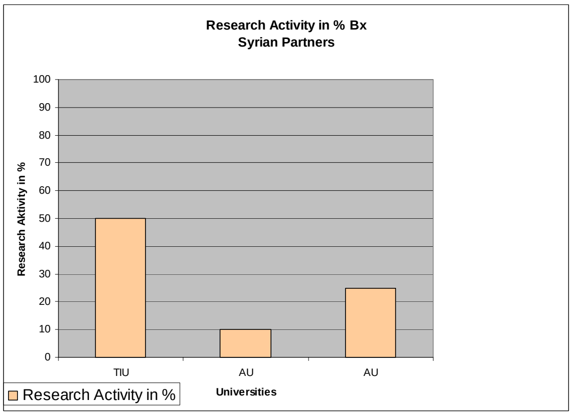


Figure 10: Research activity in % for the Degree Bx for the Syrian Partners

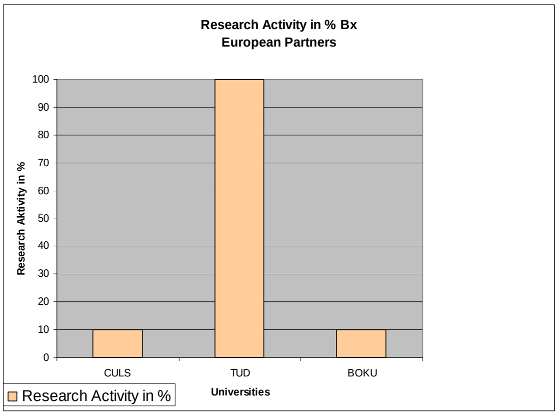


Figure 11: Research activity in % for the Degree Bx for the European Partners

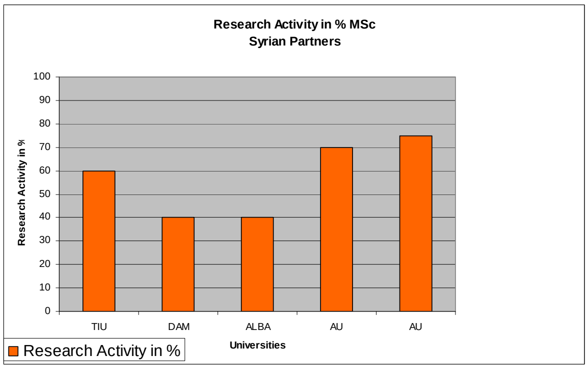


Figure 12: Research activity in % of MSc - Degree for Syrian Partners

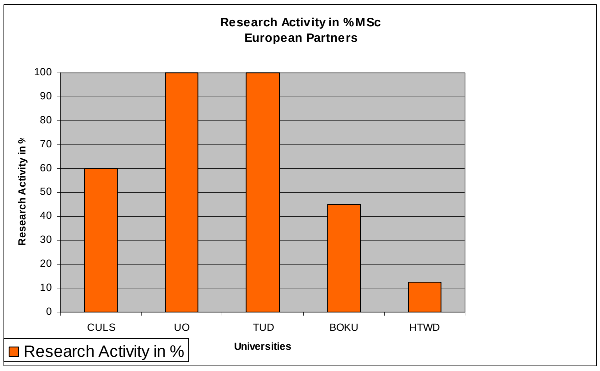


Figure 13: Research activity in % of MSc Degree for European Partners

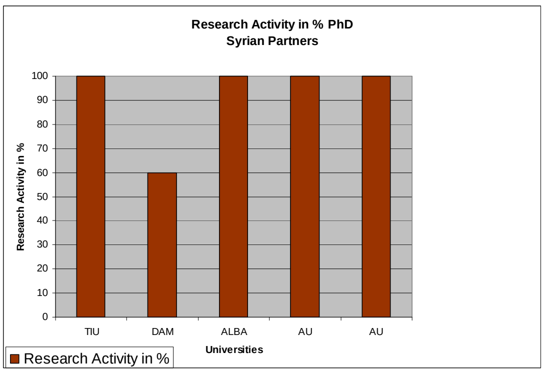


Figure 14: Research activity in % of PhD-Degree for the Syrian Partners

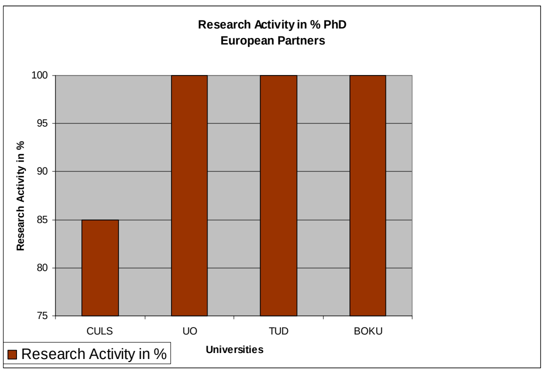


Figure 15: Research activity in % of PhD - Degree for European Partners

To make a comparison easier and more structured specific keywords are defined in the questionnaire (Table 9). It is also important to obtain information on the speed of information transfer (Question 3B, Table 10 and Figures 22 and 23). Related to the previous question is how the integration of new results is performed (Question 3C, Table 11, Figures 17 and 18). Finally the overall importance of research in the curricula is investigated (Question 4D, Table 12) in a qualitative way.

3 A. How do students get in touch with research at your faculty?

Table 9: Keywords for several programmes "How get students in touch with research"

Degree of specialisation Bx	**Keywords (teachers, projects, internet etc.)**
TIU	Teachers, books, journals and internet
DAM	Teachers, project work and internet
ALBA	Teachers, books
AU	Teachers, projects, internet
AU	Teachers, projects
CULS	Teachers, department, intranet, internet, journals, books, projects
UO	Teacher, students practical work
TUD	Projects
BOKU	Teachers, projects, internet
Degree of specialisation MSc	
TIU	Library, teachers, internet, industry, journals, proceedings, conferences and workshops
DAM	Library, teachers, internet, industry, journals, proceedings, conferences and workshop
ALBA	Teachers, books
AU	Teachers, projects, internet
AU	Teachers, projects, internet, field visits
CULS	Student assistants at depts., department of MSc thesis, supervisor, teachers, internet, literature and sci. journals
UO	Teachers, projects, internet
HTWD	Mostly through diploma and master thesis, also through introduction of research projects during lectures and small student research projects as part of curricula (information valid for div. of water sc.)
TUD	Projects
BOKU	Teachers, projects, internet
Degree of specialisation Dipl.	
HTWD	Mostly through diploma and master thesis, also through introduction of research projects during lectures and small student research projects as part of curricula (information valid for div. of water sc.)

In Figures 16 to 19 keywords for the thematic topic ***"How get students in touch with research"*** for Bx and MSc degrees are collected and presented for Syrian and European Partners respectively.

Keywords and quantification for Bx degrees:

Syrian Partners: Teacher (36%) /Projects (29%) /Internet (21%) and Books (14%).

European Partners: Teacher (34%) /Projects (33%) /Internet (22%) and Books (11%).

Keywords and quantification for MSc degrees:

Syrian Partners: Teacher (30%)/ Internet (25%) / Projects (13%) / Books/Journals (19%) Library (13%).

European Partners: Teacher (33%)/ Internet (11%) / Projects (56%) / Books/Journals (0%) /Library (0%).

For the Bx degree for both is the keywords distribution the same, but for the MSc degree the European Partners compiled Teacher/Internet and Project as dominant factor.

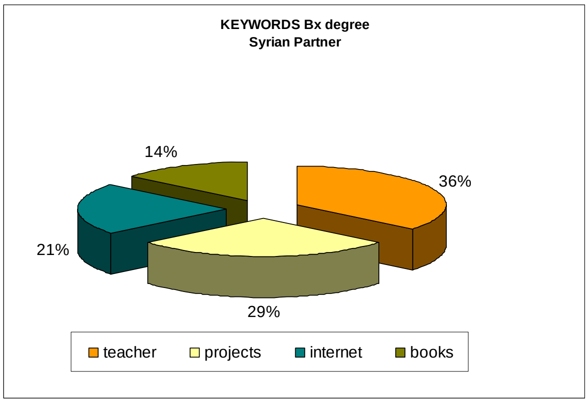


Figure 16: Keywords for the Bx degree: "*How get students in touch with research*"

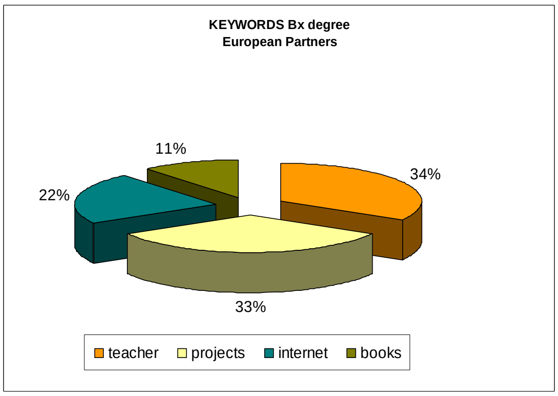


Figure 17: Keywords for the BSx degree: "*How get students in touch with research*"

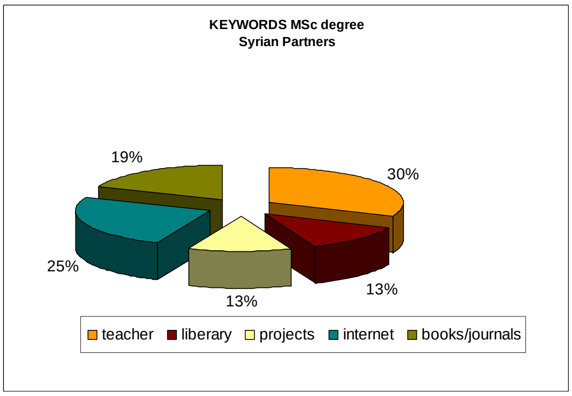


Figure 18: Keywords for the MSc degree: "*How get students in touch with research*"

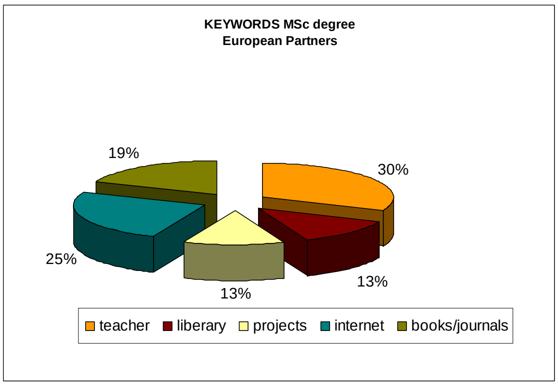


Figure 19: Keywords for the MSc degree: "*How get students in touch with research*"

The PhD study is by definition research oriented and this question is inadequate in this form. What could be addressed during the course of the project is how the access to latest scientific developments is provided.

3 B. How fast new research results are included in the courses and the practical work?

Table 10: Evaluation Table "How fast new research results are included in courses and practical work"

Degree of specialisation Bx	**1 very fast, 2 fast, 3 slow, 4 very slow, 5 Noa**
TIU	3
DAM	3-4
ALBA	4
AU	3
AU	4
CULS	2
UO	2
TUD	2
BOKU	2
Degree of specialisation MSc	
TIU	3
DAM	3 for all, 2 for agricultural engineering
ALBA	3
AU	2
AU	3
CULS	1-2
UO	2
TUD	1
BOKU	2
Degree of specialisation Dipl.	
HTWD	fast (in terms of presenting current activities in lectures to raise interest, also occasionally including student projects into current research; information valid for div. of water sc.) otherwise noa

Noa = No answer

Figure 20 and 23 present an evaluation of the thematic "***How fast new research results are included in courses and practical work***" for Bx and MSc degrees.

For the Syrian Bx degrees answers indicate that new research results are fast (50%) / slow (50%)/ included in the courses and practical work. European Partners answered for Bx degree that the new research results are fast (100%) transmitted.

In MSc degrees of Syrian partners new research results are fast (20%) and slow (80%) included in the courses and practical work. On the European side the new research are very fast (40%) and fast (60%) assessable.

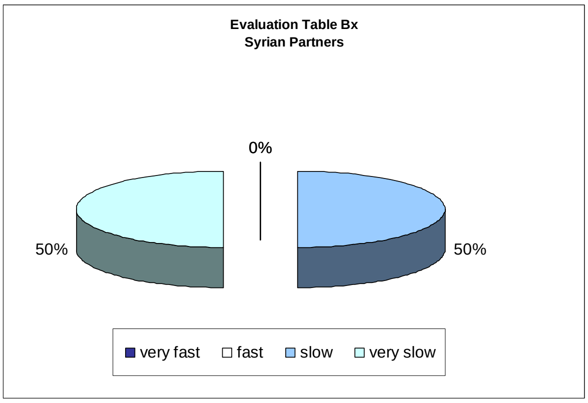


Figure 20: Bx evaluation "*How fast new research results are included in courses and practical work*"for the Syrien Partners

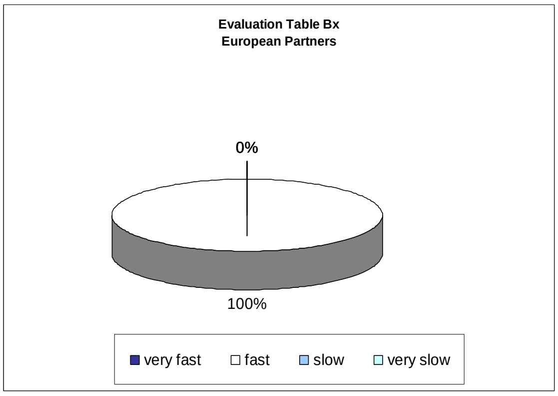


Figure 21: Bx evaluation "*How fast new research results are included in courses and practical work*" for the European Partners

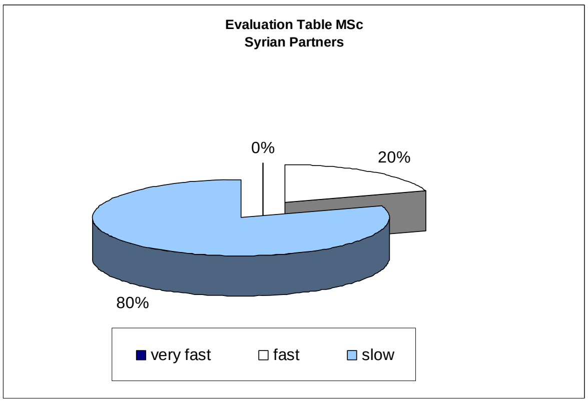


Figure 22: MSc evaluation "*How fast new research results are included in courses and practical work*" for the Syrien Partners

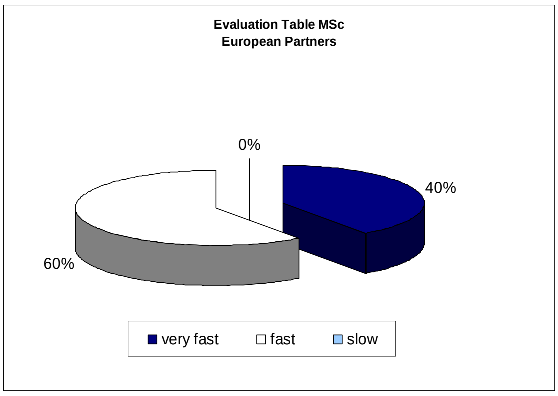


Figure 23: MSc evaluation "*How fast new research results are included in courses and practical work*" for the European Partners

3 C. How new research results are included in the courses and the practical work?

Table 11: Keywords for several programmes "How new research results included in courses and practical work"

Degree of specialisation BSx	**Keywords (lectures, project work, independent study, thesis work)**
TIU	Lecturers, project work
DAM	Lecturers, project work
ALBA	Lecturers, project work
AU	Lectures, project work
AU	Lectures, project work
CULS	The last semester lectures are oriented to the development in the subject, similarly the practical training
UO	Lectures project work
TUD	lectures, project work, independent study, thesis work
BOKU	Lectures, project work
Degree of specialisation MSc	
TIU	Thesis work, lectures, internet, independent study
DAM	Thesis work, lectures
ALBA	Thesis work, lectures
AU	Lectures, independent study, project and thesis work
AU	Lectures, project work, thesis work
CULS	Lectures are regularly upgraded, seminars and field and lab training as well
UO	Project diploma, independent study
TUD	lectures, project work, independent study, thesis work
BOKU	Lectures, project work, independent study, thesis work
Degree of specialisation Dipl. Ing.	
HTWD	fast(in terms of presenting current activities in lectures to raise interest, also occasionally including student projects into current research; information valid for div. of water sc.) otherwise noa

Figure 24 and Figure 27 keywords for the question how ***"new research results are included in courses and practical work"*** in Bx and MSc degrees are presented.

For Bx of the Syrian Partners only lectures (50%) and project works (50%) are the important factors.

European Partners used more categories, lecture (45%), project works (33%), thesis work (11%) and independent studies (11%).

The outcome of MSc studies is for Syria and Europe nearly uniform.

Syria: lecture (28%), project work (32%), independent study (20%) and thesis work (20%).

Europe: lecture (36%), project work (27%), independent study (27%) and thesis work (18%).

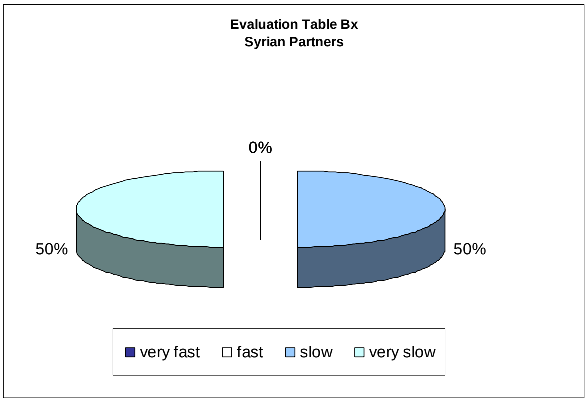


Figure 24: Bx degree keywords: "*How new research results are included in courses and practical work*"

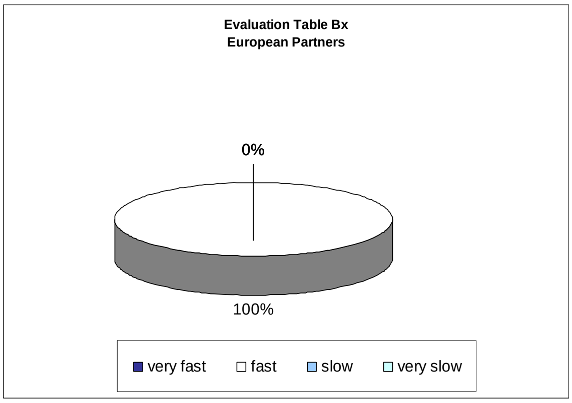


Figure 25: Bx degree keywords: "*How new research results are included in courses and practical work*"

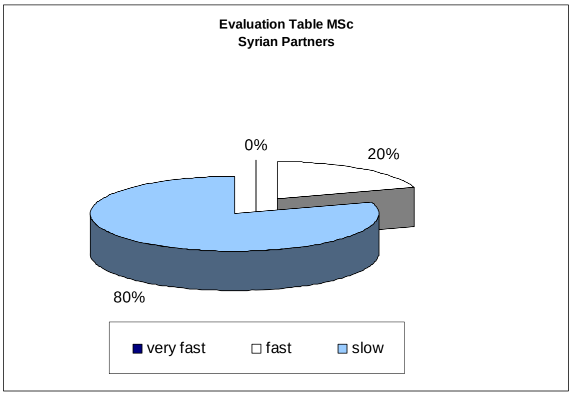


Figure 26: MSc degree keywords "*How new research results are included in courses and practical work*"

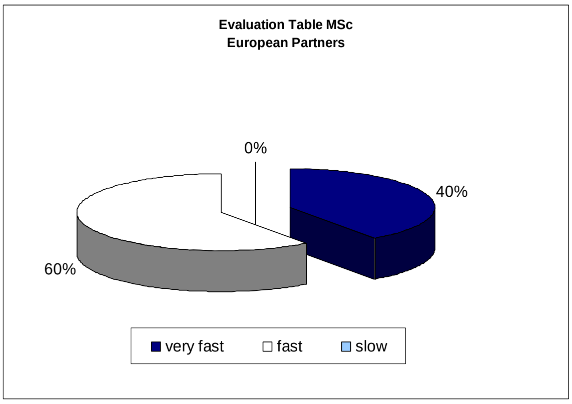


Figure 27: MSc degree keywords "*How new research results are included in courses and practical work*"

3 D. What is the importance of research in curricula and teaching?

Table 12: Remarks for the importance of research in curricula and teaching

Degree of specialisation Bx	**Remark**
TIU	Important for qualification of lecturers
DAM	Curricula should be upgraded periodically to include case studies built on results of new research outcomes and introduced to the students
ALBA	Project works, thesis work
AU	To help students and improve the knowledge
AU	help
CULS	Medium, study is more oriented to the fundamental part of the subject
UO	Medium
TUD	Unity of research and teaching, Lectures of partners from enterprises, project works, thesis work
BOKU	Important for qualification of lecturers
Degree of specialisation MSc	
TIU	Important for project work and thesis
DAM	MSc students should be aware of new research on the field of their study to open the way for their own research work and initiatives
ALBA	Project works, thesis work
AU	Very important for the thesis to make good researcher
AU	Very important
CULS	For the MSc is much more research output included in the teaching
UO	High
TUD	Unity of research and teaching, Lectures of partners from enterprises, project works, thesis work
BOKU	Important for final thesis work and for qualification of lecturers
Degree of specialisation Dipl.	
HTWD	generally not very important in most of the involved divisions (except Diploma and Master thesis)

The final section is devoted to the cooperation between higher education institutions and industry in relation to research and practical training.

A. How much does your faculty (study programme) work together with industry in the field of the water sector, in terms of students per year and projects per year (estimated numbers)?

Table 13: Overview of Faculty/Study Programme and Average student number of participating universities

Participating Universities	Faculty	Study programme	Average student number
TIU	Faculty of Civil Engineering		60
TIU	Faculty of Agrar. Engineering.		100
TIU	Faculty of Science		20
DAM	Faculty of Civil Engineering		70
DAM	Faculty of Agricultural Engineering		100
DAM	Faculty of Sciences		15
ALBA	Faculty of Civil Engineering	Water Res., Eng. & Man.; Env. Eng.	10 5
AU	Faculty of Agriculture Engineering	Environmental Engineering	16
AU	Faculty of Civil Engineering.	Water Eng.	140
CULS		4-6 Programmes	
UO	Faculty of Nature and Technics	Environmental Protection	230
HTWD		Civil Engineering & Architecture	204 (2010)
HTWD		Civil Engineering.	133
TUD	Hydro Sciences	Hydro Sciences	600
SEED/TUD		Urban Water Management (Waste water Treatment and Urban drainage)	
BOKU		Environmental Engineering	180 (2000 -2010)

Table 14: Overview about Students per year and projects per year for several programmes

Degree of specialisation BSx	Students per year	Projects per year
TIU	120	40
DAM	70	35
DAM	100	35
DAM	15	13
ALBA	15	15
AU	16	3

AU	140	2
CULS	Roughly 20% of the total number of students	Thesis, no projects
UO	5	2
TUD	200	100
SEED/TUD	1-2	1-2
BOKU	180	10
Degree of specialisation MSc		
TIU	40	25
DAM	20	15
DAM	35	20
ALBA	11	11
AU	6	4
AU	6	3
CULS	Around 15% of students, orientation goes more to the research, also in co-operation with the research institutes	Thesis, no projects
UO	8	3
HTWD	2	1
TUD	300	150
SEED/TUD	1-2	1-2
BOKU	100	20
Degree of specialisation Dipl.		
HTWD	5-8	3-5

Degree of specialisation PhD		
TIU	4	4
DAM	3	3
DAM	5	3
ALBA	3	3
AU	3	3
AU	1	1
CULS	80% Very much oriented to research, co-operation with Academy of Science, research institutes, sometimes with companies	Thesis, no projects
UO	No comment	No comment

TUD	100	25
SEED/TUD	1/5a	1/5a
BOKU	20	20

The project work is not an important factor on the Bx and MSc degrees in Syria and Europe. A few of students on this level work in a project. (Figure 28 – 31)

The PhD level is often linked with a project work. (Figure 32 - 33)

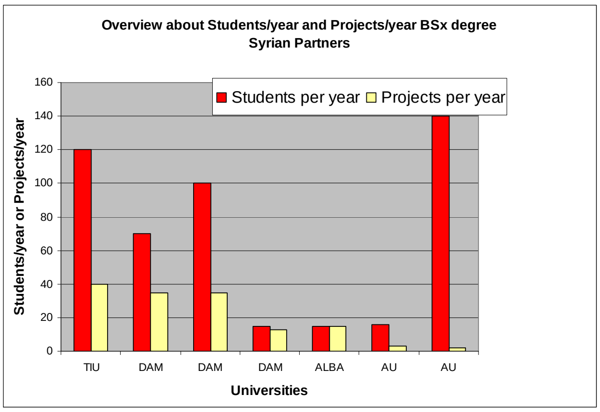


Figure28: Overview of students/year and projects/year for Bx degree

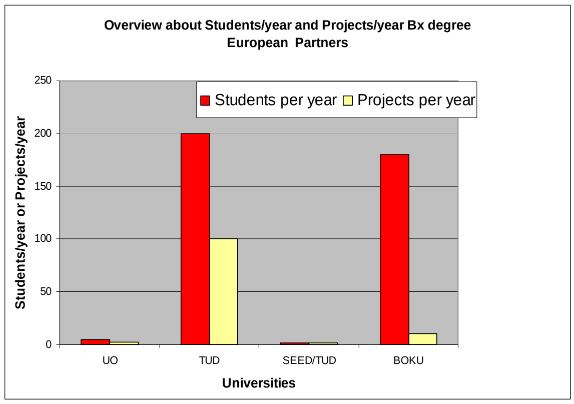


Figure29: Overview of students/year and projects/year for Bx degree

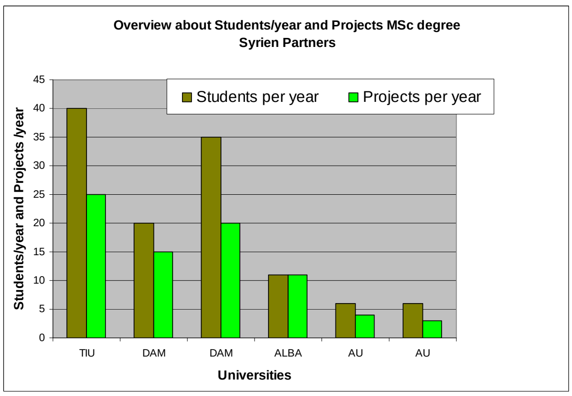


Figure 30: Overview of students/year and projects/ year for MSc degrees

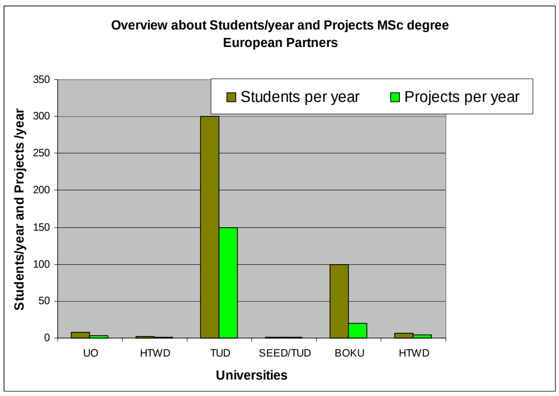


Figure 31: Overview of students/year and projects/year for MSc degrees

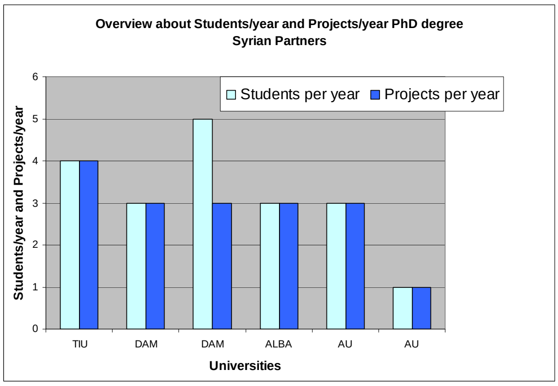


Figure 32: Overview of Students/year and projects per year for PhD degree

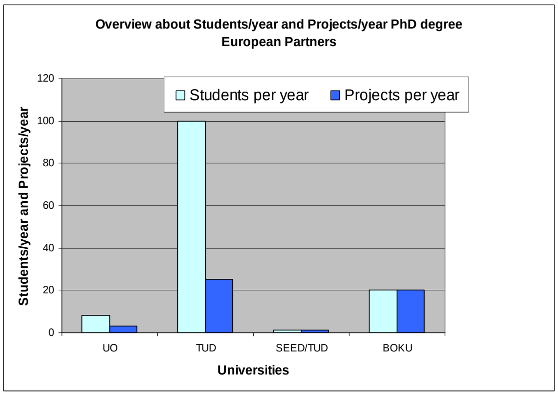
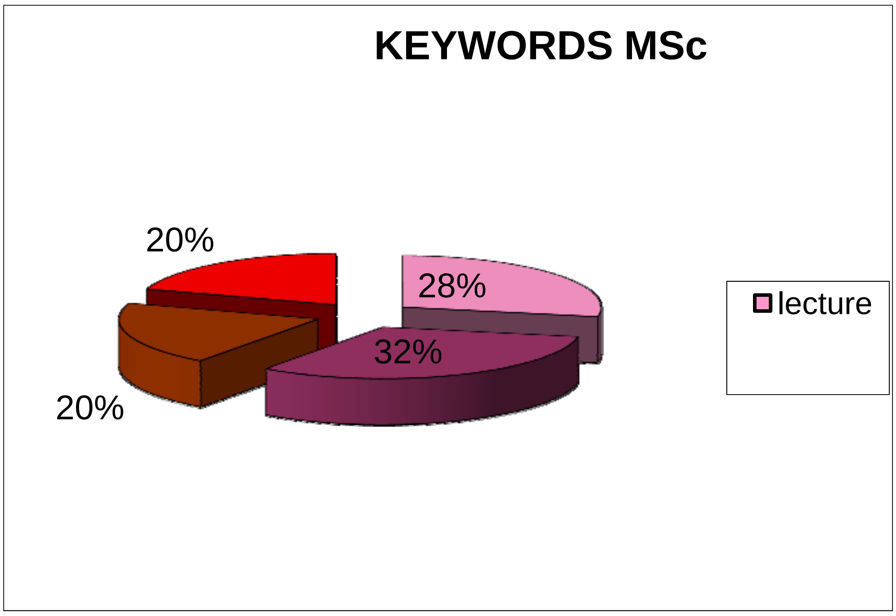


Figure 33: Overview of Students/year and projects per year for PhD degree



B. What are the (dis)advantages of this co-operation (simplified SWOT – Analyses)?

Table 15: Overview of Advantages and Disadvantages of several programmes

Degree of specialisation Bx	Advantages	Disadvantages
TIU	Getting a good experience for working in companies and abroad	Complicated situations and infrastructure, internet and libraries, mobility
DAM	1)The students are connected well to the fieldwork, 2)are engaged with the theory implementation 3)feel the engineering solutions and are more attached to their own specification	1)Need more time to finalise work 2)Slow communication between the University and the industry 3) Routine suffering! 4) Industry is not always willing to change their way of work and test new approaches. It is difficult to form one team to work things out
ALBA	Getting a good experience for working in companies and abroad	Complicated situations and infrastructure, internet and libraries, mobility
AU	Outdoor facility of modern instruments	
CULS	Getting experience to work for company, sometimes getting the job offer	More complicated co-ordination, abuse of student work free of charge – cheap labour for some companies
UO	No comment	No comment
TUD	• Unity of research and teaching • Education related to practice • Preparation of the job	• Neglect of basic research
SEDD/TUD	Processing of routine jobs get to know sewage works	High input for support moderate results
BOKU	Connection to needs of stakeholders	High coordination requirement for short work

Degree of specialisation MSc		
TIU		
DAM	It is a challenge where the new researchers prove themselves for the industry, test and introduce new approaches and results Enhance cooperation between the universities and industry Great new trends of work Improve industrial performance in terms of better understanding and achieving work related targets such as efficiency, effective, tested and approved solutions	1) Need more time to finalise work 2) Slow communication between the University and the industry 3) Routine suffering! 4) Industry is not always willing to change their way of work and test new approaches. It is difficult to form one team to work things out
ALBA		
AU	Give us updating data about field research	
CULS	Close relation to the companies/ institutes. Possible finding job for the graduate, practical experience for the student	Some disappointed students after having practice in some companies
UO	After co-operation increase the possibilities to get work in industry	
HTWD	- funding - market relevance - career opportunity for graduate - clearly defined aim - less effort for staff	- limited supervision of graduate's work - less flexibility in adapting ongoing experiments - suppression of graduate's own scientific creativity
TUD	• Unity of research and teaching • Education related to practice • Preparation of the job	• Neglect of basic research
SEED/TUD	Potential challenging tasks load relieving for staff	Better input-benefit ratio mutually satisfactory results
BOKU	Connection to needs of stakeholders	No
Degree of specialisation Dipl.		
HTWD	- funding - market relevance - career opportunity for graduate - clearly defined aim - less effort for staff	- limited supervision of graduate's work - less flexibility in adapting ongoing experiments - suppression of graduate's own scientific creativity

Degree of specialisation PhD		
TIU		
DAM	It is a challenge where the new researchers prove themselves for the industry, test and introduce new approaches and results Enhance cooperation between the universities and industry Great new trends of work Improve industrial performance in terms of better understanding and achieving work related targets such as efficiency, effective, tested and approved solutions	1) Need more time to finalise work 2) Slow communication between the University and the industry 3) Routine suffering! 4) Industry is not always willing to change their way of work and test new approaches. It is difficult to form one team to work things out
ALBA		
AU	Give us updating data about practical water problems	
CULS	Close research cooperation, even between Dept. and institution. Close research links and possibility for applications of the research outputs	Sometimes pressure for less theoretical and scientific orientation of the PhD work.
UO		
SEED/TUD	Stimulation for existing knowledge extensive tasks	Time duration
BOKU	Connection to needs of stakeholders	Pressure of expected result
TUD	• Unity of research and teaching • Education related to practice • Preparation of the job	• Neglect of basic research

ANNEX

Questionnaire

"Development of a Modern higher Education system for Water Engineering in Syria"

A. Describe which programme(s) in the field of environment-water are offered at your faculty.

Degree of specialisation	Title	Duration Years [1)]	Start Age [2)]	End Age [3)]
BSc				
MSc				
PhD				

Remark: if degree is different, please specify (Acronym)

[1)] 1 Year = 60 ECTS (2 Semester á 30 ECTS)

[2)] Average student age when starting the programme: …..........

[3)] Average student age when finishing the programme: ....…

B. Please weight the curriculum of your programme(s) with respect to the workload, in particular please distinguish in **lectures, exercises** (examples, laboratory, and field work), **and project** (in % of total workload).

Remarks: (lectures + exercises + project (including thesis work) = 100 %

BSc .... - …....... - .... %

MSc .... - …....... - .... %

PhD thesis work ……..… ECTS lectures ……..….. ECTS

C. What should be changed to this division, in your opinion, to improve the study curricula?

____
____
____

1. A. Please tell something more about the final projects (thesis works) carried out at your faculty. Is it compulsory to have a final project at the end of the programme(s)?

Degree of specialisation	Yes	No	Credits
BSc			
MSc			

PhD			

B. Please weight the **research activity** in % of ECTS awarded to thesis.

BSc ……....... %
MSc .... %
PhD ………… %

2. A. How do students get in touch with research at your faculty?

Degree of specialisation	Keywords (teachers, projects, internet etc.)
BSc	
MSc	

B. How fast are new research results included in the courses and the practical work?

Degree of specialisation	1 very fast, 2 fast, 3 slow, 4 very slow, 5 Noa
BSc	
MSc	

Noa = No answer

C. How are new research results included in the courses and the practical work?

Degree of specialisation	Keywords (lectures, project work, independent study, thesis work)
BSc	
MSc	

D. What is the importance of research in curricula and teaching?

Degree of specialisation	Remark
BSc	
MSc	

3. A. How much does your faculty (study programme) work together with industry in the field of the water sector, in terms of students per year and projects per year (estimated numbers)?

Faculty ____ Study programme _____

Average student number ____ _____

Degree of specialisation	Students per year	Projects per year
BSc		
MSc		
PhD		

B. What are the (dis)advantages of this co-operation (simplified SWOT – Analyses)?

Degree of specialisation	Advantages	Disadvantages
BSc		
MSc		
PhD		

3.1.2 The Bologna Process in the EU - Examples for Application in Higher Education

3.1.2.1 Germany – University of Rostock, Faculty for Agriculture and Environmental Sciences

Responsible for Rural areas:

→ Agriculture → Nature protection → Forestry → Spare time → Recovery → Drinking water supply →Trade → village → Raw material providing → Waste disposal → Traffic

Study courses

- Agricultural ecology

Bachelor of Science (B.Sc.) (6 Semester)

Master of Science (M.Sc.) (4 Semester)

- Land Improvement and Environmental Protection

Bachelor of Science (B.Sc.) (6 Semester)

Master of Science (M.Sc.) (4 Semester)

- Bachelor of science:
- Undergraduate Program in Land Improvement and Environmental Protection

  6 semester (3 years)

Structure of Bachelor-Course

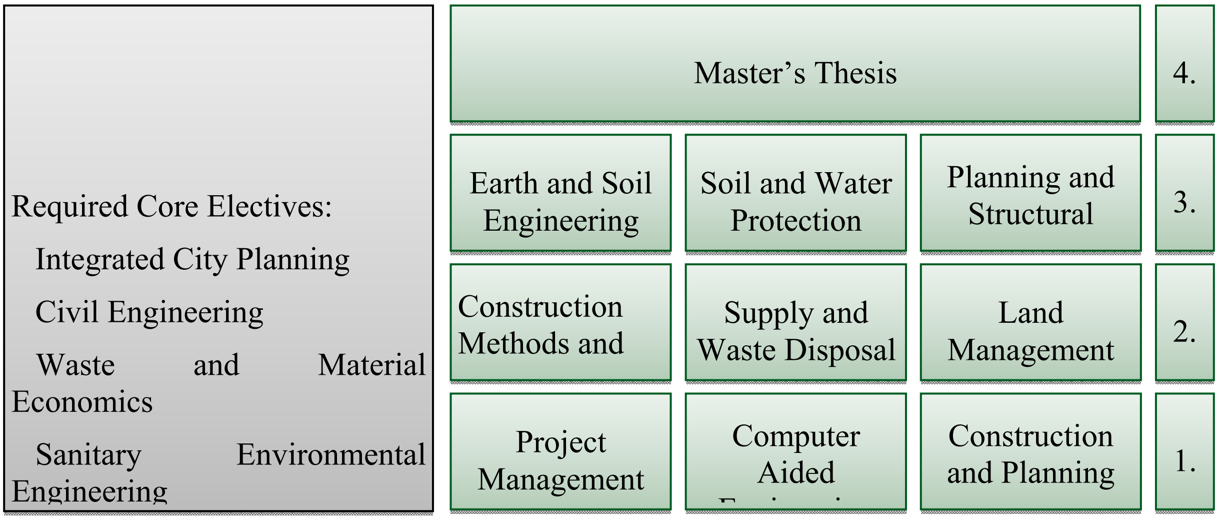
Agr. Engineering and	Bachelor Thesis		Core elective courses	Core elective courses	6.
Landscape Planning	Architecture in Settlements	Construction Industry	Core elective courses	Core elective courses	5.
Soil Mechanics Road Planning	Hydro-mechanics	Geoinformatics I	Landscape Ecology	Habitat Diagnostics	4.
Materials/Buildin	Sanitary Engin. and Waste Management	Raumordnung/ Landeskunde	Hydrology and Meteorology	Cartography/Remote Sensing	3.
Mathematical Statistics	Basics of Civil Engineering		Soil sciences	Geodesy	2.
Chemistry	Mathematics (Natural Science)	Physics	Fundamentals of Ecology and Eco-Physiology of Plants		1.

- Master of science:
- Graduate Program in Land Improvement and Environmental Protection about 30 students/year

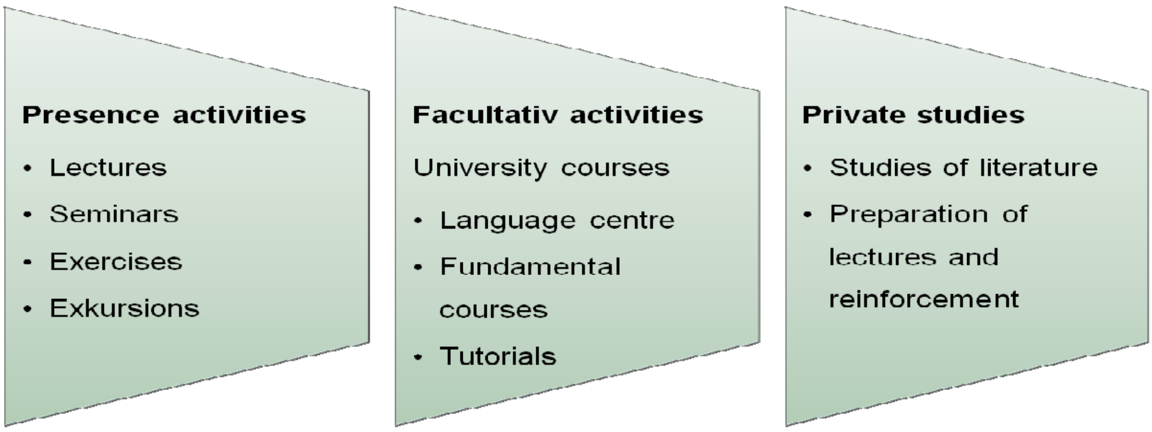
  4 semesters (2years)

- Structured PhD courses and a new Bachelor of sciences (Environmental Engineering) are in preparation.

Structure of Master-course LKU



Organisation



1 Modul with 6 credit points equates

- 180h workload
  - 4 Semester week hours ca. 56h ◊*124h Private studies*

The graduate program drives the graduate student to study in an independent, constructive, and research oriented way. According to the tendencies and professional goals of the students, they can choose between the six offered main focuses of studies, which offer high demand, international professions:

-- Integrated City Planning

-- Civil Engineering

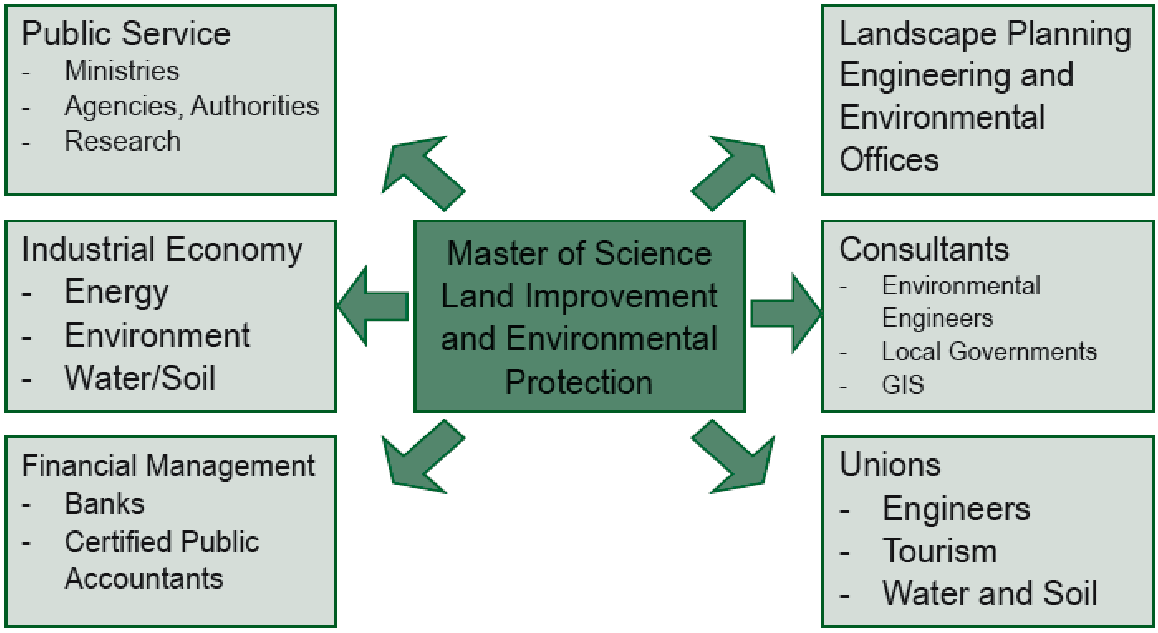
-- Waste and Material Economics

-- Sanitary Environmental Engineering

-- Landscape Ecology and Resource Protection

-- Hydrology and Landscape Water Supply

Graduates application fields:



Especially in the Master program the students are confronted with the research problems. For instance they have to solve parts of such programs in there master thesis. The PhD students are fully integrated in the actual research programs.

Main research topics in the professorship for hydraulics and sanitary engineering are:

- Management of all kinds of wastewater and water treatment plants
- Treatment control of small wastewater treatment plants (Our Institute is a certified testing institute of construction institute in Berlin)
- Ecological sanitation
- Optimizing of wastewater pumping systems
- Rheological Problems (Transportation of slurries and liquid manure in pipes)
- Disintegration of wastewater sludge, Special sewer systems (Vacuum and pressure systems)

Profil lines of the University of Rostock in the interdisciplinary faculty:

- Department Life light and matter
- Department Maritime systems
- Department Aging sciences
- Department Knowledge, Culture, Transformation

The Faculty for Agricultural- and Environmental sciences

Lectures in Environmental Engineering

- Building market/ Building construction
- Environmental economy
- Project management
- Hydrology
- Engineering hydrology
- Landscape water balance
- Agricultural Meteorology
- Technical Mechanics
- Geotechnics, Foundations
- Road construction
- River development
- Irrigation and Drainage
- Storage tank construction
- Sanitary Engineering
- Wastewater treatment
- Coastal Engineering
- Harbor Engineering
- Waste management
- Mass flow management
- Use of renewable energy

Lectures in Management of rural areas:

- Geodesy
- Cartography
- Geo informatics
- Landscape planning
- Landscape works
- Land managementt
- Economy
- Finance, Agricultural marketing
- Agricultural politics
- Village Engineering
- Construction

- Development ofVillages
- Habitat diagnostics
- Botanic

3.1.2.2 Austria – University of Natural Resources and Life Sciences Vienna, (BOKU), Department of Water, Atmosphere and Environment,

Curriculum Development in the field of Environmental Engineering

Study Structure:

- Bachelor studies (time-line: 6 semesters)
  1st Degree: "Bachelor of technical sciences"
- Master studies (time-line: 4 semesters)
  a continuing program after the bachelor study
  2nd Degree: "Master of engineering"
- PhD studies (time-line: 6 semesters)
  Program which is offered for master program graduates.
  Degree: "Doctor of Agricultural Sciences" (Dr. nat. techn.)
  NEW: Doctorate of Social and Economic Sciences at BOKU (Dr.rer.soc.oec)

1. Curriculum development at BOKU - From "Diplom-Ingenieur" to Bachelor / MSc

Frame for Bachelor – Master – System

Bachelor	min. 70%	147 Wh / 6 Sem
Master		max. 63 Wh / 4 Sem.
Elective subjects	min. 10%	15 Wh / 6 Sem
Total Duration		210 Wh / Sem

Wh = teaching hours per week

Total hours Wh * 14, e.g. 147* 14 = 2058 hours

In ECTS 180 * 25 or 30 = 4500 - 5400 hours workload

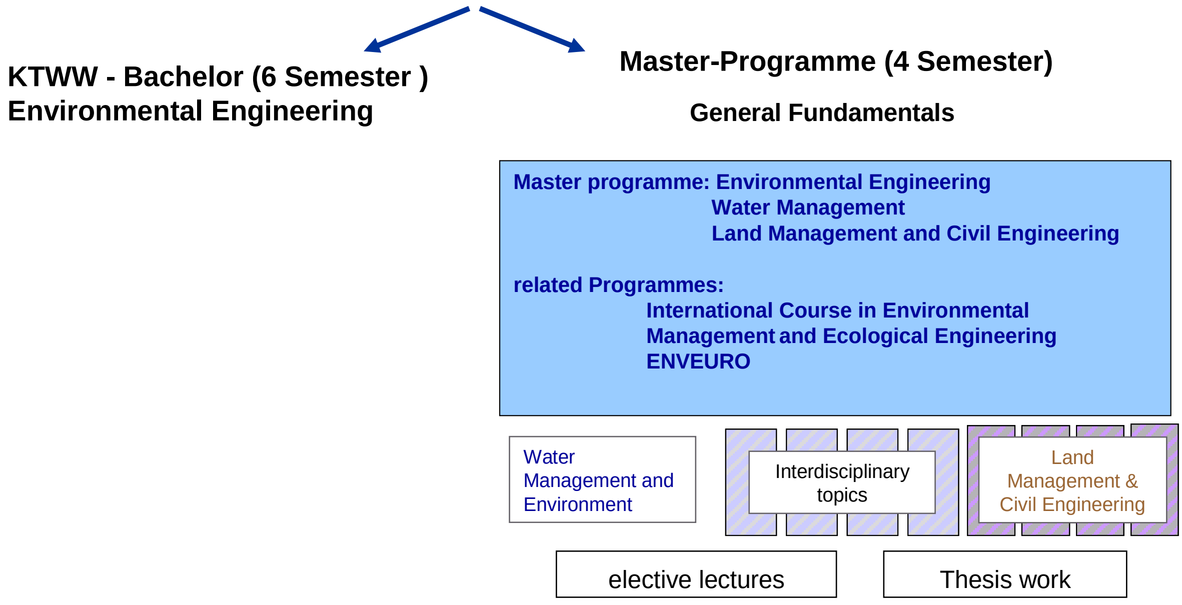
	Old	New
Part II	194 courses (comp.+ elective)	156 courses (comp.+ elective)

Part I	62 compulsory courses	54 compulsory courses
	256 weekly hours equvalents (5 years = 10 terms) Equals 25,6 hours per term and per week	210 weekly hours equvalents Equals 21 hours per term and per week

Reduction of workload: 210 weekly hours equivalent → 300 ECTS

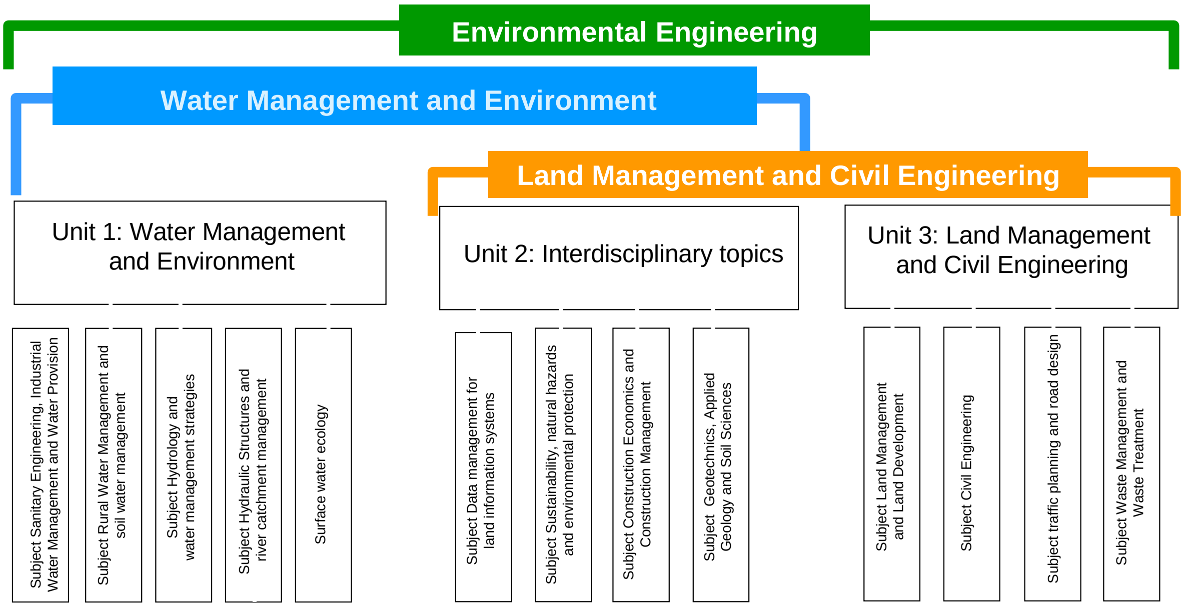
2. Department Water, Atmosphere and Environment (Prof Loiskandl)
new curriculum : Environmental Engineering
Environmental Engineering is an applied technical orientated course with strong background on natural sciences and ecological empathy. This allows graduates to work at an interdisciplinary level in planning, implementing supervising, maintaining and administrating engineering projects related to land and water management as well as waste disposal.
The field of activity is still the rural area but in close interrelation with the demands and special features of the urban area.

New curriculum: Environmental Engineering (2003)



KTWW = EE Bachelor (6 semester) Core subjects: Natural sciences - Technical and specific basics - Economy, Law, Social aspects

Environmental Engineering



Environmental Engineering = Unit 1-3

- Water Management and Environment → Unit 1+2
- Land Management and Civil Engineering→ Unit 2+3

Unit 1: Water Management and Environment

Subject Sanitary Engineering, Industrial Water Management and Water Provision

Subject Rural Water Management and soil water management

Subject Hydrology and water management strategies

Subject Hydraulic Structures and river catchment management

Surface water ecology

Unit 2: Interdisciplinary topics

Subject Data management for land information systems

Subject Sustainability, natural hazards and environmental protection

Subject Construction Economics and Construction Management

Subject Geotechnics, Applied Geology and Soil Sciences

Unit 3: Land Management and Civil Engineering

Subject Land Management and Land Development

Subject Civil Engineering

Subject traffic planning and road design

Subject Waste Management and Waste Treatment

3. Experiences with curriculum development

Diploma Curriculum

Pros	Contras
Well known, accepted Balanced curriculum Distinct to curricula of competitors Broad range of professional topics Problem oriented approach	Limited compatibility with international programmes Lack of international recognition No graduation for drop-outs Long study duration

Bachelor - Master

Pro:	Contras
Internat. Acceptance Comparable formal standards Stimulation of mobility Competitive to polytechnics Bachelor graduation	Difficult a priori evaluation Unknown employers acceptance of Bachelor degree Non-homogeneous Master programs Broad professional expertise only with B+M

3.1.2.3 Higher Education System in the Czech Republic

Higher education is the highest level of the Czech education system. Czech higher education dates back six hundred years. In 1348 Emperor Charles IV founded a university in Prague which is the oldest academic institution in Central Europe. It is now called Charles University.

The central governing body for education is the Ministry of Education, Youth and Sports. The quality of higher education is fostered by the Accreditation Commission. Since 2001 the three cycle structure has strictly been implemented in higher education (i.e. Bachelor's, Master's and Doctoral study programmes).

For more detailed information about the higher education system in the Czech Republic go to Chapters on Higher Education of Eurypedia.

Tuition language

The main tuition language is Czech, however the range of programmes delivered in foreign languages (mainly in English) is expanding in particular to cater for international students.

Admission Requirements

The principal requirement for entering a Bachelor´s degree programme or a full Master´s degree programme is the **completion of a full secondary general education or vocational education** with a “maturitní zkouška” school-leaving examination, for fine arts degrees, applicants who have gained their “absolutorium” from a conservatoire may be admitted. Admission to a follow-up Master´s degree programme depends on the completion of the relevant Bachelor´s degree programme or its equivalent. Admission to Doctoral studies depends on the successful completion of a Master´s degree programme.

Students who want to study full-time should apply directly to the higher education institution of their choice. Students may apply for several study programmes at various institutions and faculties. The **deadline for submitting applications** is usually the end of February or March. Most higher education institutions offer the option of filing an application in electronic form. The date, content and form (oral or written examination, aptitude test) of the admission procedures are decided upon by the dean of the faculty or the rector of the higher education institution. At most higher education institutions the applicants take **entrance examinations**,

which are usually held between June and September. Examinations at higher education institutions for the arts take place earlier, in January, and the deadline for filing applications is normally the end of November. Student administration departments at various faculties can provide information on applications, admission requirements and studies.´

Organisation of Studies

The **academic year** lasts 12 months; the start is fixed by the head of the higher education institution. Courses are divided into semesters, years or blocks, which are composed of a period of teaching, an examination period and holiday. The structure of the academic year is decided by each institution. It usually begins in October and is divided into two semesters: winter and summer, with approx. a five-week examination period after each semester. A semester normally consists of 15 weeks of teaching followed by an examination period, with a week's holiday after the winter semester and a two-month holiday (July, August) after the summer semester.

Curriculum

Deciding the content of studies and the design of study programmes is one of the academic freedoms of higher education institutions in the Czech Republic. However, all study programmes are subject to accreditation which is granted by the Ministry of Education on the basis of a decision by the Accreditation Commission.

Student Assessment

The frequency and methods of **assessing students’ achievements** differ according to the field of study. In some cases, a system of partial examinations taken after each semester has been introduced, in other cases one comprehensive examination after each completed part of studies is prescribed, mostly at the end of a certain module. Study outcomes at higher education institutions are assessed mainly by a system of credits or points. The credit system (European Credit Transfer System) has been encouraged since it allows completed parts of studies to be recognised, thus contributing to transferability within the system.

Degree structure

Higher education institutions form the highest level of Czech education. They offer accredited **degree programmes at three levels:**

Bachelor´s, Master´s, and Doctoral, as well as lifelong learning courses. Higher education institutions can be either university or non-university types. Traditional university-type institutions may offer all types of degree programmes while non-university institutions are characterised by providing mainly Bachelor´s degree programmes. The documents confirming the completion of studies and right to the appropriate academic title are a higher education diploma and a supplement to the diploma.

Bachelor´s degree programmes

Bachelor´s degree programmes are **3 to 4 years** in duration and constitute the first level of higher education. The study programme must be completed with a final state examination, which usually includes the presentation and defence of a thesis. Successful graduates may enter the labour market or continue their studies in follow-up master's programmes in related fields.

Master´s degree programmes

Master´s degree programmes may either follow on from Bachelor programmes as follow-up Master´s programmes (**1 to 3 years**), or they may be full programmes (**4 to 6 years**). Programmes focus on the acquisition and application of theoretical knowledge, and on the development of creativity and talent. Graduates in Master´s programmes have to take a final state examination and publicly present and defend a thesis. Studies in medicine, veterinary medicine and hygiene are completed by a demanding state examination, including the presentation and defence of a rigorous thesis.

Doctoral degree programmes

Doctoral programmes (which normally last **3 years**) are intended for graduates from Master´s programmes and focus on independent creative work in research, development or the arts. Doctoral studies are completed by way of a state doctoral examination and the public presentation and defence of a doctoral thesis (dissertation) based on original work, which must have been published or admitted for publishing.

Because of growing interest, some institutions provide also study programmes leading to the degree of Master of Business Administration (MBA). This study is oriented on solving real-life case studies and should enhance managerial knowledge and skills of students. See the website of the Association of the Czech MBA Schools.

Tuition fees

By law, **higher education at public and state institutions is free of charge** for citizens of all nationalities, with the following **exceptions**:

- fees for administration of admission proceedings;

- fees for extending the duration of study beyond a set limit;
- fees for the study of an additional programme to the original studied;
- fees for study in a foreign language.
- Private institutions of higher education can fix their own fees. The tuition fees differ from 2,000-15,000 USD per year and the amount depends on the relevant institution and study programme.

3.1.3 Higher Education System for Water Engineering in Syria – Actual State

The deliverable 1.2 is the report about different activities. In this one is include the analysis of the higher education structure at the cooperating Syrian as well as EU universities in Water engineering. In dependence from the analysis results a comparison of the different higher education systems will be described. Besides to the teaching process the student self-administration structure in the EU and Syria are investigated.

- Structure of HES in Syria - *Wahed, M.N. A., Deputy Minister of High Education*
- Structure of HES in Damascus University - *Seif, W., Damascus Univeristy*
- Structure of HES in Tishreen University Lattakia - *Hassan, I., Tishreen University University*
- Structure of HES in Al-Baath-University Homs - *Shaker, A., Al-Baath-University*
- Structure of HES in Higher Institute of Water Management – *Al Shibai, M., Higher Institute of Water Management*
- Structure of HES in Aleppo University - *Aldarir, A.N., Aleppo University*
- Structure of HES in Technische Universitaet Dresden - *Graeber, P.-W., Technische Universitaet Dresden*
- Structure of HES in University Rostock - *Eckstaedt, H., University Rostock*
- Structure of HES in University of Applied Sciences Dresden - *Grischek, T.: University of Applied Sciences Dresden*
- Structure of HES in Austria -*Loiskandl, W.: University of Natural Resources and Applied Life Sciences*
- Structure of HES in Czech Republic - *Matula, S.: Czech University of Life Sciences*
- Structure of HES in Poland - *Ciesielszuk, T.: Opole University*
- Structure of HES and request to the universities by Arab Center for the Studies of Arid Zones & Dry Land - *Droubi, A., ACSAD*
- Request to the universities by General Company for Engineering Studies and Consulting *Haboub, M.N.: General Company for Engineering Studies and Consulting*
- Request to the universities by M & S Umweltprojekt - *Maertner, B., M & S Umweltprojekt*
- Structure of HES and request to the universities by Environmental Ministry - *Eckardt, A., Saechsisches Staatsministerium Umwelt und Landwirtschaft*
- Request to the universities by Stadtentwaesserung Dresden - *Balmer, G., Stadtentwaesserung Dresden*
- Questionnaire and evaluation "Development of a Modern higher Education system for Water Engineering in Syria" by BOKU Vienna
- "Questioning the role of internationalization in the nationalization of higher education: the impact of the EU TEMPUS Programme on higher education in Syria"

by Rami M Ayoubi and Hiba K. Massoud, Ministry of Higher Education and Damascus University, Syrian Arab Republic, 2012

- “HIGHER EDUCATION IN SYRIA” 2013 – edited by:
  Education, Audiovisual and Culture Executive Agency (EACEA), Unit P10 - Tempus and Bilateral Cooperation with Industrialised Countries and National Tempus Office Syria

General Situation of Higher Education in Syria

- “Higher education includes: two-year post-secondary intermediate institutes under the Ministry of Education (Intermediate Teacher-Training Institutes and Intermediate Technological Institutes) or other ministries (Agriculture, Industry , etc); two-year post-secondary higher institutes and centres under the Ministry of Higher Education (the Higher Institute of Drama and the Higher Institute of Music are under Ministry of Culture); and universities (in the number of four: Damascus, Aleppo, Tishreen and Al-Ba’ath), also supervised by the Ministry of Higher Education.
  In 1997/89, ther were 120 intermediate institutes, of wich 97 were affiliated to different ministries and 23 to the four universities. After two years of study, graduates from intermediate institutes are awarded an assistant certificate. Universities and higher institutes are awarded an assistant certificate. Universities and igher institutes award a bachelor’s degree after four years of study in the case of basic sciences, humanities, economics, law, education,, fine arts, physical education,, Sharia (or Islamic law), and nursing;
  after five years in the case of architecture, pharmacy, dentistry, veterinary medicine, civil engineering,agriculture, chemical and petroleum engineering; or after six years in the case of medicine. A diploma of qualification and specialization is awarded after one year of study following the bachelor’s degree, and a post-graduate diploma is awarded after one or two years of study (post-graduate certificate after three or four years of study in the case of medicine). A master’s degree requires one year of study after the post-graduate diploma, and a doctorate two years of study after the master’s degree.”

  Source: World data on Education, 6Th edition, 2006/07 , Compiled by UNESCO-IBE, www.ibe.unesco.org

- Bachelor degree4 or 5 years; years 1 -3 the same lectures for all Bachelors, years 4 + 5 are specialised
- Master degree 2-3 years
- PhD 3 years
- Duration of academic semesters : HIWM 16 weeks

3.1.4 Principles of Bologna Process

The Bologna Declaration is a pledge by 29 countries to reform thestructures of their higher education systems in a convergent way.

Key points

- Comparable and transparent curriculum structure
- European Credit Transfer System (ECTS)
- Political decisions
- New partnerships and co-operations
    - national
    - international
    - global

http://ec.europa.eu/education/higher-education/doc1320_en.htm

http://ec.europa.eu/education/lifelong-learning-policy/doc62_en.htm

Bologna Process is named after the Bologna Declaration

Lisbon Convention on 11st April 1997		
Bologna Declaration on 19th June 1999		
Prague Communiqué	in	2001
Berlin	in	2003

Bergen Communiqué in 2005
London Communiqué of May 2007
Löwen in 2009

the Bologna Process unites 47 countries

The **Lisbon Convention** established two bodies which oversee, promote and facilitate the implementation of the Convention:

(1) the Committee of the Convention on the Recognition of Qualifications concerning Higher Education in the European Region, and

(2) the European Network of Information Centres on Academic Mobility and Recognition (the ENIC Network).

The overarching aim of the **Bologna Process** is to create a

European Higher Education Area (EHEA)

based on international cooperation and academic exchange

The envisaged European Higher Education Area will

- facilitate mobility of students, graduates and higher education staff;
- prepare students for their future careers and for life as active citizens in democratic societies, and support their
- personal development;
- offer broad access to high-quality higher education, based on democratic principles and academic freedom.
- Easily readable and comparable degrees organized in a three-cycle structure (e.g. bachelor-master-doctorate)
- Quality assurance in accordance with the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG).
- Fair recognition of foreign degrees and other higher education qualifications in accordance with the Council of Europe/UNESCO Recognition Convention.

1. Adoption of a system of easily readable and comparable degrees
2. Adoption of a system essentially based on two main cycles, undergraduate and graduate
3. Establishment of a system of credits – ECTS
4. Promotion of mobility for students and for teachers, researchers and administrative staff
5. Promotion of European co-operation in quality assurance with a view to developing comparable criteria and methodologies.
6. Promotion of the necessary European dimensions in higher education,

with regards to curricular development, interinstitutional co-operation, mobility schemes and integrated programmes of study, training and research
7. Life-Long-Learning (LLL)
8. Students activities on all decisions and initiatives on all levels of the academic self-government
9. Promoting the attractiveness of the European higher education area
10. Teeth of the European Higher Education Area with the European research area

- **ECTS-Credit Points**
  1 ECTS ➔ a workload of 25 until 30 hours
  the workload per year ➔ 60 ECTS ➔ max. 1,800 hours
  the workload per year ➔ 52 weeks minus about 6 weeks vacation/holydays
  ➔ 45 weeks time 40 hour/week ➔ 1,800 hours ➔ 60 ECTS
- **Workload for the students**
  Courses, Lectures, Exercises (classroom teaching)
  Preparation and follow up
  Examination
  Self-study

From the teaching to the learning system

The ECTS gives greater weight to practical training and to intensive research projects. The way credits are measured reflects how hard a student has worked. The new evaluation methods reflect not only a student's performance on exams, but also his or her lab experiments, presentations, hours spent on study, innovation capacities, and so forth

Framework

- 1st cycle: typically 180–240 ECTS credits,
  usually awarding a Bachelor's degree.
- 2nd cycle: typically 90–120 ECTS credits (a minimum of 60 on 2nd-cycle level).
  Usually awarding a Master's degree.
- 3rd cycle: Doctoral (PhD) degree. No ECTS range given.

Realization

- The total study periode for consecutive study courses (Bachelor plus Master) may be only 10 semester (5 years)
- Therefore 6 semester Bachelor study and 4 semester Master study
- The studiability of course offerings is to check by Accreditation office
- For the accreditation the studies must be modularized and must have a ECTS-system
- In the bachelor studies are the scientific foundations, methodological skills and career-related qualifications mediated

- Master studies are more application- oriented (M-Eng.) and more research-oriented (MSc.) to differentiate

3.2 New Curricula for Syrian Higher Education System of Water Engineering

This deliverable "Development of new curricula" proposes a modern higher education structure for water engineering in Syria in compliance with the results of deliverable nr. 1.2. This modern higher education structure is equivalent to the structure of Lisbon agenda and the Bologna process. Second in this one a profile of requirements on a graduate in the field of water engineering/hydro sciences will be defined. These criteria are the requirements by practice and research. These structure is certify by the MHE and 4 Syrian universities

3.2.1 Education Profiles

EDUWAT – Basic contents of the education profiles		
Water Engineering	**Rural engineering,** **Hydraulic engineering**	**Water protection,** **Water management,** **Hydrology**
Focus of work: Water supply, urban waste water disposal, water protection areas, hazardous to water materials	**Focus of work** Agricultural irrigation and drainage, river engineering, storage engineering, water maintenance	**Focus of work:** water monitoring, water management, water remediation, storage management
Application fields: • Water authorities • Public utilities • Industrial enterprises • Enterprises for planning, calculation and construction of plants	**Application fields:** • Agricultual and water authorities • Farms • Enterprises for planning, calculation and hydraulic engineering	**Application fields:** • Water authorities • Storage operator • Enterprises for planning, controlling, calculation and hydraulic engineering
Main focus of education • Drinking water supply (water recovery, water treatment and water distribution) • Industrial water supply • Urban waste water disposal • Industrial waste water disposal • Water protection areas (for drinking and medicinal water) • Plants and regulations for handling with hazardous to water materials • Mining water engineering (mining and remediation)	**Main focus of education** • Agricultural irrigation systems • Agricultural drainage systems • River engineering • Flood protection • Storage engineering • Statics, construction, soil engineering, hydraulics, geohydrolgy, concrete construction, nature-orientated construction methods • Soil • Groundwater	**Main focus of education** • Water monitoring (sampling, valuation) • River, lake and storage management (quantitative and qualitative) • Groundwater management (quantitative and qualitative) • Remediation of rivers, lakes, storages and rroundwater • Storage management (flood, low water and water quality) • Hydrology, hydrobiology, hydrochemistry, geohydrology

• Process engineering, plant construction, hydraulics, hydrochemistry, hydrobiology		

Basic education for all education profiles		
Environmental law and water rights	Hydrology	Hydro chemistry
Hydro biology	Water supply	Water treatment
Waste water treatment	Land improvement	Hydraulic engineering (river engineering, storage engineering, agricultural hydraulic engineering)
Water management	Soil and groundwater sciences	

3.2.2 Summary of Courses

University	Bachelor Course	Short cut	Master Course	Short cut
Al Baath University Homs	Water & Soil Engineering and Environment	BSGW	Water & Soil Engineering and Environment	MSGW
	Water Engineering	BWE	Water Engineering	MWE
Higher Institute of Water Management			Water Management	MWM
University of Aleppo	Agricultural Water Management	BAWM	Agricultural Water Management	MAWM
	Water Engineering	BWE	Water Engineering	MWE
Damascus University	Hydrology - Science and Engineering	BHSE	Hydrology - Science and Engineering	MHSE
	Soil and Groundwater - Science and Engineering	BSGW	Soil and Groundwater - Science and Engineering	MSGW
	Water Engineering and Management	BWEM	Water Engineering and Management	MWEM
Tishreen University Lattakia	Water Engineering and Environment	BWE	Harbour Construction and Coastal Engineering	
			Sanitary Engineering	MHCCE
			Water Resources Management	MSE
			Water Structures	MWRM

1. Damascus University, Faculty of Civil Engineering

- Module Compendium Hydrology - Science and Engineering (HSE)

  Bachelor programme
  Master Programme

- Module Compendium Soil and Groundwater - Science and Engineering (SGW)

  Bachelor Programme
  Master Programme

- Module Compendium Water Engineering and Management (WEM)

  Bachelor Programme
  Master Programme

2. Tishreen University Lattakia, Faculty of Civil Engineering

- Module Compendium Bachelor of Water Engineering and Environment (BWEAE)

  Quality Management Bachelor of Water Engineering and Environment (BWEAE)

- Module Compendium Master of Harbor Construction and Coastal Engi-neering (MHCCE)

  Quality Management Master of Harbor Construction and Coastal Engi-neering MHCCE

- Module Compendium Master of Sanitary Engineering (MSE)

  Quality Management Master of Sanitary Engineering (MSE)

- Module Compendium Master of Water Resources Management (MWRM)

  Quality Management Master of Water Resources Management (MWRM)

- Module Compendium Master of Water Structures (MWS)

  Quality Management Master of Water Structures (MWS)

- Training Courses of suggested programmes

3. University of Aleppo

Faculty of Agricultural Engineering

- Module Compendium Agricultural Water Management (AWM)

  Bachelor Programme
  Master Programme

Faculty of Civil Engineering

- Module Compendium Water Engineering (WE)
  Bachelor Programme
  Master Programme

4. Al Baath University Homs

Faculty of Agriculture

- Module Compendium Water & Soil Engineering and Environment (SGW)

  Bachelor Programme
  Master Programme

Faculty of Civil Engineering

- Module Compendium Water Engineering (WE)

  Bachelor Programme
  Master Programme

3.2.3 New Education Structures

3.2.3.1 Al Baath University Homs

3.2.3.1.1 Bachelor Course of Water & Soil Engineering and Environment – BSGW

The academic plan in the **Bachelor course of Water & Soil Engineering and Environment program**, aims at providing the students the following items:

1. High-level information in science and computer techniques, and developing the skills in engineering sciences and its applications.
2. Developing the ability of the students to achieve various water engineering and environmental studies, check and use it according to the engineering codes.
3. Comparing between the engineering solutions, and choose the optimum ones.
4. Developing the work skills and regulate the relationship between the work team which the best and have many specialists.
5. Strengthening the research ability, developing, and working with the modest software's, equipment's… etc.
6. Developing the item of the scientific, social and cultural of the student's characters.
7. Continuous developing to get the high quality of the research, teaching…...etc.

	Credits	**%**
Modules with Basics in Mathematics and Natural Sciences	45	25%
Modules with Basics in Engineering	30	17%
Modules with Basics in Hydro Sciences	20	11%
Modules with specialized Basics	25	14%
Elective Modules	15	8%
General Qualification	20	11%
Practical Training /Project	10	6%
Bachelor examination	15	8%
Total	**180**	**100%**

Module Semester	**1**	**2**	**3**	**4**	**5**	**6**	**Total / ECTS**
Basics in Mathematics and Natural Sciences	20	20	5				**45**
Basics in Engineering	5		10	15			**30**
Basics in Hydro Sciences		5	10	5			**20**
Specialized Basics		5	5	10	5		**25**
Elective Modules					15		**15**
General Qualification	5					15	**20**
Practical Training/ Project Study					10		**10**
Bachelor Thesis incl. Defense						15	**15**
Total	**30**	**30**	**30**	**30**	**30**	**30**	**180**

	Modules in Natural Sciences 25%		Modules inTechnical Sciences 25%		Modules in Economic & Social Sciences 25%		Mosules in Variable Sciences 25%

Module nr.	Course Semester	1	2	3	4	5	6	Total / ECTS
	Basics in Mathematics and Natural Sciences	**20**	**20**	**5**	**0**	**0**	**0**	**45**
BSGW01	Mathematics	5						**5**
BSGW02	Statistics		5					**5**
BSGW03	General Physics	5						**5**
BSGW04	General chemistry	5						**5**
BSGW05	Analytical Chemistry		5					**5**
BSGW06	Plant physiology	5						**5**
BSGW07	Computer sciences		5					**5**
BSGW08	Soil Physics			5				**5**
BSGW09	Soil Science principles		5					**5**
	Basics in Engineering	**5**	**0**	**10**	**15**	**0**	**0**	**30**
BSGW10	Climate & Meteorology	5						**5**
BSGW11	Geographic information system AND REMOTE SENSING (GIS)			5				**5**
BSGW12	Soil Fertility and Plant Nutrition				5			**5**
BSGW13	Water Relationships (soil-water- plant)				5			**5**
BSGW14	Soil Chemistry			5				**5**
BSGW15	Soil Conservation and Reclamation				5			**5**
	Basics in Hydro Sciences	**0**	**5**	**10**	**5**	**0**	**0**	**20**
BSGW16	Hydrology		5					**5**
BSGW17	Irrigation			5				**5**
BSGW18	Soil and Water Microbiology			5				**5**
BSGW19	Agricultural Drainage				5			**5**
	Specialized Basics	**0**	**5**	**5**	**10**	**5**	**0**	**25**
BSGW20	Soil Analysis			5				**5**
BSGW21	Irrigation Methods				5			**5**
BSGW22	Water Resources				5			**5**

	Management							
BSGW23	Soil & Water Pollution					5		5
BSGW24	Agricultural geology		5					5
	Elective Modules	**0**	**0**	**0**	**0**	**15**	**0**	**15**
BSGW25	Soil Colloids					5		5
BSGW26	Fertilizers and fertilization					5		5
BSGW27	Soil Taxonomy					5		5
BSGW28	Water Chemistry					5		5
BSGW29	Waste Water					5		5
BSGW30	Organic Agriculture					5		5
	General Qualification	**5**	**0**	**0**	**0**	**0**	**15**	**20**
BSGW31	climate change						5	5
BSGW32	Economics						5	5
BSGW33	Agricultural Project management						5	5
BSGW34	Languages	5						5
BSGW35	**Practical Training/ Project Study**					10		**10**
BSGW36	**Bachelor Thesis incl. Defense**						15	**15**
	Total	**30**	**30**	**30**	**30**	**30**	**30**	**180**

3.2.3.1.2 **Master Course of Water & Soil Engineering and Environment**

The academic plan in the **Master course of water & Soil engineering and environment program**, aims at providing the students the following items:

1. High level information in science and computer techniques, and developing the skills in engineering sciences and its applications.
2. Developing the ability of the students to achieve various water engineering and environmental studies, check and use it according to the engineering codes.
3. Comparing between the engineering solutions, and choose the optimum ones.
4. Developing the work skills and regulate the relationship between the work team which the best and have many specialists.
5. Strengthening the research ability, developing, and working with the modest software's, equipment's… etc.
6. Developing the item of the scientific, social and cultural of the student's characters.
7. Continuous developing to get the high quality of the research, teaching…...etc.

	Credits	**%**
Modules in Advanced Applied Mathematics	10	8%
Modules in Engineering	25	21%
Modules in Hydro Sciences	15	13%
Modules with Specialization/	10	17%
Elective Modules	10	
Modules for general Qualification	10	8%
Practical Training /Project	10	8%
Master Thesis plus Defense	30	25%
Total	**120**	**100%**

Module Semester	**1**	**2**	**3**	**4**	**Total / ECTS**
Advanced Applied Mathematics	10				**10**
Engineering	10		15		**25**
Hydro Sciences	5		10		**15**
Specialization Modules		10			**10**
Elective Modules		10			**10**
General Qualification	5		5		**10**
Practical Training/ Project Study		10			**10**
Master Thesis plus Defense				30	**30**
Total	**30**	**30**	**30**	**30**	**120**

	Modules in Natural Sciences 10% - 25%		Modules inTechnical Sciences 10 - 25%		Modules in Economic & Social Sciences 5% - 15%		Modules in Variable Sciences 55% - 70%

Module Nr.	Course Semester	1	2	3	4	Total/ ECTS
	Mathematics and Natural Sciences	**10**	**0**	**0**	**0**	**10**
MSGW01	Biology	5				**5**
MSGW02	Advanced statistics	5				**5**
	Engineering	**10**	**0**	**15**	**0**	**25**
MSGW03	Advanced soil physics	5				**5**
MSGW04	Advanced soil chemistry	5				**5**
MSGW05	Advanced soil biology			5		**5**
MSGW06	Advanced soil fertility			5		**5**
MSGW07	Advanced soil taxonomy			5		**5**
	Hydro Sciences	**5**	**0**	**10**	**0**	**15**
MSGW08	Advanced water relationships			5		**5**
MSGW09	Advanced irrigation and drainage			5		**5**
MSGW10	Advanced hydrology	5				**5**
	Specialization modules	**0**	**10**	**0**	**0**	**10**
MSGW11	Advanced soil conservation		**5**			**5**
MSGW12	Advanced soil reclamation		**5**			**5**
	Elective modules		**10**			**10**
MSGW13	Water harvesting in dray areas		5			**5**
MSGW14	Agricultural pollution in dray areas		5			**5**
MSGW15	Biofertilization in dray areas		5			**5**
MSGW16	Waste water management		5			**5**
MSGW17	Biodiversity in dray areas		5			**5**
	General Qualification	**5**	**0**	**5**	**0**	**10**
MSGW18	Agriculture Project planning and controlling	5				**5**
MSGW19	advanced Water resources management			3		**3**
MSGW20	Research Methodology & Scientific writing			2		**2**
MSGW21	**Practical Training/Project study**		10			**10**
MSGW22	**Master Thesis plus Defense**				30	**30**
	Total	**30**	**30**	**30**	**30**	**120**

3.2.3.1.3 Bachelor Course in Water Engineering BWE

The academic curriculum of the **Bachelor course of Water Engineering program**, aims to providing the students with the following items:

1. Fundamental understanding of science and mathematics with highly-developed problem-solving skills
2. Broadening and deepening Knowledge and understanding of engineering sciences and its applications.
3. High level knowledge in water sciences and related computer techniques
4. Developing the ability of the students to conduct various water engineering and environmental studies according to the engineering codes.
5. Select and appraise an optimum solution for water engineering problems using appropriate tools based on analytical and systematic thinking. .
6. Ability to work effectively within multidisciplinary teams. .
7. Strengthening the research ability and developing their skills in applying related software , using laboratory equipment's… etc.
8. Ability to improve self learning to get the high quality of the research and advanced technologies.

	Credits	%
Modules with Basics Sciences	45	25%
Modules with Basics in Engineering	50	28%
Modules with Basics in Hydro Sciences		
Modules with specialized Basics	25	14%
Elective Modules	15	8%
General Qualification	20	11%
Practical Training /Project	10	6%
Bachelor examination	15	8%
Total	**180**	**100%**

Module Semester	**1**	**2**	**3**	**4**	**5**	**6**	**Total / ECTS**
Basics Sciences	20	5	10				**45**
Basics in Engineering	5	10	10	10			**35**
Basics in Hydro Sciences		5	5		5		**15**
Specialized Basics			5	15		5	**25**
Elective Modules					15		**15**
General Qualification	5			5		10	**20**
Practical Training/ Project Study					10		**10**
Bachelor Thesis incl. Defense						15	**15**
Total	**30**	**30**	**30**	**30**	**30**	**30**	**180**

	Modules in Natural Sciences 25%		Modules inTechnical Sciences 25%		Modules in Economic & Social Sciences 25%		Modules in Variable Sciences 25%

Module nr.	Course Semester	1	2	3	4	5	6	Total/ ECTS
	Basic Sciences	**20**	**15**	**10**				**45**
BWE01	Mathematics	5						**5**
BWE02	Descriptive Geometry	5						**5**
BWE03	Probability & Statistics		5					**5**
BWE04	Physics		5					**5**
BWE05	Chemistry for Engineers			5				**5**
BWE06	Informatics/Computer sciences	5		5				**10**
BWE07	Mechanics 1+2	5	5					**10**
	Basics in Engineering	**5**	**10**	**10**	**10**			**35**
BWE 08	Surveying			5				**5**
BWE09	Geoinformatics/GIS				5			**5**
BWE10	Engineering Geology	5						**5**
BWE11	Soil Mechanics			5				**5**
BWE12	Building Materials		5					**5**
BWE13	Strength of Materials		5					**5**
BWE14	Reinforced Concrete/Steel structures				5			**5**
	Basics in Hydro Sciences		**5**	**5**		**5**		**15**
BWE15	Hydraulics		5	5				**10**
BWE16	Hydrobiology					5		**5**
	Specialized Basics			**5**	**15**		**5**	**25**
BWE17	Structure mechanics				5			**5**
BWE18	Hydrology & Hydrometry			5				**5**
BWE19	Sanitation and waste water treatment				5			**5**
BWE20	Water supply system				5			**5**
BWE21	Water Resources management						5	**5**

	Elective Modules*					**15**		**15**
BWE22	Irrigation & Drainage					5		**5**
BWE23	Hydrogeology					5		**5**
BWE24	Water storage					5		**5**
BWE26	Soil and water pollution					5		**5**
BWE27	Watershed management & monitoring					5		**5**
BWE27	Microbiology					5		**5**
	General Qualification	**5**			**5**		**10**	**20**
BWE29	Law and legislation				5			**5**
BWE30	Engineering Economics						5	**5**
BWE31	Water project management						5	**5**
BWE32	Languages	5						**5**
BWE33	**Practical Training/ Project Study**					10		**10**
BWE34	**Bachelor Thesis incl. Defense**						15	**15**
	Total	**30**	**30**	**30**	**30**	**30**	**30**	**180**

Modules of Master Course of Water Engineering MWE

The academic plan in the Master course of Water Engineering program, aims at providing the students the following items:

1. High level information in science and computer techniques, and developing the skills in engineering sciences and its applications.
2. Developing the ability of the students to achieve various water engineering and environmental studies, check and use it according to the engineering codes.
3. Comparing between the engineering solutions, and choose the optimum ones.
4. Developing the work skills and regulate the relationship between the work team which the best and have many specialists.
5. Strengthening the research ability and developing and working with the modest software's, equipment's… etc.
6. Developing the item of the scientific, social and cultural of the student's characters.
7. Continuous developing to get the high quality of the research, teaching…...etc.

	Credits	%
Modules in Advanced Applied Mathematics	10	8%
Modules in Engineering	15	13%
Modules in Hydro Sciences	25	21%
Modules with Specialization	10	17%
Elective Modules	10	
Modules for general Qualification	10	8%
Practical Training /Project	10	8%
Master Thesis plus Defense	30	25%
Total	**120**	**100%**

Module **Semester**	**1**	**2**	**3**	**4**	**Total / ECTS**
Advanced Applied Mathematics	10				**10**
Engineering	5		10		**15**
Hydro Sciences	10		15		**25**
Specialization		10			**10**
Elective Modules		10			**10**
General Qualification	5		5		**10**
Practical Training/ Project Study		10			**10**
Master Thesis plus Defense				30	**30**
Total	**30**	**30**	**30**	**30**	**120**

	Modules in Natural Sciences 10% - 25%		Modules inTechnical Sciences 10 - 25%		Modules in Economic & Social Sciences 5% - 15%		Modules in Variable Sciences 55% - 70%

Module nr.	**Course Semester**	**1**	**2**	**3**	**4**	**Total/ECTS**
	Advanced Applied Mathematics	**10**	**0**	**0**	**0**	**10**
MWE01	Advanced Mathematics	5				**5**
MWE02	System analysis	5				**5**
	Engineering	**5**	**0**	**10**	**0**	**15**
MWE03	Advanced hydromechanics	5				**5**
MWE04	Dam construction			5		**5**
MWE05	Hydrometry			5		**5**
	Hydro Sciences	**10**	**0**	**15**	**0**	**25**
MWE06	Aquatic ecology	5				**5**
MWE07	Water quality	5				**5**
MWE08	IWRM			5		**5**
MWE09	GW modelling			5		**5**
MWE10	SW modelling			5		**5**
	Specialization modules	**0**	**10**	**0**	**0**	**10**
MWE11	Waste water treatment		5			**5**
MWE12	Advanced Irrigation and Drainage Engineering		5			**5**
	Elective modules		10			**10**
MWE13	Flood and drought protection		5			**5**
MWE14	Integrated water resources management		5			**5**
MWE15	Sewage Network Modelling		5			**5**
MWE16	Drinking water treatment		5			**5**
MWE17	Water supply system modelling		5			**5**
	General Qualification	**5**	**0**	**5**	**0**	**10**
MWE18	Project planning and controlling	5				**5**
MWE19	Water and energy			3		**3**
MWE20	Research Methodology & Scientific writing			2		**2**
MWE21	**Practical Training/Project study**		10			**10**
MWE22	**Master Thesis plus Defense**				30	**30**
	Total	**30**	**30**	**30**	**30**	**120**

3.2.3.2 Aleppo University

3.2.3.2.1 AU- Bachelor Course Agricultural Water Management - BAWM

<table>
<tr><td>Semester 1</td><td rowspan="3">Mathematics</td><td>Physics</td><td rowspan="2">Chemistry</td><td>Biology & Genetics</td><td>Computer Sciences</td><td>English language</td></tr>
<tr><td>Semester 2</td><td>Statistics</td><td>Crop Production and Horticulture</td><td>Meteorology</td><td>Arabic language and History</td></tr>
<tr><td>Semester 3</td><td>Physics</td><td>Soil Science</td><td>Agricultural Economy and Water Rights</td><td>Fundamentals of Drawing and Farm Buildings</td><td>Hydraulics</td></tr>
<tr><td>Semester 4</td><td>Geodaesy/ Topography</td><td>Water Ressources Management</td><td>Hydrology</td><td colspan="2">Elective Modules</td><td rowspan="2">Practical Training/ Project Study</td></tr>
<tr><td>Semester 5</td><td>Forest & Pastures Management</td><td>Irrigation</td><td>Waste Water Discharge</td><td colspan="2">Elective Modules</td></tr>
<tr><td>Semester 6</td><td>Drainage</td><td>Ecology and Environmental Protection</td><td>Practical Training/ Project Study</td><td colspan="3">Bachelor Thesis incl. Defense</td></tr>
<tr><td>Credits</td><td>5</td><td>5</td><td>5</td><td>5</td><td>5</td><td>5</td></tr>
</table>

Modules in Natural Sciences 25%

Modules inTechnical Sciences 25%

Modules in Economic & Social Sciences 25%

Mosules in Variable Sciences 25%

3.2.3.2.2 AU - Master Course Agricultural Water Management

Semester 1	**Mathematics /Statistics**	**Hydrology**	**Soil and Water Relationship**	**Salted Soils**	**Elective Modules**	
Semester 2	**Modeling and Simulation**	**Hydromechanics**	**Agricultural Meteorology**	**Waste Water Treatment and Use**	**Advanced Irrigation**	**Practical Training/ Project Study**
Semester 3	**Advanced Drainage**	**Scientific Writing**	**Elective Modules**		**Practical Training/ Project Study**	
Semester 4	**Master Thesis**					
Credits	5	5	5	5	5	5

Green	Modules in Natural Sciences 10% - 25%
Light blue	Modules inTechnical Sciences 10 - 25%
Orange	Modules in Economic & Social Sciences 5% - 15%
Grey	Modules in Variable Sciences 55% - 70%

3.2.3.2.3 AU - Bachelor Course Water Engineering - BWE

<table>
<tr><td>Semester 1</td><td rowspan="2">Mathematics</td><td rowspan="2">Physics</td><td rowspan="2">Chemistry</td><td>Biology</td><td>Fundamentals of Engineering Drawing</td><td>English Language</td></tr>
<tr><td>Semester 2</td><td>Meteorology</td><td>Hydraulics</td><td>Arabic Language and History</td></tr>
<tr><td>Semester 3</td><td>Statistics</td><td>Computer Sciences</td><td>Soil Science & Soil Mechanic</td><td>Geodesy / Geoinformatics</td><td>Hydrology</td><td>Irrigation</td></tr>
<tr><td>Semester 4</td><td>Reinforced Concrete Construction</td><td>Pumping Stations</td><td>Drainage</td><td>Water Ressources Management and Water Rights</td><td colspan="2">Elective Modules</td></tr>
<tr><td>Semester 5</td><td>Structural Engineering</td><td>Hydrometry</td><td>Drinking Water Supply</td><td>Elective Modules</td><td colspan="2">Practical Training/ Project Study</td></tr>
<tr><td>Semester 6</td><td>Waste Water Discharge</td><td>Hydraulic Installations</td><td>Practical Training/ Project Study</td><td colspan="3">Bachelor Thesis incl. Defense</td></tr>
<tr><td>Credits</td><td>5</td><td>5</td><td>5</td><td>5</td><td>5</td><td>5</td></tr>
</table>

Modules in Natural Sciences 25%

Modules inTechnical Sciences 25%

Modules in Economic & Social Sciences 25%

Mosules in Variable Sciences 25%

3.2.3.2.4 AU - Master Course Water Engineering - MWE

Semester 1	**Advanced Mathematics**	**Construction Materials**	**Hydromechanics**	**Advanced Irrigation**	**Elective Modules**	
Semester 2	**Modeling and Simulation**	**Hydro Systems Analysis**	**Hydraulic Engineering**	**Climate Changes**	**Advanced Drainage**	**Scientific Writing**
Semester 3	**Waste Water Treatment**	**Elective Modules**		**Research Project**	**Practical Training/ Project Study**	
Semester 4	**Master Thesis**					
Credits	5	5	5	5	5	5

Modules in Natural Sciences 10% - 25%	Modules inTechnical Sciences 10 - 25%
Modules in Economic & Social Sciences 5% - 15%	Modules in Variable Sciences 55% - 70%

3.2.3.2.5 Curriculum for B.Sc. in Hydrology Science and Engineering (BHSE)

1. General Structure

	Credits	%
Modules with Basics in Mathematics and Natural Sciences	43	24
Modules with Basics in Engineering	35	19
Modules with Basics in Hydro Sciences	32	18
Modules with specialized Basics	24	13
Elective Modules	10	6
Modules for General Qualification	10	6
Practical Training /Project	14	8
Bachelor examination	12	7
Total	180	100

Module Semester	1	2	3	4	5	6	Total/ ECTS
Basics in Mathematics and Naural Sciences	25	13	5				43
Basics in Engineering	5	17	13				35
Basics in Hydro Sciences			12	5	15		32
Specialized Basics				15		9	24
Elective Modules				5	5		10
General Qualification				5		5	10
Practical Training/ Project Study					10	4	14
Bachelor Theses incl. Defense						12	12
Total	30	30	30	30	30	30	180

Module Nr.	Course Semester	1	2	3	4	5	6	Total/ ECTS
	Basics in Mathematics and Natural Sciences	25	13	5				43
BHSE.01	Mathematics	5	5	5				15
BHSE.02	Probability and Statistics	5						5
BHSE.03	Computer Science	5	4					9
BHSE.04	Physics	5						5
BHSE.05	Soil and Water Chemistry	5						5
BHSE.06	Engineering Geology		4					4
	Basics in Engineering	5	17	13				35
BHSE.07	Engineering Graphics	5						5
BHSE.08	Applied Hydraulics		4	4				8
BHSE.09	Geotechnics		4	4				8
BHSE.10	Statics and Dynamics		5	5				10
BHSE.11	Topography/Geodesy		4					4
	Basics in Hydro Sciences			12	5	15		32
BHSE.12	Hydrogeology			4				4
BHSE.13	Meteorology			4				4
BHSE.14	Hydrology				5			5
BHSE.15	Waste Water Treatment			4				4
BHSE.16	Hydraulic Structures					5		5
BHSE.17	Groundwater					5		5
BHSE.18	Urban Water Management					5		5
	Specialized Basics		0	0	15	0	9	24
BHSE.19	Flood Risk Management				5			5
BHSE.20	Aspects of Irrigation and Drainage				5			5
BHSE.21	Land Use Planning						4	4
BHSE.22	Fundamentals of Hydrologic Modeling				5			5
BHSE.23	Climate Change and Water Resources Management						5	5
	Elective Modules	0	0	0	5	5	0	10
BHSE.24	Water Protection/Protection Areas				5			
BHSE.25	Environmental impact Assessment				5			

BHSE.26	**GIS and Remote Sensing in Water Management**					**5**		
BHSE.27	**Watershed management**					**5**		
	General Qualification				**5**		**5**	**10**
BHSE.28	**Language**				**5**			**5**
BHSE.29	**Technical and Financial Reports**						**5**	**5**
BHSE.30	**Practical Training/ Project Study**					**10**	**4**	**14**
BHSE.31	**Bachelor Thesis with Defense**						**12**	**12**
	Total	**30**	**30**	**30**	**30**	**30**	**30**	**180**

3.2.3.2.6 **Curricula Structures - Bachelor Course Hydrology Science and Engineering**

Semester 1	**Mathematics**	**Probability and Statistics**	**Computer Science**	**Physics**	**Soil and Water Chemistry**	**Engineering Graphics**	
Semester 2	**Mathematics**	**Computer Science**	**Engineering Geology**	**Applied Hydraulics**	**Geotechnics**	**Statics and Dynamics**	**Topography/Geodesy**
Semester 3	**Mathematics**	**Applied Hydraulics**	**Geotechnics**	**Statics and Dynamics**	**Hydrogeology**	**Meteorology**	**Waste Water Treatment**
Semester 4	**Hydrology**	**Flood Risk Management**	**Aspects of Irrigation and Drainage**	**Fundamentals of Hydrologic Modeling**	**Elective Modules**	**Language**	
Semester 5	**Hydraulic Structures**	**Groundwate**	**Urban Water Management**	**Elective Modules**	**Practical Training/ Project Study**		
Semester 6	**Land Use Planning 4cr**	**Climate Change and Water Resources Management**	**Technical and Financial Reports**	**Practical Training/ Project 4cr**	**Study Bachelor Thesis incl. Defense 12cr**		
Credits	**5**	**5**	**5**	**5**	**5**	**5**	

Modules in Natural Sciences 25%	**Modules inTechnical Sciences 25%**	**Modules in Economic & Social Sciences 25%**	**Modules in Variable Sciences 25%**

3.2.3.2.7 Curriculum for M.Sc. in Hydrology Science and Engineering

General Structure:

	Credits	%
Modules in Mathematics and Natural Sciences	10	**8%**
Modules in Engineering	10	**8%**
Modules in Hydro Sciences	20	**17%**
Modules with Specialization	20	**17%**
Elective Modules	15	**13%**
Modules for general Qualification	5	**4%**
Practical Training /Project	10	**8%**
Master Thesis plus Defense	30	**25%**
Total	**120**	**100%**

Module Semester	1	2	3	4	Total/ ECTS
Mathematics and Natural Sciences	**5**	**5**			**10**
Engineering	**5**	**5**			**10**
Hydro Sciences	**5**	**10**	**5**		**20**
Specialization	**10**	**5**	**5**		**20**
Elective Modules	**5**	**5**	**5**		**15**
General Qualification			**5**		**5**
Practical Training/ Project Study			**10**		**10**
Master Thesis plus Defense				**30**	**30**
Total	**30**	**30**	**30**	**30**	**120**

Module Nr.	Course Semester	1	2	3	4	Total/ECTS
	Mathematics and Natural Sciences	**5**	**5**			**10**
MHSE.01	Mathematics	5				5
MHSE.02	Biology-Ecology		5			5
	Engineering	**5**	**5**			**10**
MHSE.03	Dams	5	5			10
	Hydro Sciences	**5**	**10**	**5**	**0**	**20**
MHSE.04	Reservoir (Regulating Flow in Rivers)	5				5
MHSE.05	River Morphodynamics		5			5
MHSE.06	Water Quality Monitoring and Management			5		5
MHSE.07	Flood Protection in Lowland Areas		5			5
	Specialization	**10**	**5**	**5**	**0**	**20**
MHSE.07	Automation and Control in irrigation Projects	5				5
MHSE.08	Groundwater Modelling		5			5
MHSE.09	River Basin Development			5		5
MHSE.10	Unsaturated Zone Hydrology	5				5
	Elective Modules	**5**	**5**	**5**		**15**
MHSE.11	Integrated Hydrological and River Mo delling		5			5
MHSE.12	Introduction to Coastal Science and Engineering		5			5
MHSE.13	Service Oriented Management of Irrigation Systems	5				5
MHSE.14	Pumping Stations			5		5
MHSE.15	Water Resources Development	5				5
MHSE.16	Water Supply and Sanitation			5		5
	General Qualification			**5**		**5**
MHSE.17	Writing of proposals for water projects			5		5
MHSE.18	**Practical Training/Project study**			**10**		**10**
MHSE.19	**Master Thesis plus Defense**				**30**	**30**
	Total	**30**	**30**	**30**	**30**	**120**

3.2.3.2.8 **Curricula Structures - Master Course Hydrology Science and Engineering**

Semester 1	Mathematics	Dams	Reservoir (Regulating Flow in Rivers)	Automation and Control in irrigation Projects	Unsaturated Zone Hydrology	Elective Modules
Semester 2	Biology-Ecology	Dams	River Morphodynamics	Flood Protection in Lowland Areas	Groundwater Modelling	Elective Modules
Semester 3	Water Quality Monitoring and Management	River Basin Development	Elective Modules	Writing of proposals for water projects	Practical Training/ Project Study	
Semester 4	Master Thesis					
Credits	5	5	5	5	5	5

Modules in Natural Sciences 10% - 25%	Modules inTechnical Sciences 10 - 25%	Modules in Economic & Social Sciences 5% - 15%	Modules in Variable Sciences 55% - 70%

3.2.3.3 Damascus University

3.2.3.3.1 Curriculum for B.Sc. in Soil and Groundwater (BSGW)

General Structure

	Credits	%
Modules with Basics in Mathematics and Natural Sciences	45	25
Modules with Basics in Engineering	15	8
Modules with Basics in Hydro Sciences	30	17
Modules with specialized Basics	30	17
Elective Modules	15	8
Modules for General Qualification	20	11
Practical Training /Project	10	6
Bachelor examination	15	8
Total	**180**	**100**

Module Semester	**1**	**2**	**3**	**4**	**5**	**6**	**Total/ ECTS**
Basics in Mathematics and Natural Sciences	25	10	10				**45**
Basic in Engineering		10	5				**15**
Basics in Hydro Sciences		5	10	10	5		**30**
Specialized Basics				15	10	5	**30**
Elective Modules					10	5	**15**
General Qualification	5	5	5			5	**20**
Practical Training/ Project Study				5	5		**10**
Bachelor Theses incl. Defence						15	**15**
Total	**30**	**30**	**30**	**30**	**30**	**30**	**180**

Module Nr.	Course Semester	1	2	3	4	5	6	ECTS
	Basics in Mathematics and Natural Sciences	**25**	**10**	**10**	**0**	**0**	**0**	**45**
BSGW.01	Mathematics I	5						5
BSGW.02	Mathematics II		5					5
BSGW.03	Mathematics III			5				5
BSGW.04	Physics I	5						5
BSGW.05	Physics II		5					5
BSGW.06	Computer Sciences	5						5
BSGW.07	Chemistry	5						5
BSGW.08	Biology	5						5
BSGW.09	Geodesy and Cartography			5				5
	Basics in Engineering	**0**	**10**	**5**	**0**	**0**	**0**	**15**
BSGW.10	Engineering Graphics		5					5
BSGW.11	Engineering Geology			5				5
BSGW.12	Computer Sciences/Modelling		5					5
	Basics in Hydro Sciences	**0**	**5**	**10**	**10**	**5**	**0**	**30**
BSGW.13	Soil Physics				5			5
BSGW.14	Soil Chemistry				5			5
BSGW.15	Fluid Mechanics		5					5
BSGW.16	Hydraulics			5				5
BSGW.17	Meteorology and Hydrometeorology					5		5
BSGW.18	Soil Sciences			5				5
	Specialized Basics	**0**	**0**	**0**	**15**	**10**	**5**	**30**
BSGW.19	Water Management Legalisation						5	5
BSGW.20	Pumping Stations and Transport Pipe Lines					5		5
BSGW.21	Soil Conservation and Management				5			5
BSGW.22	Irrigation/Drainage Systems				5			5
BSGW.23	Hydrogeology and Groundwater Flow				5	5		10
	Elective Modules					**10**	**5**	**15**
BSGW.24	Surface and Ground Water Protection						5	
BSGW.25	Water and Solute Transport in Soils					5		
BSGW.26	Managing Soil Erosion					5		
BSGW.27	Climate Change					5		

BSGW.28	Water Resources Management						5	
BSGW.29	Groundwater Modelling						5	
	General Qualification	5	5	5	0	0	5	**20**
BSGW.30	Project Management			5				5
BSGW.31	Writing of Technical/Financial Proposals						5	5
BSGW.32	Foreign Language	5	5					10
BSGW.33	**Practical Training/ Project Study**				**5**	**5**		**10**
BSGW.34	**Bachelor Thesis incl. Defense**						**15**	**15**
	Total	**30**	**30**	**30**	**30**	**30**	**30**	**180**

3.2.3.3.2 Curricula structure - Bachelor Course Soil and Groundwater (BSGW)

Semester 1	**Mathematics I**	**Physics I**	**Computer Sciences**	**Chemistry**	**Biology**	**Foreign Language**
Semester 2	**Mathematics II**	**Physics II**	**Engineering Graphics**	**Computer Sciences/Modelling**	**Fluid Mechanics**	**Foreign Language**
Semester 3	**Mathematics III**	**Geodesy and Cartography**	**Engineering Geology**	**Hydraulics**	**Soil Sciences**	**Project Management**
Semester 4	**Soil Physics**	**Soil Chemistry**	**Soil Conservation and Management**	**Irrigation/Drainage Systems**	**Hydrogeology and Groundwater Flow**	**Practical Training/ Project Study**
Semester 5	**Meteorology and Hydrometeorology**	**Pumping Stations and Transport Pipe Lines**	**Hydrogeology and Groundwater Flow**	**Elective Modules**	**Elective Modules**	**Practical Training/ Project Study**
Semester 6	**Water Management Legalisation**	**Elective Modules**	**Writing of Technical/Financial Proposals**	**Bachelor Thesis incl. Defense**		
Credits	5	5	5	5	5	5

(green)	Modules in Natural Sciences 25%
(light blue)	Modules inTechnical Sciences 25%
(orange)	Modules in Economic & Social Sciences 25%
(grey)	Modules in Variable Sciences 25%

3.2.3.3.3 Curriculum for Master Course Soil and Groundwater (MSGW)

General Structure

	Credits	**%**
Modules in Mathematics and Natural Sciences	10	8%
Modules in Engineering	10	8%
Modules in Hydro Sciences	10	8%
Modules with Specialization	35	29%
Elective Modules	10	8%
Modules for General Qualification	5	4%
Practical Training /Project	10	8%
Master Thesis plus Defense	30	25%
Total	**120**	**100%**

Module Semester	1	2	3	4	Total/ ECTS
Mathematics and Natural Sciences	10				**10**
Engineering	5	5			**10**
Hydro Sciences		5	5		**10**
Specialization	10	20	5		**35**
Elective Modules			10		**10**
General Qualification	5				**5**
Practical Training/ Project Study			10		**10**
Master Thesis plus Defense				30	**30**
Total	**30**	**30**	**30**	**30**	**120**

Module Nr.	Course Semester	1	2	3	4	Total/ECTS
	Mathematics and Natural Sciences	**10**	**0**	**0**	**0**	**10**
MSGW.01	Advanced Mathematics/Statistics	5				**5**
MSGW.02	Soil and Water Chemistry	5				**5**
	Engineering	**5**	**5**	**0**	**0**	**10**
MSGW.03	Computer Science Modelling	5				**5**
MSGW.04	Advanced Spatial-Data Analysis		5			**5**
	Hydro Sciences	**0**	**5**	**5**	**0**	**10**
MSGW.05	Soil/Plant Sciences Models			5		**5**
MSGW.06	Water Planning and Economics		5			**5**
	Specialization	**10**	**20**	**5**	**0**	**35**
MSGW.07	Advanced Hydrogeology	5				**5**
MSGW.08	Groundwater Modelling		5			**5**
MSGW.09	Soil and Water Management		5			**5**
MSGW.10	Water Planning and Economics	5				**5**
MSGW.11	Remediation of Soils and Groundwater			5		**5**
MSGW.12	Groundwater Management and Exploitation		5			**5**
MSGW.13	Groundwater organic contaminant pollution and remediation		5			**5**
	Elective Modules			**10**		**10**
MSGW.14	Advanced GW Management			5		**5**
MSGW.15	Climate Change Impacts and Adaptation			5		**5**
MSGW.16	Drainage & land reclamation			5		**5**
	General Qualification	**5**	**0**	**0**	**0**	**5**
MSGW.17	Research Methodology & Scientific Writing	5				**5**
	Practical Training/Project study			**10**		**10**
MSGW.18	Project on Groundwater Management			5		**5**
MSGW.19	Project on Soil and Water Management			5		**5**
MSGW.20	**Master Thesis Plus Defense**				**30**	**30**
	Total	**30**	**30**	**30**	**30**	**120**

3.2.3.3.4 Curricula Structures - DAM - Master Course Soil and Groundwater (MSGW)

Semester 1	**Advanced Mathematics**	**Soil and Water Chemistry**	**Computer Science Modelling**	**Advanced Hydrogeology**	**Water Planning and Economics**	**Research Methodology & Scientific Writing**
Semester 2	**Advanced Spatial-Data Analysis**	**Water Planning and Economics**	**Groundwater Modelling**	**Soil and Water Management**	**Groundwater Management and Exploitation**	**Groundwater organic contaminant pollution and remediation**
Semester 3	**Soil/Plant Sciences Models**	**Remediation of Soils and Groundwater**	**Elective Modules**	**Elective Modules**	**Practical Training/Project study**	**Practical Training/Project study**
Semester 4	**Master Thesis**					
Credits	5	5	5	5	5	5

(green)	Modules in Natural Sciences 10% - 25%
(light blue)	Modules inTechnical Sciences 10 - 25%
(orange)	Modules in Economic & Social Sciences 5% - 15%
(grey)	Modules in Variable Sciences 55% - 70%

3.2.3.3.5 Curriculum for B.Sc. in Water Engineering and Management

General Structure

	Credits	%
Modules with Basics Sciences	**30**	17
Modules with Basics in Engineering	**30**	17
Modules with Basics in Hydro Sciences	**25**	14
Modules with Specialized Basics	**40**	22
Elective Modules	**10**	6
Modules for General Qualification	**20**	11
Practical Training /Project Study	**10**	6
Bachelor Examination	**15**	9
Total	**180**	100

Module / **Semester**	**1**	**2**	**3**	**4**	**5**	**6**	**Total / ECTS**
Basics Sciences	15	5	5	5			**30**
Basics in Engineering	5	10	10	5			**30**
Basics in Hydro Sciences	5	10	5	5			**25**
Specialized Basics			10	10	10	10	**40**
Elective Modules					5	5	**10**
General Qualification	5	5			10		**20**
Practical Training/ Project Study				5	5		**10**
Bachelor Thesis incl. Defense						15	**15**
Total	**30**	**30**	**30**	**30**	**30**	**30**	**180**

	Course Semester	**1**	**2**	**3**	**4**	**5**	**6**	**Total / ECTS**
1	**Basics Sciences**	**15**	**5**	**5**	**5**			**30**
BWEM.01	Mathematics	5	5	5				15
BWEM.02	Computer Sciences	5						5
BWEM.03	Physics	5						10
BWEM.04	Soil and Water Chemistry				5			5
2	**Basics in Engineering**	**5**	**10**	**10**	**5**			**30**
BWEM.05	Statics & Strength of Materials	5	5					10
BWEM.06	Geotechnics				5			5
BWEM.07	Engineering Graphics		5					5
BWEM.08	Geodesy/Topography			5				5
BWEM.09	Engineering Geology			5				5
3	**Basics in Hydro Sciences**	**5**	**10**	**5**	**5**			**25**
BWEM.10	Fluid Mechanics	5	5					10
BWEM.11	Hydraulics			5				5
BWEM.12	Surface Water Hydrology		5					5
BWEM.13	Groundwater /Hydrogeology				5			5
4	**Specialized Basics**			**10**	**10**	**10**	**10**	**40**
BWEM.14	Hydro Structure Engineering			5		5		**10**
BWEM.15	Irrigation and Drainage				5			**5**
BWEM.16	Pumping Stations					5		**5**
BWEM.17	Water Supply Engineering			5	5			**10**
BWEM.18	Waste Water Treatment						5	**5**
BWEM.19	Water Demand Management						5	**5**
5	**Elective Modules**					**5**	**5**	**10**
	Group I						5	5
BWEM.20	Irrigation Management						5	
BWEM.21	GIS and Remote Sensing in Water Management						5	
BWEM.22	Environmental Impact Assessment						5	
	Group II					5		5

BWEM.23	Climate Change and Water Resources Management					5		
BWEM.24	Participatory Water Management					5		
BWEM.25	International Water Issues					5		
6	**General Qualification**	**5**	**5**			**10**		**20**
BWEM.26	Foreign Language	5	5					10
BWEM.27	Technical and Financial Reports					5		5
BWEM.28	Hydro informatics Tools					5		5
BWEM.29	**Practical Training/ Project Study**				5	5		**10**
BWEM.30	**Bachelor Thesis including Defense**						15	**15**
	Total	**30**	**30**	**30**	**30**	**30**	**30**	**180**

3.2.3.3.6 Curricula Structures Bachelor Programme Water Engineering and Management (BWEM)

Semester 1	Mathematics	Computer Sciences	Physics	Statics & Strength of Materials	Fluid Mechanics	Foreign Language
Semester 2	Mathematics	Statics & Strength of Materials	Engineering Graphics	Fluid Mechanics	Surface Water Hydrology	Foreign Language
Semester 3	Mathematics	Geodesy/Topograph y	Engineering Geology	Hydraulics	Hydro Structure Engineering	Water Supply Engineering
Semester 4	Soil and Water Chemistry	Geotechnics	Groundwater /Hydrogeology	Irrigation and Drainage	Water Supply Engineering	Practical Training/ Project Study
Semester 5	Hydro Structure Engineering	Pumping Stations	Elective Modules	Technical and Financial Reports	Hydro informatics Tools	Practical Training/ Project Study
Semester 6	Waste Water Treatment	Water Demand Management	Elective Modules	Bachelor Thesis incl. Defense		
Credits	5	5	5	5	5	5

Modules in Natural Sciences 25%

Modules inTechnical Sciences 25%

Modules in Economic & Social Sciences 25%

Modules in Variable Sciences 25%

3.2.3.3.7 Curriculum for M.Sc. in Water Engineering and Management

General Structure:

		Credits	%
1	Modules in Mathematics and Natural Sciences	**20**	17
2	Modules in Engineering	**10**	8
3	Modules in Hydro Sciences	**15**	12.5
4	Modules with Specialization	**30**	25
5	Elective Modules	**10**	8
6	Modules for general Qualification	**5**	4.5
7	Practical Training /Project	**10**	8
8	Master Thesis plus Defense	**20**	17
	Total	**120**	**100**

	Module Semester	**1**	**2**	**3**	**4**	**Total / ECTS**
1	Mathematics and Natural Sciences	10	5	5		**20**
2	Engineering	5	5			**10**
3	Hydro Sciences	5	5	5		**15**
4	Specialization	10	10		10	**30**
5	Elective Modules		5	5		**10**
6	General Qualification			5		**5**
7	Practical Training/ Project Study			10		**10**
8	Master Thesis plus Defense				20	**20**
	Total	**30**	**30**	**30**	**30**	**120**

	Course Semester	**1**	**2**	**3**	**4**	**Total/ ECTS**
1	**Mathematics and Natural Sciences**	**10**	**5**	**5**	**0**	**20**
MWEM.01	Applied Mathematics	5				**5**
MWEM.02	Applied Statistics		5			**5**
MWEM.03	Water Quality Monitoring and Management			5		**5**
MWEM.04	Geoinformatics/GIS	5				**5**
2	**Engineering**	**5**	**5**	**0**	**0**	**10**
MWEM.05	Advanced Geotechnics	5				**5**
MWEM.06	Soil Erosion and Sediment Transport		5			**5**
3	**Hydro Sciences**	**5**	**5**	**5**	**0**	**15**
MWEM.07	Drinking Water System / Modeling		5			**5**
MWEM.08	Applied Hydrology and Hydrogeology	5				**5**
MWEM.09	Groundwater Modeling			5		**5**
4	**Specialization**	**10**	**10**	**0**	**10**	**20**
MWEM.10	Hydraulic Structures	5				**5**
MWEM.11	Decision Support Systems		2			**2**
MWEM.12	Water System Management		3			**3**
MWEM.13	Principles of Integrated Water Resources Management		2			**2**
MWEM.14	Water Resources Planning	5				**5**
MWEM.15	Public Health and Sanitation		3			**3**
5	**Elective Modules***	**0**	**5**	**5**	**0**	**10**
	Group I			5		5
MWEM.16	Water Resources Development					
MWEM.17	Water Supply and Sanitation					
MWEM.18	Public Education and Participation					
	Group II		**5**			**5**
MWEM.19	Optimal Use of Irrigation Water					
MWEM.20	Reservoirs Operations and Management					
MWEM.21	Water Rights and Conflict Resolution					
6	**General Qualification**			**5**		**5**
MWEM.22	Writing of proposals for water projects			5		**5**
MWEM.23	**Practical Training/Project study**			**10**		**10**
MWEM.24	**Master Thesis plus Defense**				**30**	**30**
	Total	**30**	**30**	**30**	**30**	**120**

*Elective Modules - select one course from each group

3.2.3.3.8 Curricula Structures - Master Course Water Engineering and Management – MWEM

Semester 1	Applied Mathematics	Geoinformatics/GIS	Advanced Geotechnics	Applied Hydrology and Hydrogeology	Hydraulic Structures	Water Resources Planning
Semester 2	Applied Statistics	Soil Erosion and Sediment Transport	Drinking Water System / Modeling	Water System Management	Public Health and Sanitation	**Elective Modules**
Semester 3	Water Quality Monitoring and Management	Groundwater Modeling	**Elective Modules**	Writing of proposals for water projects	**Practical Training/Project study**	
Semester 4	**Master Thesis**					
Credits	5	5	5	5	5	5

Modules in Natural Sciences 10% - 25%

Modules inTechnical Sciences 10 - 25%

Modules in Economic & Social Sciences 5% - 15%

Modules in Variable Sciences 55% - 70%

3.2.3.4 Goals of the Bachelor Course of Water Engineering and Environment

The academic plan in the Bachelor course of water engineering and environment program, aims at providing the students the following items:

1. High level information in science and computer techniques, and developing the skills in engineering sciences and its applications.
2. Developing the ability of the students to achieve various water engineering and environmental studies, check and use it according to the engineering codes.
3. Comparing between the engineering solutions, and choose the optimum ones.
4. Developing the work skills and regulate the relationship between the work team which the best and have many specialists.
5. Strengthening the research ability and developing and working with the modest software's, equipments… etc.
6. Developing the item of the scientific, social and cultural of the student's characters.
7. Continuous developing to get the high quality of the research, teaching...etc.

3.2.3.4.1 Modules of Bachelor Course Water Engineering and Environment BWEAE

9.

	Credits	%
Modules with Basics in Mathematics and Natural Sciences	26	14
Modules with Basics in Engineering	74	41
Modules with Basics in Hydro Sciences	16	9
Modules with specialized Basics	30	17
Elective Modules	9	5
Modules for general Qualification	10	6
Practical Training /Project	6	3
Bachelor examination	9	5
Total	**180**	**100**

Module/ Semester	**1**	**2**	**3**	**4**	**5**	**6**	**Total/ ECTS**
Basics in Mathematics and Natural Sciences	18	5	3				**26**
Basics in Engineering	8	18	21	13	9	5	**74**
Basics in Hydro Sciences		3	5	8			**16**
Specialized Basics				5	12	13	**30**
Elective Modules				3	3	3	**9**
General Qualification	4	4	2				**10**
Practical Training/ Project Study						6	**6**
Bachelor Thesis incl. Defense						9	**9**
Total	**30**	**30**	**30**	**30**	**30**	**30**	**180**

Nr of Module	Course Semester	1	2	3	4	5	6	Total/ ECTS
	Basics in Mathematics and Natural Sciences	**18**	**5**	3				**26**
BWEAE 01	Mathematics (1,2,3)	5	5	3				13
BWEAE 02	Physics for Engineering	5						3
BWEAE0 3	Chemistry for Engineering	5						3
BWEAE 04	Basic of Informatics	3						3
	Basics in Engineering	**8**	**18**	**21**	**13**	**9**	**5**	**74**
BWEAE 05	Mechanical Engineering	5						5
BWEAE 06	Building Materials		5					**3**
BWEAE0 7	Mechanics of materials		5					**6**
BWEAE 08	Geometrical Representation	3						**3**
BWEAE 09	Engineering Geology		5					**3**
BWEAE 10	Structures Analysis			5				**5**
BWEAE 11	Soil Mechanics			5				**5**
BWEAE 12	Reinforced Concrete (1+2)				3	3		**6**
BWEAE 13	Numerical Analysis and Modeling					3		**3**
BWEAE 14	Foundation Engineering				5			**3**
BWEAE 15	Metal and Mixed Structures				5			**5**
BWEAE 16	Building Construction		3					**3**
BWEAE 17	Roads and Transportation Engineering					3		**3**
BWEAE 18	Geodesy			5				**5**
BWEAE 19	Economic and Engineering Projects Management						5	**3**
BWEAE 20	Technical equipments			3				**3**
BWEAE 21	Technology of Construction			3				**3**
	Basics in Hydro Sciences		**3**	**5**	**8**			**16**
BWEAE 22	Hydrology		3					**3**
BWEAE 23	Fluids Mechanics			5				**4**
BWEAE 24	Basics of Environment and Sanitary Engineering				3			**4**
BWEAE 25	Hydraulics				5			**3**
	Specialized Basics				**5**	**12**	**13**	**30**
BWEAE 26	Drinking and Waste Water Networks				5			3
BWEAE 27	Drinking and Waste Water Treatment					5		3
BWEAE 28	Irrigation and Drainage					3		3
BWEAE 29	Water Structures					4		3
BWEAE 30	Dams						5	3
BWEAE 31	Pumping Station and Hydraulics Machines						3	3
BWEAE 32	Harbors Engineering						5	**5**

	Elective Modules				**3**	**3**	**3**	**9**
BWEAE 33	Solid Waste Management and Contaminates Treatment				+	+	+	**3**
BWEAE 34	Water Exploitation and Management				+	+	+	**3**
BWEAE 35	Water Chemistry and Microbiology				+	+	+	**3**
BWEAE 36	Execution Technology of Water Structures				+	+	+	**3**
BWEAE 37	Water Resources development and advanced Technologies				+	+	+	**3**
BWEAE 38	Municipal and Industrial Water Management				+	+	+	**3**
BWEAE 39	Engineering Hydrogeology				+	+	+	**3**
BWEAE 40	Drainage and Land Reclamation				+	+	+	**3**
BWEAE 41	Irrigation and Drainage Networks				+	+	+	**3**
BWEAE 42	Dams related Structures				+	+	+	**3**
BWEAE 43	Coastal Protection Engineering				+	+	+	**3**
BWEAE 44	Exploitation and Management of Sea Structures				+	+	+	**3**
BWEAE 45	Exploitation and Management of Water Structures				+	+	+	**3**
BWEAE 46	Water Tanks				+	+	+	**3**
	From these Courses students must select one course in each Semester 4, 5 and 6 (from 4 groups (sanitary Engineering, Harbor and Coastal Engineering, Water structures, Water resources management).							
	General Qualification	**4**	**4**	**2**				**10**
BWEAE 47	English	+						**2**
BWEAE 48	Arabic		+					**2**
BWEAE 49	Arabic Culture	+						**2**
BWEAE 50	History of Sciences and Technologies		+					**2**
BWEAE 51	Rights and Water Legislations			+				**2**
BWEAE 52	**Practical Training/ Project Study**					**6**		**6**
BWEAE 53	**Bachelor Thesis with Defense**						**9**	**9**
	Total	**30**	**30**	**31**	**29**	**30**	**30**	**180**

3.2.3.4.2 Study Plan of Bachelor Course Water Engineering and Environment BWEAE

Nr of Module	Courses	S. 1	S. 2	S. 3	S. 4	S. 5	S. 6	Total/ ECTS
	Modules in Basic Sciences							
BWEAE 01	Mathematics (1,2,3)	4/2/0/0	4/2/0/0	2/2/0/0				12
BWEAE 02	Physics for Engineering	4/0/2/0						5
BWEAE 03	Chemistry for Engineering	4/0/2/0						5
BWEAE 04	Basic of Informatics	2/2/0/0						3
	Basics in Engineering							
BWEAE 05	Mechanical Engineering	4/2/0/0						5
BWEAE 06	Building Materials		4/2/0/0					5
BWEAE 07	Mechanics of material		4/2/0/0					5
BWEAE 08	Geometrical Representation	1/3/0/1						3
BWEAE 09	Engineering Geology		4/2/0/0					5
BWEAE 10	Structures Analysis			4/2/0/0				5
BWEAE 11	Soil Mechanics			4/2/0/0				5
BWEAE 12	Reinforced Concrete (1+2)				2/2/0/0	2/2/0/0		6
BWEAE 13	Numerical Analysis and Modeling					2/2/0/0		3
BWEAE 14	Foundation Engineering				4/2/0/0			5
BWEAE 15	Metal and Mixed structures				4/2/0/0			5
BWEAE 16	Buildings Construction		1/3/0/1					3
BWEAE 17	Roads and Transportation Engineering					4/2/0/0		5
BWEAE 18	Geodesy			4/2/0/0				5
BWEAE 19	Economic and Engineering Projects Management						4/2/0/0	5
BWEAE 20	Buildings Services			2/2/0/0				3
BWEAE 21	Technology of			2/2/0/0				3

	Construction							
	Basics in Hydro Sciences							
BWEAE 22	Hydrology		2/2/0/0					3
BWEAE 23	Fluids Mechanics			3/2/2/0				5
BWEAE 24	Basics of Environment and Sanitary Engineering				2/2/0/0			
BWEAE 25	Hydraulics				3/2/2/0			5
	Specialized Basics							
BWEAE 26	Drinking and Waste Water Networks				4/2/0/0			5
BWEAE 27	Drinking and Waste Water Treatment					4/2/0/0		5
BWEAE 28	Irrigation and Drainage Engineering					2/2/0/0		3
BWEAE 29	Water Structures					2/2/1/1		4
BWEAE 30	Dams Engineering						4/2/0/0	5
BWEAE 31	Pumping Station and Hydraulics Machines						2/2/0/0	3
BWEAE 32	Harbors Engineering						4/2/0/0	5
	Elective Modules							
BWEAE 33	Solid Waste Management and Contaminates Treatment				2/2/0/0	2/2/0/0	2/2/0/0	**3**
BWEAE 34	Water Exploitation and Management							**3**
BWEAE 35	Water Chemistry and Microbiology							**3**
BWEAE 36	Execution Technology of Water Structures							**3**
BWEAE 37	Water Resources							**3**

	development and advanced Technologies							
BWEAE 38	Municipal and Industrial Water Management							**3**
BWEAE 39	Engineering Hydrogeology							**3**
BWEAE 40	Drainage and Land Reclamation							**3**
BWEAE 41	Irrigation and Drainage Networks							**3**
BWEAE 42	Dams related Structures							**3**
BWEAE 43	Coastal Protection Engineering							**3**
BWEAE 44	Exploitation and Management of Sea Structures							**3**
BWEAE 45	Exploitation and Management of Water Structures							**3**
BWEAE 46	Water Tanks							**3**
From these Courses students must select one course in each Semester 4, 5 and 6								
	General Qualification							
BWEAE 47	English	2/0/0/0						2
BWEAE 48	Arabic		2/0/0/0					2
BWEAE 49	Arabic Culture	2/0/0/0						2
BWEAE 50	History of Sciences and Technologies		2/0/0/0					2
BWEAE 51	Rights and Water Legislations			2/0/0/0				2
	Practical Training/ Project Study							
BWEAE 52	Practical Training/ Project Study					**6**		**6**
	Bachelor Thises with Defense							
BWEAE 53	Bachelor Thesis with Defense					**9**		**9**
	Total	**30**	**30**	**30**	**30**	**30**	**30**	**180**

Lecture/Tutorial/Laboratory/Excursion(Homeworks)

3.2.3.5 Tishreen University Lattakia

3.2.3.5.1 Modules of Master course Harbors Construction and Costal Engineering MHCCE

The academic plan in the Harbor Construction and Coastal Engineering program, aims at providing the students the following items:

1. High level information in science and computer techniques, and developing the skills in engineering sciences and its applications.
2. Developing the ability of the students to achieve various Harbor Construction and Coastal Engineering studies, check and use it according to the engineering codes.
3. Comparing between the water engineering solutions, and choose the optimum ones.
4. Developing the works skills and regulate the relationship between the work team which the best and have many specialists.
5. Strengthening the research ability and developing and working with the modest software's, equipments… etc.
6. Developing the item of the scientific, social and cultural of the students' characters.
7. Continuous developing to get the high quality of the research, teaching…...etc.

3.2.3.5.2 Modules of Master course Harbors Construction and Costal Engineering MHCCE

	Credits	%
Modules in Mathematics and Natural Sciences	15	13
Modules in Engineering	10	8%
Modules in Hydro Sciences	10	8%
Modules with Specialization	30	25%
Elective Modules	10	8%
Modules for general Qualification	5	4%
Practical Training /Project	10	8%
Master Thesis plus Defense	30	25%
Total	**120**	**100%**

Module Semester	**1**	**2**	**3**	**4**	**Total/ECTS**
Mathematics and Natural Sciences	10	5			**15**
Engineering		10			**10**
Hydro Sciences	10				**10**
Specialization	10	10	10		**30**
Elective Modules		5	5		**10**
General Qualification			5		**5**
Practical Training/ Project Study			10		**10**
Master Thesis plus Defense				30	**30**
Total	**30**	**30**	**30**	**30**	**120**

Nr of Module	**Course Semester**	**1**	**2**	**3**	**4**	**Total/ ECTS**
	Mathematics and Natural Sciences	**10**	**5**			**15**
MHCCE 1	Advanced Mathematics	5				**5**
MHCCE 2	Mathematical and physical Modeling	5				**5**
MHCCE 3	Methods of scientific research		5			**5**
	Engineering		10			**10**
MHCCE 4	Construction and protection of shores		5			**5**
MHCCE 5	Planning of Harbors		5			**5**
	Hydro Sciences	**10**				**10**
MHCCE 6	Hydro Physic of Seas and Currents	5				**5**
MHCCE 7	Hydro Dynamic of shores	5				**5**
	Specialization	**10**	**10**	**10**		**30**
MHCCE 8	Sea and Shore Structures	5				**5**
MHCCE 9	Navigation and Sea Measurements Devices		5			**5**
MHCCE 10	Sediments Transport and Movement		5			**5**
MHCCE 11	Harbors Construction			5		**5**
MHCCE 12	Technology of Harbors Structures			5		**5**
MHCCE 13	Sea Navigation	5				**5**
	Elective Modules		**5**	**5**		**10**
MHCCE 14	Sea Geodesy					**5**
MHCCE 15	Dynamics of Sea Waters					**5**
MHCCE 16	Maintenance and Rehabilitation of Harbor Structures					**5**
MHCCE 17	Marine Ecology and Sea Environmental Protection					**5**
MHCCE 18	Economics of Sea Transportation					**5**
MHCCE 19	Naval Safety and assurance					**5**
	From these modules students must select one module for each of the 2nd . and 3rd. Semester					

	General Qualification			**5**		**5**
MHCCE 20	Rights and Sea Legislations			**5**		**5**
MHCCE 21	**Practical Training/Project study**			**10**		**10**
MHCCE 22	**Master Thesis plus Defense**				**30**	**30**
	Total	**30**	**30**	**30**	**30**	**120**

3.2.3.5.3 Study Plan of Master Course Harbors Construction and Costal Engineering MHCCE

Nr of Module	Courses	S. 1	S. 2	S. 3	S. 4	Total/ ECTS
	Modules in Mathematics and Natural Sciences					
MHCCE 1	Advanced Mathematics	3/2/0/2				**5**
MHCCE 2	Mathematical and physical Modeling	3/2/0/2				**5**
MHCCE 3	Methods of scientific research		3/2/0/2			**5**
	Engineering					
MHCCE 4	Construction and protection of shores		3/2/0/2			**5**
MHCCE 5	Planning of Harbors		3/2/0/2			**5**
	Hydro Sciences					
MHCCE 6	Hydro Physic of Seas and Currents	3/2/0/2				**5**
MHCCE 7	Hydro Dynamic of shores	3/2/2/0				**5**
	Specialization					
MHCCE 8	Sea and Shore Structures	3/2/2/0				**5**
MHCCE 9	Navigation and Sea Measurements Devices		3/2/2/0			**5**
MHCCE 10	Sediments Transport and Movement		3/2/2/0			**5**
MHCCE 11	Harbors Construction			3/2/2/0		**5**
MHCCE 12	Technology of Harbors Structures			3/2/2/0		**5**
MHCCE 13	Sea Navigation	3/2/2/0				**5**
	Elective Modules					
MHCCE 14	Sea Geodesy		3/2/2/0	3/2/2/0		**5**
MHCCE 15	Dynamics of Sea Waters		0	0		**5**
MHCCE 16	Maintenance and Rehabilitation of Harbor Structures		0	0		**5**
MHCCE 17	Marine Ecology and Sea Environmental Protection		0	0		**5**
MHCCE 18	Economics of Sea Transportation		0	0		**5**
MHCCE 19	Naval Safety and assurance		0	0		**5**

From these Courses students must select one course in each Semester 2 and 3						
	General Qualification					
MHCCE 20	Rights and Sea Legislations			3/2/2/0		**5**
	Practical Training/ Project Study					
MHCCE 21	Practical Training/Project Study			**10**		**10**
	Master Thesis with Defense					
MHCCE 22	**Master Thesis with Defense**				**30**	**30**
	Total	**30**	**30**	**30**	**30**	**120**

3.2.3.5.4 **Goals of the Master course of sanitary engineering MSE**

The academic plan in the Master course of sanitary engineering program, aims at providing the students the following items:

1. High level information in science and computer techniques, and developing the skills in engineering sciences and its applications.
2. Developing the ability of the students to achieve various sanitary engineering studies check and use it according to the engineering codes.
3. Comparing between the sanitary engineering solutions, and choose the optimum ones.
4. Developing the works skills and regulate the relationship between the work team which the best and have many specialists.
5. Strengthening the research ability, developing and working with the modest software's, equipments… etc.
6. Developing the item of the scientific, social and cultural of the students characters.
7. Continuous developing to get the high quality of the research, teaching…...etc.

3.2.3.5.5 Modules of Master course of sanitary engineering MSE

	Credits	%
Modules in Mathematics and Natural Sciences	15	13%
Modules in Engineering	10	8%
Modules in Hydro Sciences	10	8%
Modules with Specialization	30	25%
Elective Modules	10	8%
Modules for general Qualification	5	4%
Practical Training /Project	10	8%
Master Thesis plus Defense	30	25%
Total	**120**	**100%**

Module Semester	**1**	**2**	**3**	**4**
Mathematics and Natural Sciences	10	5		
Engineering	5	5		
Hydro Sciences	10	0		
Specialization	5	15	10	
Elective Modules		5	5	
General Qualification			5	
Practical Training/ Project Study			10	
Master Thesis plus Defense				30
Total	**30**	**30**	**30**	**30**

Nr of Module	Course Semester	1	2	3	4	Total/ECTS
	Mathematics and Natural Sciences	**10**	**5**			**15**
MSE 1	Advanced Mathematics	5				**5**
MSE 2	Mathematical and physical Modeling	5				**5**
MSE 3	Methods of scientific research		5			**5**
	Engineering	**5**	**5**			**10**
MSE 4	Water Supply and Waste Water treatment		5			5
MSE 5	Geotechnical Engineering of Sanitary Structures	5				**5**
	Hydro Sciences	**10**				**10**
MSE 6	Advanced Hydraulics	5				5
MSE 7	Advanced Water Chemistry	5				5
	Specialization	**10**	**15**	**5**		**30**
MSE 8	Solid Waste Management and Contamination Treatment		5			5
MSE 9	Environment Impacts Assessment	5				5
MSE 10	Water Supply and Waste Water Networks Advanced	5				5
MSE 11	Pumping stations Advanced		5			5
MSE 12	Sanitary Engineering Structures		5			
MSE 13	Technology of Environmental Structures			5		5
	Elective Modules		**5**	**5**		**10**
MSE 14	Advanced Geodesy		+	+		5
MSE 15	Ecology and Environment Protection		+	+		5
MSE 16	Maintenance and Rehabilitation of Environmental Structures		+	+		
MSE 17	Municipal and Industrial Water Management		+	+		5
MSE 18	Integrated Water Resources Management		+	+		5
MSE 19	Advanced Water Tanks		+	+		
	From these Courses students must select one module for each of the 2nd and 3rd Semester					
	General Qualification			**5**		**5**
MSE 20	Water Rights and Conflict Resolution			5		5
MSE 21	**Practical Training/Project study**			**10**		**10**
MSE 22	**Master Thesis plus Defense**				**30**	**30**
	Total	**30**	**30**	**30**	**30**	**120**

3.2.3.5.6 Study Plan of Master course of sanitary engineering MSE -

Nr of Module and symbol	Courses	S. 1	S. 2	S. 3	S. 4	Total/ECTS
	Modules in Mathematics and Natural Sciences					
MSE 1	Advanced Mathematics	3/2/0/2				5
MSE 2	Mathematical and physical Modeling	3/2/0/2				5
MSE 3	Methods of scientific research		3/2/0/2			5
	Engineering					
MSE 4	Water Supply and Waste Water treatment		3/2/0/2	3/2/0/2		5
MSE 5	Geotechnical Engineering of Sanitary Structures	3/2/2/0				
	Hydro Sciences					
MSE 6	Advanced Hydraulics	3/2/0/2				5
MSE 7	Advanced Water Chemistry	3/2/2/0				5
	Specialization					
MSE8	Solid Waste Management and Contamination Treatment		3/2/2/0			5
MSE 9	Environment Impacts Assessment		3/2/2/0			5
MSE 10	Water Supply and Waste Water Networks Advanced	3/2/2/0				5
MSE 11	Pumping stations Advanced		3/2/2/0			5
MSE 12	Sanitary Engineering Structures		3/2/2/0			5
MSE 13	Technology of Environmental Structures			3/2/2/0		5

	Elective Modules					
MSE 14	Advanced Geodesy		3/2/2/0	3/2/2/0		5
MSE 15	Ecology and Environment Protection		+	+		5
MSE 16	Maintenance and Rehabilitation of Environmental Structures		+	+		5
MSE 17	Municipal and Industrial Water Management		+	+		5
MSE 18	Integrated Water Resources Management		+	+		5
MSE 19	Advanced Water Tanks		+	+		5
	From these Courses students must select one course in each Semester 3 and 4					
	General Qualification					
MSE 20	Water Rights and Conflict Resolution			3/2/2/0		**5**
	Practical Training/ Project Study					
MSE 21	Practical Training/ Project Study			**10**		**10**
	Master Thesis with Defense					
MSE 22	**Master Thesis with Defense**				**30**	**30**
	Total	**30**	**30**	**30**	**30**	**120**

Lecture/Tutorial/Laboratory/Excursion (homework's)

3.2.3.5.7 **Goals of Master course of Water Resources Management MWRM**

The academic plan in the Master course of water resources management program, aims at providing the students the following items:

12. High level information in science and computer techniques, and developing the skills in engineering sciences and its applications.
1. Developing the ability of the students to achieve various water problems and water engineering studies, check and use it according to the engineering codes.
2. Comparing between the water engineering solutions, and choose the optimum one.
3. Developing the works skills and regulate the relationship between the work team which the best and have many specialists.
4. Strengthening the research ability and developing and working with the modest software's, equipment… etc.
5. Developing the item of the scientific, social and cultural of the student's characters.
6. Continuous developing to get the high quality of the research, teaching…...etc.

3.2.3.5.8 Modules of Master Water Resources Management MWRM

	Credits	**%**
Modules in Mathematics and Natural Sciences	15	13%
Modules in Rural Water management	10	8%
Modules in Hydro Sciences	10	8%
Modules with Specialization	30	25%
Elective Modules	10	8%
Modules for general Qualification	5	4%
Practical Training /Project	10	8%
Master Thesis plus Defense	30	25%
Total	**120**	**100%**

Module Semester	**1**	**2**	**3**	**4**	**Total/ECTS**
Mathematics and Natural Sciences	10	5			**15**
Rural Water management		5	5		**10**
Hydro Sciences	10				**10**
Specialization	10	15	5		**30**
Elective Modules		5	5		**10**
General Qualification			5		**5**
Practical Training/ Project Study			10		**10**
Master Thesis plus Defense				30	**30**
Total	**30**	**30**	**30**	**30**	**120**

	Course Semester	**1**	**2**	**3**	**4**	**Total/ECTS**
	Mathematics and Natural Sciences	**10**	**5**			**15**
MWRM 1	Advanced Mathematics	5				**5**
MWRM 2	Mathematical and physical Modeling	5				**5**
MWRM 3	Methods of scientific research		5			**5**
	Rural Water management		5	5		**10**
MWRM 4	Irrigation and Land Use		5			**5**
MWRM 5	Drainage Engineering and Land Reclamation			5		**5**
	Hydro Sciences	**10**				**10**
MWRM 6	Advanced Hydraulics	5				**5**
MWRM 7	Groundwater Hydraulics	5				**5**
	Specialization	**10**	**15**	**5**		**30**
MWRM 8	Engineering Hydrology	5				**5**
MWRM 9	Engineering Hydrogeology		5			**5**
MWRM 10	Agricultural Soil and Water Chemistry	5				**5**
MWRM 11	Protection and Conserving of Groundwater			5		**5**
MWRM 12	Migration of contaminants		5			**5**
MWRM 13	Integrated Water Resources Management		5			**5**
	Elective Modules		**5**	**5**		**10**
MWRM 14	Ecology and Environment Protection					**5**
MWRM 15	Maintenance and Rehabilitation of Well structures					**5**
MWRM 16	pumping test					**5**
MWRM 17	Municipal and Industrial Water Management					**5**
MWRM 18	Drinking water system Modeling					**5**
	From these Courses students must select one module for each of the 2nd and 3rd Semester					
	General Qualification			**5**		**5**
MWRM 19	Water Rights and Conflict Resolution			**5**		**5**
MWRM 20	**Practical Training/Project study**			**10**		**10**
MWRM 21	**Master Thesis plus Defense**				**30**	**30**
	Total	**30**	**30**	**30**	**30**	**120**

3.2.3.5.9 Study Plan of Master Course Water Resources Management MWRM

Nr of Module and symbol	Courses	S. 1	S. 2	S. 3	S. 4	Total/ECTS
	Modules in Mathematics and Natural Sciences					
MWRM 1	Advanced Mathematics	3/2/0/2				5
MWRM 2	Mathematical and physical Modeling	3/2/0/2				5
MWRM 3	Methods of scientific research		3/2/0/2			5
	Rural Water management					
MWRM 4	Irrigation and Land Use		3/2/0/2			5
MWRM 5	Drainage Engineering and Land Reclamation			3/2/0/2		
	Hydro Sciences					
MWRM 6	Advanced Hydraulics	3/2/0/2				5
MWRM 7	Groundwater Hydraulics	3/2/2/0				5
	Specialization					
MWRM 8	Engineering Hydrology	3/2/2/0				5
MWRM 9	Engineering Hydrogeology		3/2/2/0			5
MWRM 10	Agricultural Soil and Water Chemistry	3/2/2/0				5
MWRM 11	Protection and Conservation of Groundwater			3/2/2/0		5
MWRM 12	Migration of contaminants		3/2/2/0			5
MWRM 13	Integrated Water Resources Management		3/2/2/0			5
	Elective Modules					
MWRM 14	Ecology and Environment Protection		3/2/2/0	3/2/2/0		5

MWRM 15	Maintenance and Rehabilitation of Well structures		0	0		5
MWRM 16	Pumping test		0	0		5
MWRM 17	Municipal and Industrial Water Management		0	0		5
MWRM 18	Drinking water system Modeling		0	0		5
	From these Courses students must select one course in each Semester 2 and 3					
	General Qualification					
MWRM 19	Water Rights and Conflict Resolution			3/2/2/0		5
	Practical Training/ Project Study					
MWRM 20	Practical Training/ Project Study			10		10
	Master Thesis with Defense					
MWRM 21	Master Thesis with Defense				30	30
	Total	30	30	30	30	120

Lecture/Tutorial/Laboratory/Excursion (homework's)

3.2.3.5.10 Goals of the program Master Course of Water Structures MWS

The academic plan in the Master course of water structures program, aims at providing the students the following items:

1. High level information in science and computer techniques, and developing the skills in engineering sciences and its applications.
2. Developing the ability of the students to achieve various water structures engineering studies, check and use it according to the engineering codes.
3. Comparing between the engineering solutions, and choose the optimum one.
4. Developing the works skills and regulate the relationship between the work team which the best and have many specialists.
5. Strengthening the research ability and developing and working with the modest software's, equipments… etc.
6. Developing the item of the scientific, social and cultural of the student's characters.
7. Continuous developing to get the high quality of the research, teaching…...etc.

3.2.3.5.11 **Modules of Master Water Structures MWS**

	Credits	%
Modules in Mathematics and Natural Sciences	15	13
Modules in Engineering	10	8%
Modules in Hydro Sciences	10	8%
Modules with Specialization	30	25%
Elective Modules	10	8%
Modules for general Qualification	5	4%
Practical Training /Project	10	8%
Master Thesis plus Defense	30	25%
Total	**120**	**100%**

Module Semester	1	2	3	4	Total/ECTS
Mathematics and Natural Sciences	10	5			**15**
Engineering	10	5	5		**20**
Hydro Sciences	10				**10**
Specialization		15	5		**20**
Elective Modules		5	5		**10**
General Qualification			5		**5**
Practical Training/ Project Study			10		**10**
Master Thesis plus Defense				30	**30**
Total	**30**	**30**	**30**	**30**	**120**

Module Nr.	Course Semester	1	2	3	4	Total/ECTS
	Mathematics and Natural Sciences	**10**	**5**			**15**
MWS 1	Advanced Mathematics	5				**5**
MWS 2	Mathematical and physical Modeling	5				**5**
MWS 3	Methods of scientific research		5			**5**
	Engineering		5	5		**10**
MWS 4	Concrete of Water Structures			5		**5**
MWS 5	Geotechnical Engineering of Water Structures		5			**5**
	Hydro Sciences	**10**				**10**
MWS 6	Advanced Hydraulics	5				**5**
MWS 7	Hydro Dynamic of Water Structures	5				**5**
	Specialization	**10**	**15**	**5**		**30**
MWS 8	Water Structures and River Engineering		5			**5**
MWS 9	Advanced Engineering Hydrology	5				**5**
MWS 10	Dams and related Water Structures		5			**5**
MWS 11	Pumping and Hydro power Stations		5			**5**
MWS 12	Technology of Water Structures			5		**5**
MWS 13	Irrigation and Drainage Advanced	5				**5**
	Elective Modules		**5**	**5**		**10**
MWS 14	Advanced Geodesy					**5**
MWS 15	Drainage Engineering and Land Reclamation					**5**
MWS 16	Maintenance and Rehabilitation of Water Structures					**5**
MWS 17	Ecology and Environment Protection					**5**
MWS 18	Agricultural Soil and Water Chemistry					**5**
MWS 19	Integrated Water Resources Management					**5**
From these modules students must select one module for each of the 2nd and 3rd Semester						
	General Qualification			**5**		**5**
MWS 20	Water Rights and Conflict Resolution			**5**		**5**
MWS 21	**Practical Training/Project study**			**10**		**10**
MWS 22	**Master Thesis plus Defense**				30	**30**
	Total	**30**	**30**	**30**	**30**	**120**

3.2.3.5.12 **Study Plan of Master Course Water Structures MWS**

Nr of Module and symbol	Courses	S. 1	S. 2	S. 3	S. 4	Total/ECTS
	Modules in Mathematics and Natural Sciences					
MWS 1	Advanced Mathematics	3/2/0/2				5
MWS 2	Mathematical and physical Modeling	3/2/0/2				5
MWS 3	Methods of scientific research		3/2/0/2			5
	Engineering					
MWS 4	Concrete of Water Structures			3/2/0/2		5
MWS 5	Geotechnical Engineering of Water Structures		3/2/0/2			5
	Hydro Sciences					
MWS 6	Advanced Hydraulics	3/2/0/2				5
MWS 7	Hydro Dynamic of Water Structures	3/2/2/0				5
	Specialization					
MWS 8	Water Structures and River Engineering		3/2/2/0			5
MWS 9	Advanced Engineering Hydrology	3/2/2/0				5
MWS 10	Dams and related Structures		3/2/2/0			5
MWS 11	Pumping and Hydro power Stations		3/2/2/0			5
MWS 12	Technology of Water Structures			3/2/2/0		5
MWS 13	Irrigation and Drainage Advanced	3/2/2/0				5
	Elective Modules					
MWS 14	Advanced Geodesy		3/2/2/0	3/2/2/0		5
MWS 15	Drainage Engineering and Land Reclamation		0	0		5
MWS 16	Maintenance and Rehabilitation of Water Structures		0	0		5
MWS 17	Ecology and Environment		0	0		5

	Protection					
MWS 18	Agricultural Soil and Water Chemistry		0	0		**5**
MWS 19	Integrated Water Resources Management		0	0		**5**
	From these modules students must select one module in each Semester 2 and 3					
	General Qualification					
MWS 20	Water Rights and Conflict Resolution			3/2/2/0		**5**
	Practical Training/ Project Study					
MWS 21	Practical Training/ Project Study			**10**		**10**
	Master Thesis with Defense					
MWS 22	**Master Thesis with Defense**				**30**	**30**
	Total	**30**	**30**	**30**	**30**	**120**

Lecture/Tutorial/Laboratory/Excursion (homework's)

3.3 Modules for the New Education

The modules of the different study courses from 1.4 describe the content (adapted to the subjects and applications in Syria) and load work (credit points) of the lectures, exercises and practical training. This one has an interface to the curricular which is outside of this project. These modules are equivalent to the Lisbon and Bologna. Assembling of the new modules, overall faculties, according to the requirements out of the development objectives for the water sector in Syria

See appendix: Modules compendium

3.3.1 Damascus University, Faculty of Civil Engineering

- Module Compendium Hydrology - Science and Engineering (HSE)
  Bachelor programme
  Master Programme
- Module Compendium Soil and Groundwater - Science and Engineering (SGW)
  Bachelor Programme
  Master Programme
- Module Compendium Water Engineering and Management (WEM)
  Bachelor Programme
  Master Programme

3.3.2 Tishreen University Lattakia, Faculty of Civil Engineering

- Module Compendium Bachelor of Water Engineering and Environment (BWEAE)
  Quality Management Bachelor of Water Engineering and Environment (BWEAE)
- Module Compendium Master of Harbor Construction and Coastal Engi-neering (MHCCE)
  Quality Management Master of Harbor Construction and Coastal Engi-neering MHCCE
- Module Compendium Master of Sanitary Engineering (MSE)
  Quality Management Master of Sanitary Engineering (MSE)
- Module Compendium Master of Water Resources Management (MWRM)
  Quality Management Master of Water Resources Management (MWRM)
- Module Compendium Master of Water Structures (MWS)
  Quality Management Master of Water Structures (MWS)
- Training Courses of suggested programmes

3.3.3 University of Aleppo

Faculty of Agricultural Engineering

- Module Compendium Agricultural Water Management (AWM)

  Bachelor Programme

  Master Programme

Faculty of Civil Engineering

- Module Compendium Water Engineering (WE)
  Bachelor Programme

  Master Programme

3.3.4 Al Baath University Homs

Faculty of Agriculture

- Module Compendium Water & Soil Engineering and Environment (SGW)

  Bachelor Programme

  Master Programme

  Faculty of Civil Engineering

- Module Compendium Water Engineering (WE)

  Bachelor Programme

  Master Programme

3.4 Teaching materials

A modern education structure is combined with a modern teaching material. The modern teaching methods are formed by working groups, team working, project study and a big part of self-study. In this context teaching materials will be developed both in printed and in digital form. Implementation of Internet based learning methods. This material would be developed for selected universities and selected study courses

3.5 Quality Management and Accreditation

To enhance the quality and relevance of higher education in Syria a quality management for the monitoring of the new study structure would be established. A very important point for acceptance of the new study courses by the EU countries is the accreditation and the permanent quality management of the education system. Special guidelines are written and supervise by the EU universities.

The **protection of the quality** of education and research needs to be solved by different ways. This starts with the selection of the Chair and teaching staff in the universities. This selection should be supervised by an independent commission. It is a good idea to invite international experts in these committees. Moreover, a competitive international in magazines should be followed so that international applicants have the opportunity to apply. The selection must be based on objective criteria (invitation letter, international opinion) for the claimant. In addition, a high degree of an objective assessment must be guaranteed. The quality of program are protected by independent bodies (eg. as from European universities). The quality of the research should be oriented itself to international partners. One of the criteria for the quality of the publication of articles in prestigious international journals.

The accreditation of study programs are limited to a maximum period of five years. After an additional evaluation of the quality certification can be assigned for the next period. The same should be implemented for the evaluation of teachers and chair. Only after a successful audit by an international commission, the chair-holders may obtain an extension of his contract.

One of the most important requirements of a high level of teaching and research is a full-time job for the professor at the universities, with the exception of the assessment of teachers. The current situation at many universities, where Professor and teachers only a part-time job you have is to a higher level in teaching and research in relation addition to the proposed project already have several activities between Syria and Germany, in particular the Technical University of Dresden (TUD) occurred. Many Syrian scientists at TUD completed a master's or PhD program. As part of the alumni program visit Syrian teaching chair owner TUD. The TUD has installed an alumni regional ambassador to Damascus University. Last year, a scientific congress was organized by Syrian and German graduates and professor at the University of Damascus / Syria (DUS).

The final versions of the modules will be submitted to every university board and the MHE scientific board for accreditation procedure. The following flow chart show steps of this to be achieved:

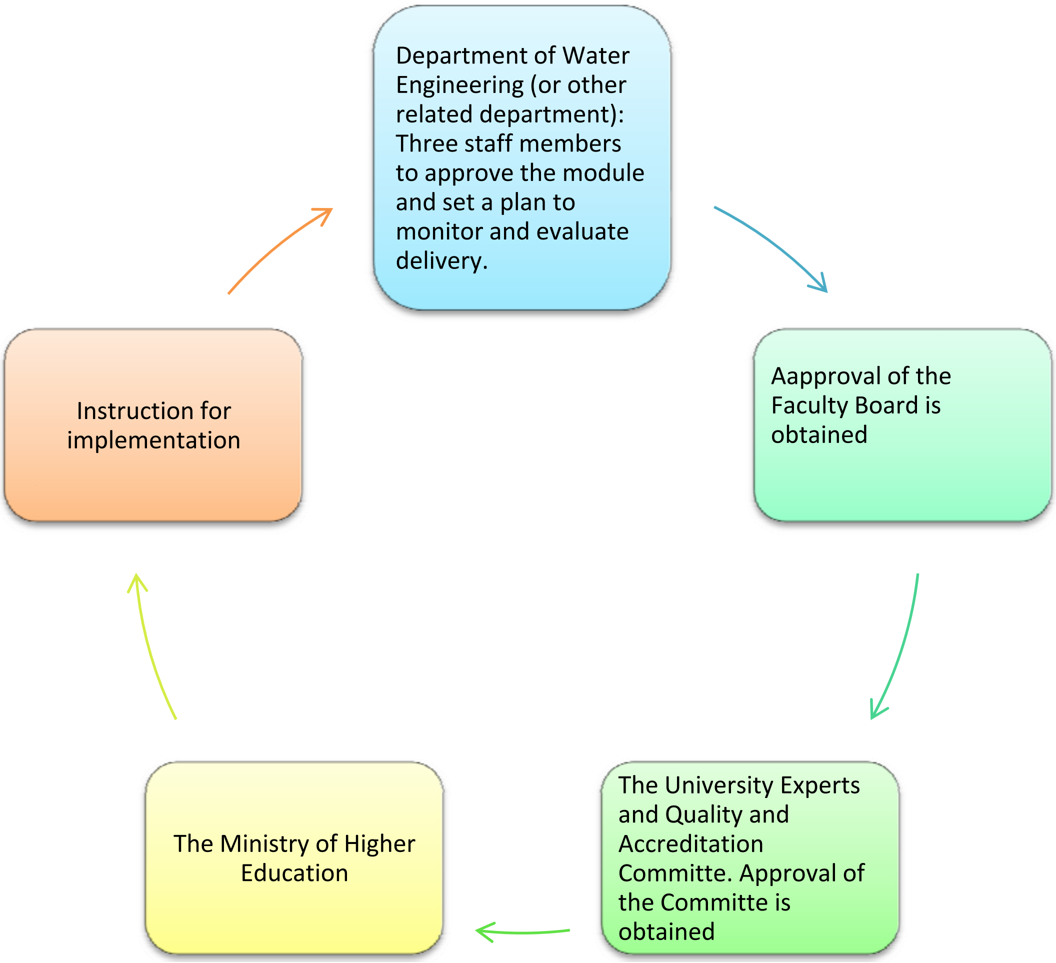


Fig. 1: Module Example for quality assurance and accreditation

Within the EU project of modernization of higher education in Syria we started to build NARS (national academic reference standards) for engineering. Later within national project carried out by MoHE we developed NARS for all sectors including civil eng. It will be appreciated contribution if we can develop NARS for water engineering.

To enhance the quality and relevance of higher education in Syria a quality management for the monitoring of the new study structure would be established. A very important point for acceptance of the new study courses by the EU countries is the accreditation and the permanent quality management of the education system. Special guidelines are written and supervise by the EU universities

-------IDEAS------------------------CONCEPTS----------------PROPOSALS------------------

Licensing, quality assurance and accreditation of institutions and/or programmes

Source: "Syria - Review of Higher Education"
Rami Ayoubi, Anas Al-Ahmar, Susan Ahmar-Dakna
Ministry of Higher Education and Damascus University
http://eacea.ec.europa.eu/tempus/participating_countries/eval/syria_en.pdf

The current body responsible for the evaluation of higher education institutions and programmes should be the Ministry of Higher Education. However, the procedures for quality assurance and accreditation operate in an ad hoc way. No evaluation tests have taken place so far, and evaluation is conducted informally with no formal procedures for the evaluation process. There are some attempts to launch the first pilot evaluation test for university graduates of both public and private higher education institutions. The licensing mechanisms to establish a higher education institution are different from public to private. The body responsible for licensing the public institution is the Prime Minister's Office and this is done according to the Five Year Plan.

For the private institutions, the body responsible for giving a licence to establish a private university is the Ministry of Higher Education after receiving the approval of the Council of Higher Education and in accordance with the relevant *Presidential Law*. Very few attempts have been made to evaluate the institutional level. Most self-assessments were made at academic department level. External reviews approaching a quality assurance system were based on very individual initiatives by universities, as in the case of Damascus University, which made a whole evaluation and review of its current operating system with the support of quality experts from the EU. Participation of students in approaching the system is rarely mentioned in most universities. However, Damascus University was the leading body in this activity. Most of these evaluations were never published and disseminated to the public.

The quality new curricula should be done in different ways:

The quality assurance but it starts with the appointment and appointment of teachers for the HIWM. This should be an independent procedure, the tendering and appointment committees are assisted by international experts. To be made during the occupation must end for objects based on criteria of the alerts, the application documents and the interviews. It must also focus on rigorous and objective evaluation. Therefore, the involvement of international experts and members of the appeal commission is of fundamental importance.

The quality of the master programs via the accreditation by independent agencies GE. Since there is currently in Syria do not have enough internationally recognized scientist in the Department of Water Management, will be involved primarily in foreign-expert in the accreditation agencies.
The quality of research based on international research programs in the settlement of international cooperation partners. One measure is the international publication activity in the form of abstracts and peer-reviewed publications in re-renowned journals.

The award of the Certificates, the quality should be limited in time and periodic evaluations (2 to 5 year cycle). On the same basis, the professors are also concerned with a time limit and only in a positive evaluation made according to a further extension periods.

A basic prerequisite for high quality teaching and research requires a full-time employment of the teaching staff, excluding guest lecturers. Currently based in Syria's usual practice of part-time employment of professors is a high quality of research and training diametrically opposed.

"The European Quality Assurance Reference Framework (EQAVET) is a reference instrument designed to help EU countries promote and monitor the continuous improvement of their vocational education and training systems on the basis of commonly agreed references. The framework should not only contribute to quality improvement in VET but also, by building mutual trust between the VET systems, make it easier for a country to accept and recognise the skills and competencies acquired by learners in different countries and learning environments.

EU countries use the framework to improve their quality assurance systems in a way that involves all relevant stakeholders. This includes:

- setting up national reference points for quality assurance;
- actively participating in the relevant European-level network;
- developing a national approach aimed at improving quality assurance systems and making the best possible use of the framework.

EQAVET is a **voluntary system** to be used by public authorities and other bodies involved in quality assurance" (http://ec.europa.eu/education/policy/vocational-policy/eqavet_en.htm).

When Prof. Al-Shibai was the head of quality assurance center at the university and within the EU project of modernization of higher education in Syria (ended 2011) we built NARS (national academic reference standards) for civil engineering by gathering all the information from university staff and stakeholders. The next step should be to build specific ARS (academic reference standards) for water engineering upon the general one of civil engineering NARS. If we could accomplish and agreed on that then we can build the suitable curriculum accordingly. I can bring the NARS we prepared for engineering (done in cooperation with British council) and according to ABET criteria and UK-SPEC. This could be a ground for further development.^

Source: TEMPUS Project "Accreditation – Pathway to Quality_Assurance"
1st_International Consortium Workshop at Damascus_University
"Program Accreditation and Self Evaluation"

From Input based to Outcome based Academic Programs:

Objectives
Establish internationally accepted accreditation criteria for selected bachelor programs from pilot faculties of major public and private universities in Syria with a view of accepted reference points against which the programs will be assessed

Approach
Elements of educational quality will be discussed and assessed between public and private Syrian universities together with international partners with regard to the following challenges:

(1) How to bring focus on outcomes as evidence of program quality?

(2) How to measure quality?

(3) Study programs that meet school leaver's and employers' requirements

Expected Results

A valuable comparison of each participating university and their achievements in program quality in view of international accreditation criteria

3.5.1 Example of a process for Quality Insurance and Accreditation in the Damascus University

Department of Water Engineering (related other department):

Three staff members to assure module delivery and approve it. This should include a design of a monitoring format to check: the module delivery according to the described subjects, modules materials, lecturers, assignments, students satisfactory, relation to the course objectives and expected outcomes. The three staff committee may recommend further improvement to the module or added subjects to match the industry needs in a circular management approach every few years.

The department should prepare the following points:

- The main dimensions of the course
- Related profile
- Programme structure and mobility
- Admission needs and enhancements
- Funding resources
- Staff
- Module into the current education system
- Internationalisation
- Research themes
- Specific centre of education (one necessary, en. Establishment of a research centre for a specific subject such as Groundwater Modelling or IWRM in arid zones and dry lands, etc.)
- Career centre
- The expected outcomes of the module and research benefits

The Faculty Board:

The Faculty Board is responsible for reviewing the module taking into account the approval of the water department and should ask other water related departments to review the proposed module and exchange their remarks with the water department. At the end a finalised version should jointly be developed and submitted to the University Board. The Faculty Board should seek opinion of other universities academic staff and outer experts from the industrial sectors as well to assure standard module quality and that fits the market needs.

The University Experts and Quality and Accreditation Committee:

The committee should make a review according to the Quality and Accreditation document of the University and its criteria assuring all its elements to match the requested education system and its dimensions. The committee approval should be submitted to the Ministry of Higher Education.

Three main points to be assured:

- The ability of the system to be set as a whole into the education and research process
- Students feedback
- Management cycle is assured: Plan-Do-Check-Act

Two levels of monitoring the implementation:

1. Self-reporting; internal evaluation
2. Peers: External evaluation by experts/researchers. Involvement of international experts in the accreditation process

Damascus University is welling to develop the existing Quality Assurance Centre for the new TEMPUS-courses as they structured according to Bologna System and encourage participation of the whole university members

The Ministry of Higher Education:

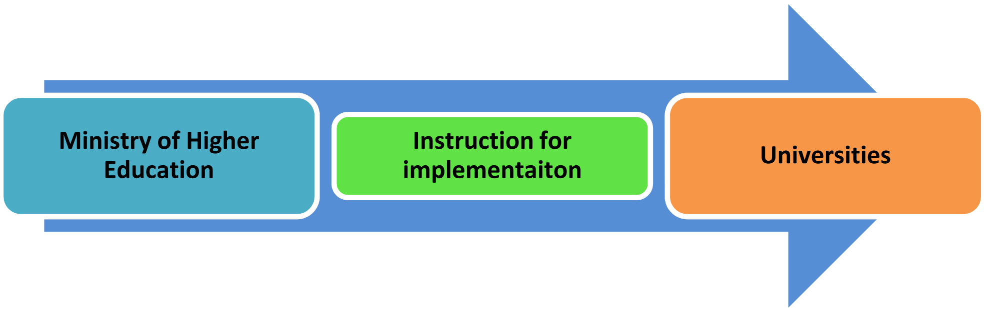


Fig. 2: Approves the course and instruct the University(s) for implementation

All details about the accreditation process are well given in the Tempus Project: Accreditation - Pathway to Quality Assurance that was run by Damascus University 2008-2010: http://www.tempus-accreditation.edu.sy/ Damascus< Aleppo, AlBath and Tishreen Universities have accordingly established educational standards and programs to meet up with internationally accepted accreditation criteria with the help of European Universities and accreditation agencies to gather evidence for accountability, assure that graduates are adequately prepared to enter and continue a career in their profession and to stimulate adequate processes for continuous quality improvement.

The project has established an accreditation procedure according to internationally and nationally accepted criteria. The project components consist of a self-evaluation documentation for selected Bachelor and Master study programs according to breakdowns of international accreditation application documents, benchmarking and peer evaluation, preparation of improved study programs and submission to accreditation in a step-by step assessment and quality development process. Universities accreditation procedure should be followed for accreditation purpose of the current study programmes.

The accreditation instruments were clearly set by the involved university and details were documents for as for the following aspects:

1. Self-Evaluation report.
2. Expert consultation during campus visit.

3. Expert reports (peers).
4. Statements to the expert reports.
5. Application report.

For more detail see too: Chapter: Quality protection

3.6 Professional Training Courses

This deliverable content the developing of training courses by the universities for the society. Therefore a strong cooperation between the universities and the enterprises is necessary. Besides it is necessary to develop extra occupational specialist trainings programs for graduated students (achievement of additional academic degrees). This one goes in the direction to Life Long Learning. In this context it is possible to study different sciences.

The HIWM can here also share our experience with professional training and the outcome of our previous WS with INWENT where we define the training needs of related ministries (managerial training) and the resulted final training book we jointly published (Higher level management for the Syrian water sector) I also can bring a copy of this training manual. The managerial skilled presented at this training book are very important for water professionals. Also HIWM organized a meeting on April 2014 with MoWR& MoE, MoAR where we discussed the training (e-training) needs of these ministries. We defined the main training courses required.

3.6.1 Trainings Courses

The following are some professional training course that the Universities are proposing to give for the industrial sectors:

All Courses Include:

- Knowledgeable instructors skilled at communicating ideas and concepts
- Opportunity to work at your own pace and have your personal questions answered
- Time reserved for specific project questions and/or discussions with other participants
- A complete set of course notes and sample exercises
- A downloadable copy of the exercise files, trial version of the software and any supplementary material (if applicable).

3.6.1.1 Surface and Groundwater Hydrology

This short course concentrates on the quantification of surface and groundwater hydrological processes. An understanding of rainfall, evapotranspiration, runoff, groundwater recharge, groundwater storage, and groundwater movement is essential for those involved in the science, engineering or management of the water environment. This course provides a conceptual and quantitative understanding of hydrology and the basic principles of hydraulics as a basis for later applied studies of water quality, water engineering, and water management.

Duration: 10 days

Intended for: Civil engineers, Hydrologists and Geologists in the Ministry of Water Resources.

3.6.1.2 Groundwater Modelling

This is a course that teaches the following:

General principles of GW Modelling. A course on the use of the GMS software including an introduction to PEST plus an introduction to MODFLOW-USG.

Details on GMS training:

A Hands-On Short Course Featuring Geostatistics, Site Characterization, MODFLOW/MODPATH/MT3DMS/RT3D Simulations, Analytic Element Modelling and Model Calibration. This groundwater modelling training course is designed as a hands-on, application oriented training course. The course will provide the attendees with the knowledge and tools necessary to solve groundwater modelling problems quickly and efficiently. The course begins with a review of groundwater modelling concepts and then attendees immediately begin building groundwater models. A series of lectures and instructor led exercises will be presented on using GMS with MODFLOW, PEST, MODPATH, MT3DMS, borehole data, and GIS data. Attendees will learn how to generate numerical models from high-level conceptual models constructed with GIS tools.

Duration: 15 days

Intended for: Hydro -geologists, groundwater modellers, engineers or geologists interested in using MODFLOW or other models for development of groundwater models for flow and transport application. Attendees should have a basic understanding of hydrogeology.

3.6.1.3 Dams and Reservoirs (Regulating Flow in Rivers)

Sustainable design and optimum operation of dams and reservoirs

Dams and reservoirs contribute to economic development by securing water supplies, generating power and regulating river flows. Dam designers require reliable hydrological assessments to ensure the structure is viable, while also minimising impacts to the environment and local communities. Dam operators must often balance conflicting needs, such as mitigating floods, maximising hydropower production and maintaining the reliability of water supplies. Operations are becoming more sophisticated as the demand for efficiencies in water and power increase, while at the same time as dam safety remains of paramount importance.

The theoretical and practical knowledge, along with a numerical modelling tools help to optimise the design and operation of dams and reservoirs. Also, modelling tools form the backbone of sophisticated but easy to use Decision Support Systems (DSS) that enhance robust decision-making, ranging from long-term planning assessments to real-time dam

Duration: 10 days

Intended for: Engineers and Geologists in the Ministry of Water Resources.

3.6.1.4 River Assessment and Monitoring

General Description: This course is designed to train individuals in field data collection methods and analysis techniques for:

1- Determining stream channel stability, stream bank erosion prediction, and measurement,
2- Sediment relations,

3- Potential versus existing stream conditions,
4- Influence of riparian vegetation on channel stability,
5- The variables that influence stream conditions,
6- Integration of ecosystem concepts into field applications.

The monitoring of vertical and horizontal stability, channel materials, sediment transport and hydraulics will be presented. The course includes hands-on techniques for field measurements, data analysis and interpretations and the use of replicate studies for verification and time trend analysis. Design and application of monitoring objectives and methods for channel stability and the collection and analysis of suspended and bedload sediment will also be included.

Duration: 10 days

Intended for: Civil Engineers and Geologists in the Ministry of Water Resources.

3.6.1.5 Environmental Impact Assessment

The aim of this course is to provide a thorough, stimulating and practical education in EIA and its related areas. Its specific objectives are to:

- provide a programme of studies to equip participants to undertake the planning and management tasks associated with the principal stages of environmental assessment,
- provide an opportunity for participants to pursue particular aspects of environmental assessment, or wider environmental management, in greater depth by choice of assignments and selected topics.

The course gives participants a sound basic knowledge of the relevant aspects of the process of EIA, environmental science, and environmental planning before it builds upon this with more specialist teaching. Students therefore gain a thorough grounding in EIA procedures and current practice and an introduction to the rapidly growing environmental management field. The course trains participants in EIA project management skills that involve the co-ordination of the contributions of technical specialists, decision-makers and consultees. Participants acquire appropriate analytical and communication skills, and flexibility of approach - thus graduating with expertise highly valued by employers.

Duration: 15 days

Intended for: Hydro-geologists, engineers or geologists.

The university of Tishreen has set a number of training course in other subjects and are summarised here:

3.6.1.6 Environmental Impact Assessment

The **aim of this course** is to provide a thorough, stimulating and practical education in EIA and its related areas. Its specific objectives are to:

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Duration: 15 days

Intended for: Hydro-geologists, engineers or geologists.

3.6.1.7 Training Course: Integrated Water Resources Management

The course has been put to engineers working in field of sanitary engineering, irrigation engineering, water structures and water resources management. The goal of course is giving the absolvent the experience in field **Integrated water resources management**.

Course contents:

- Concept and principles of integrated water resources management;
- Management of water demand;
- System of evaluating and planning of water resources using program WEAP;
- Basics of water resources and components of water balance- practical examples;
- Water managements and evaluating of water resources- practical case;
- Construction of water data bases in GIS Environment;
- Construction of mathematical standard model ;
- Systems of coordinate and system of abortion and adaptation of work places of mathematical model;
- Connection between GIS and mathematical model.

Duration: 15 days

3.6.1.8 Training Course: Water harvesting

The course has been put to engineers working in field of irrigation engineering, water structures and water resources management. The goal of course is giving the absolvent the experience in field Water harvesting.

Course contents:

- Components of water harvesting system;
- Affecting Technical coefficients on using competence of water harvesting technologies;
- Technologies of water harvesting;
- Technical Evaluating of methods of water harvesting;
- Formation of rain storms and affecting coefficients on them;

- Methods of calculation of discharges in temporary streams;
- Mechanism of choosing the construction places of small dams;
- Engineering technologies of construction of water traps.

Duration: 15 days

3.6.1.9 Training Course: Development of Water resources

The course has been put to engineers working in field of irrigation engineering, water structures and water resources management. The goal of course is giving the absolvent the experience in field Development of water resources.

Course contents:

- Importance of hydrological studies and water measurements in estimating and exploiting of water resources;
- Study of Sedimentation in dams reservoirs;
- Methods of Exploitation of marine springs;
- Methods of sweetening of sea- and saltwater;
- Reuse of wastewater in Irrigation and other use;
- Increase of using efficiency in irrigation , drinking water and industry;
- Importance of understanding of concept of virtual water e and soft water path;
- Application some computing programs and software in field of water resources management and saving it from pollution;

Duration: 15 days

3.6.1.10 Training course: Study and carry out of immersion maps (plans) produced from supposed dam collapse using computing programs:

The course has been put to engineers working in field of dams engineering and water structures and water resources management. The goal of course is giving the engineers experience in executing and putting immersion maps produced from floods and supposed dam collapse and putting executed plans to reduce the humanity and materiality costs.

Course contents:

- Causes and machinery of flood occurrence (events);
- Methods of calculation of flood waves;
- Methods of defining of immersion lines;
- Causes and machinery of dam collapse occurrence;
- Putting measures (some regulation measures) to exploit the areas, which exist under stream of the dam and possible to immerse from the river valleys .

Duration: 15 days

3.6.1.11 Training course: Calculation of Crop water requirements and design of Irrigation networks using computing programs:

The course has been put to engineers working in field of irrigation engineering, water structures, water resources management and agricultures engineering. The goal of course is giving the engineers experience in calculation and optimal design of opened and closed irrigation networks.

Course contents:

- Relationship between soil and water ;
- Resources of irrigation water;
- Crop water management - Crop water requirements, measurements and irrigation scheduling
- Components of irrigation networks;
- Optimal planning and design of irrigation networks;
- Using of computer programs (software) in calculation of opened and closed irrigation networks ; Distribution and regulation of water flow in opened and closed irrigation networks;
- Irrigation project operation and maintenance ;
- GIS application in irrigation management.

Duration: 15 days

3.6.1.12 Training course: Water Measurements

The course has been put to engineers working in field of dams engineering, irrigation engineering, water structures and water resources management. The goal of course is giving the engineers experience of different **water measurement** of some water parameter related water structures ,rivers and groundwater.

Course contents:

- Inspection and observation of dams (settlement, seepage, evaluation of reading recorded water level in piezometers;
- Observation of parameters of Groundwater ;
- Observation of goodness of surface and groundwater;
- Climatically and hydro metrological measurements in river basins;
- Optimal planning and design of irrigation networks;
- Using of computer programs (software) in calculation of opened and closed irrigation networks ;
- Distribution and regulation of water flow in opened and closed irrigation networks.

Duration: 15 days

3.6.1.13 Training course: Dam safety

The course has been put to engineers working in field, water structures, water resources management and in general engineering works. The goal of course is giving the absolvent the experience in field dam safety.

- Course contents:
- Introduction to dam safety
- Types of dams
- Hydraulics inlet and outlet structures
- Causes of dam failure
- The inspection program
- Dam safety laws
- Inspection of dams and reporting
- Operation and maintenance of dams and control structures
- Emergency actions and procedures.

Duration: 15 days

3.6.1.14 Training Course: Irrigation

The course has been put to engineers working in field, water structures, water resources management and in general engineering works. The goal of course is giving the absolvent the experience in field **irrigation**.

- Course contents:
- Properties of agricultural lands;
- Properties of agricultural soils and soil classification and characteristics;
- Irrigation hydraulic structures – storage reservoirs, spillways, canals, gates and check structures;
- Water conveyance, distribution, drainage and seepage;
- Crop water management - crop water requirements, measurements and irrigation scheduling;
- Irrigation project operation and maintenance;
- GIS application in irrigation management.

Duration: 15 days

3.6.1.15 Training Course: Introduction to Water Resources

The course has been put to engineers working in field, water structures, water resources management and in general engineering works. The goal of course is giving the absolvent the experience in field **water resources.**

- Course contents:
- Basic mathematics and computer skills related to water resources;
- Introduction to water resources engineering;
- Surface hydrology, groundwater hydrology and principles of groundwater hydrology and models;
- Soil classification – standard of soil classification, laboratory soil sieve analysis, soil porosity and density, etc.
- Principles in environmental engineering and science - physical, chemical and biological processes in water and wastewater treatment systems and their relationship to the environment.

Duration: 15 days

3.6.1.16 Training Course: Water supply networks

The course has been put to engineers working in field sanitary engineering, water structures and water resources management. The goal of course is giving the absolvent the experience in field Water supply networks.

Course contents:

- Required database to design of Water supply networks;
- Layout of water distribution networks;
- Structures of tanking of drinking water;
- Pumping stations of drinking water;
- Hydraulically design of distribution of drinking water;
- Principles and Structures of drinking water purification.
- Application some Computing programs and software in field Water purification and supply networks.

Duration: 15 days

3.6.1.17 Training Course: Wastewater Treatment and Networks

The course has been put to engineers working in field sanitary engineering, water structures and water resources management. The goal of course is giving the absolvent the experience in field wastewater treatment and networks.

Course contents:

- Resources of wastewater;
- Unsteady behavior of wastewater;
- Hydraulical design of wastewater networks;
- Layout of collection networks of wastewater;
- Structures of tanking of wastewater;
- Pumping stations of wastewater;
- Principles and Structures of wastewater treatment;
- - Application some Computing programs and software in field wastewater treatment and collection networks.

Duration: 15 days

3.6.1.18 Training Course: Study of Environmental Impact Assessment

The course has been put to engineers working in field sanitary engineering, water structures, water resources management and in general engineering works. The goal of course is giving the absolvent the experience in field Environmental Impact Assessment

Course contents:

- Introduction to Environmental Impact Assessment;
- Standard Elements of an Environmental Impact Assessment;
- Overview of Environmental Impact Assessment Tools;
- Environmental Impacts and Mitigation Measures to Be Considered in an EIA Process;
- Guidance on Possible Mitigation;
- Case Studies.

Duration: 15 days

3.6.1.19 Training course: Shore Structures

The goal of the course is definition of shore structures and methods of their design including sea waves breaker, vertical protection facilities and Sea quays.

The course have been suggested to engineers and specialists need more knowledge about Shore engineering basics and design sea and shore structures as waves breaker, vertical and oblique protection facilities and quays.

Course contents:

- Shore processes,
- Waves forecasting,
- Types of Shore Structures and influenced waves loads on them;

- Design of shore and sea structures.

Duration: 15 days

3.6.1.20 Training Course: Planning and Designing of Harbors

The course has been put to engineers working in field of Planning and designing of harbors. The goal of course is developing of knowledge of absolvent about the Planning and designing of harbors.

Course contents:

- Planning of harbors;
- Shores processes;
- Sea waves breakers;
- Sea canals;
- Sea quays;
- Practical examples and case studies.

Duration: 15 days

3.6.1.21 Training course: Sea Waves Breaker

The course benefits the engineers, which work in designing of shore structures, especially sea wave breaker or which work as supervisor engineer of shore engineering projects.

Course contents:

- Knowing of several types of sea wave breaker and coefficient of defining their use.
- Engineering design of different sea waves breaker from initial to final design and accommodate of designing schemata and digital sections
- Impacts of establishing of sea wave breaker on neighbour shores.
- Executing and establishing of sea waves

Duration: 15 days

3.6.2 Common Course among the four Universities, Practical Training in Water Engineering and Management

The Department of Water Engineering at the Faculty of Civil Engineering, Damascus University in cooperation with national relevant water engineering and management associations will be responsible for the organization and running of the Practical Training sessions at the end of the fourth and sixth semesters during the long break. The duration of each Practical Training session will be two weeks. The Preparation and conduct of the training will be done as follows:

3.6.2.1 Preparation of Practical Training

a) The allocation of water engineering and management Practical Training places to students will be undertaken by The Department of Water Engineering at the Faculty of Civil Engineering, Damascus University in cooperation with national relevant water engineering and management associations at a practical training place not approved and allocated by the Department before the start of training will not be recognized

b) Lists of Practical Training places will be made available to students not later than four weeks before the end of the respective semesters

c) The allocation of Practical Training places to students will be completed not later than one week before the end of the respective semesters

3.6.2.2 Guidelines for Practical Training Assessment

- Every Engineering and Management Practical Training will be treated as a subject of the succeeding semester
- Non-completion of Practical Training will lead to failure
- Practical Training reports will be handed in for assessment before the end of the second week of the succeeding semester and marking completed before the end of that semester
- Students may be required to present themselves before the examiners for an oral examination
- A student who fails in a part of a Practical Training because of reasons other than (2) or (3) will be allowed to carry it forward and retake the Practical Training in the particular part failed. If the student fails again, he/she will be required to repeat the training when it is next offered before proceeding to the next one or before he/she can be allowed to graduate
- A student who fails after repeating a Practical Training twice swill be discontinued from studies
- Students, who do not go to places allocated to them for Practical Training without satisfactory reasons will be deemed to have absconded from Practical Training and will as a result, be discontinued from their studies

Two proposals of practical training on water engineering and management

3.6.2.3 Water Supply Management - Maintenance of Distribution Pipeline and Leakage Prevention (for Bachelor Degree)

a) **Rational**

The need for sustainable fresh water supply has become an increasingly important concern globally, with countries everywhere actively seeking solutions for their water management needs. In light of rapid increase of population and urbanization and arising water requirements, the pursuit of long term planning, efficiency and productivity becomes an essential objective.

b) **Implementing Authority**

Damascus City Water Supply and Sewerage Authority (DAWSSA)

c) **Objectives**

To make the improvement plan which contribute to solving the issues about distribution pipeline and underground leakage.

d) **Outputs**

- Students understand the current conditions of water supply management in big-sized city
- Students acquire the practical knowledge and skills in order to build the appropriate distribution pipeline
- Students acquire the practical knowledge and skills in order to establish the leakage prevention systems
- Students make the report of the current issues and countermeasures in their cities using the knowledge and skills which you acquired through this training

3.6.2.4 Participation, Consensus Building, and Conflict Management

(for Master degree**)**

3.6.2.4.1 Practical Training Context and Need

Technical excellence remains necessary for creating sustainable water management decisions, perhaps even more so than ever. People all over the world need technical engineering competence more than ever before. However, it is not sufficient in itself. The ability to put that competence at the service of those who need it depends, in many cases, on changing the relationship between the experts and those whom they are serving. This practical training aims at helping to build, to modify, or to create such new functional relationships.

The new water resources decision-making environment requires at least two sets of skills. First, it requires excellent and broad technical skills that reach across disciplines to consider alternatives that in the past were often not evaluated. In addition, today’s water decisions often rest on a scientific basis that is itself incomplete. This sometimes means that water decision makers must first get agreement on what studies need to be conducted and what data should be collected, to ensure that decisions are based on science, not rhetoric. As a result, water planners and managers need a breadth of technical knowledge that goes beyond the traditional excellence in engineering.

Second, water planners and managers need another set of skills: the skills of designing and conducting processes that draw together partners, stakeholders, and

publics, resulting in decisions that enjoy broad cross-sectoral, and often transboundary, public support. The era where water planners and managers decide–

announce–defend is rapidly disappearing. In this new era, water management is done

with (as opposed to being done "for" or "to") potentially affected agencies, public and

private organizations, individuals, and others.

This practical training teaches this second set of skills. These are the skills that will help water resources decisions makers avert conflict, deal with conflict should it arise, and use water decisions as a venue for dialog when others are closed to parties locked in various types of non-water conflicts.

3.6.2.4.2 **Training Objectives**

By the end of this course the student will be able to:

● dentify the characteristics of effective participatory, consensus building, and water conflict management processes

● design and facilitate multidisciplinary teams, as needed in IWRM, a variety of interactive workshops, and large and small meetings

● identify behaviours that escalate conflict during a dispute with other agencies, stakeholders, or the public – and identify behaviours that halt this escalation

● select appropriate techniques for a participatory process

● design basin-wide organizations and frameworks for action

3.6.2.4.3 **Training Methodology**

This practical training is designed to teach skills, as well as concepts. When learning a skill, it is not enough just to "know about" it. Skills have to be practiced, preferably in conditions that replicate the circumstances under which they will be used. For this reason, the general sequence for each skill taught in this course is:

● Brief presentation

● A class activity or team exercise in which you apply the skill

● A class discussion or debriefing to focus in on key issues or important things that were learned from the activity.

This means that the practical training is interactive, and the active participation is an essential part of the learning. Look upon each team exercise, for example, as another opportunity to learn more about working in teams.

3.6.2.4.4 **Training Materials**

The practical training consists of essays and exercises. The essays are written by practitioners: professionals who have used the tools for many years in water management situations throughout the world. In most cases, they are composites constructed from several essays on the topic by the author(s). The authors are trainers as well as practitioners. The course presentations follow the essays closely.

The exercises, in some cases tested over many years, have been chosen and developed specifically for the skill or process that is being taught. Most are based on real cases. Attribution is provided for all materials where appropriate. The truth, however, is that the materials have evolved over years of training water managers and decision makers.

3.6.3 Practical and Advanced Training Courses for Academic Staff of Syrian Universities during the Workshops

3.6.3.1 Dresden: 06/06/-until 09/06/2011-

- Tour and explanation of the effectiveness of a river bank drinking water plant in Dresden-Hosterwitz – by *Grischek, Th.: University of Applied Science, Dresden*
- Tour and explanation of the effectiveness of a sewage treatment plant in Dresden-Kaditz – by *Pohl. J.: Stadtentwaesserung Dresden*
- Remediation of contaminated sites on the example of a former military airfield - by*Maertner, B. M&S Umweltprojekt, Plauen*
- Technische Universitaet Dresden, Department of Hydro Sciences – Explanations on equipment, laboratories, research topics by the head of Department,

3.6.3.2 Vienna: 04/09/-until 09/09/2011

- Quality Management at University of Natural Resources and Life Sciences (BOKU) - *T. Guggenberger*
- Research Services at BOKU - B. Koch
- Introduction of Department Water, Atmosphere and Environment of BOKU
  - Water Management, Hydrology and Hydraulic Engineering (IWHW) - *H.P Nachtnebel*,
  - Institute of Sanitary Engineering and Water Pollution Control (SIG) - R. Haberl,
  - Institute of Hydraulics and Rural Water Management (IHLW) – G. Kammerer
  - Institute of Hydrobiology - H. Waidbacher,
  - Institute of Waste Management - P. Lechner,
- Visit of Laboratories of Department Water, Atmosphere and Environment
- Visit of “Hundertwasser” Incinerator in Vienna
- Fieldtrip to Marchfeld - field site of soil water content monitoring, farmers training,(→The soil as most important link in the continental water exchange)

3.6.3.3 Prague: 16/02 to 21/02/2014

- Detailed introduction of Czech University of Life Sciences in Prague (CULS) and Faculty of Agrobiology, Food and Natural Resources (FAFNR) - Dean of the Faculty
- Water management and water planning in the CZECH REPUBLIC – Ministry of Agriculture
- Water at Ministry of the Environment - Department of Water Protection
- Visit of the Department of Water Resources with laboratories
- Visit of field research station in Suchdol,

3.6.3.4 Plauen: 29/06 to 04/07/2014

- Dual Educational System in Germany - K. Rafeld (*Director of University of Cooperative Education Plauen and Glauchau*):
- Visit of the former alum mine of Plauen with groundwater managing system
- Excursions to:
  - Drinking water plant in Plauen, Pausaer street,
  - City- waste water plant in Plauen- Chrieschwitz und
  - Village- waste water plant in Tirpersdorf
  - Storage reservoir Pöhl,
  - Nature reserve Triebetal,
  - Flood protection in the Upper Vogtland,
  - Muldenberg reservoir/dam + drinking water plant

3.6.3.5 Dresden: 14/09 to 19/09/2014

- Visit of Department of Agriculture of the University of Applied Sciences Dresden
- „SAXONY! - A Business Location at Its Best“ by Saxony Economic Development Corporation - M. Kristen

3.6.3.6 Vienna: 23/11 to 27/11/2014

- Quality documentation for the Quality Audit 2014 referred to HS-QSG Accredidation and Quality Management – BOKU
- Teaching Evaluation - by students, examples after H. Rindermann
- Excursion to the Danube regulations upstream of Vienna

3.6.3.7 Plauen: 22/03 to 26/03/2015

- The importance of the unsaturated zone - P.-W. Graeber TUD
- Decision support systems for the application of small waste water treatment systems - B. Maertner MUS
- Water systems in aride zones - W. Loiskandl/P. Cepuder BOKU
- Construction and Regeneration of drinking water production wells - O. Pattloch, KP-IWA

3.6.4 Introduction E-Training of IWRM into Syrian Water Sector

By: Dr. Mahmoud Al-Sibai, HIWM

What is e-learning?

E-learning[1] (or eLearning) is the use of electronic media, educational technology and information and communication technologies (ICT) in education. E-learning includes numerous types of media that deliver text, audio, images, animation, and streaming video. Using local networks or the Internet in networked learning, underlay many e-learning processes.

Why e-training?

E-training is an effective and modern alternative method for training. It has several advantages over traditional methods . It allows participants anywhere in the world to learn at their own convenience, and immediately apply their newly acquired knowledge in their working environment.

The advantage of development of distance education (e-Learning) and the availability of required infrastructure overcome the difficulty of trainees from different provinces to be at the Institute's headquarters .

Key advantages of e-learning include:

- Improved open access to wide range of educational and training materials
- Improved interactions and exchange experiences between trainees-trainees and trainees-instructors,
- It also help students in acquisition of technological skills through practice with tools and computers.

Experiences worldwide

E-training in water sector has been growing very fast for its convenient and cost effective. Here are some cases worldwide:

- UNESCO-IHE offers high-quality online courses[2] in an increasing number of topics of interest in the water sector. The innovative delivery format makes learning exciting, flexible, interactive and effective. These online courses are intended for professionals working in public and private institutions, NGOs, and academic institutions.
- IWAS (International Water Research Alliance Saxony), together with the German IHP/HWRP (International Hydrological Programme of UNESCO and Hydrology and Water Resources Programme of WMO), has developed an E-learning module on IWRM that is supposed to complement classical learning options[3]. To facilitate access to the module, the 39 lectures are subdivided into six categories:
  - Water and the physical environment

- Technical measures
- Water governance
- Economic instruments
- Tools
- IWRM implementation and case studies

Target groups of the module are graduating students in water-related fields, decision makers, water experts and administrative staff.

- The TU Dresden has rich experience in using e-training. The Department of Hydro Sciences use such e-learning modules. In some courses of master program "Hydro Sciences and Engineering", which is teached in English, e-learning was used, especially by using the system "Ilias"[4]

e-training/learning in Syria

The Syrian Virtual University is a leading e-learning university in the region. It started with 100 students, and today it has 15000 students. The SVU e-learning platform facilitates continuing undergraduate and postgraduate studies especially for those who have jobs. E-training is a new area in Syria and should be explored more and more.

Professional training in water sector is common and delivered by several national and international organization. However, e-training in water sector has never be done before in Syria. Therefore, its of great importance to introduce such methodology especially that the IT infrastructure are well developed and internet access is available in all ministries.

Importance of IWRM

IWRM is a framework designed to improve the management of water resources based on four key principles adopted at the 1992 Dublin Conference on Water and the Rio de Janeiro Summit on Sustainable Development.

Water resources in Syria are under increasing pressure. Effective water security management therefore requires planners to take into account the 'triple bottom line' and evaluate policies in terms of their **economic**, **environmental**, and **social** impacts All recent five year plans in Syria concentrate on the importance of applying IWRM. A lot of efforts are undergoing in this direction on technical and administrative levels.

HIWM experience

One of mean duties of HIWM is to offer professional training to engineers working in water sector. HIWM started to develop its first e-course on IWRM early last year as recommended from MoHE. This was the first ever done in water sector in Syria.

A scientific committee for the course was established and had its first meeting on July 2013. It has experts from the concerned ministries (MoHE, MoE, MoWR, MoAAR) in addition to HIWM. The strategy, procedures, evaluation method and the subjects suggested by HIWM for the course were accepted by the committee. The course was converted into a "training program" consists of several e-courses, the first one to be called "Basics of IWRM".

The material of the course was prepared in cooperation between HIWM, MoE and MoAAR (as they are the main stakeholders) according to guidelines set up by HIWM to fit such methodology. Each of course' theme has a main multimedia document (a hyper-text document with many of linkages to different related media files such as videos, reports, images, websites, tables…etc), e-references for further readings and a web-based discussion forum.

The e- course was organized in 3 sequential modules :

1. Development of IWRM concept and its principles
2. Integration issues in water management
3. Main challenges facing water resources in Syria (quantity & quality)

The **discussion** topics were initiated by the instructor to challenge the trainees and examine their understandings

Twelve engineers have participated in this course from MoE, MoWR, MoAR. The course started on 6/11/2013 and ended on 27/11/2013. All registered participants got a user name and password to access the platform of the course from HIWM web site (*http://hiwm.albaath-univ.edu.sy* /). Each one of the participants has to prepare a simple case study showing the importance of applying IWRM. The final evaluation of the participants was according to their involving in discussion and to the relevance of their case studies.

Conclusions

Applying new methodologies in training like e-learning is very promising and should be considered at our project especially that it is very difficult for participants to travel to other city to attend the course. The feedback from our participants was very positive and encouraging and HIWM is planning for the next course. The main concern which should take into consideration is the content and material of the course which should be suitable to deliver through this methodology.

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[1] http://en.wikipedia.org/wiki/E-learning

[2] http://www.unesco-ihe.org/online-courses

[3] www.iwrm-education.de/#!start

[4] www.ilias.de/docu/ilias.php?baseClass=ilrepositorygui&reloadpublic=1&cmd=frameset&ref_id=1

For more details see appendix: Al-Shibai, HIWM, *INTRODUCING* ***E-TRAINING*** *OF IWRM INTO SYRIAN WATER SECTOR*

4 Research at the Universities

Lead Partner: BOKU	*Title of work package*	*Type of work package*
WP.2	Research at the universities	Development
2.1	Comparison of research to quality and quantity	
2.2	Workshop	
2.3	Developing of research structure in SY universities	
2.4	Workshop	

Related assumptions and risk:

Risks are in the decision making and implementation process in case that one important policy maker is not adequately involved. To overcome this risk, the Syrian partners are engaged to identify all stakeholders to involve. The new structures need a clear distribution of competences and must be acceptable nation-wide. The research must be in accordance with the new Syrian water master plan.

Description* of *work package:

In WP2 adequate measures to modernize and improve research structures are worked out and proposed. A set of quality assurance indicators should en able a follow up control of the effectiveness of the measures. This WP requires a strong involvement of all partners, especially the Syrian partners are asked to bring in their specific requirements. Conclusions from best practises of partners are drawn and used for discussion of the Syrian requirements. In the first step the quality and quantity of research activity in the partner universities are analyzed. The results will be compare, discuss and published during a workshop. The universities in the EU have a number of research activities. This is possible by structures of research funding and by external funding administration (financial). Building on strength and weaknesses structural improvements and new mechanism are proposed. Special methods for fund raising of external funds must be developed. Explored are the available external funds and the conditions for fund raising. The workshop aims for an intensive exchange of approaches of participating institutions on research funding. For a high quality research in the universities are propose structure for building interdisciplinary research cooperation inside the universities (building of centres of excellence, scientific centres). In the national and international level it is necessary to build structures for building interdisciplinary research cooperation among the universities (networking, EU projects).lt is necessary to develop new research fields by combination of traditional sciences (trans-disciplinarity). Building on tradition new pathways for research will be explored. Climate change issues and drought risks are of mayor concern for the region. Mitigation strategies and adaptations are an urgent need for new research activities. The final workshop sums up the discussion and aims to bring the proposals structures usable for policy and decision makers.

Deliverables

2.1 Comparison of research to quality and quantity – report (2011-05-16)

According to the HUMBOLDT-Spirit in the most European universities the unity of education and research is implemented. The interaction between the education and research produced positive impulse of both. For detailed information about the quality and quantity the research are analyzed in the Syrian as well as European universities. The results will be combined in a report which are announced all partners in consortium as well as publicized by Internet platform.

2.2 Workshop (2011-09-15)

During this workshop the partner discuss the results and the report from the activity 2.1. At the same this workshop serves the partners, special from the Syrian site, familiarize with the research and education activities at the University Rostock in Germany. Additional of the results the networking, activity 5.2, is support, too.

2.3 Developing of research structure in SY universities –report (2012-10-31)

Structural improvements and new mechanism are proposed. Like internal funding also external founding has similar needs on transparency. In addition an office dealing with international funding agencies is required. Explored are the available external funds and the conditions for fund raising. One key issue is interdisciplinary inside and outside. The proposed project is one attempt to foster cooperation in an international context for the water sector. New pathways for research will be explored.

2.4 Workshop (2012-06-16)

The workshop aims for an intensive exchange of approaches of participating institutions on research funding. In the CULS the workshop will be organised in an interactive set up, with keynote addresses followed by group discussions (round table and (or with facilitators). Each group will nominate a reporter for the final discussion in the plenum. The outcome of the workshop will be documented in a report. This report will be shared with all stakeholders in the Syrian research community.

4.1 Introduction

A short reflection of the project objectives in the view of achievements are used to demonstrate the information flow and also the linkage to the other work packages, especially to WP1. This report also draws on task 1.2 “Comparison of higher education systems” (Interim Report attachment A). At the end a final evaluation of project outcome in relation to the proposal is provided. Some remarks are also made to future challenges in research within the Syrian environment.

Aims:

1. *propose measures to modernize and improve research structures*
2. *quality assurance indicators to control effectiveness of measures*

First in combination with work package 1, a questionnaire (Annex B) was developed to obtain basic date and to compare the present status of participating institutions for both education and research. The questionnaire is also based on previous experiences of BOKU within Tempus Project ETNET-WATER. The questionnaire was not split in two parts, because it is obvious that university education is per definition related to research, hence the research involvement is reflected in the curriculum. It is important to demonstrate the level of research involvement of Syrian students in the new proposed 3 level education system (bachelor-master-doctorate).

The prerequisite of a strong involvement of all partners, especially the Syrian partners, was given.

Outcome:

1. *Conclusions from best practises of partners are drawn and used for discussion of the Syrian requirements*
2. *Quality and quantity of research activity in the partner universities are analysed, compared and presented during a workshop*
3. *Research funding within EU model for Syria?*
4. *Building on strength and weaknesses → structural improvements and new mechanism are proposed*
5. *What special methods for fund raising (external funds) are possible?*
6. *The final workshop sums up the discussion and aims to bring the proposals structures usable for policy and decision makers*

Topic 1 and 2): At the workshop in Plauen (29/06 to 04/07/2014), Germany a first draft of report WP2 was presented and some open questions were discussed. The developed curricula were also discussed and each partner was provided new or improved existing curricula. The time horizon for the finalization is the end of 2014.

Remark: agreed principles by projects partners are:

Bachelor Programs are:

- Science- and general knowledge oriented
- BOKU-Master study concept serves as sample curriculum
- Job oriented and empowered
- High flexibility (mobility)
- Continuation from one bachelor to different master

Modularisation

Creation of bigger lecture units

Degrees

Master: According to orientation: Master (Magister) or Dipl. Ing.

Having this at hand the workload (Figure 1) of students with respect to research is clearly visible.

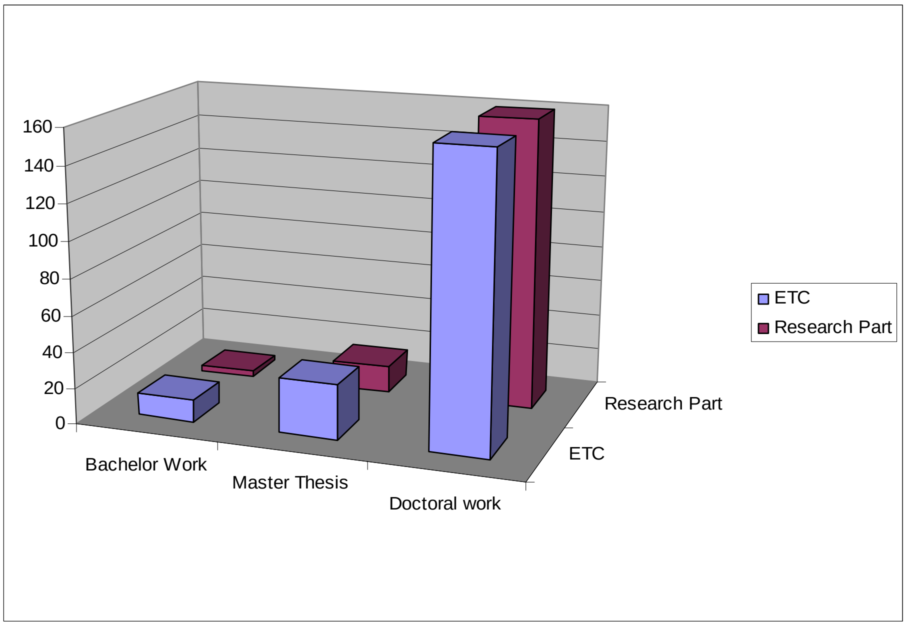

Figure 1: Research workload at different education levels

Topic 2) and 3)

Quality and quantity of research activity in the partner universities are analysed, compared and presented during a workshop

A **structural analysis** of research activities of Syrian partners was performed. Summarized outcomes and needs are:

1. Building interdisciplinary research cooperation inside universities (building of centres of excellence, scientific centres)
2. Establish on national and international level interdisciplinary research cooperation among universities (networking, EU projects).
3. Adapt to new challenges by the development of new research activities in combination with traditional sciences (trans-disciplinarity).
4. New pathways for research by building on tradition will be explored.

4.2 Examples for New Research Activities

As examples for new research activities the following are named by Syrian partners

1. Climate change issues and drought risks are of major concern for the region.
2. Mitigation strategies and adaptations are an urgent need
3. Rehabilitation of water infrastructure. This research need arose during the course of the EDUWAT-Project due to the specific situation of Syria.
4. Other topics are foreseen. The structure, more specific the modularization, allows a fast reaction to this research challenges for the provision of well training young people. Moreover parts or modules could be arranged and utilized for this needs in short courses and post graduate training programs.

The success of this part of the project was a clear information flow, starting with the questionnaire (Task 1.2 Comparison of higher education systems), as already described above. The link of teaching and to research at different education levels could be work out. (See also contribution to report: March, 2012, Development of a Modern Higher Education System for Water Engineering in Syria, Annex A)

This baseline data provided besides general information of the universities, **Information of thesis** workload (final project) and involvement in research at different levels. **Research visibility in curriculum** and also **"industry" (**used as synonym for research institutions, small and medium enterprises, international companies, NGO's**) involvement** was reflected**.**

Research and education challenges directly impact the university stakeholders. The different groups involved - academic staff, administration (Infrastructure, Examination office) and students - have different needs and are affected in a different way (Table 1). The impact on universities has to be distinguished between the transition period and permanent changes, e.g. new curriculum structure following the Bologna declaration (transition) and adaptation of content to new challenges (transition). Solving this problem will open the pathway for a sound cooperation with the other sector in the knowledge triangle, innovation for society. One of the aspects to ensure research beyond obtaining a degree is continuing education, which may directly reflect the needs of society and the water sector.

Table 1: Compilation of impact of stakeholders in the education system (adapted from Loiskandl, Hohenheim 2004)

Universities	**Academic staff**	**Administration**	**Students**
Bologna 1999 International offices Co-operation vs. Competition Market presence Increase of competence Acknowledge time for changes **Extra costs?** **Incentives, investment in future**	Language New partners Collaboration Sharing of teaching material Expertise exchange New teaching methods Changes in thinking Cultural diversity Mobility and training **Extra work , incentives**	Language ECTS Flexibility Mutual trust International contracts **Extra work**	Language Different environment Broaden mind/ Specialising Integration International job's Make new friends Life long experience **Continuing education**
European	European	European	European

One of the mayor changes on university level is the introduction of so called international offices. This contributes also significant to reduce the unhealthy competition and leaded instead to more co-operation. Co-operation increases the market presences and takes into account that many environmental problems are transnational. We are all aware that a new education environment has developed globally. The strength of universities in relation to education and research is indispensable for the future competitiveness of European science in a global marketplace. ELLS may serve as a unique platform for comprising expertise in relation to environmental issues to meet in an optimal way the user demands on education, but also on research as an integral part of university, to reach market conformity and satisfies expectations of graduates and students alike (Figure 1).

4.2.1 Achievements with respect to the development of research structure are:

- Research structure is included in curricula,
- Research visibility could be improved,
- The awareness of research needs could be raised,
- new research topics are addressed and
- the workload for research in curricula is clearly defined

The main remaining question for realisation is the **Infrastructure at universities and in the private sector.**

4.3 Importance of Research at Universities

The success of universities is not measured only by merely the number and quality of graduates, but also by the accomplished research. Moreover, we need to modernize and re-build the whole process of research, ending with a new research structure. Special workshops and meetings are needed between the Syrian partners to discuss and analyze the amount (number) and quality (outcome) of the research.

The agreed priorities of scientific research in the field of Water Engineering in Syria are:

- Focussing on applied research (beneficial to citizens).
- Developing scientific modalities appropriate for the reconstruction of all water facilities that suffered destruction or sabotage in Syria.
- Developing immediate emergency solutions to secure water services needed in numerous affected areas.

4.4 Research Funding Resources:

The main problem here is that the available financial support is limited. In general no financial support is given for independent researchers. Financial support out of the university (from public and private sectors) is at a minimum amount.

4.4.1 Some of Potential Funding Resources:

a. 3rd party funds industry and enterprises: industrial companies generally pay for the research conducted at the universities or other research institutions.

b. Government funding: some of the budget of the universities is allocated for scientific research. All research institutions are allocated a research budget.

c. EU: universities are involved in many international research projects funded by EU (horizon 2020, former framework programs) and/or national funding agencies. AL-Baath University benefitted from participating in Tempus projects to develop new research structures.

d. Cooperation with international research institutes, who fund research to be conducted in cooperation with universities. Some of these organizations that are working in Water Sector are: ICARDA, ACSAD, ISESCO ….etc.

Benefitting from European experience in research funding is without a doubt very fruitful. The European model for funding research can be tailored to meet the situation in Syria.

4.4.2 What Research Frameworks are already Available?

1. Scientific research agreements between MoHE with relevant ministries (Figure 5):
    - A. Ministry of agriculture and agrarian reform[1]
    - B. Ministry of Environmental affairs[2]

Fig. 5 Research agreements

2. The national policy for Science, Technology and Innovation

The Higher commission for scientific research (HCSR) has a committee for the water sector. HCSR has already issued the main research subjects for this sector within the national policy for Science, Technology and Innovation. This policy has been approved by the prime-minister and the final report was issued in 2012[3] .

The committee has held several meetings with all stakeholders (including universities) to discuss the research needs for the water sector. A “SWAT” analyses of this sector was performed. Six main research priorities for the water sector were prioritised:

1. Impact of climate change on water resources

[1] http://www.mohe.gov.sy/mohe/index.php?node=5512&cat=2704&
[2] http://mohe.gov.sy/MEHO/file/2014/MoheEnvironment2014.pdf
[3] Web site http://www.hcsr.gov.sy/ar/node/48 ,2012 (report in Arabic)

2. Estimation of water balance components for surface and ground water
3. Water resources protection
4. Trans-boundary rivers (especially Euphrates)
5. Agricultural Drainage and land reclamation
6. Applying and developing new technologies for the Syrian conditions in the water sector

HCSR will cover the cost of successful proposals. All the approved projects are financed by HCSR

The summary of research funding of EU-Partners and the Syrian partners are presented in parallel to be able to address the different research environment.

Table 1 Comparison of research resources

<table>
<tr><td colspan="6">Research funding summary at consortium partners</td></tr>
<tr><td colspan="3">EU-Partner</td><td colspan="3">Syrian-Partner</td></tr>
<tr><td></td><td>Funding sources</td><td>Remarks</td><td></td><td>Funding sources</td><td>Remarks</td></tr>
<tr><td>TUD</td><td>EU, DFG, Contracts (public, private)</td><td></td><td>DAM</td><td rowspan="4">Self-funding (from university budget) 50%
Joint projects (local, regional, international)15%
Joint research (local, regional, international)15%
State budget 20%</td><td rowspan="4"></td></tr>
<tr><td>HTW</td><td></td><td></td><td>ALBA</td></tr>
<tr><td>URO</td><td></td><td></td><td>TiU</td></tr>
<tr><td>BOKU</td><td>EU, FWF, FFG, Contracts (public, private)</td><td>Highly competitive,
Economic orientation</td><td>AU</td></tr>
<tr><td>CULS</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>HTWD</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>UO</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>MUS</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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</table>

Legend: EU European Union (frame work programmes, horizon 2020, Erasmus+)

FWF Austrian Science Fund

FFG - Austrian Research Promotion Agency

TUD Technische Univeristaet Dresden, Germany
MHE Ministry of Higher Education, Syria
BOKU Universitaet fuer Bodenkultur Wien, Austria
URO University Rostock, Germany
HTWD Hochschule fuer Technik und Wirtschaft Dresden, Germany
MUS
CULS University of Life Sciences Prague, Czech Republic
UO University of Opole, Poland
DAM Damascus University, Syria
ALBA Al-Baath University Homs, Syria
TiU Tishreen University Lattakia, Syria
AU University of Aleppo, Syria
HIWM Higher Institute of Water Management, Homs, Syria

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LOISKANDL W. 2002 Report of SPI "Teaching Resources, ETNET 21 Plenary Assembly Warsaw

Euro League for Life Sciences

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Links:

QA Group of ELLS: www.euroleague-study.org/supportteams/quality/index.html

European University Association EUA: www.euy.be/eua.index.isp

INCHER Kassel: http://www.uni-kassel.de/einrichtungen/en/incher/about-incher.html

Network QM of Austrian universities: www.qm-netzwerk.at/Home/das_netzwerk/

Austrian Agency for Quality Assurance and Accreditation: www.aq.ac.at/

Quality Management at BOKU: www.boku.ac.at/qm.html

http://www.boku.ac.at/fileadmin/data/H01000/H10090/H10400/H10450/dokumente/LV-Eval-neu_FB-SS-2013.pdf

http://www.boku.ac.at/universitaetsleitung/rektorat/stabsstellen/qm/themen/lv-evaluierung/was-ist-neu/

http://www.boku.ac.at/universitaetsleitung/senat/boku-studien-fuer-die-zukunft/studienentwicklung/

http://www.boku.ac.at/universitaetsleitung/senat/boku-studien-fuer-die-zukunft/studienentwicklung/mustercurricula/

http://sss.dcu.ie/afi/docs/bologna/writing_and_using_learning_outcomes.pdf

5 Innovation

Lead Partner: HTWD	*Title of work package*	*Type of work package*
WP.3	Innovation	Development
3.1	Comparison of innovation	
3.2	Workshop	
3.3	Developing of innovation transfer system	
3.4	Workshop	

Related assumptions and risks

It has to be assumed that there will be no hindering of collaboration between all partner countries due to political decisions/restrictions. There is no specific risk for this work package.

Description* of *work package

Aims are to improve teaching/ research at institutions to prepare their staff and students for innovative thinking/acting. Based on findings from WP 2 to 5, a definition of innovation in teaching and research, a comparison of procedures to support innovation, the WP integrates 4 main tasks:

1. Development of exemplary concepts for student projects/seminars on methods to create innovative ideas, to design business plans, to develop marketing strategies, soft skill competences and self-employment opportunities. Experiences from the "Dresden-exists" initiative to support the foundation of enterprises by students included.

2. Establishing links between industries/authorities and universities for innovative teaching. Fields will be identified, where their involvement is vital to improve education e.g. by guest lectures, specific courses, guided excursions. A list of proposals will be produced incl. rationale and local success stories.

3. Create networking of industries and universities to raise innovation in applied research. Conditions for collaboration will be defined including intellectual property rights, patenting strategies, exploitation of results, win-win-situations etc. Advantages of such projects will be summarized in an article for publication.

4. Strengthening collaboration between Syrian/EU partners for innovation. Based on task 3 results, specific rules, experiences and needs for regulation/agreements will be discussed and best ways for organising staff/students exchange as well as parallel lab/field work in innovative research fields will be identified. Discussion on how differences in culture and supervision affect birth and realisation of innovative ideas.

For all 4 aspects, an email circular and a questionnaire will be organised. Two workshops in Syria and Germany will cover all 4 aspects, thus involving a group of students for part 1, experts from local industries in part 2 and 3.

Description of deliverables

3.1 Comparison of innovation –report

Definition of innovation, analysis of the state of the art and technology in enterprises, authorities and universities in all partner countries, comparison with the world standard, tools and methods for students, needed soft skills. Running two courses with students to apply the developed concepts, evaluation of the questionnaire, finalisation of the guideline for 2 projects or seminars for students including teaching material

3.2 Workshop

Proposals for involvement of industries/administration in teaching, documentation of best practice results and Iimitations. ldentification of the most promising scientific fields and practical needs where involvement from industries/state authorities would result in short-term improvements. Discussion of motivation and costs.

3.3 Developing of innovation transfer system -report-

A web-based selection of forms for collaborative agreement, standards and rules for IPR and how to ensure good science will be organised keeping into account partner-specific conditions in Syria. Successful collaborative projects between industries and universities from different countries will be highlighted and summarized in an article to be published in the partner university journals. Description of transfer procedures and agreements.

3.4 Workshop

In connection with WP 6, best options for collaboration between institutions in Syria and the EU will be identified based on experiences and project results, a road map for continuation of collaboration and preparation of innovative project proposals will be created. Administrative problems arising from the different structures in education/research at both sides will be evaluated and proposals to solve them.

5.1 Summary

For the development of an innovation transfer system for Syria, it was intended to compare innovation in Syria and Germany and to draw conclusions from such a comparison. Unfortunately, due to the current political situation in Syria, visits and individual discussions have been limited. Instead, the current status of innovation in Germany has been assessed (Section 0) and recommendations have been developed from the assessment (Chapter 5.7).

Section 0 describes the importance of innovation for Germany while the following Section 5.4 gives a summary of the latest report of the Commission of Experts for Research and Innovation which annually presents an in-depth analysis of the current status of research and innovation to the German Federal Government.

Section 5.5 focuses on the universities where creative thinking and innovation must be fostered as integral part of the study process. While the overall structure of the university courses has been well established and the transition from the old system to a more harmonised system typically comprising of a Bachelor and a Master degree (Bologna Process) has almost been completed, more needs to be done to remain on the forefront of excellent research and innovation. The section assesses the key processes that enhance creative thinking and innovation starting from creative teaching to the support of transition from studying to entrepreneurship. As there are no prescriptive procedures, examples are given to demonstrate potential ways forward.

Chapter 3 gives recommendation on how an innovation transfer system in Syria could be established. Based on the findings of the assessment of innovation in Germany, the recommendations include potential modifications to the teaching and learning methods at universities which help encourage creative thinking.

An innovation transfer system is suggested comprised of two main components: a national support programme and a number of advice centres for business start-up at universities. Recommendations on the implementation are given.

The recommendations are complemented by some teaching material that can be used for the initial work at the advice centre but also for general qualification courses.

5.2 Introduction

Innovation is one of the three components of the knowledge triangle (

Fig. 1). Although a component in its own right, it is closely related to the other two components, higher education and research.

A prerequisite for innovation is creativity. While creativity is the creation of new and useful ideas by an individual or group, innovation is the implementation of such ideas through an organisation. Without creativity there is no innovation and therefore both processes have been considered in the analysis of innovation in Germany and in the recommendations for an innovation transfer system for Syria.

While some of the key components of an innovation transfer system such as supporting networks, financial support structures or patenting procedures can consistently be applied at a higher level, e.g. country-wide or on a regional level, other processes are less prescriptive and therefore more dependent on the initiative of individuals or smaller groups, e.g. a professor, a group of teaching staff or a university institute. In particular the enhancement of creative thinking through innovative teaching and learning methods leaves room for a large variety of concepts and methods. As such only a few examples can be given not excluding other ways that might also be suitable. Some might just provide a basis for further ideas.

The facilitation of innovation transfer should start at university. It is important to encourage students in the development of ideas, help with the assessment of those ideas, to support the development of respective business concepts and to provide a network of contacts. Funding mechanisms need to be in place to support the first stages of transferring ideas into viable business.

Although the education and in particular at universities helps establish the foundation of innovation, further support is needed to ensure the sustainable development of the businesses. While at university the focus of support is on the development of ideas and their transformation into business concepts, post university support focuses more on financial funding, the building of a suitable team, networking and publicity.

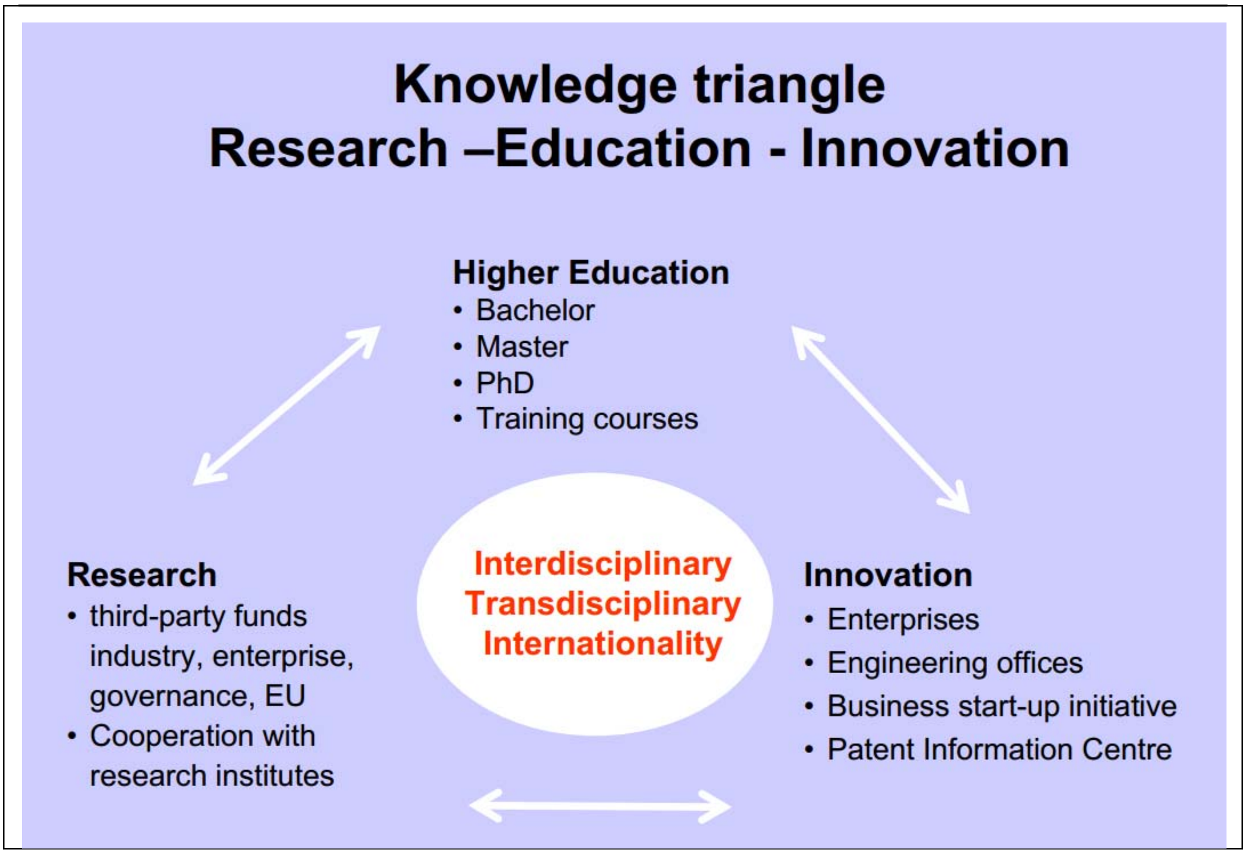

Fig. 1: Knowledge Triangle

5.3 Comparison of Innovation

5.3.1 Syria

Importance and Current Status of Innovation for Syria

On the Global Competitiveness Index list (WEF, 2010), Syria ranks 94th amongst 140 countries. Innovation is one of the 12 pillars considered for the estimation of the index. In terms of innovation Syria only classifies 115th, a clear indication that innovation has not been considered a priority for the development of the country.

Considering the actual situation, Syria urgently needs innovative policies and new technologies that support the resource management. On the water sector modernisation is vital to help the country deal with chronic water shortages.

There is no specific programme for encouraging innovation and promoting it. Syria needs to establish a good connection between university and industry to come out with innovative ideas that may help to solve some of the present critical problems that are very challenging to the economy and society.

Linkage between universities and industry by establishing a centre for innovation transfer could be a start base for transferring knowledge and experience and launching activities. Challenging fields should be given priority and should be wisely linked to the regional development of the country. So, innovative ideas can be presented to find solutions and overcome challenges. Partners from different institutions should be involved alongside with decision makers

Innovation at Universities

The Global Competitiveness Index also contains a specific indicator for higher education and training. There, Syria classifies 107th indicating that improvements at Universities are needed to better respond to the needs of the economy. However, the quality of maths and science education ranks much higher (70th) leaving room for improvement at the management level and the non-scientific subjects.

A study on innovation and technology in Syria carried out by the SME Support Programme (SEBC & SSP, 2009) tried to identify specific weaknesses at the public universities. Amongst the weaknesses are two aspects of the university education that directly link to creativity and innovation:

"The low ratio teachers / students do (sic) not allow effective communication and coaching, which are the only way to develop students' creativity.

Curricula are not updated; the system is based on notions transfer and examination, and does not foster communication and creativity skills…"

The study also identifies a "*poor relationship with industrial sectors…*" which also indicates that there is little transfer of between university and the industry.

The Ministry of Higher Education (MHE) has been addressing some of the issues. In cooperation with SHABAB, a non-governmental organisation, the MHE has established the Knowing about Business (KAB) project aiming at introducing entrepreneurship as mandatory subject at all public universities.

Another weakness identified by the study is the "*very low level of research*" which is a severe limiting factor of innovation.

The Syrian Enterprise and Business Centre

The Syrian Enterprise and Business Centre (SEBC) is a Syrian non-profit making institution established in 2006 as an NGO according to Syrian laws, benefiting from a legacy of 10 year cooperation between the EU and Syria in developing business sector in Syria (namely the Syrian-European Business Centre 1996-2006).

Evolving as a smooth transition from the “Five-A” extremely successful EU funded programme, SEBC has become the leading implementation agency for development projects, ensuring an integrated socio-economic development process with a focus on developing the private sector. In other words, SEBC is the catalyst institution for business sector development and growth in Syria.

Leading by example and serving as a role model, SEBC, The European styled, Syrian operated and managed business institution, adopts innovative styles, bottom up approach and demand driven techniques to achieve its set objectives:

Increase the Syrian economic enterprises (Private and Public) competitiveness in local and international markets

Assist Syrian private sector enterprises to access international markets

Enhance the business community through increasing the number of enterprises with high growth potential and evolving capability in addition to providing them with required support

Promote the positive development of the Syrian organizational and financial frame work to uphold development of private sector enterprises

Facilitate the establishment of an efficient network of business support institutions

The level of activities has recently declined due to the crisis in the country.

In the future the SEBC could play a key role in establishing an innovation transfer system as suggested in Section 5.8.

Junior Chamber International

The Junior Chamber International (JCI) has been established in Syria in 2004. The JCI is an international organisation of young leaders and entrepreneurs set up to develop the necessary skills for successful business through personal development training and business lectures. Major activities in Syria ceased in 2011. In the future the JCI could play an active role in the promotion of innovation transfer from university to business.

5.3.2 Germany

Importance of Innovation for Germany

Education and technology are vital for highly developed countries with limited natural resources such as Germany. Innovative methods, products and services keep the economy going, ensure a good income and increase the living standard. Innovation therefore must be rated among the best Germany has to offer. Rating the development of new products and innovative ideas worldwide, Germany is one of the leading countries (Fig. 2).

On the Global Competitiveness Index list Germany classifies 5th amongst 140 countries(note this is the 2010 index to make it comparable to a meaningful Syrian ranking prior to the crisis).

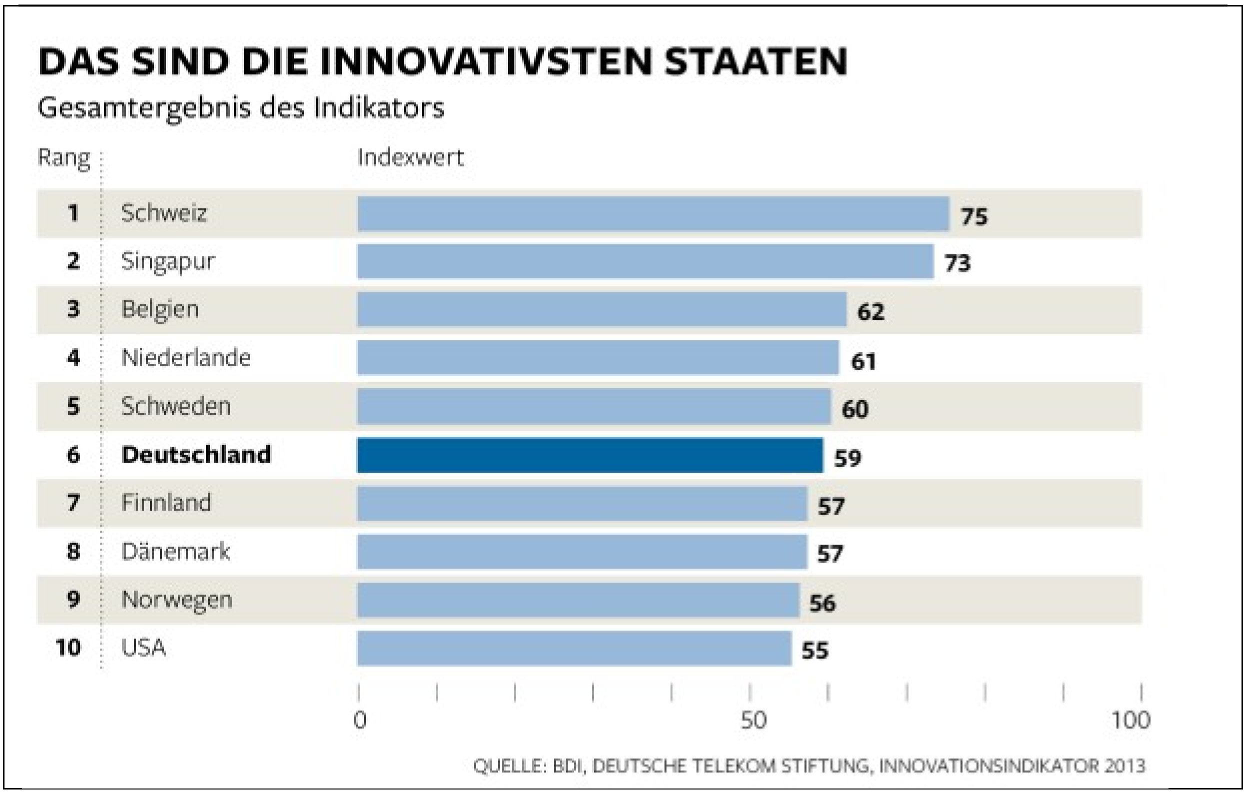

Fig. 2: Ranking Worldwide Innovation (Source: BDI, 2014)

Generally there is a strong link between a company’s innovation level and its engagement with universities using their creative potential for innovation (Janeiro et al., 2012) and also between a company’s financial performance and its sourcing knowledge externally, e.g. in the form of support from universities (Kafouros and Forsans, 2012).

5.4 Evaluating Innovation - Expert Commission Research and Innovation

5.4.1 The work of the Commission

Recognising the pivotal importance of Innovation for the German economy, the Federal Government has established the scientific Commission of Experts for Research and Innovation (Expertenkommission Forschung und Innovation - EFI) in 2006. In their annual report the 6 experts provide the government with an analysis of the state of innovation and provide guidance on future development strategies.

The commission is responsible for:

1. Combining the interdisciplinary discourse with regard to innovation research of economic and social sciences, economics of education, engineering and natural sciences and the engineering perspective and

2. Scientific policy advice in:

a) Presentation and analysis of structures, trends, performances and perspectives of the German research and innovation system in a temporal and international comparison,

b) Assessment of high priority questions of the German research and innovation system,

c) Development of possible actions, and action recommendations, for the development of the German research and innovation system.

5.4.2 The Report 2013

In their Annual Report 2013, the Commission of Experts for Research and Innovation presents current analyses, assessments and recommendations on designing the German research and innovation system (EFI, 2013).

With regard to its R&I policies, Germany has made substantial progress, which has been highly acknowledged internationally. In 2011, Germany almost reached the three- per cent target for national R&D intensity. Research and innovation of German companies contributed significantly to the stabilisation of the German labour market and to Germany's continuing export success. Science organisations and tertiary education institutions are benefitting from the measures implemented in recent years. To stay on this road to success, Germany will have to strengthen research and innovation also in the future.

Yet there are not only successes to be recorded. Not all of the objectives for the on-going legislative period have been met: although the introduction of R&D tax credits and improved conditions for venture capital had been enshrined in the Federal Government's coalition agreement, these measures have not been implemented. Besides this, there are pressing political tasks relating to organising cooperation between the Federal and State Governments (Länder), as well as pressing issues in other policy areas.

In Chapter A1, the Expert Commission takes the occasion of the upcoming autumn 2013 federal elections as an opportunity to identify fields of action that should receive special attention in the next legislative period.

The Expert Commission also contributes to current discussions relating to R&I policies. Chapter A2 discusses the pros and cons of open access publishing and advocates a second publication right to improve public access to scientific findings.

The Expert Commission welcomes the introduction of a unitary European patent system and a corresponding patent jurisdiction, which has now been adopted (Chapter A3). This reform represents an improvement for small and medium-sized enterprises (SMEs) in particular. Yet the harmonisation of Europe's patent system is by no means complete. The costs of patenting will have to be lowered, and it is also important to ensure that strict quality standards are applied to the assessment of patents filed. In the long run, these are prerequisites for creating socially desirable incentives for innovation.

The current start-up landscape in Berlin (Chapter A4) demonstrates how entrepreneurship in Germany can flourish. With its thriving IT and internet sector, the city has a favourable competitive position within the innovative internet economy. This is important not only for the city of Berlin, but also for Germany as a business location. Berlin exemplifies how the internet economy can generate significant value creation and employment opportunities within a short period of time. To foster the positive development of Germany's internet and IT industry, it is particularly important to improve framework conditions for financing growth of new enterprises.

In the field of innovation financing, crowd funding (Chapter A5) is an interesting recent development. Crowd funding is a new, internet-based form of financing. In the view of the Expert Commission, crowd funding offers new enterprises and SMEs an attractive alternative, or supplement, to financing from other capital owners, such as business angels. The Expert Commission presents suggestions on further developing the potential of crowd funding in Germany and limiting the risks of this form of financing.

In Chapter A6, the Expert Commission expressly recommends using randomised experiments to evaluate innovation activities. Such procedures could generate significant efficiency gains and thus lead to considerable improvements in the use of scarce R&D subsidies.

In the first of their four key studies, the Expert Commission discusses the coordination of Germany's climate, energy and innovation policies (Chapter B1). In these areas, the Federal Government pursues targets that partially overlap. Hence it is necessary to strengthen coordination so as to create synergies and avoid counterproductive interactions. The Expert Commission particularly recommends expanding the European Emissions Trading System (EU ETS) as well as fundamentally reforming the promotion of renewable energy sources and creating a pan-European market for Renewable Energy Certificates. The security of planning for businesses should be increased through binding long-term policy targets and stringent implementation. In the view of the Expert Commission, the successful implementation of the Energy Transition will require improved coordination and the pooling of skills. Here, a national energy platform comprising representatives of federal ministries and the federal states as well as major corporations could play an important role.

The key topic discussed in Chapter B2 is the on-going internationalisation of research and development. There are indications of a new division of labour between highly developed industrialised countries and emerging economies. Germany still enjoys an excellent reputation both as an investor and as a location for R&D activities. Yet R&D in Germany could be made even more attractive by introducing R&D tax credits. The Expert Commission expresses concerns regarding the increasing specialisation in industrial research in Germany. This is a trend that results in short-term benefits but can lead to a "competence trap" in the long term: promising new fields of competence are not fully tapped, or not exploited in time. Hence, in future, Germany should focus on developing new competences in cutting-edge technologies through broad basic research and effective technology transfer – thereby ensuring that Germany remains attractive for foreign enterprises as an innovation location.

Chapter B3 discusses the role of innovation-oriented procurement by the public sector. To date, Germany has not been making full use of its potential for innovation-oriented procurement. Too often, public procurement makes use of established solutions or solutions with minor innovative potential, thereby inhibiting the development and distribution of innovative products and services. The Expert Commission is in favour of supporting new initiatives by the European Commission – especially the initiative for implementing pre-commercial contract awarding and the renewal of the EU Directive on European procurement law – as well as corresponding measures at the national level. Here, government policies should be guided by the aim of optimising the provision of services for public benefit through the procurement of innovative products and services.

The fourth key study (Chapter B4) discusses the role of women in Germany's R&I system. A shortage of skilled workers in the STEM professions (academic disciplines of Science, Technology, Engineering and Mathematics) is increasingly becoming a bottleneck for Germany's innovative power and international competitiveness. Skills and innovation potential of the employment population that have been previously underutilised must therefore be better exploited. The Expert Commission sees considerable need for action to enable women to contribute to a greater extent to research and innovation in Germany.

Especially in view of the narrowing leeway for fiscal policy, the Expert Commission urges the Federal Government to strongly commit to a long-term research and innovation policy. The success of recent years should create confident. A waning commitment on the part of the Federal Government, the Länder governments and the private sector carries the risk of consciously losing innovation-generated economic growth potential.

5.5 Creativity and Innovation at University

5.5.1 Creativity at Universities – a Critical Analysis of the Present Status

Wolfgang Wagner undertook a critical analysis of the status of creative thinking at German universities (Wagner, 2010). His findings show that there is plenty of room for improvement. His conclusions indicate that creative students generally find it difficult to fulfil their creativity. Wagner came up with a list of uncommon recommendations to promote the most valuable good driving the German economy:

The crazy thinking with its wild associations must be again promoted at universities. Only crazy thinking creates the novel.

Extension of the bachelor course to 4 years to include a “creative year”.

Explore the methodologies and thinking of as many other disciplines as possible during the first year and draw conclusions for the own subject.

Allow 20% of the time for self-determined free project work starting from the 4th semester.

The exact thinking checks and evaluates ideas. Learn the exact thinking and practice its error-friendly application to evaluate creative projects.

Understand education as competence and not knowledge. Education means the free recognition, development and accomplishment of each individual’s potential.

Contextual knowledge is necessary to resolve problems. The required knowledge should be defined via the competence rather than specialist knowledge.

Teaching and research should be an opportunity to gain a reputation.

Open the university to the education of the underprivileged. Support the first generation of such a family’s university students with a grant.

The universities must be democratically controlled and freed from the predominance of the professors. Re-define the services of the universities for the society in a parliamentary way: creative problem solving in research, teaching and learning.

The findings complement the latest assessment of the EFI. While the EFI report points out that “…Germany should focus on developing new competences in cutting-edge technologies through broad basic research and effective technology transfer…”, the critical assessment of creativity at universities goes to the roots of innovative power. Creativity is a prerequisite for innovation and must be enhanced to ensure Germany remains on the forefront of innovation.

Another study of the German and the US university system in the context of entrepreneurialism at universities by Lehrer et al. (2009) also indicates that *“homogenization weakens the contextual sources of entrepreneurialism and triggers a process of decline”*. Whereas the German university of the 19th century became the success model emulated by the US and many other countries, it has progressively evolved into a bureaucratically administered entity in which entrepreneurship is largely unfeasible. The authors identify the decline as the result of active national policy choices for the sake of rationalizing national R&D and the overall organization of higher education. 5 years later and recognising the problems, at many universities efforts have been made to overcome them.

5.6 Creative Teaching

Creative or innovative teaching at universities is of pivotal importance to encourage students to discover and develop their individual creative potential. Although traditional lectures will not disappear, other forms of teaching that allow for more active involvement of students have been established at many universities in Germany. Some of them have been successfully experimenting with new forms of teaching, a new relationship between teacher and student, learning concepts tailored to individual needs etc.

Craft et al. (2014) define the term “creative teaching” as encompassing term for teaching creatively and for teaching for creativity. While teaching creatively focuses on imaginative approaches in teaching, teaching for creativity targets the students creative abilities.

It has also been recognised that in order to enhance change and improvement, teachers need support in their work. Many universities now provide services (advice, coaching, training) to teaching staff alongside with the offers for students.

Tab. 1 only shows a few of many examples of the current developments and changes at German universities.

Tab. 1: Examples - Innovative Teaching
Technical University Kaiserslautern – Students as Partners Starting with 4 departments in 2008, the TU Kaiserslautern has made a serious attempt to profoundly change their teaching and as a direct consequence to increase the success rate of students. The key element identified to ensure success is the recognition of the students as partners. In their new role as partners with increasing participation and simultaneously increasing responsibility students are motivated to shape and improve the teaching. The key element that teaching mostly lacked was transparency. While research has already become more transparent, teaching has not developed in the same way. To achieve more student involvement the following elements have been implemented: Students can define their own teaching projects and present them for funding Student can win a price for the best teaching projects A steering committee “Studying and Teaching” has been established where students and teachers jointly discuss the funding of projects and research. Students have a minority veto. There is financial support available for the best innovative teaching projects. Further to the improvement of teaching, students gain invaluable soft skills through their involvement and participation at the university.
University for Applied Sciences Hamburg – Learning how to Teach Recognising deficits in the teaching, the University for Applied Sciences Hamburg (HAW) has developed and tested a new concept of coaching teaching staff to improve their teaching skills. The coaching system is now an accredited system and has been successfully implemented at the HAW. It comprises two components: Compulsory 1-year individual coaching for newly appointed teaching staff Optional 1-year team coaching for experienced teaching staff.

In particular the team coaching has helped increase transparency and through the sitting in on other lectures a lively discussion has been established which subsequently helped improve the teaching.

Krull et al. (2010)

University Kiel – Simply Good Teaching

The university Kiel is one of many universities experimenting with new ways of teaching. There is a lively exchange of feedback both from students and teachers aiming at further improvements. A selection of methodologies applied is given below.

The World Café is a methodology to get an in-depth discussion started. Dialogues in small groups similar to a street café or in the salons of the 19th century are more intense than a discussion in large groups in a seminar room. Participants in small groups of no more than 6 people including one "host" sit around a table and discuss a particular subject. An exchange between tables helps to deepen the discussion further. Comments and thoughts can be written down on the paper tablecloth. The results are presented and summarised in a plenary session.

Learning by Teaching is a simple methodology where students take on the role of teachers and pass on some of their knowledge to their fellow students. One of the advantages is that through the preparatory work students go through a second phase of learning. They are in the best position to judge where the difficulties are and can address them in an appropriate way. Generally the students' level of attention increases if they have to teach the subject of a lesson later on. Furthermore, successful teaching enhances confidence.

Discussion of Theses is an approach to scientific discussion. Students working in groups either prepare or are provided with one thesis relevant to their actual course work. The first step is to jointly establish a counter-thesis. The group then splits into two, each preparing arguments to support the thesis or the counter-thesis in the following discussion. The groups are then positioned at the end of a drawn line. The ends represent the thesis or the counter-thesis, respectively. The other students take position along the line, their position representing their individual opinion. In the course of the following discussion, they change position depending on how the arguments have changed their position. At the end a plenary discussion follows identifying what worked well and where weaknesses have been identified. This methodology enhances scientific, innovative thinking.

http://www.einfachgutelehre.uni-kiel.de/

5.6.1 Promotion of Creative and Innovative Thinking

Ultimate aim of innovative teaching is to promote creative and innovative thinking. Innovative teaching comprises many components that also characterise creativity and as such teaching and learning go hand in hand:

Ability of unconventional thinking

Through unconventional methods of teaching students acquire some familiarity with unconventionality which can be further enhanced.

Individual initiative

Through the concept of joint responsibility and partnership between teachers and students, initiative is promoted. Motivation and interest increase, too.

Special ability for a particular task and a profound knowledge

Through the various on-going changes and improvements in teaching at universities, students are expected to learn better.

Motivation and interest for a particular task.

Through applied project work, the presentation of project work and the discussion with other students or for example the teaching of subjects to others, students learn to work on a task with interest and engagement.

At many German universities, lectures and workshops are offered relating to the topic of creativity and how it can be promoted. Often such activities are limited to psychologists but should be part of any studies. One example is given in Tab. 2.

Supportive measures such as fellowships, grants, prices have been established to promote creativity and innovation.

Tab. 2: Example - Promotion of Creative and Innovative Thinking
Europe University Frankfurt – Albert Einstein Fellowship for creative and interdisciplinary thinking Recognising the importance of creative thinking across any boundaries, the Europe University in conjunction with the Einstein Forum and the Foundation Daimler and Benz provide a fellowship for researchers wanting to cross boundaries. The fellowship allows the realisation of a project outside of the scientist's subject of work and experience. Through the grant and provided accommodation in the summer house of A. Einstein at Caputh, for 6 month the scientist can devote his time uninterruptedly to the project.
http://www.forschung.europa-uni.de/en/ausschreibung/7910

5.6.2 Promotion of Interdisciplinary Thinking

The interdisciplinary approach has long been recognised as important credential to the success of research and innovation. At many universities in Germany efforts have been made to promote interdisciplinary research and it is now a requirement for funding of research projects. Interdisciplinary teaching and learning has consequently been recognised as important for the development of such skills. Repko (2009) gives 4 abilities that interdisciplinary learning fosters:

Perspective-taking techniques.

This refers to the capacity to understand multiple viewpoints on a given topic including an appreciation of the differences between disciplines and especially their perspectives on how to approach a problem and their rules of evidence.

Development of structural knowledge.

This is composed of two elements, declarative knowledge (i.e., factual information) and procedural knowledge (i.e., process-based information), which are needed to solve complex problems.

Integration of conflicting insights from alternative disciplines.

When ideas from a variety of disciplines are embraced when investigating an issue, alternative perspectives and predictions often arise. The intellectual challenge is to find ways to account for these which entails careful and creative thinking rather than revert to a single disciplinary explanation.

Interdisciplinary understanding.

This entails seeing an issue from an array of perspectives and recognizing how each of the alternative approaches influences one another.

At many German universities interdisciplinary teaching is an integral part of the courses. Two examples are given in Tab. 3 below.

Tab. 3: Examples - Promotion of interdisciplinary thinking
University of Applied Sciences Dresden – Environmental Engineering The University of Applied Sciences offers a complementary course Environmental Engineering specifically aiming at expanding the horizon, communicating with other disciplines and also international exchange. The one-semester practical and theoretical coursework includes: Remote sensing AutoCAD Landscape and open space development Urban design Floodplain ecology Water supply and modelling Geotechnical project – experimental soil mechanics Thermal renewable energy systems Seminar: Innovation in industry and transportation The course is open to students with at least four semesters in any subject of Engineering or Environmental Sciences.
 http://www.htw-dresden.de/en/index/international/international-students/environmental-engineering.html
Universities in Münster – Network Water Recognising the need for interdisciplinary work on the water sector, the Network Water – Universities in Münster (Netzwerk Wasser – Hochschulen in Münster) was founded in 2004. It is a platform of more than 30 working groups from the University of Applied Sciences, the University and the University Hospital. Through the integration of applied research and basic research on the water sector, the network has successfully developed a broad expertise and scientific excellence in three main fields: “Water and Nature”, “Water and Technique” and “Water and Humans”. The expertise is available to: Research and development

Innovation

Education

Knowledge transfer and trans-disciplinary processes

Each semester the network offers an interdisciplinary lecture “Water Knowledge” which covers a wide variety of subjects such as the fauna of watercourses, the inheritance from coal mining, flood protection and ecology, emission-free production of tomatoes and fish in greenhouses and others.

http://www.uni-muenster.de/NetzwerkWasser

5.6.3 Involvement of Students in on-going Research

Most universities provide the opportunity for students to participate in research activities. There are many ways of enhancing student involvement from an early stage and integrate students or graduates into the on-going research:

Compulsory work placements with a strong link to on-going research,

Compulsory project work with a strong link to on-going research,

Subject of Master and Bachelor theses relevant to on-going research,

Student research assistants,

PhD students.

<u>Student assistants</u> are paid for a limited number of hours to support the research staff thereby getting an inside in the actual research topics and development. The concept is aimed at students having an interest in research and might want to follow up their studies with further research. They get the opportunity to identify their particular field of interest which ideally leads to a Bachelor or Master thesis that is tailored to their interests.

<u>PhD students</u> have usually specified their research subject in conjunction with the on-going research at a particular institution or have identified an institution where their subject fits in. In Germany the majority of the research work at universities is carried out by PhD students. They momentously support the professors in their work and are also often involved in teaching.

New forms of better integrating students into research work have been implemented at some universities and show promising results (see example in Tab. 4 below).

Tab. 4: Example - Involvement of students in on-going research

University of Applied Sciences Dresden – Student Engineer Bureau (STING)

STING is a new approach to integrate students into on-going research activities. The team currently working on the research project “Energy efficiency in the drinking water supply” is composed of two scientists and 5 student assistants. Partners from the industry (regional water supply company and engineering consultancy) are also involved.

At first guided closely by the scientists, students were involved in the planning, preparation and completion of the experimental work in the laboratory. As the work progressed, they individually have taken over more responsibility and are now largely working independently. Progress and any issues have been regularly discussed. Support was made available at all times to avoid unproductive work but also to raise the confidence of the students.

The approach taken provides many benefits:

Opportunity for the partner from the industry to identify future staff and to help develop the required skills and built up a good relationship prior to potential employment.

Opportunity for the students to get an insight into research work and its application. They learn how to work as part of a team. The experience of taking responsibility is an excellent and necessary preparation for future work.

Students get an insight into where their studies tie in with potential future work in either research or the industry. This enhances their commitment to achieve good results and leads to increased engagement in their studies.

Opportunity for the HTWD to identify students for future research and integrate and form closer working (and sometimes personal) relationships with them from an early stage.

The breaking down of barriers between scientists and students by working in a team enhances the confidence of the students in their work and leads more quickly to the envisaged results.

5.6.4 Funding of Research

Funding of research is a prerequisite for the development of innovation. Fig. 3 gives an overview of the research performing organisations and their funding.

External funding at research institutions is an integral part of the budget available for research activities. The majority of the scientists at universities are funded externally.

External funding is limited to particular projects for a limited period of time, usually ranging from 2 to 3 years. Institutions applying for funding have to undergo a strict evaluation that takes the innovative character of the suggested project into consideration as well as the potential economic benefits including the opening-up of new markets for German enterprises.

The Federal Ministry of Education and Research (BMBF) have recently taken a new approach to the funding of research. Most programmes now require the co-funding through at least one partner from the industry. Small and medium enterprises are particularly encouraged to participate in applied research. Application for funding must include a utilization plan including prospects of success, potential applications and new markets, financial estimates, follow-up activities, benefits for the research institution).

Innovation

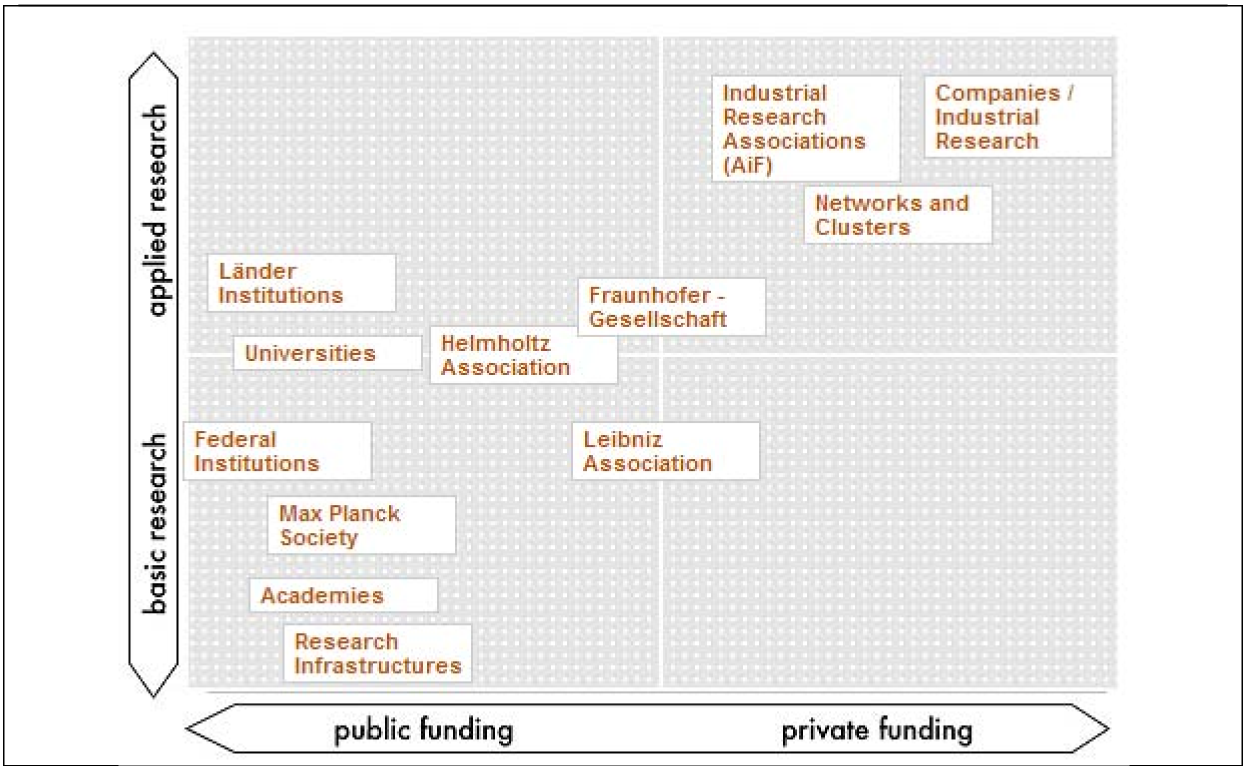

Fig. 3: Research performing organisations (BMBF, 2014)

5.6.5 Support of Transition from Studying to Entrepreneurship

Universities across Germany have recognised that in order to promote innovation and to ensure its subsequent transfer into sustainable business, students need support at an early stage. Further to the encouragement students receive through their studies, practical mentoring in the development of business ideas is now provided at many universities. Tab. 5 provides some examples.

The respective activities are supported by the Federal Ministry of Economics and Energy (BMWi) for example through EXIST, a support programme aimed at improving the entrepreneurial environment at universities and research institutions and at increasing the number of technology and knowledge based business start-ups. The EXIST program is part of the German government's "Hightech Strategy for Germany" and is co-financed by the European Social Fund (ESF).

Tab. 5: Examples - Support of Transition from Studying to Entrepreneurship

University of Applied Sciences Dresden – Incubator for business start-ups

Recognising the need to support students with innovative ideas to transform their ideas into a sustainable business, the HTWD has established the “Business Forge” to provide a wide range of offers for their students.

The Incubator offers a contact point for all questions on how to set up your own business.

The work of the Incubator primarily aims at the following two scenarios:

1. You have a good idea but are unsure whether it can be put into practice.

2. You have an excellent idea and want to put it into practice.

The support team of three experts offers:

The specification and substantiation of a business idea,

Develop a business plan,

Free use of rooms and infrastructure for up to 2 years,

Room for exchange with other teams,

Coaching including camps, seminars and lectures,

Use of the services of DRESEDEN EXISTS,

Advice on funding and financing,

Establishment of business contacts,

A wide range of events such as networking events, workshops and competitions.

http://www.htw-dresden.de/wiwi/fakultaet/htw-gruendungsschmiede.html

EXIST – National Support Network

EXIST is a support programme of the Federal Ministry of Economics and Energy (BMWi) aimed at improving the entrepreneurial environment at universities and research institutions and at increasing the number of technology and knowledge based business start-ups. The EXIST programme is part of the German government’s “Hightech Strategy for Germany” and is co-financed by funding of the European Social Fund (ESF).The network covers three main areas as shown below.

Fig. 4: Programme Lines Exist Program

1. The EXIST programme line "Culture of Entrepreneurship" supports projects at universities to build up an infrastructure for providing skills and support for technology and knowledge-based innovative ventures. In support of these activities, universities receive an allowance from the German Federal Ministry of Economics and Energy over a three-year period.

2. EXIST Business Start-Up Grant supports the preparation of innovative business start-up projects at universities and research institutions. The grant aims to help scientists, university graduates and students developing their business ideas into business plans and to advance their ideas for products and services.

3. EXIST Transfer of Research promotes technology-based business start-up projects in the pre-start-up and the start-up stage. EXIST Transfer of Research complements the broadly targeted EXIST Business Start-Up Grants with an excellence-oriented measure for high-tech start-ups.

The purpose of the first funding phase is to support research teams at universities or research institutes so as to enable them to provide proof for the technological feasibility of their product idea and to prepare the business start-up. During the second funding phase, the newly founded technology-oriented companies can be supported to continue the product design, for instance up to the prototype realization and to be able to solicit external funding for their company.

…http://www.exist.de/

5.7 Development of Innovation Transfer System Syria

In parallel to the structured implementation of the Bologna Process for water engineers in Syria the next couple of years, further changes to the education system should be envisaged to help enhance innovation. Restructuring the higher education system should include changes in the methodology of teaching and learning. Many European universities have already implemented profound changes in recent years. Syria can benefit from their manifold and successful experience.

To enhance innovation, an innovation transfer system that would provide support to students and graduates aiming at a business start-up should be established. It should become an integral part of the universities to ensure support at an early stage.

A recent research on innovation success of Portuguese Businesses by Janeiro et al. (2013) has clearly shown that the companies with the highest level of innovation also have to the highest level of engagement with universities using their creative potential for innovation. Therefore a strong cooperation between companies and the universities should be build-up.

A number of Syrian institutions, (e.g. SEBC, SHABAB) are in a good position to support the process and contribute advice during the pilot stage. Participating in the launch of an innovation transfer system will benefit the institution as it can extend its activities.

Encouragement of Innovation at the University

To promote innovation and the transfer of innovation, various mechanisms can be implemented to provide practical support to students.

Measures range from changes in teaching and learning methodologies to the implementation of an innovation office at the university that supports students in realising ideas and starting a business.

Although this is an engineering course, soft skills are as important as the engineering skills. A few methods relevant to any field of work have been selected and recommendations have been made how to implement them in the courses.

Some of the measures suggested in the sections below are accompanied by exemplary concepts for a lecture, seminar and other activities.

5.7.1 Creative teaching, learning and thinking

Creativity is the aspect of the education system that drives future innovation. Although individual creativity naturally varies, creativity can be enhanced and certain aspects can be significantly improved. Achim et al. (2013) sum it up in their study which analyses the development of engineering students' creative thinking: *"…everyone has creative abilities within them. Everyone can learn techniques that will lead them to generate more and better ideas. Creativity is not a rare talent that only few people are born with; each of us can be creative, under the right circumstances."*

The advantages and disadvantages of the current teaching methods should be assessed and analysed in the context of alternative methods.

The ultimate aim of any changes is to increase student involvement thereby increasing interest and enhancing their performance. Gibson (2010) found that the interaction between teacher and student plays a pivotal role, more important than the creative, unconventional ways of delivering the subject. And on the student's as well as the teacher's side it is passion for the subject that acts as a powerful and encompassing driver (Craft et al., 2014).

A study at Tishreen University (Ismael et al., 2010) similarly concludes that "*…Effective instructors are those who understand the importance of involving all of their students in learning.*"

5.7.2 Other Forms of Teaching/Learning

There are many new forms of teaching that have been successfully applied. Some of them have been described in Section 5.5. Tab. 6 summarises their application. They will work in combination with the traditional lectures, seminars etc. Ultimately they result in new forms of learning.

Preparing with students: students get involved in the planning. It is a means of increasing transparency of teaching to which students generally positively respond. It includes the topics and the way they are taught.

Learning by teaching: is an excellent form of enhancing learning. It works best in smaller groups. Prior to a particular seminar, students are informed that they will have to prepare the content for their fellow students. This will force an intense study of the topic.

Away from the class room: helps to create a more relaxed atmosphere that enhances learning. It can be simply realised by re-arranging tables in a café-style. Students and teachers can work and discuss in small groups.

Competitions and prices: it is energising to prepare material for a competition. It enhances quality as generally more attention is paid when actively preparing material compared to passively listening. It applies to teachers as well as students. Lectures or seminars could be subject to a competition as well as student project work, a solution to a problem, a test etc. Prices should be relevant to the studies and for students it could include going to a conference, getting financial support for a particular project etc.

Discussions: a well prepared discussion could be part of any topic. It helps students to learn how to think in a structured way and enhances their communication skills. A discussion could more general and open to any contribution or it could concentrate on a set of thesis and counter-thesis covering a particular topic. Students can prepare a discussion which additionally intensifies learning as they need to further study the topic as they gather information for the discussion.

Tab. 6: Application – Other forms of teaching/learning	
Preparing with students	Any subject Any form of teaching Could range from a single topic to the semester planning
Learning by teaching	Any subject Seminars Small stand-alone topics
Away from the class room	Languages, general qualification (e.g. soft skills) Seminars (small groups)
Competitions and prices	Any subject Any form of teaching or learning Could be applied from university level to small groups Applies to teachers and students
Discussions	Any subject Smaller groups Could be applied from university level to small groups Can be combined with 'Away from the class room' approach

5.7.3 Promoting Creativity

Integral part of the teaching should be the active promotion of creativity. The ultimate aim is to:

Develop new ideas,

Promotion of new thinking structures,

Promotion of creating & learning,

Increase curiosity, enthusiasm and subsequently motivation for learning,

Promotion independent learning,

Promotion of reflective thinking.

The aims listed apply to all forms of teaching throughout the studies. How the promotion of creativity can be incorporated into the teaching is shown in Tab. 7 below.

Tab. 7: Application – Promoting Creativity	
Develop new ideas	Present and use other/new problem solving concepts Choose unusual and original themes for project work
Promotion of new thinking structures	Students analyse a topic from different perspectives Allow divergence from consensus and established rules and routines Establish links to other disciplines
Promotion of creating & learning	Students produce results such as concept of teaching the topic, a podcast, planning for an event etc.
Increase curiosity, enthusiasm and subsequently motivation for learning	Provide as much practice oriented inputs as possible Support students in finding their individual way of learning Involve students in research and give them a chance to contribute ideas at an early stage
Promotion independent learning	Students define their topics for theses etc. Allow students to contribute questions and highlight gaps in the research Students participate in research on a well-defined topic Students organise their own learning structure, process and schedule Students define their own goals
Promotion of reflective thinking	Students are asked to always critical check their thinking and ideas Students identify assumptions and prejudices Discussions Aim to work/research beyond the set target

5.7.4 Practice Orientated Teaching

An important aspect of the education of water engineers should be the practice oriented teaching. There are many ways that can complement theoretical teaching at an early stage amongst them:

Guest lectures from experts from of the industry,

Excursions,

Project work,

Workshops where a particular subject is treated intensively in a block.

5.7.5 Teaching Soft Skills

There are various methods that can be generally applied to the process of creating ideas and analysing them, to identify issues and problems and to find potential solution.

Students should know them as they will be useful throughout their professional life.

Three of the most important methods have been selected and are described below. The brief description is complemented by an example for a seminar (see Appendix). Tab. 8 gives a summary of their application.

Tab. 8: Application – Teaching soft skills	
Brainstorming	General qualifications Seminar/workshop
SWOT	
Change Point of View	
Material for Seminar “Teaching Soft Skills”	

5.7.6 Brainstorming

Brainstorming is a useful technique to identify issues, solutions and opportunities. It can help individuals and organisations challenge their thinking, create space for doing things differently, and get different (hopefully better) results.

In a brainstorming session, it is quantity that counts not quality. The ultimate goal is to produce as many ideas as possible.

A session is composed of three steps:

Definition of topic,

Generation of ideas,

Evaluation of results.

There are various techniques; some of them are listed below:

Free brainstorming: the participants express their ideas as they occur.

Round-Robin brainstorming: the participants express their ideas in turns thereby ensuring that the session is not dominated by one or several people.

Pencil and paper brainstorming: participants write their ideas first and share them with the group afterwards.

Mind Mapping: a scribe gathers first ideas and writes them on a piece of paper arranging them around the topic in the middle. Further ideas will be arranged in a similar by either branching out from the first ideas or added as new ideas.

At the end of a session there will be a long list of ideas. Out of all ideas a list of feasible ideas will evolve which are recommended for further investigation. The evaluation process includes the following steps:

Ensure all ideas are correctly understood, Categorisation of ideas,

Ranking of ideas.

Tab. 9 provides some advice for a successful session.

Tab. 9: Tips - Brainstorming
It requires an experienced facilitator. The topic must be clearly defined. The question should be defined in a way that it allows positive and negative responses. Aim to generate as many ideas as possible in 20 to 30 minutes. Clarify that any idea is important. Don´t allow changes or any criticism or evaluation of the ideas while gathering ideas. Encourage less active participants to contribute their ideas.
http://www.wsa-intl.com http://www.businessballs.com/

5.7.7 SWOT Analysis

The SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis is an extremely useful tool for understanding and decision-making for all sorts of situations in business and organizations. Advice for a successful analysis session is given in Tab. 10.

The SWOT analysis is composed of four factors describing a situation or organisation. Strengths and weaknesses describe the internal factors whereas opportunities and threats describe the external factors. They are mapped against each as shown in Fig. 5: SWOT Matrix

The mapping allows identifying the priorities and assessing where the risk.

The S/O-field helps identify the best match of opportunities and strength defining the priorities.

The S/T-field identifies the risks that might compromise the strengths. The field should help answer the question how certain strengths can be applied to avoid particular risks.

The W/O-field points towards how opportunities can be used despite certain weaknesses and how weaknesses can be changed.

The W/T-field identifies where the highest risks are that should be avoided as the required strengths are missing.

Based on the combinations, suitable targets and options to achieve them will be developed.

SWOT-Analysis	**Strengths (internal)**	**Weaknesses (internal)**
Opportunities (external)	**S/O** **obvious natural priorities**	**W/O** **potentially attractive options**
Threats (external)	**S/T** **easy to defend and counter**	**W/T** **potentially high risk**

Fig. 5: SWOT Matrix

Tab. 10: Tips - SWOT
It requires an experienced facilitator The target of the SWOT analysis must be very clearly defined. It is important not to confuse external opportunities and internal strengths. A SWOT analysis describes a situation or conditions but is not a means to develop a strategy. There is no prioritising.
http://www.businessballs.com/

5.7.8 Changing Point of View

This is a tool if one looks for an innovative solution to a persistent problem that could not be resolved despite many attempts. Maybe changing the point of view is the solution. Changing Points of View is an exercise that enables people to look at a problem from a new perspective. Further advice is given in Tab. 11.

The method is a good unblocking tool when a group or team is stalled.

There are two main variations:

Changing perspectives: seeing the problem from another's point of view.

Double reversal: approaching a problem when the negatives (why a proposed solution won't work) are easier to identify than positives, or when conventional thought seems to hinder progress.

Changing perspective involves the analysis of the point of view of another person. One writes down what the other person might think, say or feel, consolidates and clarifies the points and discusses potential action related to one’s original idea.

The double reversal can be applied if conventional thinking does not lead any further. It has certain aspects that help energise the group. The double reversal comprises the following steps:

Identify the goal.

Write the goal in reverse of the original intent.

Rather than thinking about how to make something work, think about how to prevent something from working. (This is a single reversal technique.)

Identify the ways in which reversal can be attained.

Reverse the suggestions. (This is the double reversal.)

Review the new list for useful ideas.

Tab. 11: Tips – Changing Point of View
Change Point of View is primarily used for problem solving and not for well working things. The reverse thinking (e.g. “What do I need to do to flood the village and maximise destruction?”) can create an absurd situation but generally this can be used to energise the group.
 http://www.businessballs.com/ http://www.wsa-intl.com/271-tool-changing-points-of-view/

5.7.9 Involvement of Students in Research Activities

To enhance innovation it is important to get students involved in on-going research at an early stage (see Tab. 12). Staff as well as students greatly benefit from the concept of student support staff working in a research project. The benefits for students are manifold and include:

Identification of interests (topics),

Gaining inside in research activities,

Teamwork experience.

Students’ project studies, practical training and their Bachelor or Master thesis can also be integrated in the on-going research. In this way interest and responsibility will be gradually built up.

It is important to see students involved in any research as team members. The better they are integrated the more likely they will contribute good results.

Tab. 12: Application – Involvement of students in research activities	
Student support staff	Year 2 and year 3 Any research
BSc/MSc students	Year 3 Any research

5.7.10 Collaboration with a Company/Authority

An excellent way of gaining practical experience alongside the studies is the collaboration with a partner from the industry or an authority. There are several forms of collaboration listed in detail below and summarised in Tab. 13:

Contract between a company/authority and a particular student. Companies use the scheme to ensure they get the qualified staff they need. The often provide a topic for practical training, project studies and the BSc or MSc thesis, relevant to the company. They support the work with hands-on experience, advice and their expertise. Often they also support the student financially throughout the study time.

Contract between a company/authority and the university for a particular BSc or MSc thesis. The company usually provides the subject. Supervision will be jointly although the ultimate responsibility lies with the university. The contract between the company and the university regulates the data protection and data security and the status of the thesis. The company does not provide financial support.

Contract between a company/authority and the university for a particular project or practical training. This works best for a well-defined small topic or problem usually suggested by the company that can be finished in the set time. University and company jointly supervise the work.

Contract between company/authority and the university for teaching. Experienced staff from the industry are employed as guest lecturers for either a particular subject or a series of lectures.

Agreement on research collaboration between a company/authority and the university for a particular research project. Students can be integrated in research projects where they benefit from the involvement in research as well as practical work. An exchange between universities could be part of the agreement.

Tab. 13: Application – Collaboration with a company/authority	
Contract company/authority - student	Year 1 to year 3
Contract company/authority – university	Duration of project work Any research/working field relevant to the company and the university
Contract company/authority – university	Year 3 (duration of BSc/MSc thesis) Any research/working field relevant to the company and the university
Contract company/authority – university	Particular lecture/lecture series As per curriculum
Contract company-authority – university	Duration of research project work Field of particular project research

5.7.11 Competition for Innovation

Encouraging students to develop and propose innovative ideas should be addressed in the university educational programme. An annual competition for innovative ideas could provide an attractive platform (Stage 1). A close collaboration with the suggested advice centre (see Section 5.8) would ensure that the best ideas are taken forward and are given a chance to be further developed und if considered feasible to be funded for the development into an investment-worthy business case (Stage 2).

A team of experts composed of university staff, practitioners from the industry (e.g. already collaborating with the advice centre) and students is needed to establish the competition and to decide on the annual subject of the competition and to peer-review and finally judge the contributions.

At a pilot stage the competition can be established for the water sciences only and if successful it can then be extended to university level. Subjects of the pilot competition should tie-in with the national requirements and as such might include:

Water use efficiency,

Water reuse,

Water resources development,

Practical ways for water saving,

Simple and practical ideas for IWRM implementation and

Addressing the water shortage.

The competition and the judging of the ideas should be open to the scientific community and also to external experts in particular from the water industry. It could be a starting point for further collaboration between students (the university) and water companies. It is also a chance for students to demonstrate their potential.

The financing of the competition could be composed of three components:

Advice centre contribution (staff, small financial support for participants)

University contribution (facilities, staff)

External funding from the water industry

Tab. 14: Implementation – Competition for Innovation	
1 Establishment of pilot competition team	Responsible: Team leader of advice centre for innovation transfer 2 university staff 2 practitioners from the industry 2 students 1 staff from other institutions
2 Selection of subject of competition	Responsible: Competition team Definition of fields where innovation is most urgently needed Selection of annual topics Announcement of topics
3 Review of contributions	Responsible: Competition team Pre-review ideas Organise presentation of ideas (invite external professional experts) Establish judging principles Suggest best 3 ideas for further support at the innovation advice centre
4 Review of pilot competition and	Responsible: Competition team Review pilot competition Suggest improvements Follow-up further development of winner’s ideas Review the process Draft guidelines for application elsewhere
5 Establish annual competition at university level	Responsible: Team leader of advice centre for innovation transfer

5.8 Innovation Transfer System

5.8.1 Concept

Based on some of the successful components of innovation transfer in Germany, the recommended innovation transfer system (Fig. 6) could be composed of two key components:

a national support programme and

advice centres at universities.

State universities as well as private universities should have access to the funds which are distributed upon application for specific projects. This need to be elaborated more: For instance, if the university is private the state government should have an alternative solution to sustain on-going studies and research activities. A few lines in which is described in how should the government arrange for this. A career centre would also be a good idea to encourage finding and linkage of research to industry

It is important that the innovation transfer system should have its base at the universities where research takes place. This allows the support of students at early stages and the targeted promotion of innovation transfer at the cradle of innovation.

Publicity should be the responsibility of the advice centre.

Institutions already working on enterprise and business development (e.g. SEBC) should contribute their expertise and provide advise.

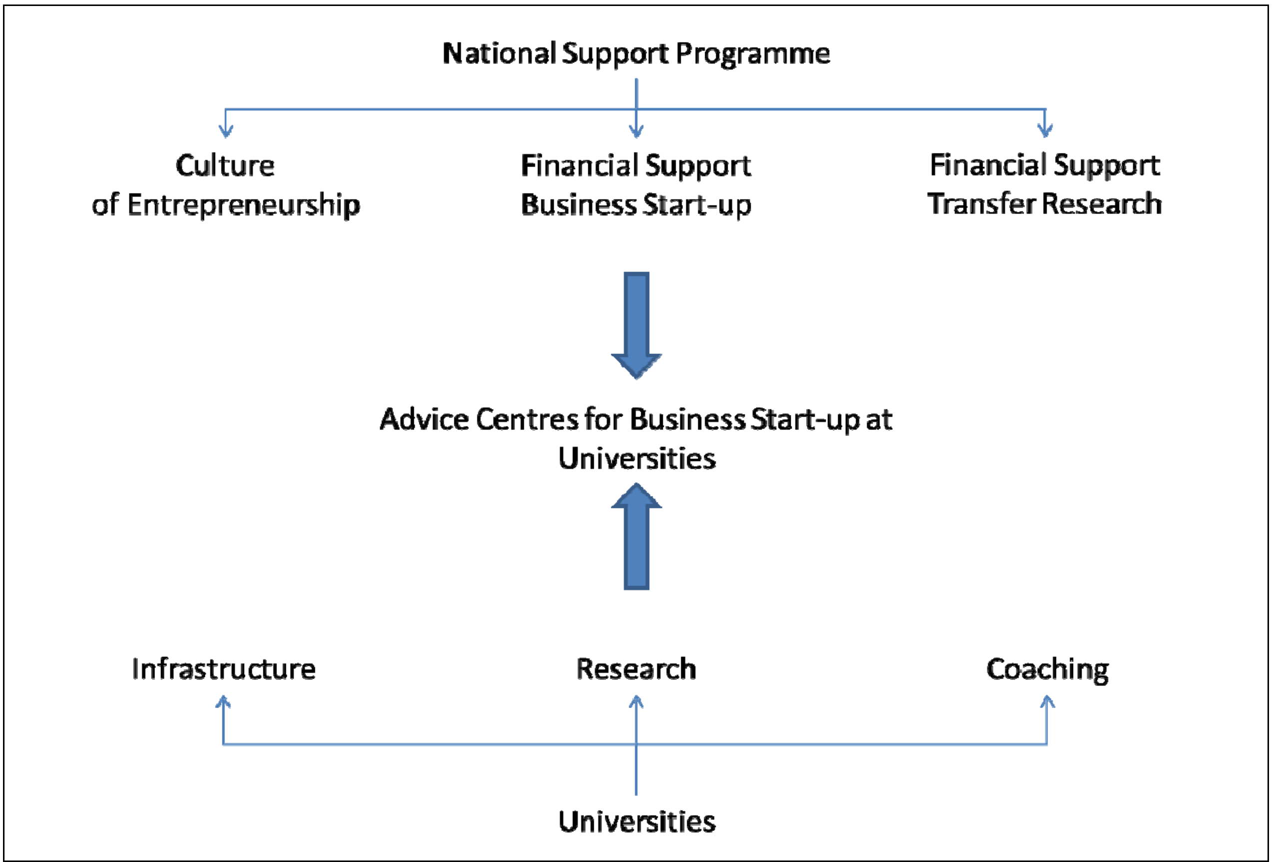

Fig. 6: Structure of Recommended Innovation Transfer System

5.8.2 The national support programme

The national support programme will provide the financial frame for the transfer of innovation. It would be best based with the Ministry of Economy and Trade. Alternatively it could be integrated into the Ministry of Higher Education. The ministry can either run the programme or commission the programme to be run by a third party.

The programme will provide financial support in three forms:

Financing the support centres,

Business start-up grant,

Transfer of research support,

Grant for small projects with less focus on innovation.

5.8.3 Financing of the Advice Centre for Business Start-up

It is recommended that the financial responsibility for all components of the innovation transfer system lies with the national support programme. Although the respective universities might contribute to the financing of the advice centres (e.g. by providing facilities and staff) the ultimate responsibility should remain with the national programme.

5.8.4 Business start-up grant

The Business start-up grant aims at supporting early-stage start-ups from universities. The development of the product/service concept and the drawing up of a business plan through to the establishment of the company are financed within this programme.

It supports innovative technology-oriented start-up projects and innovative services with a high customer benefit based on academic findings indicative of a unique selling point on the market.

Grants can be applied for by:

Graduates from universities and other research institutions,

Graduates or former academic associates (up to five years after graduation/leaving the institution),

Students who have completed at least half of their course at the time of application,

Start-up teams of up to three people.

The financial support is provided for a period up to one year to:

Subsistence grant depending on level of degree:

PhD: SYP 60,000/month

Graduates: SYP 55,000/month

Undergraduates: SYP 50,000/month

Note: 25% must be added for applicants based in Damascus

Material expenses: up to SYP 200,000 for individual start-ups (up to SYP 500,000 for teams) (This vary a lot depends on the level of study. The mentioned numbers are for undergraduates. This can be multiplied by 2 or 10 or more for master degrees or PhD depends on the research type and the requested tools.)

Start-up-related coaching: SYP 200,000/month

Applications for the grant will be submitted by the research institution via the support centre.

5.8.5 Transfer of Research Support

The transfer of research grant is designed to increase the number of high-technology start-ups from universities and other research institutions.

It supports high-technology start-up projects with intensive development periods, assuming the technical feasibility of the product concept has in principle been demonstrated and development work to realize the product concept in the form of a marketable product in the company and the launch of business activities.

The grant is aimed at

Teams of researchers at universities or other research institutions (maximum of three academics, technicians or lab workers)

Enlargement of the team to include one person with business skills is possible

The financial support is provided for a period up to 18 months and covers:

Staff costs,

Material expenses up to SYP 200,000-3000,000 (average figures) for equipment, material, capital goods, property rights, market research, awarding of contracts,

Coaching measures SYP 300,000/month

Applications for the grant will be submitted by the research institution via the advice centre.

5.9 Advice Centre for Business Start-up (Business Forge)

5.9.1 Location

Advice centres should be established at the main universities. To start the process of creating the system one centre might be established as a pilot project followed by regional centres grouping universities together. Depending on success, the regional centres can then be further broken down to individual university level.

5.9.2 Staff

With the advice entre working at university level, it requires the collaboration between faculties. Staff should be trained in economics.

The support team should be run by a team leader (part time or volunteering) in charge of the management of the centre, one full-time staff who would be responsible for the lectures and the mentoring and one or two student support staff (part-time) who would assist with any preparatory work. The team leader will have a greater input during the founding phase to establish contacts, lead negotiations, draft agreements and develop concepts. Once the advice centre has been established the input would be significantly less than during the early stages.

Support might be provided by other already established institutions.

5.9.3 Facilities

The university provides the facilities for a person or a team to continuously work on an innovation from the concretisation of an idea to the founding of a business. As such the facilities provided include:

2 – 3 rooms,

Computer/work stations,

Internet and telephone facilities,

Presentation facilities,

Other facilities (e.g. for visitors, laboratories).

5.9.4 Services

Lecture series (for suggested structure see Appendix)

Concretisation of business idea,

Development of business plan,

Use of infrastructure for max. 5 years,

Platform for exchange with other teams/individuals,

Coaching for start-up-relevant topics,

Consultation on subsidies, promotions and financing,

Support with application for grants at the National Support Programme,

Upon application the centre provides a mentor,

Contacts to the business world,

Events such as networking, competitions etc.

The lecture series could also be offered to all students as part of the general qualifications.

5.9.5 Financing

It is recommended that the financial responsibility for all components of the innovation transfer system lies with the national support programme.

A key might be agreed defining a contribution from the respective universities.

5.9.6 Recommendations for Implementation

Tab. 15 and Tab. 16 the implementation process for the national support programme and the advice centre, respectively.

Considering the present crisis and the need for basic reconstruction works the suggested innovation transfer system might be tailored to the actual situation focusing on financial support and limited coaching for small businesses in the interest of national reconstruction.

Tab. 15: Implementation – National support programme	
1 Call experts and draft programme	Responsible: Prof. Dr Mohammad Amer Al Mardini Call for experts from university, the (water) industry and other existing institutions Establish expert team Draft programme and define requirements for the next 5 years Prepare material for presentation
2 Establishment of contact with the Ministry of Economy and Trade and the Ministry of Higher Education	Responsible: Prof. Dr. Mohammad Amer Al Mardini Presentation of idea by the team of experts to the MET and the MHE Incorporate comments and finalise programme Establish funding and application procedures (funding stream) Nominate peer-reviewer
3 Establish contact to the industry	Responsible: Expert team Identify potential partners Contact individual partners Establish formal partnership
4 Review programme on a annual basis for 5 years	Responsible: Independent peer-reviewer Review of programme Present the review to the expert team Revise programme

Tab. 16: Implementation – Advice Centre for Business Start-up	
1 Establishment of pilot advice centre at Damascus University	Responsible: Prof. Dr. Mohammad Amer Al Mardini Establish contact to Faculty of Economics to discuss project Establish contact to the Faculty of Information to discuss the project Form working group to establish the centre and nominate team leader Jointly develop concept for presentation to the Ministry of Higher Education Integrate two core lectures into the offers for the general qualifications (start at the department of water) Organise facilities (rooms, purchase computers etc.) Employ staff (1 full time economist (leader), 1 SHK) Publicity (including presentation of the concept to the staff and students at university, the business community , the interested public) Establish contacts to entrepreneurs willing to build-up a national support network under the umbrella of the advice centre (or the national support programme) Organise first competition for innovation Identify potential pilot start-up(s) from the competition Guide and support the pilot start-ups Duration: 5 years
2 Evaluation of pilot advice centre at Damascus University	Responsible: Independent peer-reviewer Number of start-ups Participants in lectures offered by the advice centre Financial arrangements with National Support Programme in place? Development of procedures for application of funding (grants and financing of facilities and staff) finalised? Guidelines for support developed? Is there a need to increase the number of advice centres?
3 Establishment of other advice centre(s) at the Universities	If a need for more advice centres has been identified Responsible: Leader of Damascus advise centre Presentation of work of advise centre at Damascus University to other universities (including of Lattakia, Homs and Aleppo) Identification of other location(s) and respective responsibility Capacity building by the Damascus Advise centre Follow reviewed Damascus procedure

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5.11 Appendices

Example Structure Lectures Business Management and Business Planning

Tab. 17: Overview lectures in business management for business start-ups
Introduction
Founding your own business – first steps
Business idea and business plan
Marketing 1
Marketing 2
Business law
Taxes
Financial planning 1
Financial planning 2
Business administration 1
Business administration 2
Organisation and staff

Tab. 18: Overview lecture development of business plan	
Content	
Executive Summary of BP	Business idea and concept Potential customers, benefit for the customers Team and competencies Financial summary Financial need
Business idea	Presentation of idea Definition of users, estimate of user number Competitive advantage State of development Patenting
Market and Competition	Target users Market analysis, trend analysis Market coverage Structure of industry Barriers to market Competitors, their strengths and weaknesses Market strategy
Marketing	Target groups Product description Price Marketing Distribution
Team and Management	Team members, qualifications Legal form Location and structure of organisation Value chain and workflow Development and sales cooperation Partners
Chances and Risks	SWOT analysis Analysis of chances from the market analysis Further development of business Analysis of chances from the market analysis Strategies
Implementation	Short, medium and long-term work packages Milestones
Financial planning	Budgeting Planning for liquidation Profitability Capital need and sources Development scenarios
Documents	Personal documents Legal documents Other documents required

6 Triangle of Education, Research and Innovation

Lead Partner: ALBA	Type of work package	Tit/e of work package	Start	End
WP.4	Development	Triangle of education, research and innovation	5	36

4.1	Development of the triangle system	Report		2013-09-30	International level
4.2	Workshop	Events: Conferences and Seminars	UO	2012-04-30	International level

Related assumptions and risks:

The related assumptions are the results and the deliveries of the previous WP1, 2, and 3. The risks are the non performance of the deliveries in the WP1, 2, and 3. Risks are in the decision making and implementation process in case that one important policy maker is not adequately involved. To overcome this risk, the 5yrian partners are engaged to identify all stakeholders to involve.

Description of *work package*:

The triangle of education, research and innovation is the core of the project. The tri angle can so feel well only, how every single part. Therefore, the three parts, education, research as well as innovation are developed in temporal order before (WP1, 2 and 3). Good single achievements do not mean automatically that a new quality originates from the unification which is more than only the addition of the single achievements. That's why a separate WP is implemented to analyze an d to develop the mutual connections of the triangle. This one happens not in the self run, but the involved partners must recognize the mutual advantage and prove as a use.

In this WP the methods of the triangle connection of the EU must adapted to the 5yrian conditions and requirements. The connection between research and higher education is characterized by the involving of students, special graduation thesis and project studies, in the research processing. Besides, the results of research flow in directly the teaching. The results of research go as innovation in the enterprises, engineering offices. The highest qualified kind is to start-up the business based of a research results. The biggest part of research demands will be done by the industry and enterprises.

The connection between industry and education is given by the request of high motivated graduated which a high level of capability. So the industry influences the quality of the education. The graduates of the universities are the most important input to the industry; this one is the human asset of the economy of the countries. By the WP the quality and relevance of higher education in 5yria are enhanced. Besides, the triangle education-research-innovation is determined by inter-disciplinarily, trans-disciplinarily and internationalisation.

The deliveries of this WP enhance the employability of the graduates and the networking among the universities and research institutions both in the 5yria and European countries.

Deliverables

4.1 Development of the triangle system (2013-09-30)

This report shoes activities which are necessary to implement an effective working triangle system. For the triangle exist a frame which must fill in with adapted variants for each university and her region. Core points are the integration of research activities into the professional studies, the updating of the curricula based on the recent research results, generation of forums for contact between academic research and companies, consideration of socio-economical and policy effects.

4.2 Workshop (2012-04-30)

This workshop takes place in Opole/Poland and is organized by the UO. In this workshop a permanent discussion about this WP 4 carry out. This WP 4 is linked very strong to the WP1, 2 and 3. The discussion must go not only inside the team of WP4 but also outside to WP1, 2 and 3. Therefore the workshops in the other WP's are relevant, too. The final results of the delivery 4.1 wiII be presented at the workshop WP 6.

Aim of the report:

- Studying in depth each node of the triangle of education, research and innovation.
- Studying the relation between the three nodes of the triangle of education, research and innovation.
- Studying the steps to be taken to enhance the optimal functioning of the triangular system.

6.1 General Overview – Introducing the Triangle of Education, Research & Innovation

The goal of the project is an education for highly motivated scientists of the water management sector as one of the priority sectors of Syrian economic system and corresponding to the requirements of the modern labour market. New master and PhD study courses in water engineering for all universities are being developed and ready for implementation in Syria, using existing study courses of Faculties Civil Engineering and Agriculture. One goal is also to overcome the fragmentation and to create a transparent teaching environment for Syrian stakeholders. The quality and competence of the Syrian graduates are enhanced by introduction of the Bologna system including modules and ECTS.

Because the triangle is the core of EDUWAT Project, the focus in this report on the three nodes of the triangle (Figure 1), the relations between those nodes and the steps to optimize the triangular system. In the preceding work packages the nodes were partly elaborated separately.

The challenge of WP4 was to link the parts (WP1 education, WP2 research, WP3 innovation) together and to bring the triangular concept to life.

All the discussions were oriented to meet the situation Syrian partner universities, not only of Al Baath University.

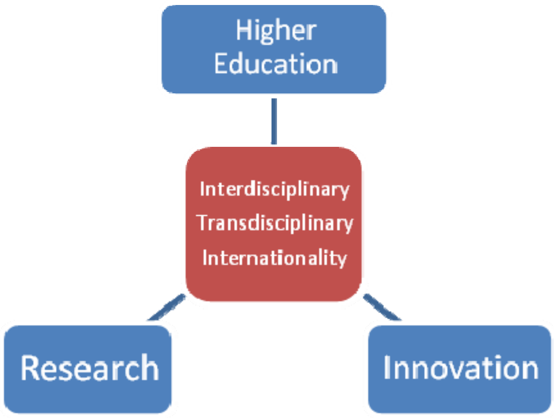


Fig. 1: Nodes of the triangle

6.1.1 Nodes of the Triangle

6.1.1.1 Education

The report is based on the experience of Homes University within the project EDUWAT, but in a general view for Syria. The education environment as proposed by EDUWAT is following the three levels established according to the Bologna process:

- **Bachelor**
- **Master**
- **PhD**

Observed are the increasing numbers of Master and PhD degrees are accomplished in water engineering.

Additionally acknowledged is the need for continuous education by

- **Postgraduate training courses**

The two main education directions related to water engineering studies are hosted by the:

1- Department of Water Resources Engineering and Management in the Faculty of Civil Engineering.

2- Department of Soil and Water Engineering Department at the Faculty of Agriculture.

- These two faculties are also present in similar or comparable form at the other Syrian universities. These two faculties provide bachelor degrees, masters & PhD's. They also support scientific research conducted by the academic staff and students.
- In addition the Higher Institute for Water Management (HIWM), a unique institution in Syria, awards Master and PhD's degrees. Scientific research is also supported as well. The Higher Institute for Water Management is located at the campus of Al Baath University at Homs city in Syria.

General conclusion from discussions involving all partners are:

- Reducing the study time for bachelor, master & PhD is very important according to Bologna Process. Implementing the credit hour system can be very useful in decreasing the years spent by students in the university.
- Master students are directed to cooperate with local authorities to have access to real case studies in water management. This guarantees the link between university and stakeholders.
- Curricula of study programs related to water engineering are revised and modernized from time to time (Figure 2). This was partly under an initiative directed by MoHE to modernize curricula and build National Academic Reference Standards (NARS).

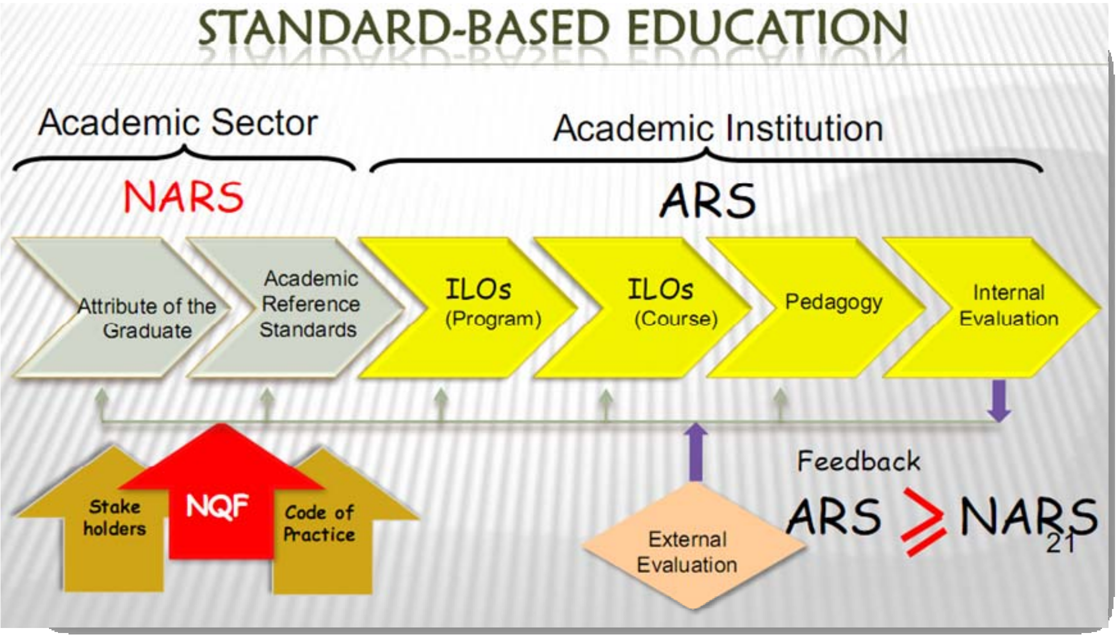


Fig. 2 National Quality Framework (NQF) for curriculua evaluation and improvement

First attempts of continuous education are:

- Annually, Al Baath University celebrates the international day of water on the 22nd of March each year. Usually workshops are held, speakers are invited to lecture about modern water studies.
- Occasionally, water related training, workshops (Figure 3) and conferences are held at the university campus in cooperation with related ministries, research centers and

international organizations, e.g. the one held in cooperation with HIWM and AGEF (XXXXX) for optimal management of water resources. Such conferences are of great important to enhance the cooperation with other ministries and institutes. It also paves the road for new joint researches.

Fig. 3 International workshop in Homes

The priority for node one is to improve the quality of the university outcome, which are mainly the graduated students. The graduates should be better prepared to effectively enter the labour market. Here the role of the Skills and Career Center at the university is extremely important. A first center like this was established at Homs University.

In the context of Water Management education within the knowledge triangle there are key questions to be answered such as:

- Are the graduated students in the field of water studies aware of the concept of a modern water management?
- Are they capable of entering the labour market?
- Are they problem solvers?
- Do they have the expertise acquired to perform high quality research?
- Are they innovative enough to lead the process of water management?
- To what extent are students graduates capable of contributing to innovation?
- What do we expect from our graduates with in the triangular framework?
- What factors influence the intention to become self employed after graduation?
- How do start-up teams evolve during growth stages and what is the role of the entrepreneurial scientist?

As a follow up of the addressed questions recent actions taken by the University of Homes are:

The university is preparing ideas to promote the results of the project and arranging for information sessions to take place after the end of the project to publish the results of the project and give information about the manners to start the new programs.

The university has allocated two rooms as meeting point for all persons who are involved and interested in the program. Those persons may be students who would like to register, academic staff, person from industrial sector….etc. The staff responsible for this information and meeting point is responsible to do all administrative arrangements, student registration, connecting with other partners inside and outside Syria in addition to persuading the process of application.

All other EDUWAT partner universities are encouraged to take adequate measures respectively.

How can the university help students and graduates?

- Students work on a graduation project in the final year. As universities we can orient the students to search for the topic of their graduation project in the water sector institutions. We can ask them also to find a co-supervisor from these institutions who will participate in the final discussion and assessment of the project.
- Alumni: by establishing alumni associations for each field or faculty we can ensure expert and information exchange and development for all members.
  Through the alumni, all members can share together their ideas, problems, solutions and new trends; and they can discuss all these issues and make use of the experience of each other.
- Scientific journals and periodic: by making these facilities available for students and alumni, they also can take advantage of the foreign researchers and new concepts of other universities and research centers.
- Enhance consulting of international web pages of the same specialty of institutions or universities will keep them up to date with the international experts. This will lead to improving practical expertise of our staff, graduates and students.
- Taking advantage of others experiences in the EU, students are requested to perform an internship in companies of their specialization. There they should be involved in the real life where they are forced to practice what they have learnt in the university. They deal with labor market very early and directly; thus they can show their abilities and their capacity to practice the knowledge they have gained from the university in companies. This also makes an opportunity for the company to attract potential employees who they really need.
- The university should follow up the career of its graduates in the labor market after six months and after 5 years of graduation. It is important for the ministry to make this issue a task to be performed by universities and should be reported back annually.
- Information about job trends of university graduates and the relation with labor market should be collected, analyzed and published by the university to enable future students, parents and outstanding students to know more about the transformation and opportunities in labor market.
- Developing a national website (higher education career in Syria).
- Curriculum are adopted to take into consideration the concept of creative teaching, innovative thinking and thinking out of the box.

6.1.1.2 Research

Overview

Researches are conducted within the two faculties and in the Higher Institute for Water Management. Well-equipped laboratories are available and the institutions make reliable effort to supply needed equipment, although sufficient fund is always the main problem. The funding structure was analyzed in detail in WP2 (Table 1). Students at the Bachelor level are taught the basic principles of research. The involvement of students into research is increased at the Master level and culminates in PhD-Studies (WP2, Figure 1).

The research involvement can be summarized according to:

- Bachelor graduation projects: first research attempts.
- Master and PhDs thesis works: research involvement gradually increased.
- Scientific researches published in local and international refereed journals.

The main challenge for improving the research process is the concept of research itself, how do we understand the process of research and how to implement researches in real-life experiences. We need to find and activate the center of excellence in Syrian universities. Installing the new developed curricula should take into consideration the need for enhancing the research process in Syrian universities (node two in research triangle). In order to establish a totally new structure for research in Syrian universities, the three following ideas must be taken into consideration:

Interdisciplinarity: strong emphasis is given due to the new transparent curricula and improvements of the research concepts that the universities are cooperating more amongst each other and also with the private sector. Research guided teaching is one of the links in the knowledge triangle.

Trans-disciplinarity: where we have to create new research fields by combining more than one field of traditional science. Actually, all Syrian universities lack this idea in the current time. In trans-disciplinarity, we have to take great care in building a team that meets the needs of the public and private sector. The emerging problems we are facing now require understanding the complexities of a whole project, rather than single parts. Integrated water resources management is a good example of this where hydrological, hydro-geological, agricultural and socio-economical sciences are combined.

Internationality: where we have to shift the research from national to international activities. The tools used for this goal are networking and international cooperation.

Role of research in the Knowledge Triangle context

- To increase synergy of each of the three basic missions (research, education and innovation). Research guided education (see also WP1) guarantees innovation.
- More specifically the role of research in the KT context is especially to **produce more foresight knowledge to be used in education and to ensure innovation.**

The link between teaching and research could be clearly elaborated and suggestions for development and improvements were made. Finally the last node innovation is presented.

6.1.1.3 Innovation

Making innovation after setting the prerequisites through education and research guided education operational stakeholder involvement has to be addressed. Four strands have to be addressed:

- **Industry and enterprises**
- **Engineering offices**
- **Business start-up initiatives**
- **Patent Information Center**

The university supports innovation concepts initiated by students, researchers and academic staff. The support is limited due to the little amount of financial sources available at the university. Financing from outside the university is rare, although some NGO's try to support innovation ideas. The skills and career center at the university plays a key role in supporting innovation ideas of the post graduate students. Other Syrian universities also have their own skills and career centers which play similar roles.

Five years ago Al Baath University opened a patent office at the university campus, but the patent office also plays a minor role in supporting innovation in addition to helping register patents. Similar patent offices are also established in other Syrian universities and they play the same minor role.

In spite of everything above mentioned, Syrian universities are still far away from a satisfactory realization of innovation. Syrian partners should work with their European partners to develop a transfer mechanism in the field of innovation.

Importance of Innovation at Universities

All Syrian universities realize the need of innovation to develop their country and to grow the economy. One of the great challenging problems that we face in Syria is making innovation one of the important tools to help us overcome these problems. The coming years of re-construction will require a great deal of good innovations and applied researches.

Possible Steps to Enhance Innovation

Syrian universities face the challenge of equipping students with the skills required for an innovative economy. More attention should be paid from Syrian universities regarding innovation inside the universities. Skills and career centers, scientific incubators, in addition to the patent offices should play a significant role. More programs, projects and initiations should be adopted by the universities towards innovation. Installing the new developed curricula may also help in rising up the issue of innovation. Cooperation with the public and private sector in addition to international cooperation is a must.

Students at Syrian universities should be introduced to new ways of thinking, like thinking out of the box, creative thinking, brain storming …etc. Previously some Syrian universities adopted the Swedish experience at Lund University called 48BIZ-CAMP and it was supported by TEMPUS program. The Syrian version was called 24BIZ-CAMP where students of different fields of study where grouped together in groups of 6 students per group. Real-life problems were presented to each group. The problems were submitted from the public and private sector outside the university and these sides sent their representatives and were part of the coaches and jury. The students groups had 24 hours to analyze the problem, find a solution and present their solution.

Al Baath University as well as other Syrian universities is highly interested in the experience and practice of European universities in the field of innovation. We should follow the creative teaching methods of our European partners, encouraging new effective thinking methods and above all ask University teachers „act as an initiator and facilitator of innovation". Some examples of successful European experiences are EXIST & Business Forge at HTW, Dresden. Establishing a structure for "Business start-up" at the Syrian universities would help, where the universities adopt creative ideas of student leading them to a success story. The logistic and financial issues are again the main challenge. As a start, Syrian universities can supply the needed infrastructure for activating skills and career centers (Figure 4), incubators, patent offices, coaches of innovation… etc. For bringing graduates and the job market together, job fairs are being introduced at Al Baath University (Figure XX). Of course these fairs are open to graduates from all Syrian universities.

Fig. 4 Activities of Skills &Career Center at AL-Baath University

Fig. 5 The second job affair at Al Baath University

6.1.2 Relation Between Nodes:

In one sentence the relation between the nodes can be summarized as following: Research is an indispensable tool used in education for generating knowledge which, in turn, is applied to and realized in industry. On the other hand, industry brings in the real world from which schools in turn extract knowledge.

Therefore **developing interrelated structures** for interacting and cooperating with industry and society is needed, e.g.

– Promoting different forms of cross-departmental cooperation,

– Organizing university outreach: continuing education centers and innovation centers managing cooperation and co-development,

– Incubators.

6.1.2.1 Higher Education – Research

The relationship between education and research was included in the newly developed curricula. However, Dolbin (1982) stated that this relation is often assumed and just as often ignored. Research should and does influence education (and vice versa), but the gulf between the two can at times seem large. Teachers are told to use “research-based strategies” and yet such strategies may be presented to them stripped of the very sensitivity to context, analytic rigor, and thoughtful skepticism that are the hallmarks of quality research. The EDUWAT project partners are aware of this risk. Due to applying the knowledge triangle this risk is minimized.

There are a large number of research experiments of other universities those we can learn from and take what is suitable and applicable at Syrian universities. EDUWAT gives all the partner universities the chance to exchange experiments and ideas from each others. European Universities as well as enterprises have a good experience in developing innovation and research funding e.g EDUWAT partner M&S Umweltprojekt GmbH Plauen, in which of course the cooperation will continue beyond the project.

In order not to repeat the same topics in Masters and PhDs programmes, the Syrian universities have their own measurements. Before approving the registration of any Master or PhD degree student, a cross verification is done between the five Syrian public universities to check that the research topic is genuine, new and has never been addressed before. This issue is the responsibility of the researcher.

Steps taken by HEI to enhance research are indicated below:

- **Modernization of curricula** to meet the needs of research: Even though the curriculum related to water sector was revised several times and many changes have been done the need of more modernization is still present. Due to EDUWAT the education environment is drastically impacted. However global needs are constantly in progress and new needs arise from time to time. Due to the new challenges and population crisis many changes and problems have emerged, especially the demand for new water resources or at least the need for serious procedures to maintain the existing ones. These topics are very urgent and critical to be dealt with in research and researchers should pay all efforts in the field of water issues. The new curricula are aiming to reflect the reality. For example new courses for water infrastructure rehabilitation were introduced. This was not so dominant at the beginning of EDUWAT.

- The researches done at the university should deal with more **real-case studies**, in addition to focusing on the economic aspect of the research. Linking the research with needs of the market.
- **Empowering critical thinking skills**. Our universities are used to traditional lecturing and teaching but critical thinking is one of the tasks of universities. The need for empowering critical thinking skills is obvious. Few steps were taken in the university through the workshops and activities of the Skills & Career Center, but still the need to enlarge this action is present. Everyone should adopt the idea of "THINK OUT OF THE BOX". Skills and career center at the university help students and graduates to practice this kind of thinking through different workshops, activities and intensive courses.
- The regulations and laws related to the research process seem to be very good. There is no problem with the laws and regulations. The main problem is with people, so we need to get everyone involved in the process starting from the first year students.
- Finding alternative methods of funding researches.

Homs-Saxony Center for Environmental Studies was established at Al Baath University for encouraging and supporting research in the field of Environment (water, soil, air). The center should be re-activated as it is at present an ideal example of connecting HEI to research, taking into consideration the close relation between environmental studies and water engineering and management.

Changing the basis of research process in HEI will be faced by concrete walls (old-fashioned people). We have to work on young researchers starting from the first year students in order to end up with new up to date researcher. In Syria we have to change the mentality of the decision makers to get them more involved in implementing good practices of the research process and to omit out of date practices.

The financial shortcomings of researches need to be solved by finding alternative methods of funding. Getting the private sector involved in the funding of research is most important. This is done by addressing the needs of the private sector through research done by the HEI's.

Theoretically-based as well as practical-based research should be attractive for the private sector to motivate the private sector to fund research more and more.

The public sector is also involved in the funding process by some regulations and laws, but it needs to be pointed towards the researches done by the HEI's.

Private & public institutions related to water engineering include:

- Ministry of Higher Education.
- Ministry of Agriculture.
- Ministry of Water Resources.
- Ministry of Environment.
- ICARDA (International Center for Agricultural Research in the Dry Areas)
- ISESCO (Islamische Organisation für Bildung, Wissenschaft und Kultur)
- ACSAD (Arab Center for the Study of Arid Zones and Dry Lands).
- The General Company of hydraulic studies.
- Hasiaa' Industrial City in Homs & other industrial cities all over Syria.

- Chamber of Industry.
- Chamber of Commerce.
- The Syrian Engineering Syndicate.
- The Syrian Agriculture Syndicate.

6.1.2.2 Higher Education – Innovation:

Governmental universities graduate a great number of engineers every year. These graduates need to find suitable employment. Thus we can notice the increasing demand of new opportunities especially in the sector Water Management Sector.

Many steps were taken by the university and ministry of Higher education such as:

- UHES project in corporation with UNDP about the strategies of admitting universities, started in 2007. Although it was cancelled but the ideas and benefits it provided has enriched the concept of innovation.
- Patent office at the university. The patent office helps with the registration of creative ideas. Up till now only very few patents related to water management and infrastructure have been registered. Annually a fair of creative ideas of the university in Homs is being held at the campus. During these fairs the university focuses on encouraging students and graduates to present new ideas and transfer them in a genuine creative form.
- Tempus project lead by Lund University about Skills & career Centers: pathway to labor market. The center aims to provide students and graduates with many soft skills that they need in their career life in addition to their specialties. Students highly interact and communicate with the center which they find very important for them. Students are encouraged to continuously update their soft skills. Although the Skills and Career Center lacks the means of funding innovation, it can help through its good networks and relations to the private and public sector of the labour market. These networks and relations are getting bigger and wider. The idea of preparing a local or regional conference between all the skills and career centers in Syrian universities exists. The conference can be held in 2015 with the support of the ministry of Higher Education.
- The main problem is that innovation within the university can be pointed out as “individual effort” which can be called creative ideas, more than as “organized effort” which can be called real innovation.
- University Students should perform one month internship in companies and institutions.
- Symposia and conferences held by the university in cooperation with the industrial sector to highlight the problems and new creative ideas (Figure 6 and 7).

Fig. 6 Capacity Building workshops for high level manager in the Water Sector, joint cooperation between (HIWM, Al-Baath University, InWent)

Fig. 7 The first exhibition of innovations at Al Baath University

The private sector and public authorities also organize seasonal and annual competitions for creative ideas among students and academic staff. The Basel Assad prize for the best university creative idea is an example of public sector support. Shell annual competition for the most innovative idea of university students is an example of private sector support. The main problem is that participants do not get any support from the university. They put in all the effort by themselves.

The Skills and Career Center plays a reasonable role in the process of innovation promotion. The newly established Technical Incubator at the Industrial City in Hassia' (although not completed yet) will play a major role in enhancing the innovation in the university. A few years ago, the Technical Incubator was opened in Al Baath University. This step was taken by the help of foreign experience. This incubator has to be activated, as the two main problems it faces are the lack of funds and the shortage of experience. An informatics incubator was established at the university in cooperation with Syrian Scientific Informatics Association.

The Homs-Saxony Centre for environmental studies was established at the university in cooperation with LET Projects – Germany at the aim of studying issues related to environment such as water, soil, air, natural resources, pollution ….etc. unfortunately the center seldom played the required role due to many reasons.

We have received suggestions and ideas for developing innovation in Education. Of these ideas here below the experience and view of (General Company for Engineering Constructions):

Higher education in Syria generally, and in particular in the area of Water Engineering education, requires:

- Radical development of the modalities of higher education in the area of Water Engineering in order to move from teaching to learning; to develop this area the following must be achieved:
  - Developing scientific curricula (which we are doing in the EDUWAT project)
  - Developing and training of professors who are accustomed to teaching rather than learning.
  - Focusing on training students at engineering companies (to bridge the gap between the academic and practical fields).
  - Engineering companies and Universities to develop bilateral memoranda of understanding to organise the training of engineering students at engineering companies.
- Developing the education tools
  - Developing laboratories appropriate for the new curricula and innovation.
  - Developing electronic libraries and connecting them to the libraries of international Universities.

6.1.2.3 Research – Innovation

Actually, the relation between research and innovation will be automatically enhanced after building a firm connection between higher education & research and between higher education and innovation.

- More attention and more funding should be paid on innovative researches.
- Practical-based researches should have a
- Private & public sector must contribute in funding researches: Research solving practical problems and/or include new creative methods attract the private & public sector.
- The laboratories of the universities should be updated and employed more in the research process, rather than singular investment in academic activities of higher education only.
- Further training of researchers on IT skills.
- Soft skills include creative thinking, thinking out of the box, self motivation, team work, brain storming, analysis, time management and problem solving skills.
- The skills and career centre should play a major role in improving the soft skills of researchers.
- Students should be involved in the research process done by the specialized academic staff performing researches at early stages of their life in the university.
- Laws and regulations for research at the university should be changed in order to allow the students to be involved in the research process. The laws and regulations should also allow to accept researchers from outside the university (private & public sector).

- More competitions and prizes must exist to motivate innovative researches.
- Private and public sector should be allowed to contribute in determining the subjects of masters and PhD theses and they should be allowed to supervise and contribute in the referee jury.
- The experience of foreign universities in linking research and innovation should be well studied to choose appropriate techniques that can be locally implemented.

How can we connect with industrial sector and how can we attract the companies or industrial institutions?

- The university may offer cooperation with them aiming for solving their problems. Industrial research sector needs may be conducted in cooperation with stakeholders, particularly in the water sector.
- The university may also develop an agreement with companies in which we can state that the results emerging from a research in the company are a mutual property of both the university and the company; the results can also be kept as confidential non published information.
- A seminar may be held annually in a number of industrial institutions through which they can discuss together the problems and maintenance actions and they can exactly define the reasons. Thus the university staff will be able to study the issues discussed and they can through research propose solutions and enhancements.
- There are many potential private and public partners to cooperate with: Ministry of HE, Ministry of Environment, Ministry of Health affairs, Ministry of Agriculture, state universities and private universities, General Company for Studies and counseling, HIWM, ACSAD, ICARDA, ISESCO. Joint efforts may be made together or in partnership with one of them. Enhancing the water sector in Syria is of mutual interest.
- Networking between partners and distributing roles contribute to focus on defined topics such as: Aleppo University studies water pollution, Dam University studies water rational consumption, ALB University studies waste water, ICARDA studies irrigation water….. etc.
- Students work on a graduation project in the final year. As universities we can orient the students to search for topics of their graduation project in the water sector institutions. We can ask them also to find a co-supervisor who will participate in the final discussion and assessment of the project.

Global awareness for the importance of water is continuously increasing, with extra importance in the Middle East. Syria is a perfect example. The major challenges are the decreasing sources of water, climate change, global warming, dryness and the increasing demand of water. All of these challenges put us in a situation where critical action is quickly necessary and must be carried out in a well-studied and planned manner.

Suggestions provide by the Syrian private sector partner GCEC (General Company for Engineering Constructions):

These suggestions are in line with the other outcomes mentioned before.

- The administrative regulations governing scientific research are in need of development
- Funding process and participation of private sector in securing funds for researches.
- It is very useful for engineering staff with extensive company expertise to take part in supervising master’s and doctoral dissertations of engineering students.

- Building partnership between local and international Universities.
- Establishing specialised centres of excellence at Universities.
- Organising scientific seminars where engineering companies take part.

Innovation in Marketing our Scientific Products (Graduates and Research Results):

This area of innovation is currently neglected and is highly developable.

- It would be useful for engineering companies to deliver introductory lectures to University engineering students to get acquainted with the work market which they will enter after graduation. This would help students to identify their goals and encourage them to study with high motivation.
- It would be useful for companies to organise an annual open day for University engineering students; on this day routine company work will be suspended and the day dedicated for welcoming (student) guests and introducing them to the company and present engineering work.
- Finally it would be useful for engineering companies to allow university researchers and scientists to introduce the new techniques and methods that they have developed to engineering staff.

6.2 Conclusions

This report discussed deeply the development of a modern higher education system for water management and engineering in Syria with respect to the knowledge triangle. The situation in Syria is not satisfactory, while it is far better in Europe.

Great steps must be taken to fill the gap and achieve the target. EDUWAT is one of the steps in the water sector. Some steps must be taken by Syrian universities, with support of European partners. Also the need of a cooperation with the public and private sector is evident.

Research is also thought to be good for staff development, institutional image and reputation, and student recruitment. These factors could assist the setting up of an environment most conductive for learning.

An active research interest is important for good university teaching because there are common abilities underlying both research and teaching. There is a correlation between the two because the attitudes, values and competencies that lead to excellence in research (dedication, hard work, imagination, originality and critical analysis) are also likely to lead to excellence in other spheres of academic activity.

Exposing students to research makes them more likely to consider doing research themselves which could be important in areas where there is a shortage of researchers. This encourages their intelligence and geniality

The personal learning of researchers can make them more able to identify with their students' learning. Staff and students can learn together about research rather than the beginning researchers feeling inhibited by their inexperience.

Sharing the results of one's research efforts with an appreciative audience provides reinforcement for having done the research and pursuing further research.

The outcome of connecting the nodes of the knowledge triangle should be made visible to a broader audience (WP5)

The crisis in Syria puts us in a situation where we have to act quickly. The damaged water sector in Syria has a large impact on the future of the country. The reconstruction phase will start soon, so we have to start sooner.

The university are aiming at an integrative approaches ensuring active involvement of all water related stakeholders and will:

Follow action & research oriented education approaches for developing understanding and "hands-on" experience

- Use case studies, contacts with practitioners and "champions", team teaching
- Expos students to "real life" problems, interdisciplinary projects, placements in industry with academic & business mentoring
- Exploratory workshops on technology futures, teamwork on impact studies
- Link education to innovation: e.g. including incubator in education, teaching companies, entrepreneurship centers

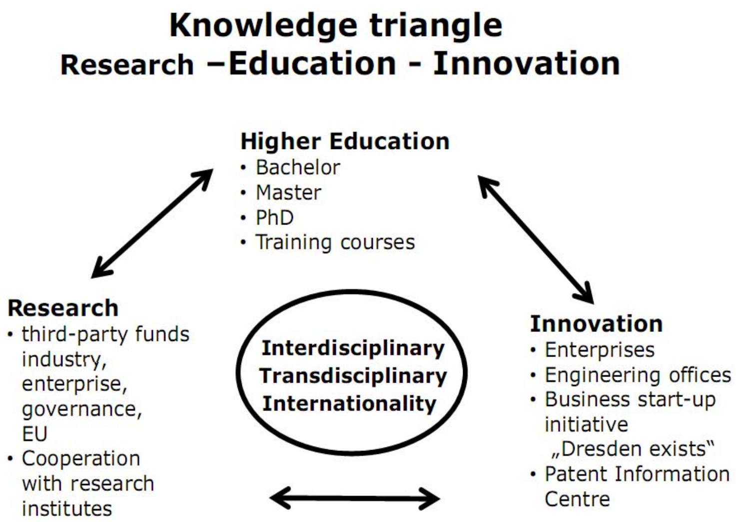


Fig. 4: Knowledge Triangle

Continuation after project life time

The involved universities will make sure that:

- Staff are qualified and available for teaching and are encouraged to act as "initiators and facilitators of innovation".
- Quality to be assured according to the steps specified in the accreditation and quality management center in each university
- New approaches could be introduced to guarantee the quality according to EU standards.
- Quality of research is improved. Publishing at internationally recognized journals should be encourage.
- Research Units at each department are activated to guarantee the linkage between research and education.
- All the required equipment and laboratories should be available at universities.
- Networking with other educational and knowledge institutes are set.
- Organize workshops: (jointly with EU partners) to present the new education system
- Joint (academic & stakeholders) supervision are established over the new system
- Education centers and innovation centers managing continue cooperation and co-development

To increase synergy, each of the three basic elements (research, education and innovation) has different key content areas and methodological development needs to focus on.

For example, the role of research in the KT context is especially to produce more foresight knowledge to be used in education and in innovation.

7 Dissemination, capacity building

Lead Partner: AU	*Tit/e of work package*	*Type of work package*
WP.5	**Dissemination, Capacity building**	Dissemination
5.1	Internal dissemination - National level	
5.2	External dissemination - International level	

Related assumptions and risks:

The related assumptions are the results and the deliveries of the previous WP1, 2, 3 and 4. The risks are the non performance of the deliveries in the WP1, 2, 3 and 4.

Risks are in the decision making and implementation process in case that one important policy maker is not adequately involved. To overcome this risk, the Syrian partners are engaged to identify all stakeholders to involve.

Description* of *work package:

The dissemination of the results of a project is just very important as the quantity and quality of this one. It is not only important to have by self a good tool for the progress in the economy of a country the whole society must can use this tool with a high benefit. The dissemination is necessary between the partners in the consortium. Besides, it is necessary to spread the knowledge of the new higher education system of water engineering over the whole Syria society and other comparable countries as well as countries in the EU. The dissemination is combined with a networking for a purpose of new capacity building. The dissemination is not an one-way street. The dissemination must be an active exchange of information and apart of collaboration. The tools of the dissemination are the workshops, seminars, conferences and other scientific meetings. Of the other hand the classical publishing in the printed mediums are a good way. In the computer science and Internet epoch the electronically media can be used effectively for the spreading worldwide. For the dissemination a special home page would be created by using of a special internet address. a special Water Management Network Website. This kind has a interface to the e-Learning system. The border line between the dissemination of research results and the Life-Long-Learning is fluently.

Deliverables

5.1 Internal dissemination

The international dissemination is the spread of the results of the previous WP. In the different WP the deliveries are discussed. In WP a lot of materials are produced for the spread over inside of the consortium. This can be printed papers and/or electronically material for the publishing in the Internet portal. For the dissemination a special home page would be created by using of a special internet address.

5.2 External dissemination

The external dissemination goes over from the consortium members to the Syrian society as well as to international partners. For a wide spreading in Syria the material must be translated in Arabic Language. This one included the Internet presentation, too. The second important point is the creation of new members of the networking for cooperation in the education as well as in the research.

7.1 Dissemination:

It is today clear that the principles and objectives of the Bologna Process may be used for reforms in any country of the world and may also form a productive basis for international co-operation in higher education outside the 'narrow' European region.

Dissemination takes on the theory of the traditional view of communication, which involves a sender and receiver. The traditional communication view point is broken down into a sender sending information and receiver collecting the information processing it and sending information back.

With dissemination, only half of this communication model theory is applied. The information is sent out and received, but no reply is given. The message carrier sends out information, not to one individual, but many in a broadcasting system.

Dissemination is a process requiring a careful match among:

- the creation of products or knowledge, and the context of that creation,
- the target audiences, and
- the content, media, formats, and language used in getting the outcomes into the hands (and minds) of those target audiences

The dissemination is combined with a networking for a purpose of new capacity building. The dissemination is not a one way street, it must be an active exchange of information and a part of collaboration.

The goal of all dissemination should be utilization. Utilization may mean different things to different members of a target audience; in some cases, it may mean rejection of a product or research finding. The critical element of utilization is that the research outcome must be critically and thoroughly digested, and the individual must fit the new information with the prior understandings and experiences.

The development of an integrated study program, based on international cooperation at academic level, reinforced by the mobility of students and teachers, carried out through a multidisciplinary and interdisciplinary approach based on the Bologna process implementation was characterized by a reciprocal enrichment, in terms of innovative educational methods and opening of the international dimension of engineering education.

Dissemination planning provides an opportunity for dissemination goals, strategies, and activities to be conceptualized and carefully considered. In the planning process, it is important to know that training events, such as:

- Conferences.
- Workshops.
- Academic courses.
- Scientific meetings.
- Seminars.
- computer-based discussion lists, and products, such as:

- reports,
- journal articles,
- video tapes,
- newsletters, and
- web sites

will be used.

Of the other hand the classical publishing in the printed mediums is a good way. In the computer science and Internet epoch the electronically media can be used effectively for the spreading worldwide.

7.1.1 Dissemination Plan:

The dissemination plan (which is a part of the overall project plan) explains how the project will share outcomes with stakeholders, relevant institutions and organizations, and how it will contribute to the overall dissemination strategy for the program.

The dissemination plan will explain:

- What is the plan to disseminate – the **message**
- To whom – the **audience**
- Why– the **purpose**
- How – the **method**
- When – the **timing**

➢ **Message**: It is often useful to think of the person on the receiving end.

✓ What do they need to know about the project?
✓ How it can communicate clearly?

- Focus on clear, simple message.
- Get the right message to the right audience.
- Coordinate messages within and across program.

➢ **Audience**: the dissemination was used to inform and engage stakeholders, and get them convinced the project.

✓ Internal – They supported the project, so keep them informed
✓ Use dissemination to make sure the project has high profile.
✓ External stakeholders – these might be teachers, researchers, Liberians, publishers, etc.
✓ The community –Think about who could learn from the knowledge and experience and share it in case studies, journals, articles.

- **Purpose**: The purpose of the dissemination may be:
  - ✓ Raise awareness – let the others know what is doing.
  - ✓ Inform –Educate community.
  - ✓ Engage –Get input / feedback from the community.
  - ✓ Promote – “sell“ the outputs and results.

- **Methods**: There is a wide variety of dissemination methods:

  - ✓ Newsletters
  - ✓ Press releases
  - ✓ Brochures
  - ✓ Conferences, presentation, posters
  - ✓ Workshops
  - ✓ Demonstrations
  - ✓ Online discussion, lists
  - ✓ Reports and other documents

- **Timing:** There should be a deciding when different dissemination activities will be most relevant. Messages will vary during the timeframe of the project. The time commitments are important - there are periods in the academic year when it will be difficult to reach academic staff.

- **The Elements of an Effective Dissemination Plan:**

- Goals: Determine and document the goals of the dissemination effort for the proposed project.

- Objectives: Associate each goal with one or more objectives that clarifies the dissemination activities.

- Users: Describe the characteristics of the "potential users" that the dissemination activities are designed to reach for each of objectives.

- Content: Identify the basic elements of the projected content.

- Source(s): Identify the primary source or sources that each potential user group is already tied into or most respects as an information source.

- Medium: Describe the medium or media through which the content of the message that can best be best delivered to potential users and describe the capabilities and resources that will be required of potential users to access the content for each medium to be used.

- Success: Describe the dissemination activities that have been successful. If data is to be gathered, describe how, when, and who will gather it.

- Access: Describe the promote access to the information and archive information that may be requested at a later date.

- Availability: Identify strategies for promoting awareness of the availability of the research-based information and the availability of alternate available formats.

- Barriers: Identify potential barriers that may interfere with the targeted users' access or utilization of the information and develop actions to reduce these barriers.

7.1.2 Dissemination and Implementation:

Dissemination and implementation are complex process, involving many disciplines and players within an organization. No one approach or strategy universally applies in every situation. Researchers, therefore, need to use multiple methods and tools to navigate the dissemination course.

The process of implementing any research outcomes begins with awareness – when potential users learn about product, tools, or findings and gain some understanding about how they work. This planning tool helps increase awareness in a systematic way by wedding the constructs of diffusion and dissemination.

Diffusion: is defined as a passive process by which an innovation is communicated through channels over time in a social system.

Dissemination: involves a more active, tailored process of communication with a goal of persuading users to adopt the innovation.

The dissemination planning tool is designed to promote awareness among research might and should be applied in practice. It provides a structure to think about what can appear to be obscure charge to which researchers are increasingly expected to respond. More importantly, it helps them recognize the importance of research's use and practical application.

7.1.3 Internal Dissemination:

The goal of the dissemination is to inform the institutions and organizations involved in long-term preservation about final results of the project. The dissemination is necessary between the partners in the consortium. Besides, it is necessary to spread the knowledge of the new higher education system of water engineering over the whole Syria society and other comparable countries as well as countries in the EU.

For the dissemination a special home page would be created by using of a special internet address. This kind has a interface to the e-Learning system. The border line between the dissemination of research results and the Life-Long-Learning is fluently.

Project partners themselves are involved in the dissemination process in order to foster awareness for the project, especially in their own universities or offices. Each institution should consider these issues in relation to its own admissions processes.

The Universities and MHE will be the first target group of dissemination of the results of this project and be included entirely into the internal exchange of plans, tools, practice and results from project.

Internal dissemination activities address the students and staffroom Universities, Ministries, Organisations, and others. The project management also plans to inform external stakeholders such as relevant companies and further ministries about the project.

Internal communication between project partners to communicate various activities, recent trips, meetings and information between project partners and any other suggestions is necessary. This can be achieved by:

- Electronic mailing lists: Currently this includes members of the project team from each partner site. Although there may be advantages to establishing a new overarching list, will aim to use existing mailing lists for its external communications.
- The internal dissemination of the project results will be ensured by posting them on a private website, which can be only accessed by the members of the project through password protection.
- Working Groups: Similarly internal project working groups can be used to manage project work and provide and effective mechanism for formative project evaluation.
- Printed publications.
- E-training to the related ministries: It is to convert the course to a "training program" consists of several e-courses, the first one to be called "Basics of IWRM" (Integrated Water Resources Management).To take advantage of development of distance education (e- Learning) and the availability of required infrastructure, and to the difficulty of trainees from different provinces to be at the universities.

❖ **Success factors and challenges for internal dissemination and exploitation strategies:**

What is critical for the success of internal dissemination is the culture of the organisation there should be both – way – approach (top – down and bottom – up) to develop a organisational culture where people actually want to get information about what colleagues are doing and which projects the organisations itself is doing.

But both dissemination and exploitation depends strongly on the project's content , the topic of the project, the consortium that does the project and each organisational culture.

❖ **Strategies:**

- A project fact sheet is necessary for people to get information in a comprehensive way.
- Positive feedback from outside.
- Team building is necessary to disseminate projects.
- Connect the project to actual needs of the organisation.
- Dissemination and exploitation strategies are different from public to private companies.
- A crucial factor is the involvement of administrative departments and organisational leaders.

7.1.4 External Dissemination:

The external dissemination goes over from the consortium members to the Syrian society as well as to international partners. For a wide spreading in Syria the material must be translated in Arabic Language, this one included the internet presentation, too. The second important point is the creation of new members of the networking for cooperation in the education as well as in the research.

A distinction is made in which tools are used for the purposes of internal and external dissemination. The drafts of the documents can be visible for the members only, as the final results and meeting and event invitations can be shared with external audiences.

The plan of dissemination must be dynamic and flexible. Partners must contribute to the generation of this lobby by adequately citing the action and publicizing it and its doings beyond their own results.

For external agents, the methods of dissemination of the knowledge generated in the Action will be those commonly used, such as posting the information on a public website, presenting communications in conferences and publishing scientific papers in regular journals. Other ways of dissemination addressing targets out of the scientific community will be implemented.

In the beginning of the EDUWAT project external dissemination activities started with a website including general information, its vision and purpose. The project management also plans to inform external stakeholders such as relevant companies and further ministries about the project. We recommend for this purpose to issue short newsletters articles in the project website.

7.1.5 Dissemination and Sustainability:

The main motivation for dissemination is increasing the awareness of distance learning possibilities and quality assurance issues in study programs among various stakeholders in partner country.

Dissemination is one of the crucial points in longevity of the project. It can be observed from two aspects:

- Local dissemination will be achieved in local students community of the partner country's university through three major modalities:
- ✓ Live and interactive presentation at University.
- ✓ Announcements and presentations to public through different media broadcasters, radio, TV, and newspapers.
- ✓ Publishing in printed and electronic form.
- Global dissemination will target as wider as possible area of student population mainly from art and media back ground and media partners in the region, but will not be limited to student only but also to professionals and other interested.

One modality in achieving global dissemination will be the most important:

Broadcasting through newly established study internet portal – unique student's radio – television widely accessible to everyone. Others ways of internet promotions will extensively used. This is the most strongest modality of promotion and dissemination of the project.

❖ **What makes dissemination effective?**

- Press releases
- Research report and summary
- Brochures, posters, community newsletters
- In – person dissemination
- Online dissemination

7.1.6 Dissemination of the Project EDUWAT:

The objective of the Dissemination Plan is to identify and organize the activities to be performed in order to promote the commercial exploitation of the project's results and the widest dissemination of knowledge from the project. The dissemination of the results of a project is just very important as the quantity and quality of this one.

Universities and colleges should support admissions staff in making informed judgments about the suitability of individual applicants through regular training and updating on the full range of qualifications and of pathways into higher education. Admissions staff should also have access to specialist advice from EU and other countries.

The following groups have been identified as EDUWAT project stakeholders:

- Ministry of High Education
- State Universities (Damascus, Aleppo, Tishreen, Albaath, Alfuraat, Hama, Tartous)
- Private Universities (f.i. Wadi International University, Arab International University Aljazeera University, Alshahba University)
- Higher Institutes (for Water Management Homs, for Marine Research Lattakia)
- Intermediate Institutes (Engineering Institute, Agricultural Institute, Technical Institute)
- Ministry of Irrigation and Water Resources
- Ministry of Agriculture and Land Reform
- Ministry of Environment
- Engineers Syndicate
- Agricultural Engineers Association
- Regional Organisations (General Commission for Scientific Agricultural research (GCSAR))
- Academic Research Centers (Water research Center Damascus, Water Directorate)
- Non Governmental Organizations (Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD),International Center for Agricultural Research in the Dry Areas (ICARDA))
- Suppliers of digital information
- National and regional information services
- E-training

The approach for dissemination is the exploitation of EDUWAT results, as well as to establish a critical mass around the project and increase the number of members in the trust in new education system. As for facilitating the internal dissemination, we have already mentioned the results of the work packages 1, 2, 3, 4 and 6 of the project to be available on the project website (www.eduwat.eu).

- EDUWAT may print copies of some information and materials for distribution either free.
- EDUWAT should plan to hold a series of dissemination events specifically aimed at the end of the project.

- Developing a publication program: targeted informational literature designed to raise awareness about EDUWAT, and its activities.
- Information flyer and brochure for applicants.

All partners have agreed to exchange case study materials. The European partners have agreed that they will be involved in the implementation phase of the program.

Activities of Universities in the field of application of project results

- Al Baath University has set up several workshops,which call the high school students and students of the Faculty of Agriculture and the Faculty of Civil Engineering, also it attended by workers in the sector of water and education. It was present the importance and results of the project and expected job opportunities after finishing the studies.
- Tishreen University established in Water Engineering Department a seminar, which explains about the project and it's importance.
- Aleppo University has established seminars in the Faculty of Agriculture about the study in the field of Water and Irrigation and the importance of the graduates and curriculum development in this sector.
- The Water Engineering Department in the University of Damascus held workshop about the importance of the study in the field of water. There was distributed pamphlets in the Ministry of Water Resources about the project, new curriculum and also about the importance of the project.

Dissemination activities will be carried by:

- Website, the project has created a website (www.eduwat.eu), which inform interested parties about the activities. For internal communication, the website be used by EDUWAT as the principal means of procedural documents for use by members of EDUWAT.
- The site is constantly updated and it contained all relevant information about all current, past, and planned project activities as well as important links. Where necessary documents may be accommodated on password protected pages.
- Instructional literature derived from experience across EDUWAT. Such literature may include developing effective mechanisms for disseminating material (seminars, workshops, conferences).
- All recruitment ads placed in outside publications (e.g., newspapers, journals, magazines, websites or newsletters) carry aim and results of the project.
- Contact with European Universities (f.i. TU Dresden, University of Rostock, BOKU University Vienna, HTW Dresden, University of Life Sciences Prague, University Opole etc.)
- It will be selected series of lectures, which was given in the workshops in addition to the curriculum, and the description of the modules in the curriculum and add to the work packages reports. After this, it will be translated into Arabic version and it will be placed on the project page. Then putting them in CD (in English and Arabic Languages) to disseminate and distribute them to the universities, organisations, ministries, institutions, etc.
- Realisation of differnt workshops for applicants for a place at universities, students in Agriculture and Civil Engineering Faculties, staff of water sector.

- Help from the Student Advisory Service of the University and the Faculty.

In brief, the most important objective of this project is to encourage the participation of universities in conservations and awareness activities. The project facilitates and promotes awareness, appreciation, knowledge, and management of water recourses through the development and dissemination of class – ready teaching aids and through the establishment of state and internationally sponsored programs. The Dissemination Planning Tool is designed to promote awareness about where the research might and should be applied in practice. More importantly, it helps to recognize the importance of the research's use and practical application.

7.2 Capacity Building:

The United Nations Development Programme (UNDP) defines capacity building as a long-term continual process of development that involves all stakeholders; including ministries, local authorities, non-governmental organizations, professionals, community members, academics and more. Capacity building uses a country's human, scientific, technological, organizational, and institutional and resource capabilities.

Capacity building has fast become a major topic among nonprofits and management support organizations (funders, associations, training centers, consultants, etc.) that provide services to nonprofits. There are a variety of definitions for capacity building. Perhaps the most fundamental definition is "actions that improve nonprofit effectiveness”. Some other discussions about capacity building refer to the concept as actions that enhance a nonprofit's ability to work towards its mission.

The concept of capacity building in nonprofits is similar to the concept of organizational development, organizational effectiveness and/or organizational performance management in for-profits. Capacity building efforts can include a broad range of approaches, e. g, granting operating funds, granting management development funds, providing training and development sessions, providing coaching, supporting collaboration with other nonprofits, etc.

The capacity building approach is used at many levels throughout, including local, regional, national and international levels. Capacity building can be used to reorganize and capacitate governments or individuals.

7.2.1 Capacity Building Process:

The capacity building process includes a detailed list of activities that helps in identifying the stakeholders as well as the need and strategies for capacity based on the programme objectives. Capacity building for social accountability can be dynamic and is based on the specific tool used to assess accountability. The process given below is a set of generic step-by-step activities suggested by UNDP that can help in building the capacities based on the requirement and need.

1. **Engaging Partners and Building Consensus:** It is important to discuss and reach an agreement on what are the key development challenges and how those can be addressed through capacity building. Based on this consensus one can define the scope, focus and the boundaries for capacity building.
2. **Capacity Needs Assessment:** Based on the target stakeholders and scale of the activity to be taken up, a capacity needs assessment helps identify the exact capacity requirement.

3. **Define Capacity Building Strategies:** This step includes defining capacity building strategies, methodologies adopted and also the cost requirement for such capacity building identified.
4. **Implementing the Capacity Building Strategies:** The primary activity at this stage includes grounding the capacity building strategies identified. Creating and establishing a cadre of trainers and advisory teams would help in efficient implementation and facilitate capacity building of the community, civil society institutions and networks.
5. **Monitoring and Evaluating Capacity Building Strategies:** Monitoring the progress of capacity building programs, conducting impact evaluations and also obtaining regular feedback on capacity building activity can help in redesigning and redrafting strategies and adopt newer approaches for capacity enhancement.

The key step in the process is the capacity needs assessment stage, which helps in identifying the exact requirement for capacity building. Capacity needs assessment can be a useful tool in identifying the key stakeholders, assessing the current levels of capacity among them, additional capacities required and developing suitable strategies. While developing capacity building strategies one should ensure that:

- it defines the required capacities clearly
- it identifies and engages national, state and local level stakeholders
- it is accurate and systematic in approach
- it provides a structure for discussion to develop the scope and scale
- it facilitates generation of qualitative and quantitative data to support further development
- it is flexible and easy for adoption
- it is in confirmation and consensus with the project goals
- it is dynamic and encourages learning

7.2.2 Functions of capacity building:

The functions of capacity building are as follows:

- Develop capabilities of staff members in teaching skills and methods of teaching the new system.
- Convince the academic and administrative leadership of the new teaching system and its contribution to raising the efficiency and effectiveness of the teaching process.
- Develop the skills and capabilities of engineers, technicians and professionals.
- Held workshops and lectures, training courses and seminars for the dissemination of new teaching system for faculty members and university employees and outside the university.
- Implementation of plans and programs and training activities.
- Provide faculty members with all published professionally in order to professional performance development professor.
- Create an environment and provide various physical means to teach.
- The provision of adequate financial resources for training programs on the new teaching system.

- The provision of training a cadre of highly efficient implementation of training programs.
- Provide tools and methods for evaluating effective planning and implementation of the new system of teaching and evaluation of training courses.
- The use of various modern technologies to enhance teaching applications.
- Support and regulate the exchange of professors, researchers and staff within the Syrian universities with European universities.

7.2.3 Why Capacity Building is needed?

- The issue of capacity is critical and the scale of need is enormous, but appreciation of the problem is low.
- The link between needs and supply is weak.
- There is a lack of realistic funding.
- There is need for support for change.
- Training institutions are isolated - communications are poor.
- Development of teaching materials is inefficient.
- Alternative ways of capacity building are not adequately recognized.

The legislative, regulatory and financial frameworks in Syrian universities do not meet the quality requirements in the educational process. What remains of the educational process depends on centered education method about the professor, absent his teaching and learning strategies that will help the development of practical skills and personal, in addition to the insufficient number of faculty members or educational facilities compared to the number of students, and weaknesses of the powers and authorities of the workers at the lower administrative levels.

Therefore, capacity building must be expanded to include the design of the curriculum strategic orientations, content and outputs, and ways of teaching and learning and assessment, the legislative framework governing the educational process, the admission of students, human resources necessary, appropriate and educational facilities that will ensure the achievement of the students requirements, stakeholders and society.

This leads to development of the academic programs that support the investment in human resources, also it must achieve the development of academic and administrative processes and human capacity building and support for linking the university community initiatives. It must give the university more responsibilities and powers in the management of human and financial resources and organizing educational operations.

7.2.4 Capacity Building in University:

Capacity building activities are aimed at enhancing human resources and strengthening institution – building. This implies human capacity building, mainly through teaching for higher university programs that involve students from developing or transition countries, and institutional capacity building through training of public officials. Cooperation with the industry in the fields of research and also in the field of education. Take of good practical engineers for teaching. (They can get title honorary professor but they don't get money for it from the university). Good planning of courses, use of same modules for several courses, adult education, live long learning. Conferences for Ph. D. students, conferences for scientists, practitioners and students.

Capacity building must be through a set of goals, including the process of improving the quality of teaching, activities, curricula, programs of study and practical activities that link higher education outputs to improve the development needs, labor market and the capacity of institutions and individuals. Training courses should be also organized to raise the level of the faculty members in the scientific, technical, linguistic and educational fields.

The issue of curricula development can be a radical integrated capable solution to improve the teaching and learning methods, and even the development of legislative frameworks governing the educational process, and securing human resources and rehabilitation of educational facilities, and develop new strategies for teaching, learning and innovative methods of evaluation in order to achieve the demands of students, university, stakeholders and society.

One of the most difficult problems with building capacity on a local level is the lack of higher education in developing countries. Another difficulty is ongoing brain drain in developing countries. Often, young people who develop skills and capacities that can allow for sustainable development leave their home country. Capacity building is interested in the following fields:

- Planning and management
- Curriculum development and design of materials
- Training of teachers
- Assess the performance of students
- Monitoring and Evaluation

There are many problems facing universities in curriculum development and change of the study system, including:

- ✓ Several members of the faculty isn't convinced of the need to change the curriculum and connect it to achieve the requirements of society
- ✓ Many faculty members do not have a clear vision for the evolution in teaching, learning and assessment in higher education methods

A great need to connect with faculty members to explain the importance, necessity and reasons for changing the curriculum, as well as to introduce them to modern methods of teaching before the start of the changing process.

The primary objective of capacity building is to prepare faculty members qualified and able to move forward in the process of "curriculum development", and to ensure that all members of the faculty and staff associated with the academic program will have the basic knowledge about modern education methods. This goal is achieved through sequential schedule in order to build the capacity of faculty members and staff associated with the academic program through a training course on modern educational methods and the need to develop the curriculum. Then must inflict faculty members to participate and attend international conferences, short visits and tasks of scientific research in European universities.

- **To build capacity at institutions of higher education around the world:**
  - Strategic planning and institutional capacity building: including access to leading experts to assess needs, provide technical assistance and share best practices from higher education systems around the world.
  - Forming global higher education linkages: making recommendations on a university's partnership strategy goals and arranging for university officials to visit key institutions.
  - Participant training: drawing the extensive relationships with academic institutions throughout the world.
  - Program evaluation: extensive experience in carrying out all stages of short – and long - term program evaluations.
  - Policy research: crafted projects and custom reports which help measure and document trends in international higher education development and academic mobility.

7.2.5 Outcomes of the project EDUWAT:

The application of the outcomes of the project must be carried out the following steps:

- ✓ New internal regulation of the faculty of setting adopts the principle of decentralization and transparency in decision-making
- ✓ Setting standards that reflect the scientific potential of the student
- ✓ Characterization of a clear and precise about the educational system
- ✓ Allocation of human and material resources necessary to activate the new curriculum
- ✓ The training of cadres working in the new curriculum
- ✓ Rehabilitation of existing educational facilities
- ✓ Obtaining the approval of the Board of Higher Education on the internal regulations of the new curriculum for the application
- ✓ To obtain accreditation for the academic program of regional and international destinations
- ✓ Start applying the new curriculum

Capacity Building is much more than training and includes the following:

- Human resource development, the process of equipping individuals with the understanding, skills and access to information, knowledge and training that enables them to perform effectively.
- Organizational development, the elaboration of management structures, processes and procedures, not only within organizations but also the management of relationships between the different organizations and sectors (public, private and community).
- Institutional and legal framework development, making legal and regulatory changes to enable organizations, institutions and agencies at all levels and in all sectors to enhance their capacities.

The process of curriculum development is to conduct limited transitional time aims to establish a new curriculum, which meets the needs of modern society and international standards.

Finally, capacity building is an ongoing process through which individuals, groups, organizations and societies enhance their ability to identify and meet development challenges.

This is partially accomplished by providing resources and training, but is most effectively done with a partner or in a Global Solidarity Partnership.

In contrast, when a capacity building project is completed, the non profit has gained the ability to achieve certain outcomes on its own, both now and into the future.

7.3 Actions taken by the German Coordinator and the Syrian Partners

The last month of the project should be devoted to identify the most feasible way for dissemination, which is to identify and organize the activities to be performed in order to promote the commercial exploitation of the project's results and the widest dissemination of knowledge from the project. The dissemination of the results of a project is just very important as the quantity and quality of this one. European partner are ready to help us in this subject.

Due to the present situation the ways for dissemination are limited. From the European partners material (guidelines, folders, homepage, etc.) could be supported. The last month of the project should be devoted to identify the most feasible way for dissemination among those are:

- News letter

Web based dissemination: Webpages are powerful for disseminating the new curricula and attracting students and industry. Frequent update to cater for the new needs would be a supportive step for continuously run the programme.

- Fact sheets
- Joint seminars with industry to be held in the universities, faculties, water related industrial sites and high schools
- Summer meetings with high school students

Aleppo University has finalised a work package, WP5, about dissemination.

7.4 Promotion and Dissemination Materials

As for promoting and disseminating information about the new study programme and the developed curricula, a number of activities took place in the involved universities to promote for the new study programme . Among those activities the following took place recently:

- Regular meetings between universities and departments of water and agricultural engineering in the involved universities.

- Dissemination of the work materials by CD and hard copies to the water related ministries and organisations have taken place in the last three months together with the project documents.
- In order to develop the professional training course, a number of meetings with water bodies took please and a number of training course were proposed accordingly.
- The career centre in the three universities have agreed to promote for the new study courses after it they are finalised in April 2015 and the universities will proved the centres with adequate information to disseminate. (http://www.skillcareer-tempus.edu.sy)

8 Sustainability

Lead Partner: DAM	**Type of work package**	**Title of work package**	**Start**	**End**
WP.6	Exploitation	Sustainability	1	36

6.1	Realisation of new structure	Methodology	2013-09-30	National level
6.2	Validation of new structures	Methodology	2013-09-30	International level
6.3	End meeting	Events: Conferences and Seminars	2013-09-30	International level

Related assumptions and risks:

The related assumptions are the results and the deliveries of the previous WP1, 2, 3, 4and 5. The risks are the non-performance of the deliveries in the WP1, 2, 3and 4.

Risks are in the decision making and implementation process in case that one important policy maker is not adequately involved. To overcome this risk, the Syrian partners are engaged to involve all identified stakeholders.

Description of work packages:

The results which are produced in the previous WP's and activities must be transferred into a regular reality. The visions and missions which are created in WP's must be applied and checked under real conditions. This can be done only for selected study courses, research contracts and links between education-research-innovation. For this the Damascus-, AI Baath- and Aleppo-Universities are selected to test and to validate the proposed modern higher education system for water engineering in Syria with the core of the triangle education-research-innovation. Each of these universities independently realizes a certain focal point of the new system. Among this one the universities must show with which aids the obtained new education system can be made as a permanent output after the end of the project. This will include the number and quality of staff, the quality assurance of education and research, the provision of budget and equipment, the durability of the networking and other goals which were given by the project.

Another condition for the sustainability is the acceptance of new structures by responsible authorities. In the project the Syrian Ministry of Higher Education is involved as a partner in each WP. During the preparation of all deliveries and carrying out of all workshops the Ministry has the possibility to be involved in any kind of the details in the new education system. This is what guarantee the acceptance by the ministry. For other Syrian ministries (irrigation, housing, technology) similar possibilities must be installed to inform them about the results of the project in good time.

Besides, in the project two representative of the Syrian water industry are involved. These both have the same possibility to affect the results of the WP's like other partners. In this WP6 and in other WPs it is a main task to spread the discussion with other enterprises, engineering offices, research institutes and others. For sustainable research activities the fund-raising must start in good time.

Expected deliverables

6.1 Realisation of new structure – (2013-09-30)

Based on the present situation in the three selected universities different parts of new education system will be arranged. The selection which part will be established in which university is depend from the analysing in the WP1, 2 and 3. In the DAM new study courses of water engineering can be installed. The ALBA jointly with the HIWM the research activity and training courses can be managed profitably. In the AU the cooperation of two faculties is possible for a defragmented education.

6.2 Validation of new structures (2013-09-30)

The proposed new education system is identical to system in the EU countries and takes the Lisbon and Bologna process. This new system must provide the effectiveness under "Syrian conditions". The acknowledgement of new structures by responsible authorities and by the society must be given. The validation of the new system will be carried out by the joint work of Syrian and EU partners. At the end of the WP6 a feasibility study is delivered.

6.3 End meeting – (2013-09-30)

The final meeting takes place in Damascus/Syria and is organized by the MHE and DAM. In this meeting all partners of the consortium take a part. It is open for a wide audience of the society. In this workshop the will be presented not only deliverable from the WP6, but also from the WP4 and other WPs. The results of this discussion in this conference are very important for the acknowledgement by the society of the proposed new higher education system.

8.1 Introduction and Background

- **The project overall aim and expected outcomes**

The overall target is the adaptation of the Syrian higher education system in the water sector to the standard of the Bologna process. The structural transformations guarantee high quality standards, comparability and acceptance of degrees for the Syrian students. The students are better prepared for professional competences in problem solving and scientific methods.

The expected outcomes are:

- concentrated studies
- better qualified students,
- a higher level in University research,
- international comparability of degrees
- better possibilities of student exchange

Damascus-, AI Baath- and Aleppo-Universities will implement the new education system (pilot application) and afford the required number and quality of staff, assure the quality assurance of education and research, the provision of budget and equipment, the durability of the networking and other items provided by the project. The starting academic year is September 2015.

For sustainability assurance the following actions are undertaken:

1. The Ministry of Higher Education is involved as a partner in each WP and has accepted to carry out an endorsement process to install the new education once completed and approved jointly by university partners and industry.
2. The other Syrian ministries (irrigation, housing, technology) the results of the project and this will be carried out during the process of endorsement.
3. For certain fund-raising is the MHE and universities responsible to start with.

- **Critical issues and challenges to be overcome:**

Attracting students and staff to run the new programme, afford the facilities and laboratories, equipment and improve training bases, human and financial resources, insertion into the current educational system of the university regular accreditation and evaluation.

- **Why realisation and validation of the new system of education:**

Validation criteria: harmonisation of the education with the rest of the developed countries (EU universities and research centre), this harmonisation enables conditions for easy exchange of staff and universities between the EU universities and Syria. It speeds up the process of internationalisation of Syrian universities and this very important to improve the education standard of the Syrian universities and encourage real research and industrial links.

8.2 Sustainability

8.2.1 Assessment of the Present System

The present higher education system had been analysed during the project running and found to be incompatible with the present EU education system which prevents, to a certain extent, benefits from the outer research activities and knowledge. This formed the background for changes of the higher educational system in Syria aiming at introducing the Bologna system of education that will introduce Syria into the European education system and research pool.

8.2.2 Implementation and Assurance of Deliverables:

- Introduce the programme to the accreditation committee in the University to pass the accreditation process. Accreditation process should include:
  - Evaluation of proposed staff quality
  - Evaluation of proposed research activities and industrial links

- Evaluation of the proposed lectures and tutorials (contents and material) and expected outcomes
- Accreditation certificate

- Introduce the programme after it has been accredited to the MHE to get approval to start implementation
- Start with the implementation plan and set a plan for quality management and evaluation with 4-5 years. This should include:
  - Evaluation of teaching process by the students and external reviewers of academic and industrial background.
  - Evaluation of the linkage with industry and implemented filed work or projects
  - Evaluation of the teaching outcomes: impact on industry, society, government

8.2.3 Planning, Human and Financial Resources for the Process of Implementation:

It was agreed to dedicate a budget for the transition time covering the supplement of teaching materials. After the transition time involved universities should contact the Ministry of Finance to allocate a proper budget and allocate part of its self-finance budget to the new study programme.

The efforts of the involved universities are to:

- Make sure that the courses are running
- The professional training course are well linked to the industry and research theme needs
- The universities take into account the students and industry demands and assure the new study programme recognition of the civil engineering board of order.
- Guarantee the support of the government and private sectors for securing jobs for the new graduates.
- Plan for teachers and teaching assistants to carry out the heavy teaching schedule
- Assure laboratories to be set for the new courses
- Assure teaching material to be prepared
- Seek support of the EU university and industry, regional and international bodies in the implementation period

As part of planning, some measures should be taken to assure human and financial resources for the process of implementation based on:

- No. of students,
- Facility needs,
- Qualified staff,
- Professional training needs,

- Equipment, laboratories, library, consumables and materials, and
- Infrastructure for staff and students, etc.

In addition adequate support to the teaching staff and students during the implementation period is going to be set as for:

- Web based advertisements and information about the new course,
- Financial support to the staff to prepare the new teaching material of any kind (printed, distributed on web or teaching software, etc.). Financial support to encourage staff to develop their skills and improve their qualifications.
- Financial support to the students is focused on reducing the entry fees to make the programme more attractive.

A staff content and financial document should be submitted to the MHE for getting the proper budget from the Ministry of Finance and self-financing.

8.2.4 Assessment of the New System:

- Assessment of the new education system: based on the quality management system of DAM University, the information of how students are satisfied with the new educational system and how they feel about the new study programme (curricula). Also the feedback from the staff and employers has to be collected for assessment. University should collect the industry feedback to see whether demand is filled in and graduate could get adequate positions and salaries.

The assessment should be carried with strong links between the MHE, the universities, industry, society and students.

8.2.5 Measures to ensure sustainability:

- Staged implementation:

To follow a staged implementation starting with a pilot university (Damascus University, DAM) would be a suitable approach to avoid the repetition of potential errors and to allow other universities to benefit from the experience made by the DAM.

After getting first graduates (MSc) of the new educational system, the practical experience from running the course would help to implement necessary changes in the system.

- Long term planning:

In order to run the new system with increased number of students, a plan should be set up to ensure involvement of new staff and enlargement of infrastructure to satisfy the changing conditions.

A significant part of assuring the continuous running of the new system is close collaboration with the EU partners, joint projects with water industry, self-finance, research implementation, joint research with environment, agriculture, etc.

In the long run, student union involvement in the process is necessary to get feedback information and to adjust the programme structure to make proper changes in the way of teaching, and also sustain ordinary life of the students.

The university career centre should be approached with the new educational course so they can support the new graduates to find relevant jobs, and may direct them to some supportive training courses to match industry needs.

- Collaboration with water industry:

Collaboration with water industry is a fundamental part of the education system as it provides university with real projects and research themes of Master and PhD theses'. Collaboration will also support university student field training, excursions and practical sessions. Water industry can also support some students or technicians with fellowship programmes and fund some university activities like workshops and training courses.

The following important cooperation elements are being realised between the universities and the research institution and industry.

- Increased cooperation between universities, research centres and industries regionally and internationally for activities such as:
- Cooperation in teaching research and joint project implementation
- Specific cooperation for innovative technology to reduce water consumption in agriculture (water use efficiency in agriculture) and solar energy techniques
- Groundwater modelling and hydrological studies: cooperation is existing now between the Ministry of Water resources and the universities in studying and designing a number of project and for giving professional training course. Similar work is being carried out jointly with ACSAD.

The aim is to connect universities, business and research centres with local level for implementing water projects.

The following organisations have the potential for cooperation and will be approached once the situation is Syria is reset:

- National Commission for Research
- Arab Centre for Studies of Arid Zones and Dry Lands (ACSAD)
- International Center for Agricultural Research in the Dry Areas (ICARDA)
- United Nations - Economic and Social Commission for Western Asia (UN- ESCWA) in Beirut
- Deutsche Gesellschaft für international Zusammenarbeit GmbH(GIZ)
- United Nations Development Programme (UNDP)
- United Nations International Children's Emergency Fund (UNICEF)
- League of Arab States (LAS)

- General Company of Engineering Construction
- Syrian Dutch Water Cooperation (SDWC)
- Japan International Cooperation Agency (JICA)

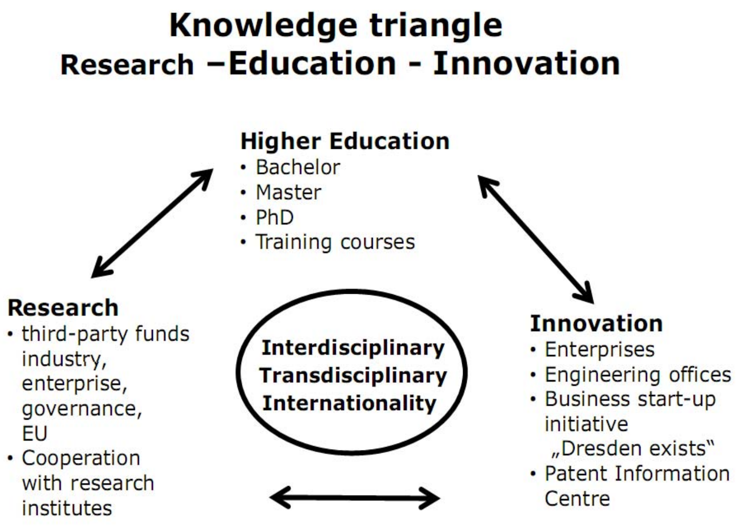
However, scientific cooperation with some EU universities are being realised. Cooperation agreements are existing between TiU and TUD, DAM and Boku University. A memorandum of understanding is signed between the Czech University of Life Sciences in Prague, DAM University and ACSAD to carry on agricultural and water research during this project.

- Support the course, the teaching staff and the students during the implementation period:
  - Web based advertisements and information about the new course,
  - Financial support to the staff to prepare the new teaching material of any kind (printed, distributed on web or teaching software, etc.). Financial support to encourage staff to develop their skills and improve their qualifications.
  - Financial support to the students is focused on reducing the entry fees to make the programme more attractive.
  - Quality assurance: Described in the paragraph above and some details are given in the Validation paragraph below.
  - Organisation of professional training courses to the water and water related organisations and encourage joint research activities and joint project implementation.
  - Set a platform for international linkage to open possibilities for regular exchange of students of different levels, staff and teaching programmes. The EU programmes especially the Erasmus+ programme that includes exchange of students and staff and support to different educational activities should be important priority of international collaboration.
- Integrating education, research and innovation

The university are aiming at an integrative approaches ensuring active involvement of all water related stakeholders and will:

Follow action & research oriented education approaches for developing understanding and “hands-on” experience

- Use case studies, contacts with practitioners and “champions”, team teaching
- Expos students to “real life” problems, interdisciplinary projects, placements in industry with academic & business mentoring
- Exploratory workshops on technology futures, teamwork on impact studies
- Link education to innovation: e.g. including incubator in education, teaching companies, entrepreneurship centres



- Continuation after project life time

The involved universities will make sure that:

- Staff are qualified and available for teaching and are encouraged to act as "initiators and facilitators of innovation".
- Quality to be assured according to the steps specified in the accreditation and quality management centre in each university
- New approaches could be introduced to guarantee the quality according to EU standards.
- Quality of research is improved. Publishing at internationally recognized journals should be encourage.
- Research Units at each department are activated to guarantee the linkage between research and education.
- All the required equipment and laboratories should be available at universities.
- Networking with other educational and knowledge institutes are set.
- Organize workshops: (jointly with EU partners) to present the new education system
- Joint (academic & stakeholders) supervision are established over the new system
- Education centres and innovation centres managing continue cooperation and co-development

To increase synergy, each of the three basic elements (research, education and innovation) has different key content areas and methodological development needs to be focused on.

For example, the role of research in the KT context is especially to produce more foresight knowledge to be used in education and in innovation.

8.3 Realisation of the New Structure

During the project running, the whole structure of the new study programme for BSc and MSc were prepared. Damascus University has developed three BSc curricula in water engineering management, soil and groundwater and hydrology and another three MSc curricula in the same subjects. Al-bath University has developed two BSc curricula in water engineering, and water and soil engineering and another two MSc curricula in the same subjects. Aleppo University has developed two BSc curricula in water engineering and agricultural water management and two MSc curricula in the same subjects. Tishreen University has developed one BSc curricula in water engineering and environment and another four MSc curricula in harbour construction and coastal engineering, water resources management, water constructions and sanitary engineering. For all these curricula all related teaching needs were developed including: modules, subjects, professional training courses, study material and related human resources, etc.). Finally the whole system of new study programmes is ready for immediate implementation. However, due to the well-known situation in Syria, the implementation of the new study programmes may start in academic year 2016-2017 as a pilot implementation in DAM, Al- Bath, Tishreen and Aleppo Universities. In the case of MSc programmes (two years of study), after first academic year of running the new study programmes, a workshop with participation of the above named universities and participation of representatives of the MHE and industrial sector will be organised in DAM to exchange the positive and possible negative experience of running the new study programme. Evaluation of the first year of implementation can give the opportunity to quickly improve the study programme and to start with necessary minor changes for the next academic year. The next step of the evaluation process will be linked with the end of the second year of MSc, so the first graduates will come. It is the time to start cooperation with the industry in the field of graduates demand and quality.

In the case of the BSc studies, we have to count with longer education (three years), the workshop will be organised after the second year of implementation similarly like in the case of MSc.

Finally, after three academic years of running both MSc and BSc programmes, the study of experience will be done and a detailed report of the study of experience will be printed out and distributed in all involved universities and to the Ministry of Higher Education.

8.3.1 Feasibility Study

The Syrian Ministry of Higher Education has general agreed to change the higher education system. They accepted the quality standards derived from Bologna process (accreditation procedures, 3 years for Bachelor etc.). In Syria exists long time experiences in the Master qualification of students, therefore in this topic will be no problems. In result of the shortening the 5 year Bachelor courses to 3 year courses higher costs for the staff members are not expected. Reforms of study structures do usually require a high degree of investments. To this point we can submit no statement because of the actual situation of Syrian economy.

The defragmentation of study courses leads to possibilities for use of modules in several directions. In this direction savings will be realized. In general the external and internal requirements for the reform are given.

8.3.2 Important reactions from the MHE and DAM

The new curricula for AU, DAM, TiU and ALBA in a number of water subjects for undergraduate and postgraduates studies are finalised. This include:

- Definition and description of the modules
- References
- Training courses
- Hand-out materials and recommended presentations

Feedback and from different water related ministries and establishments were taken into consideration and a number of training courses were adopted to enrich the courses and establish practical cooperation between universities and national water organisations

The MSc courses are expected to start in the academic year 2015-2016 and the BSc are expected to start in the academic 2016-2017

To successfully implement the new education system the Ministry, the Universities and the Faculties have to make the correlated decisions. The Faculties prepare the new curriculums in discussion with the staff members. All teachers have to develop new contents of the lectures. New study materials, software and electronic information systems (for instance “Stud IP”: course-related internet support of presence lessons) will be used. Combination of competence oriented teaching methods with mediated knowledge. The examination offices assume the new regulations. The examination of students’ performance follows new principles: not only a questioning of knowledge or repetition of working procedures but also the identification of competence indicators and problem solving skills.

The selection of which part will be established in which university depends on the analysis of the work packages the WP1, 2 and 3. However, discussion showed that all universities can implement the new study courses. ALBA jointly with the HIWM can manage to run research activities and training courses profitably.

DAM will start the Master course in 2015 and carry on an assessment process and produce an evaluation report to be used by other universities in the years after. For Undergraduate studies, a yearly monitoring and evaluation process is recommended and a staff committee could carry out an assessment and reviewing process of course improvement.

Discussion with the MHE and the Damascus University resulted in the following:

- The new study programme is possible to be implemented.
- The MSc programme can be started in the academic year 2015-2016. The BSc programme is also possible but is preferable to be established a year after the MSc is started, e.g. academic year 2016-2017. Integration of the BSc with the current study programme is possible and there are resources to assure the installation of the new system.

8.4 Validation of the New Structure

The validation of the new structure will be realised in permanent evaluation-based observance. Different steps have to be used: Evaluation of the teachers by the students, Evaluation by the Faculties, Universities and by external commissions. The study structures should be adapted to the new labour market requirements if necessary. The professionalization of the academic teaching staff should go also in the direction of the scientific development.

For the acknowledgement of the new structures by the responsible authorities and the society information presentations are intended.

Also the process of accreditation has to be used continuously for the validation of the new structures. Contact between the universities and the alumni seems additionally important. The feedback of these former students will give basic impulses for corrections in the study courses.

Important reactions from the MHE and DAM:

MHE experience and comparison with the existing modern master programs *showed* that DAM has the capability to introduce the new system and ensure validity with the MHE (Confirmation from the MHE and the VM). The Minister of Higher Education has asked for a plan to be developed to assure implementation of the new courses and this is guaranteed by the quality management and accreditation system within Damascus University and other involved universities.

As agreed with the Minister of Higher Education that:

- Methodology reports to be completed and project outcomes to be present to show the way-forward: A flowchart will be designed to illustrate methodology of implementation and validation process
- The MHE agreed to install the new courses in the involved universities once the accreditation system has been approved
- Dissemination of the developed courses for feedback from the water related Ministries and experts before approval has taken place and feedbacks have been incorporated

In the process of getting approval from main water related organisations the following points were taken into consideration:

- Bologna System is fine to be introduced and preferable for most of them, is acceptable as a (3+2 years) complete course.
- Some critical subjects were proposed by the ministries and were taken into consideration while developing the courses. Among them are water use efficiency in agriculture, integrated water resources management tools, water management and engineering, and climate change issues such as assessment and adaptation measures
- As the ministries advised for course flexibility, the developed courses are designed to be flexible in reconstructing them jointly with the ministries as well as the professional training courses. The ministries and the MHE agreed to review the courses when is necessary.
- Bring together students and ministries/companies and create an interdisciplinary culture
- Provide a lifelong learning mechanism in cooperation with beneficiaries

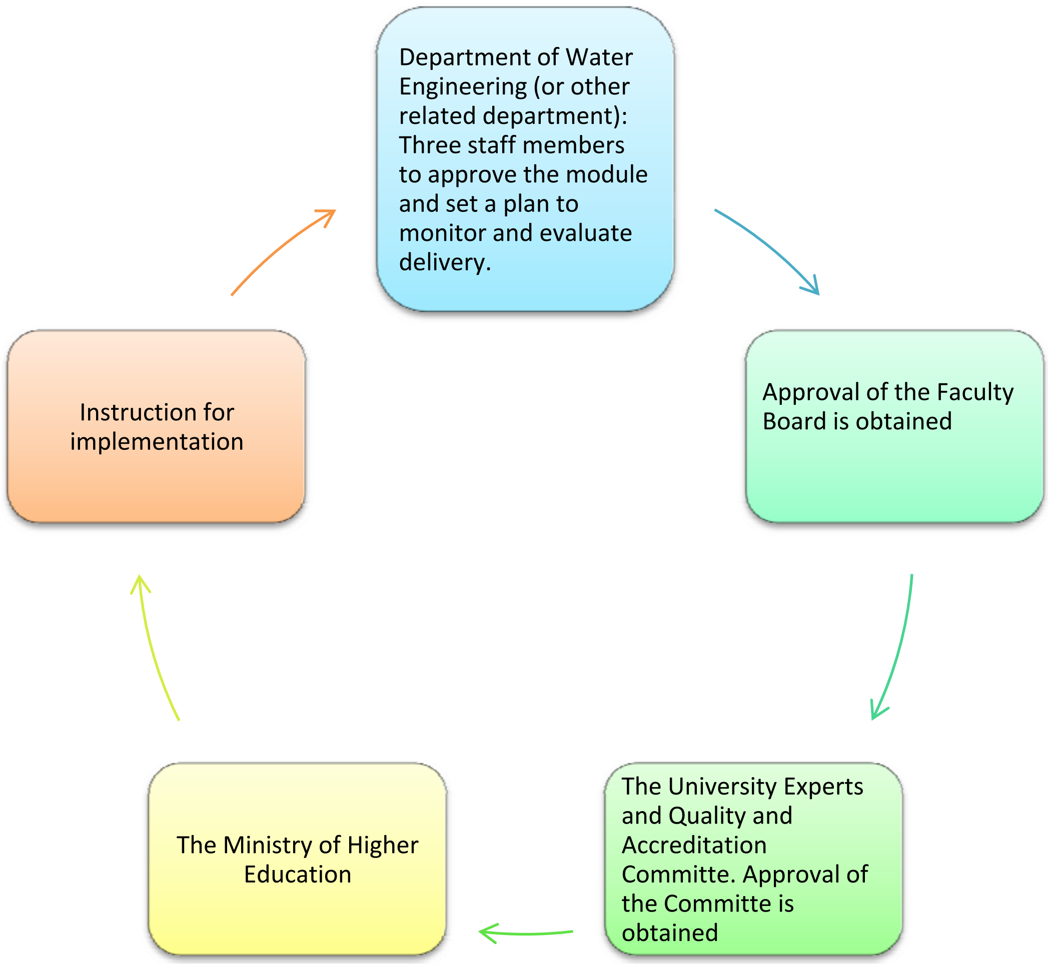
- The new study programme promotes sustainable water resources management, conservation of water resources, adaptation measures to climate change, rehabilitating of damaged water projects & hydraulic structures and assure regular updates.

Validation of the new structure will be based on the results of the study of experience. All involved universities will share the practical experience in running the BSc and MSc study programmes. It is clear that study programmes are not rigid for additional improvement supposed to be carried out after the finalising of the study and can benefit from the workshop feedbacks.

Proposed process of validation:

The final versions of the modules will be submitted to every university board and the MHE scientific board for accreditation procedure. The following flow chart show steps of this to be achieved:

Module Example for quality assurance and accreditation:



Module example:

Department of Water Engineering (related other department):

Three staff members are available to assure module delivery and approve it. This should include a design of a monitoring format to check: the module delivery according to the described subjects, modules materials, lecturers, assignments, students' satisfaction, relation to the course objectives and expected outcomes. The three staff committee may recommend further improvement to the module or added subjects to match the industry needs in a circular management approach every few years.

The department should prepare the following points:

- The main dimensions of the course
- Related profile
- Programme structure and mobility
- Admission needs and enhancements
- Funding resources
- Staff
- Module into the current education system
- Internationalisation
- Research themes
- Specific centre of education (one necessary, e.g. Establishment of a research centre for a specific subject such as Groundwater Modelling or IWRM in arid zones and dry lands, etc.)
- Career centre
- The expected outcomes of the module and research benefits

The Faculty Board:

The Faculty Board is responsible for reviewing the module taking into account the approval of the water department and should ask other water related departments to review the proposed module and exchange their remarks with the water department. At the end a finalised version should jointly be developed and submitted to the University Board. The Faculty Board should seek opinion of other universities academic staff and outer experts from the industrial sectors as well to assure standard module quality and that fits the market needs.

The University Experts and Quality and Accreditation Committee:

The committee should make a review according to the Quality and Accreditation document of the University and its criteria assuring all its elements to match the requested education system and its dimensions. The committee approval should be submitted to the Ministry of Higher Education.

Three main points to be assured:

- The ability of the system to be set as a whole into the education and research process
- Students feedback

- Management cycle is assured: Plan-Do-Check-Act

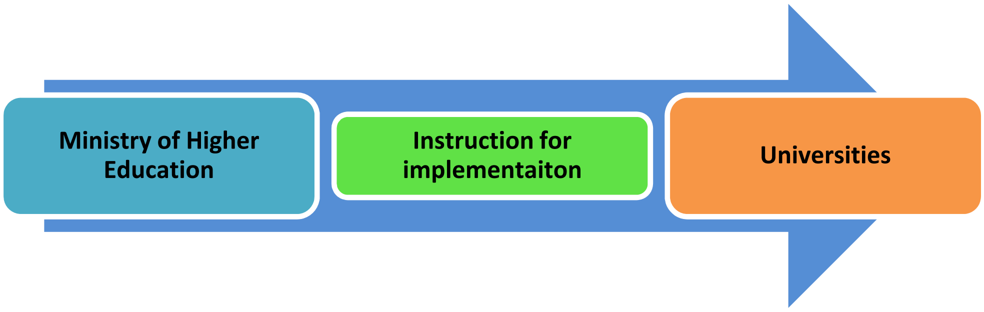
Two levels of monitoring the implementation:

1. Self-reporting; internal evaluation
2. Peers: External evaluation by experts/researchers. Involvement of international experts in the accreditation process

Damascus University is welling to develop the existing Quality Assurance Centre for the new TEMPUS-courses as they structured according to Bologna System and encourage participation of all university members.

The Ministry of Higher Education:

Approves the course and instruct the university(s) for implementation



Overall diagram of the accreditation procedure

All details about the accreditation process are well given in the Tempus Project: Accreditation - Pathway to Quality Assurance that was run by Damascus University 2008-2010: http://www.tempus-accreditation.edu.sy/ Damascus, Aleppo, Al-Bath and Tishreen Universities have accordingly established educational standards and programs to meet up with internationally accepted accreditation criteria, with the help of European Universities and accreditation agencies to gather evidence for accountability,. This assures that graduates are adequately prepared to enter and continue a career in their profession and to stimulate adequate processes for continuous quality improvement.

The project has established an accreditation procedure according to internationally and nationally accepted criteria. The project components consist of a self-evaluation documentation for selected Bachelor and Master study programs according to breakdowns of international accreditation application documents, benchmarking and peer evaluation, preparation of improved study programs and submission to accreditation in a step-by step assessment and quality development process. Universities accreditation procedure should be followed for accreditation purpose of the current study programmes.

The accreditation instruments were clearly set by the involved university and details were documented for the following aspects:

1. Self-Evaluation report.
2. Expert consultation during campus visit.
3. Expert reports (peers).
4. Statements to the expert reports.
5. Application report.

8.5 Conclusion

A plan for implementing the new BSc study programme is set for the academic year of 2016-2017 and the new MSc study programme is to be implemented for the academic year of 2015-2016

WP6 describes actions made to assure sustainability and gives details of realisation and validation of the new structure.

The following points are of the project partners' interest were assured:

- Assure the link with water related ministries and the universities have developed professional training courses to fit the needs of the ministries. The ministries will provide the universities with feedback about the graduates professionalism and need of development. They will also employ a certain number of the graduates. And provide the universities with the requested number of graduates for each course.
- Quality checking and management will be carried out as described in A2 above.
- Evaluation and adjustments where necessary will be carried out in a plan and check management cycle every 4-5 years.
- The partners are discussing the possibility to applying to the new EU Erasmus+ project to build on the results of the current project. Ideas for new projects are thought to be:

1- Development of new curricula for water bodies rehabilitation (includes irrigation structures, water supply and sanitation structures and natural water bodies damaged through the current conflict in Syria)

2- Follow up implementation of the present developed study programme, evaluate and monitor performance of staff and students. Also follow up the accreditation process and set a proper link between the industry and the universities for improving the study programme. One important thing is to jointly implement the new programme, monitor and evaluate the whole process. Professional experts from the EU can jointly support the implementation by: experts to support the accreditation process for the developed modules, provide lectures, offer short training visits for MSc students to take part of their study programme in one of the EU universities, joint research activities, and organise some of the professional training courses in the EU.

8.6 Integrating education, research and innovation

Tell me and I will forget, show me and I will remember, involve me and I will understand

Integrative approaches ensuring active involvement

There are several methods to ensure integrative approach, such as:

– Following action & research oriented education approaches for developing understanding and "hands-on" experience

– Using case studies, contacts with practitioners and "champions", team teaching

– Exposing students to "real life" problems, interdisciplinary projects, placements in industry with academic & business mentoring

– Multi-actor exercises, exploratory workshops on technology futures, teamwork on impact studies

– Linking education to innovation: e.g. including incubator in education, teaching companies, entrepreneurship centers

Continuation after project

There are several points should be considered to guarantee the continuation of development progress after ending the project, there are summarized as follow:

1. Number and quality of staff
   - Sufficient number of staff are available at faculties of civil engineering. The national policy for Science, Technology and Innovation[4] estimated the number of academic staff working in water field by 108 doctors.
   - University teachers should act as an "initiator and facilitator of innovation‟. This requires further trainings and capacity building.
2. Quality assurance
   - Each university has center for quality assurance which can support this new system[5] and all are connected to the "The Center For Measurement & Evaluation In Higher Education"[6]. However, new approaches should be used to guarantee the quality according to EU standards.
   - Quality of research is a challenging area. Publishing at internationally recognized journals should be encourage.
   - Existed Research Units at each department should be activated to guarantee the linkage between research and education.
   - Accreditation of the new degrees as it is a pathway to quality assurance. The outcome of previous TEMPUS project[7] recommended that Ministry of Higher Education should Integrate National Qualification Framework and NARS into the accreditation process of study programs[8].

[4] Web site http://www.hcsr.gov.sy/ar/node/48 ,2012 (report in Arabic)
[5] Higher Council Decision 154, 2005
[6] http://www.cme-edu.net/
[7] TEMPUS Project http://www.tempus-accreditation.edu.sy/ : "Accreditation – Pathway to Quality Assurance", Syria 2010-2013.
[8] http://www.accreditation-syria.net/NARS/index2.html; http://www.cme-edu.net/

3. Provision of equipment

   - All the required equipments and laboratories should be available at universities. Using other institutes or ministries laboratories should be encouraged via mutual agreements.

4. Durability of networking

   - It is important to networking with other educational and knowledge institutes.
   - HCSR is establishing various knowledge networks for important sectors (e.g National knowledge network for environment protection[9]). A new network: "*National knowledge network for water*" is under establishment now . The objectives of this network[10] are:

     1. Coordinate scientific researches efforts in the field of water resources
     2. Disseminate, encourage and adopting of new technologies in WRM
     3. Provide technical support in drawing the future vision of scientific research in WRM
     4. Networking between all stakeholders, universities and experts in this field.

Such networking is of great importance to keep coordination between all scientific efforts. This network is supervised, financed and maintained by HCSR and has a steering committee nominated from all related ministries.

5. Acknowledgment by other authorities for the graduated water engineer.

   - The best way for gaining the acknowledgment of others is by involving them in developing of the new course and degrees. One of recognized way is by jointly building Academic Reference Standards (ARS) for water engineers. This process is called standered-based education system which is adopted by MoHE[11] (figure 1)
   - Workshops: (jointly with other partners) to present the new education system
   - Channeling "real world" feedback to the university. This is important to complete the cycle between society and university.
   - Organising university outreach: continuing education centres and innovation centers managing cooperation and co-development

[9] http://env.hcsr.gov.sy/
[10] Draft of Prime minister Decision, Prepared by committee of water sector at HCSR ,June 2014
[11] http://www.accreditation-syria.net/NARS/index2.html

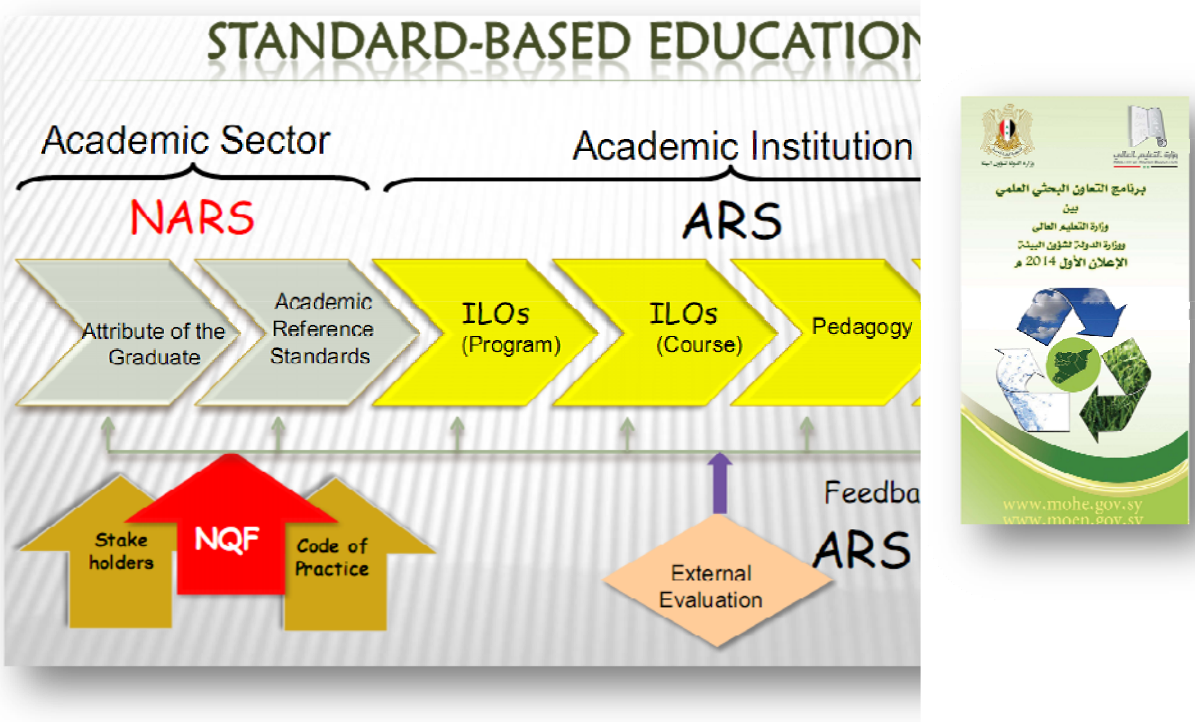


Figure 1: standard based education system adapted in Syria**.**

Role of research in the Knowledge Triangle context

To increase synergy, each of the three basic missions (research, education and innovation) has different key content areas and methodological development needs to focus on.

For example, the role of research in the KT context is especially to **produce more foresight knowledge to be used in education and in innovation.**

What research frameworks are already available

1. Scientific research agreements with other relative ministries

There are already two major research agreements between MoHE and:

C. Ministry of agriculture and agrarian reform[12]

D. Ministry of Environmental affairs[13]

The agreements are focused on conducting scientific research in areas that are of concern the two parties. The activities are financially covered by both parties

2. The national policy for Science, Technology and Innovation

[12] http://www.mohe.gov.sy/mohe/index.php?node=5512&cat=2704&

[13] http://mohe.gov.sy/MEHO/file/2014/MoheEnvironment2014.pdf

The Higher commission for scientific research (HCSR) has a committee for water sector. HCSR has already issued the main research subjects for this sector within the national policy for Science, Technology and Innovation. This policy has been approved by prime-minister and the final report was issued in 2012[14] .

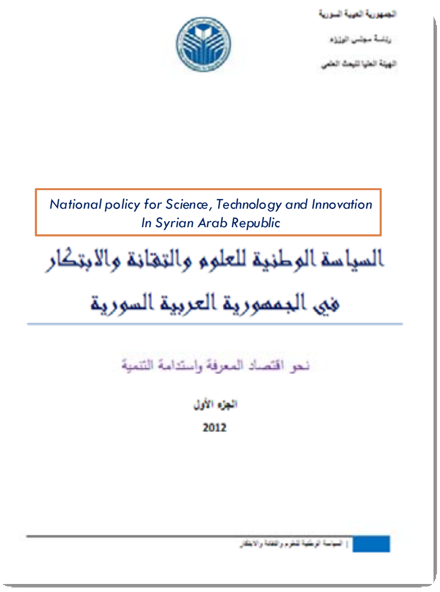
The committee has held several meetings with all stockholders (including universities) to discuss the research needs for water sector. They "SWAT" analyzed the situation of research at the sector and defined six main research priorities at water sector. These research themes were:

7. Impact of climate change on water resources
8. Estimation of water budget's components for surface and ground water basins
9. Water resources protection
10. Trans-boundary rivers (especially Euphrates river)
11. Agricultural Drainage and land reclamation
12. Applying and developing new technologies

HCSR will cover the cost of successful proposals. All the approved projects are financed by HCSR

Validation of new structure

- MoHE should **recognize** this new system. New regulations have to be issued according to a step-by-step plan.
- Bring together students and ministries/companies and create an interdisciplinary culture
- Provide a **lifelong learning** mechanism in cooperation with beneficiaries



In addition, new courses Should:

- Promote sustainable water resources management
  - Conservation of water resources
  - Adaptation measures to climate change
  - Rehabilitating of damaged water projects & hydraulic structures
- Develop new teaching materials
  - Regular updating
  - considering emerging issues "e.g. recent water resources degradations"
- Get internet platforms and introduce e-learning

[14] Web site http://www.hcsr.gov.sy/ar/node/48 ,2012 (report in Arabic)

- introduce distance and blended learning. A good experience is available at the Syrian Virtual University (SVU) using intelligent student information system[15] .

With regard to the **sustainability** of the results of this project are a number of possible sources of funding are provided.

First, the government must provide basic funding for higher education. The government is responsible for the provision of water for the population, for agriculture and industry with the required quality and quantity. Therefore it is expected that most of the Director-ments take training in the field of Water Resources and Hydro Sciences seriously and recognize the new rates. It is expected that graduates of the new courses, which are used by authorities or state-owned enterprises. From this perspective, the government needs to promote the training of young talents.

A second source of funding could tuition fees from students. But at many American universities, tuition fees are only 20% of universities budget. A third possibility for the funding of higher education is donations. To this end, a closer relationship between universities and their students must be developed. Successfull graduates of universities is morally obliged to support their educational institution. Even private companies should provide support universities oderSt scholarships or grants-for students and teachers. Finally, the universities must submit applications in response to national and international calls for funding, as well as from industry and government. Research and education should be integrated into national and international networks. For a sustainable quality in education and research, a national collaboration between partners from industry, private companies and public authorities is very important. One way to do research projects are carried out by academic institutions in collaboration with industry. At the same time, this is an opportunity to finance such. As at the Department of Hydro Sciences TUD about 75% of the project financing is realized through projects in cooperation with partners outside the university. Doctoral-operands and master's thesis or project studies in master courses can indiesen third-projects are integrated. For lectures with application-oriented topics and for the monitoring of projects, scientists from industry and authorities may also be invited.

International cooperation and cooperation with international networks is the basis for successful training of high level. A sustainable research and education can only be guaranteed by the close cooperation of recognized scholars in the field of water economy and Hydro Sciences.

The structure of the Master course is in the first two (1 year of preparation - 2 years implementation) promoted years. The long-term continuation is promising in a largely self-funding success. As funding base are several options that can be implemented in parallel to see. First, a basic funding by the Syrian government would be seen. Since the formation of the water management engineers on the Lebensgut and natural resource aimed water, the state must ensure the safe supply of population, agriculture and industry with water and is thus of their duty. The use of water management engineers will also take place in many cases in state and / or municipal facilities. So that the offspring must also be promoted in this respect. A second source of financing can be tuition fees. These make but also at prestigious universities in the USA from only about 20% of the budget. Third, it can be seen from donations funding. Given a fixed ratio

[15] https://www.svuonline.org/isis/index.php

of Damascus University is build with alumni. Successful graduates of the University should see morally obliged to support a percentage of their income their training provider. Fourth, other national and international support measures to see that promote education and research in the vital sector of water. Since this is a global challenge, there will also be future such international tenders. Especially in the arid and semi-arid regions of the world, the struggle for water to impor-gen question of stability in these regions. Already a struggle for water resources with full force in these regions is kindled. ==> Hence the great responsibility of States to worry also about the modern design of the water management engineers.

The modernised curricula are very flexible, modules may be adapted, reorganised and new contents are easily implemented. Knowledge of constructing water infrastructure is a prerequisite to rehabilitate destroyed facilities. Maintenance is also a key factor for new and old infrastructure.

TiU has already specific modules for infrastructure rehabilitation.

In the new developed curricula that TIU will adopt, the reconstruction, rehabilitation & maintenance of water infrastructure can be recognized in several modules. The graduation project in the Bachelor degree and the Master thesis can be addressed towards this idea. In addition, the training session that is present in the new curricula can be done in the field of reconstruction, rehabilitation & maintenance of the destroyed water and sanitary infrastructure in Syria.

Once the curricula is adopted it is not easy to be changed in Syria but it still possible taking into consideration the flexibility of the new curricula which may be adapted to meet the new incidental requirements.

8.7 Measures for Sustainability:

- Staged implementation:

To follow a staged implementation starting with a pilot university (Damascus University, DAM) would be a suitable approach to avoid the repetition of potential errors and to allow other universities to benefit from the experience made by the DAM.

After getting first graduates (MSc) of the new educational system, the practical experience from the running the course would help to implement necessary changes in the system.

- Long term planning:

In order to run the new system with increased number of students, a plan should be set up to ensure involvement of new staff and enlargement of infrastructure to satisfy the changing conditions.

Significant part of assuring the continuous running of the new system is close collaboration with the EU partners, joint projects with water industry, self-finance, research implementation, joint research with environment, agriculture, etc.

In the long run, student union involvement in the process is necessary to get feedback information and to adjust the programme structure to make a proper changes in the way of teaching and also sustain ordinary life of the students.

The university career centre should be approached with the new educational course so they can support the new graduates to find relevant jobs and may direct them to some supportive training courses to match industry needs.

- Collaboration with water industry

Collaboration with water industry is a fundamental part of the education system as it provides university with real projects and themes of Master and PhD thesis's. Collaboration will also support university student field training, excursions and practical sessions. Water industry can also support some students or technicians with fellowship programmes and fund some university activities like workshops and training courses.

- Support the course, the teaching staff and the students during the implementation period
  - Web based advertisements and information about the new course,
  - Financial support to the staff to prepare the new teaching material of any kind (printed, distributed on web or teaching software, etc.). Financial support to encourage staff to develop their skills and improve their qualifications.
  - Financial support to the students is focused on reducing the entry fees to make the programme more attractive.
- Quality assurance: Described in paragraph ..above.
- Organisation of professional training courses to the water and water related organisations and encourage joint research activities and joint project implementation.
- Set a platform for international linkage to open possibility for regular exchange of students of different levels, staff and teaching programmes. The EU programmes especially the Erasmus+ programme that includes exchange of students and staff and support to different educational activities.

8.8 Finical Sustainable

It was agreed to dedicate a budget for the transition time covering the supplement of teaching materials. After the transition time involved universities should contact the Ministry of Finance to allocated proper budget and allocate part of its self-finance budget to the new study programme .

The efforts of the involved universities are to:

- Make sure that the courses are running
- The professional training course are well linked to the industry and research theme needs
- The universities take into account the students and industry demands and assure the new study programme recognition of the civil engineering board of order.
- Guarantee the support of the government an private sectors for securing jobs for the new graduates.
- Plan for teachers and teaching assistants to carry out the heavy teaching schedule

- Assure laboratories to be set for the new courses
- Assure teaching material to be prepared
- Seek support of the EU university and industry, regional and international bodies in the implementation period

As part of planning, some measures should be taken to assure human and financial resources for the process of implementation based on:

- No. of students,
- Facility needs,
- Qualified staff,
- Professional training needs,
- Equipment, laboratories, library, consumables and materials, and
- Infrastructure for staff and students, etc.

In addition adequate support to the teaching staff and students during the implementation period is going to be set as for:

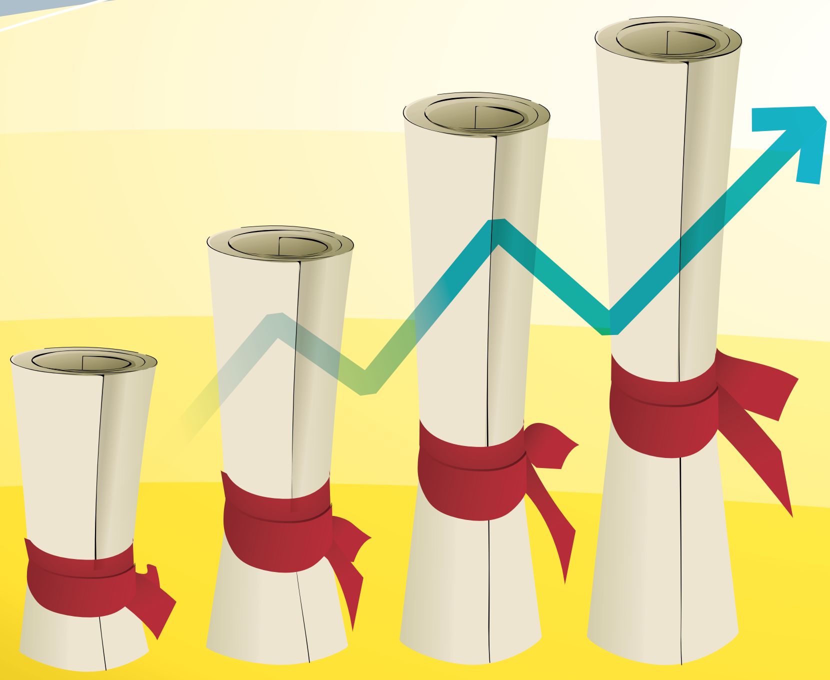
- Web based advertisements and information about the new course,
- Financial support to the staff to prepare the new teaching material of any kind (printed, distributed on web or teaching software, etc.). Financial support to encourage staff to develop their skills and improve their qualifications.
- Financial support to the students is focused on reducing the entry fees to make the programme more attractive.

A human and financial document should be submitted to the MHE for getting the proper budget from the Ministry of Finance and self-financing.

9 Quality protection

10 Annex

Education and Culture DG



ECTS Users' Guide

Education and Training

More information on the European Union is available on the Internet (http://europa.eu).

Cataloguing data can be found at the end of this publication.

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ECTS Users' Guide

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Contents

Introduction

This ECTS Users' Guide provides guidelines for implementation of the European Credit Transfer and Accumulation System (ECTS). It also presents the ECTS key documents. The Guide is offered to assist learners, academic and administrative staff in higher education institutions as well as other interested parties.

The 2009 Users' Guide elaborates on the previous version of 2005. It has been updated to take account of developments in the Bologna Process, the growing importance of lifelong learning, the formulation of qualifications frameworks and the increasing use of learning outcomes. It has been written with the help of experts from stakeholders' associations and ECTS counsellors, and submitted for consultation to stakeholders' associations, Member States' experts and the Bologna Follow-up Group. The European Commission has coordinated the drafting and consultation process and is responsible for the final wording of the Guide.

ECTS[1] is a tool that helps to design, describe, and deliver programmes and award higher education qualifications. The use of ECTS, in conjunction with outcomes-based qualifications frameworks, makes programmes and qualifications more transparent and facilitates the recognition of qualifications. ECTS can be applied to all types of programmes, whatever their mode of delivery (school-based, work-based), the learners' status (full-time, part-time) and to all kinds of learning (formal, non-formal and informal).

In the first section of the Guide, ECTS is placed in the context of the European Higher Education Area, created through the Bologna Process. This section also refers to the role of ECTS in the Framework for Qualifications of the European Higher Education Area[2] (referred to as the Bologna Qualifications Framework in this Guide).

The second section contains the ECTS key features. These constitute a concise overview of ECTS and its main functions, on which there is a broad consensus. The ECTS key features section is also available in a separate brochure.

Section 3 provides a detailed explanation of the key features. Section 4 gives guidance on how ECTS can be implemented in higher education institutions, while section 5 discusses how ECTS complements institutions' quality assurance tools.

The final sections present the ECTS key documents, suggestions for further reading on topics related to ECTS and a glossary of the terms used in this Users' Guide.

1 ECTS was originally set up in 1989 as a pilot scheme within the framework of the Erasmus programme in order to facilitate the recognition of study periods undertaken abroad by mobile students.

2 Bologna Working Group on Qualifications Frameworks (2005) A Framework for Qualifications of the European Higher Education Area; http://www.bologna-bergen2005.no/Docs/00-Main_doc/050218_QF_EHEA.pdf

1. ECTS and the European Higher Education Area (Bologna Process)

ECTS is the credit system for higher education used in the European Higher Education Area, involving all countries[3] engaged in the Bologna Process.[4] ECTS is one of the cornerstones of the Bologna process.[5] Most Bologna countries have adopted ECTS by law for their higher education systems.

Among other objectives, the Bologna Process aims at the *establishment of a system of credits as a proper means of promoting the most widespread student mobility.*[6] ECTS contributes to several other Bologna objectives:

- ECTS credits are a key element of the Bologna Framework for Qualifications,[7] compatible with the European Qualifications Framework for lifelong learning (EQF).[8] According to the Bologna Qualifications Framework, the first and second cycles have their own credit ranges (see section 3.3). Consequently, ECTS credits are used in formulating national qualifications frameworks for higher education, which may contain more detailed national credit arrangements.
- ECTS helps institutions to implement the objective of quality assurance (see section 5). In some countries ECTS is a requirement for accreditation of higher education programmes or qualifications.
- ECTS is also increasingly used by institutions in other continents and thus plays a role in the growing global dimension of the Bologna Process.

3 In some countries national or institutional systems exist alongside ECTS.

4 The Bologna process currently has 46 signatory countries. For full list see:
http://www.bologna2009benelux.org

5 Website of the Secretariat of the Bologna process Benelux 2009: http://www.bologna2009benelux.org

6 Ibidem

7 For further information see: http://www.ond.vlaanderen.be/hogeronderwijs/bologna/documents/QF-EHEA-May2005.pdf

8 Recommendation of the European Parliament and of the Council on the establishment of the European Qualifications Framework for lifelong learning (http://ec.europa.eu/education/policies/educ/eqf/reco8_en.pdf), 2008. The three levels of the Bologna Framework and the sublevel for the short cycle correspond to levels five, six, seven and eight of EQF for the higher education sector.

2. ECTS key features

ECTS

ECTS is a learner-centred system for credit accumulation and transfer based on the transparency of learning outcomes and learning processes. It aims to facilitate planning, delivery, evaluation, recognition and validation of qualifications and units of learning as well as student mobility. ECTS is widely used in formal higher education and can be applied to other lifelong learning activities.

ECTS credits

ECTS credits are based on the workload students need in order to achieve expected learning outcomes. Learning outcomes describe what a learner is expected to know, understand and be able to do after successful completion of a process of learning. They relate to level descriptors in national and European qualifications frameworks.

Workload indicates the time students typically need to complete all learning activities (such as lectures, seminars, projects, practical work, self-study and examinations) required to achieve the expected learning outcomes.

60 ECTS credits are attached to the workload of a full-time year of formal learning (academic year) and the associated learning outcomes. In most cases, student workload ranges from 1,500 to 1,800 hours for an academic year, whereby one credit corresponds to 25 to 30 hours of work.

Use of ECTS credits

Credits are allocated to entire qualifications or study programmes as well as to their educational components (such as modules, course units, dissertation work, work placements and laboratory work). The number of credits ascribed to each component is based on its weight in terms of the workload students need in order to achieve the learning outcomes in a formal context.

Credits are awarded to individual students (full-time or part-time) after completion of the learning activities required by a formal programme of study or by a single educational component and the successful assessment of the achieved learning outcomes. Credits may be accumulated with a view to obtaining qualifications, as decided by the degree-awarding institution. If students have achieved learning outcomes in other learning contexts or timeframes (formal, non-formal or informal), the associated credits may be awarded after successful assessment, validation or recognition of these learning outcomes.

Credits awarded in one programme may be transferred into another programme, offered by the same or another institution. This transfer can only take place if the degree-awarding institution recognises the credits and the associated learning outcomes. Partner institutions should agree in advance on the recognition of periods of study abroad.

Credit transfer and accumulation are facilitated by the use of the ECTS key documents (Course Catalogue, Student Application Form, Learning Agreement and Transcript of Records) as well as the Diploma Supplement.

3. ECTS key features explained

The ECTS key features give a brief outline of the European Credit Transfer and Accumulation System. This section provides more detailed explanation of concepts and functions related to ECTS. It also shows how these concepts and functions interact with and complement each other and thus enable the core functions of ECTS: accumulation and transfer (dealt with in section 4).

3.1. ECTS as a learner-centred credit system

From the key features:
"ECTS is a learner-centred system"

ECTS is a learner-centred system because it helps institutions to shift the emphasis in programme design and delivery from traditional teacher-centered approaches to approaches that accommodate for learners' needs and expectations. In traditional teacher-centred approaches, subject requirements, knowledge and the teaching process itself were considered the main elements of educational programmes. Learner-centred learning puts learning at the heart of curriculum design and delivery, and gives learners more choice in content, mode, pace and place of learning.

In such a learner-centred approach, institutions have the role of facilitating and supporting learners in shaping their own learning pathways and helping them to build on their individual learning styles and experiences.

By using learning outcomes and learners' workload in curriculum design and delivery, ECTS helps to place the learner at the centre of the educational process. By allocating credits to educational components it facilitates the creation of flexible learning pathways. Moreover, ECTS, in conjunction with outcome-based qualifications frameworks:

- establishes a closer link between educational programmes and labour-market requirements through the use of learning outcomes, thus enhancing informed learners' choices
- encourages wider access to and participation in lifelong learning, by making programmes more flexible and facilitating the recognition of prior achievement
- facilitates mobility within a given institution or country, from institution to institution, from country to country, and between different educational sectors and contexts of learning (i.e. formal, non-formal and informal learning).

3.2. ECTS and learning outcomes

From the key features:
"Learning outcomes describe what a learner is expected to know, understand and be able to do after successful completion of a process of learning."

Learning outcomes are verifiable statements of what learners who have obtained a particular qualification, or completed a programme or its components, are expected to know, understand and be able to do. As such they emphasise the link between teaching, learning and assessment.

Learning outcomes statements are typically characterised by the use of active verbs expressing knowledge, comprehension, application, analysis, synthesis and evaluation, etc.[9]

The use of learning outcomes makes the objectives of learning programmes clearer and more easily understood for students, employers and other stakehold-

9 Bologna Working Group on Qualifications Frameworks (2005) *A Framework for Qualifications of the European Higher Education Area, p. 38* http://www.ond.vlaanderen.be/hogeronderwijs/bologna/documents/050218_QF_EHEA.pdf

ers. They also make it easier to compare qualifications and facilitate the recognition of achievements.

In ECTS, the formulation of learning outcomes is the basis for the estimation of workload and hence for credit allocation. When those responsible for designing educational programmes establish the qualification profile and the expected learning outcomes of the programme and its components, ECTS credits help them to be realistic about the necessary workload and to choose learning, teaching and assessment strategies wisely. Stakeholders, such as learners and employers, may provide useful input to the formulation of learning outcomes.

The successful assessment of learning outcomes is the pre-condition for the award of credits to a learner. Therefore, statements of learning outcomes for programme components should always be accompanied by clear and appropriate assessment criteria for the award of credits, which make it possible to ascertain whether the learner has acquired the desired knowledge, understanding and competences

Two approaches exist: learning outcomes may be either threshold statements (showing the minimum requirements to obtain a pass), or written as reference points describing the typical (showing the expected level of achievement of successful learners). In any case, statements on learning outcomes must make clear which definition is being used.

Learning outcome-based approaches also enable knowledge, skills and competences gained in contexts other than formal higher education (non-formal or informal learning) to be assessed, to have credits awarded and hence to be recognised for the purpose of awarding a qualification (see section 4.5).

Figure 1 – "Learning outcomes" and "Competences" as defined in European Higher Education contexts:

In Europe a variety of terms relating to "learning outcomes" and "competences" is used with different shades of meaning and in somewhat different frames of reference. In all cases however they are related to what the learner will <u>know, understand and be able to do</u> at the end of a learning experience. Their widespread use is part of the shift in paradigm that places the learner at the centre of the higher education experience. This shift is the foundation of the European Higher Education Area, the Bologna Process and ECTS.

1. In the Qualifications Framework for the EHEA (Bologna Framework) learning outcomes (including competences) are seen as the overall results of learning. The Framework is based on the "Dublin Descriptors", developed by the Joint Quality Initiative. These descriptors consist of generic statements of typical expectations or competence levels of achievement and abilities associated with the Bologna cycles. The word *competence* is used in this case in a broad sense, allowing for gradation of abilities or skills. (http://www.bologna-bergen2005.no/Docs/00-Main_doc/050218_QF_EHEA.pdf)

2. The European Qualification Framework for LLL instead distinguishes knowledge, skills and competence. It uses the following definition: "*competence* means the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development. In the context of the European Qualifications Framework, competence is described in terms of responsibility and autonomy". In this case the term competence is understood in a more limited way, as the capacity to transfer knowledge into practice. (http://ec.europa.eu/education/policies/educ/eqf/rec08_en.pdf)

3. Tuning (Educational Structures in Europe) makes a clear distinction between learning outcomes and competences in order to distinguish the different roles of the most relevant players in the learning process: the academic staff and students/learners. For Tuning competences represent a dynamic combination of knowledge, understanding, skills, abilities and attitudes and are distinguished between subject specific and generic ones. Fostering competences is the object of a process of learning and of an educational programme. According to Tuning, learning outcomes express the level of competence attained by the learner. Learning outcomes are formulated by academic staff, preferably on the basis of input from internal and external stakeholders. (http://tuning.unideusto.org/tuningeu or http://www.rug.nl/let/tuningeu)

3.3. ECTS, levels and level descriptors

From the key features:
"Learning outcomes relate to level descriptors in national and European qualifications frameworks."

European and national qualification frameworks are based on agreed level descriptors, with learning outcomes and credits related to such levels. The Bologna Framework has agreed cycle descriptors with learning outcomes and credit ranges. The Bologna cycle descriptors are known as the 'Dublin Descriptors'[10]:

"The Dublin Descriptors offer generic statements of typical expectations of achievements and abilities associated with qualifications that represent the end of each of a Bologna cycle. They are not meant to be prescriptive; they do not represent threshold or minimum requirements and they are not exhaustive; similar or equivalent characteristics may be added or substituted. The descriptors seek to identify the nature of the whole qualification."[11]

(For further information on Dublin Descriptors see the references in the bibliography.)

10 Ibidem, p. 65

11 Bologna Working Group on Qualifications Frameworks (2005) A Framework for Qualifications of the European Higher Education Area, p. 65 http://www.ond.vlaanderen.be/hogeronderwijs/bologna/documents/050218_QF_EHEA.pdf

The first two Bologna cycles are associated with the following ECTS credit ranges:[12]

- First cycle qualifications typically include 180-240 ECTS credits.
- Second cycle qualifications typically include 90-120 ECTS credits, with a minimum of 60 ECTS credits at the level of the 2nd cycle.

These credit ranges follow the ECTS key feature stating that 60 ECTS credits are attached to the workload of a typical full-time academic year[13] of learning within a formal learning programme. This rule applies to all higher education qualifications independent of their level.

National qualifications frameworks may contain levels (or intermediate qualifications) within the three Bologna cycles (e.g. a short cycle within the first cycle). These levels allow institutions to structure a particular qualification and regulate progression through the qualification.

Credits are always described by the level at which they are awarded, based on the level of learning outcomes of the programme or component. Only credits awarded at the appropriate level can be accumulated towards a qualification. The appropriate level is stipulated in the national or institutional progression rules (see also section 4.3).

3.4. ECTS credits and workload

From the key features:

"Workload indicates the time students typically need to complete all learning activities (such as lectures, seminars, projects, practical work, self-study and examinations) required to achieve the expected learning outcomes."

Prior to estimating the workload associated with a programme or an educational component, the learning outcomes should be defined. These learning outcomes are the basis for choosing suitable learning activities and for a consistent estimation of the workload necessary to complete them.

The estimation of workload must not be based on contact hours only (i.e. hours spent by students on activities guided by teaching staff). It embraces all the learning activities required to achieve the expected learning outcomes, including the time spent on independent work, compulsory work placements, preparation for assessment and the time necessary for the assessment. In other words, a seminar and a lecture may require the same number of contact hours, but one may require significantly greater workload than the other because of differing amounts of independent preparation by students.

The estimation of workload should be regularly refined through monitoring and student feedback.

12 There is no consensus on the usefulness of credits for the third cycle, but technically it is possible to attach credits to any cycle.

13 In most cases, student workload ranges from 1,500 to 1,800 hours for an academic year, whereby one credit corresponds to 25 to 30 hours of work (see also Annex 5).

4. Implementing ECTS in higher education institutions

This section provides higher education institutions with some guidelines and illustrations of how to tackle the main steps in implementing ECTS. The objective is to show how ECTS is best used to generate maximum added value for learners.

4.1. ECTS credit allocation

From the key features:
"Credits are allocated to entire qualifications or study programmes as well as to their educational components (such as modules, course components, dissertation work, work placements and laboratory work)."

Credit allocation is the process of assigning a number of credits to qualifications/programmes or to educational components. ECTS credits are allocated on the basis of the typical workload necessary to achieve the required learning outcomes.

The number of credits allocated to the entire qualification or programme depends on the national or institutional regulations and the respective cycle of the Bologna Framework (see section 3.3).

Based on the ECTS key feature that 60 credits are allocated to the workload of a full-time academic year, 30 ECTS credits are normally allocated to a semester and 20 ECTS credits to a trimester. Qualifications which have formal programmes lasting three full-time academic years are allocated 180 ECTS credits.

Each academic year, semester or trimester is split into educational components. An educational component is understood to be a self-contained and formally structured learning experience (such as a course unit, module, seminar or work placement). Each component should have a coherent and explicit set of learning outcomes, appropriate assessment criteria, defined workload and specified number of ECTS credits.

4.1.1 Credit allocation to educational components

The allocation of credits to single educational components is performed as part of curriculum design with reference to national qualifications frameworks, level descriptors and qualifications descriptors. Generally it is the responsibility of higher education institutions and academic staff, but in some cases may be decided by external bodies.

Prior to allocating credits to individual components, an agreement should be reached on the 'profile' of the specific study programme and the associated learning outcomes. By profile is meant the description of the programme in terms of its main features and its specific aims. It is good practice to define this profile after consultation with relevant stakeholders.[14]

On the basis of the qualification profile, the academic staff design the curriculum by defining the learning outcomes and allocating credits to the programme components. Credit allocation to educational components is based on their weight in terms of the workload needed for students to achieve the learning outcomes in a formal context.

There are several approaches to credit allocation, and it is up to the institutions to decide on which method to use. The alternatives presented below illustrate two different approaches to allocating credits:

14 Experts in the field, social partners, labour-market representatives, student representatives, etc. See the Tuning approach for examples: http://unideusto.org/tuning/ or http://www.rug.nl/let/tuningeu

1) The teaching staff define the learning outcomes of each programme component, describe the learning activities and estimate the workload typically needed for a student to complete these activities. Proposals are collected, analysed and synthesised and the estimated workload is expressed in credits.

   Using this approach, all the teaching staff are involved in the process of credit allocation. They can put forward their proposals in terms of learning outcomes, and estimate the workload necessary to achieve them. Through discussion and defining of priorities they can come to a final decision on the basis of the credits available (60 for each year). This procedure may result in different numbers of credits being attributed to single components (e.g. 3, 5, 8).

   By using this option, institutions allow for maximum freedom in designing each component with regard to the learning outcomes and related workload. On the other hand, components of different sizes may be problematic when it comes to multidisciplinary or joint programmes or mobility.

2) Alternatively, the higher education institution or the faculty may decide from the start to standardise the size of educational components, giving each one the same credit value (e.g. 5) or multiples of it (e.g. 5, 10, 15), and thus predefine the number of credits to be allocated per component. In this case, the course units are often called 'modules'.

   Within this predefined structure, the teaching staff define appropriate and feasible learning outcomes and describe the learning activities, on the basis of the standard size of the components. The estimated workload must be consistent with the number of credits allocated to that component.

   By standardising the size of components, institutions allow for more flexible, multidisciplinary and interdisciplinary pathways among programmes. On the other hand, the definition of learning outcomes within a component is constrained by the pre-defined number of credits that set a priori the workload for each component.

It is recommended that in either case components should not be too small, to avoid fragmentation of a programme. It is also advised not to make components too large, as that may inhibit interdisciplinary studies and restrict the choices available within study programmes. Very large components are problematic for mobile students at all levels – institutional, national or international.

Whatever the method for credit allocation, the main element determining the number of credits is the estimated workload needed to achieve the expected learning outcomes. The number of contact hours alone must not be used as a basis to allocate credits, since contact hours are only one element of students' workload. Proper credit allocation should be part of the internal and external quality assurance for higher education institutions.

4.1.2 Estimation of workload in ECTS

In estimating students' workload, institutions must consider the total time needed by students in order to achieve the desired learning outcomes. The learning activities may vary in different countries, institutions and subject areas, but typically the estimated workload will result from the sum of:

- the contact hours for the educational component (number of contact hours per week x number of weeks)
- the time spent in individual or group work required to complete the educational component successfully (i.e. preparation beforehand and finalising of notes after attendance at a lecture, seminar or laboratory work; collection and selection of relevant material; required revision, study of that material; writing of papers/projects/dissertation; practical work, e.g. in a laboratory)
- the time required to prepare for and undergo the assessment procedure (e.g. exams)
- the time required for obligatory placement(s) (see section 4.1.3).

Other factors to take into consideration for estimating students' workload in the various activities are, for example: the entry level[15] of students for whom the programme (or its components) is designed; the approach to teaching and learning and the learning environment (e.g. seminars with small groups of students, or lectures with very large numbers of students) and type of facilities available (e.g. language laboratory, multi-media room).

Since workload is an estimation of the average time spent by students to achieve the expected learning outcomes, the actual time spent by an individual student may differ from this estimate. Individual students differ: some progress more quickly, while others progress more slowly.

4.1.3 ECTS credits and work placements

If work placements or internships are required to complete the programme (or a component) they are part of students' learning outcomes and workload and necessitate an allocation of credit. In such case, the number of credits allocated to the work placement should be included within the overall number of credits for the particular academic year.

Figure 2 – Good practice on learning outcomes and credit allocation for work placements[16]

Regarding the use of learning outcomes and credits for work placements, the following is considered good practice:

- The Learning Agreement regarding the work placement (signed by the institution, the learner and the employer) should specify the learning outcomes to be achieved;
- Work placements should have clear procedures for assessing learning outcomes and awarding credit;
- The roles of higher education institutions, learners and employers in the process of formulating as well as assessing these learning outcomes should be clear;
- The teaching staff in higher education institutions may require training regarding supervision and management of work placements;
- If required for the programme, the work placements should be integrated in the curriculum.

15 By "entry level" is meant the level of learning outcomes learners are expected to have already achieved when entering the programme.

16 Tuning Dissemination Conference: Student Workload and Learning Outcomes: Key Components for (Re)designing Degree Programmes, Key Questions, Debates and Conclusions of Workshops, (21-22 April 2008, Brussels, Belgium) see: www.tuning.unideusto.org/tuningeu/index.php?option=com_docman&task=docclick&Itemid=59&bid=92&limitstart=0&limit=5

As with any other educational component, the teaching staff should define the learning outcomes to be achieved through work placements when designing the curriculum. These learning outcomes should be accompanied by the appropriate assessment methods and criteria. It is important that the assessment methods be compatible with the nature of work placements (e.g. observation and evaluation by a tutor or production of a report by the student).

As with any other educational component, credits for work placements are only awarded when the learning outcomes have been achieved and assessed.

If a work placement is part of organised mobility (e.g. an Erasmus placement), the Learning Agreement for the placement (or Training Agreement, see key documents in section 6) should indicate the number of credits to be awarded if the expected learning outcomes are achieved.

In the case of placement experiences undertaken during a formal learning process but not required by the programme, it is nevertheless advisable to define the learning outcomes and the workload in a Learning Agreement. The learning outcomes achieved through non-compulsory work-placements should then also be documented for example in student's Transcript of Records, the Diploma supplement (see key documents in section 6) or Europass Mobility document. They can also be recognised by an award of corresponding ECTS credits which are in that case additional to the standard number of 60 ECTS credits for the academic year.

4.1.4 Monitoring of credit allocation

The credit allocation to a new programme or component should be validated according to national and/or institutional rules. During programme delivery, the credit allocation should be regularly monitored to establish whether the estimated workload is realistic. Both validation and monitoring of credit allocation, like other aspects of a credit system, should be part of institutions' internal quality assurance procedures.

Monitoring can be managed in different ways. Whatever method is used, student and staff feedback should constitute an essential element for checking and revising credit allocation. Data on completion times and the assessment results of programmes and their components are also part of the monitoring of credit allocation.

It is important to inform students and staff about the purpose of the monitoring exercise and how it will be carried out, ensuring accurate answers and a high response rate.

If evaluations reveal a discrepancy between the anticipated workload and the time actually taken by the majority of students to achieve the expected learning outcomes, a revision of the workload, learning outcomes or learning and teaching methods becomes necessary. This revision should not be done during an academic year but should apply to upcoming academic years.

4.2. Awarding ECTS credits

Learners are awarded ECTS credits only when appropriate assessment has shown that they have achieved the required learning outcomes for a component of a programme or for the qualification. Credits are awarded by authorised awarding institutions. If the required learning outcomes are achieved in non-formal or informal contexts, the same number of credits as foreseen in the formal programme is awarded following the appropriate assessment. To validate non-formal or informal learning, higher education institutions can put in place different forms of assessment than those used for learners enrolled in the formal programme (see section 4.5). In any case, the assessment methods should be publicly available.

The award of credits certifies that a learner has complied with the requirements of the component. The number of credits awarded to the learner is the same as the number of credits allocated to the component. The full number of credits is always awarded if the student achieves a passing grade; it is never adjusted according to the learner's level of performance. ECTS credits do not express how well the learner performed in satisfying the requirements for the award of credit. The quality of the learner's performance is expressed by the institutional or national grading system.

Some national or institutional regulations foresee 'condoning'/ compensation procedures.[17] In such cases, the details of that process should be transparent.

Individual learners may be awarded more or fewer than 60 ECTS credits per academic year if they successfully undertake more or fewer educational components than those scheduled in the learning programme.

4.3. ECTS credit accumulation and progression

From the key features:
"Credits may be accumulated with a view to obtaining qualifications, as decided by the degree-awarding institution."

At European level, the Bologna Qualifications Framework defines the credit ranges that a learner is required to accumulate in order to receive a qualification corresponding to the first and second cycle (see section 3.3). The credit ranges for qualifications within National Qualifications Frameworks are compatible with the Bologna credit ranges, even though the former may be more prescriptive and more detailed.

At national or institutional level, progression rules or programme requirements enable learners to progress within a given cycle in order to obtain a specific qualification. These stipulate the credits, for what learning outcomes, at what level, can be accumulated and how. Progression rules may be expressed in terms of the numbers of credits or credit ranges required at different stages within a programme of study (e.g. a minimum number of credits required to pass from one academic year/ semester to another). They may also be formulated in terms of detailed rules on what components must and/or can be taken at what stage and of what level (e.g. compulsory courses, optional courses and prerequisites). The rules may be formulated as a combination of the above.

Progression rules also relate to the number of credits to be obtained at different levels within the National Qualifications Framework. Some qualifications frameworks are also credit frameworks, meaning that they define the number of credits per type of qualification (e.g. master). Such credit frameworks set the number of credits to be awarded after the achievement of required learning outcomes. Progression rules define how learners progress within the learning pathway to achieve this number of credits in a progressive manner.

Accumulation of credits is documented in an official institutional Transcript of Record, so that learners can have a record/ proof or confirmation of what they have achieved at each stage of their educational pathway.

4.4. Credit transfer in ECTS

From the key features:
"Credits awarded in one programme may be transferred into another programme, offered by the same or another institution. This transfer can only take place if the degree-awarding institution recognises the credits and the associated learning outcomes. Partner institutions should agree in advance on the recognition of periods of study abroad."

Successful credit transfer requires academic recognition of credits. Recognition of credits is the process through which an institution certifies that certain learning outcomes achieved and assessed in another institution satisfy certain requirements of one of the programmes they offer. Given the diversity of programmes and higher education institutions, it is unlikely that the credits and learning outcomes of a single educational component in different programmes

17 Condoning is the term used when an examination board exempts a student from reassessment in a failed (or marginally failed) component if the other related components are passed with sufficiently high grades.

will be identical. Therefore, a flexible approach to recognition of credits obtained in another context is recommended. 'Fair recognition' rather than perfect equivalence is to be sought. Such 'fair recognition' should be based on the learning outcomes – i.e. what a person knows and is able to do - rather than on the formal procedures that have led to the completion of a qualification or its component.[18] The recognition process should be transparent.

The Recommendation on Criteria and Procedures for the Assessment of Foreign Qualifications[19] as adopted by the Lisbon Recognition Convention Committee states that:

Recognition of foreign qualifications should be granted unless a substantial difference can be demonstrated between the qualification for which recognition is requested and the relevant qualification of the State in which recognition is sought. In applying this principle, the assessment should seek to establish whether:

(a) the differences in learning outcomes between the foreign qualification and the relevant qualification of the country in which recognition is sought are too substantial to allow the recognition of the foreign qualification as requested by the applicant.

Recognition means that the number of credits gained for suitable learning outcomes achieved, at the appropriate level, in another context will replace the number of credits that are allocated for these learning outcomes at the awarding institution. For example in practice a 4 ECTS credit component in one institution can replace a 5 ECTS credit component in another institution if learning outcomes are equivalent. The student will then be awarded 5 ECTS credits.

Decisions on credit recognition and transfer are taken by the qualification-awarding institution on the basis of reliable information on the learning outcomes achieved, as well as on the means of assessment and their validation. Institutions should make their recognition policies known and easily accessible.

In ECTS, credit recognition for the purpose of accumulation and transfer are facilitated by ECTS key documents like the Course Catalogue, the Learning Agreement and the Transcript of Records (see section 6).

4.4.1 ECTS and periods of study abroad

In the case of agreed student mobility, the three parties involved – the home institution, the host institution and the student – should sign a Learning Agreement for mobility (see section 6.3.1) prior to the mobility period. In such cases, recognition of the credits by the home institution is automatic if the conditions stipulated in the learning agreement have been fulfilled.

All learning components to be followed abroad should be listed in the Learning Agreement. Where a student is awarded credits for learning components other than those specified in the Learning Agreement it is up to the home institution to decide whether or not to recognise these. In case of changes to the programme of study agreed with the learner, the Learning Agreement may be amended, but the amended version must be signed again by the same three parties concerned within an agreed period of time.

The recognition of credits in the framework of joint programmes is stipulated in the regulations of the programme. There may be no need for Learning Agreements for mobility in the case of joint programmes as the credits achieved in the partner institution are automatically recognised if the rules of the joint programme are followed and the conditions are satisfied.

Further guidance on how to organise periods of study abroad within the framework of bilateral agreements can be found in annex 2 of this guide.

18 Adam, S (2004) Final report and Recommendations of the Conference: Improving the recognition systems of degrees and study credit points in the European Higher Education Area.
http://www.aic.lv/rigaseminar/documents/Riga_Final_ReportP_S_Adam.pdf

19 For the full document see: Recommendation on Criteria and Procedures for the Assessment of Foreign Qualifications as adopted by the Lisbon Recognition Convention Committee at its second meeting, Rīga, 6 June 2001. http://www.coe.int/t/dg4/highereducation/Recognition/Criteria%20and%20procedures_EN.asp#TopOfPage

4.5. ECTS and lifelong learning

From the key features:

"ECTS is widely used in formal higher education and can be applied to other lifelong learning activities. If students have achieved learning outcomes in other learning contexts or timeframes (formal, non-formal or informal), the associated credits may be awarded after successful assessment, validation or recognition of these learning outcomes."

The use of ECTS for lifelong learning enhances the transparency of learning programmes and achievements not only when it comes to the main higher education degrees (bachelor, master or doctorate) but for all types of learning activities provided or learning outcomes recognised by higher education institutions. The fact that all learning achievements are documented and awarded a corresponding number of ECTS credits makes it possible for learners to have this learning recognised with a view of achieving a qualification, when these learning outcomes satisfy the requirements of the qualification.

4.5.1 ECTS and continuing education

Not all learners are full-time students enrolled in regular learning programmes. A growing number of adult learners follow 'stand-alone' training, without necessarily pursuing a specific qualification. Higher education institutions face increasing demands to satisfy the needs of adult learners and/or employers and to provide individual learning pathways.

When using ECTS for continuing education, the same principles for credit allocation, award, transfer and accumulation apply. Like for credits allocated to components which are part of programmes, credits allocated to continuing education are based on the workload typically needed to achieve the expected learning outcomes.

Credits awarded for continuing education may be recognised and accumulated towards a qualification or not, depending on the desire of the learner and/or the requirements for the award of the qualification. Some learners may only be interested in following a particular educational component without wishing to obtain the qualification.

4.5.2 ECTS and recognition of non-formal and informal learning

People often possess valuable competences acquired outside higher education institutions, through other types of learning activities, work or life experience. There is no reason why non-traditional learners should not benefit from the transparency and recognition which institutions can provide by using ECTS.

Recognition of non-formal and informal learning opens up the possibility to achieve a higher education qualification to those who have not been able or have not wished to do so in the traditional way.

Higher education institutions should have the competence to award credits for learning outcomes acquired outside the formal learning context through work experience, hobbies or independent study, provided that these learning outcomes satisfy the requirements of their qualifications or components. The recognition of non-formal and informal learning should be automatically followed by the award of the number of ECTS credits attached to the corresponding part of the formal programme. The number of credits awarded should be the same as the credits allocated to formal educational components with comparable learning outcomes.

As with formal education, the award of credit is preceded by an assessment to verify the achievement of learning outcomes. The assessment criteria and associated methods should be constructed so as to measure the achievement of the required learning outcomes at the appropriate level, without reference to specific learning activities. For example, classroom discussion of the subject matter would no longer be considered in assessment, whereas the corresponding learning outcome of constructing arguments while interacting with a group would become relevant.

Institutions are encouraged to publish their recognition policy and practices for non-formal or informal learning prominently on their website. These policies should include elements such as feedback to learners on the results of the assessment or the possibility for learners to appeal. Institutions are also encouraged to create 'assessment facilities' for advice, counselling and recognition of non-formal and informal learning. These may take different forms depending on national and institutional practices (e.g. they may exist within single higher education institutions or as joint centres for several institutions).

By implementing procedures for the recognition of non-formal and informal learning, the social dimension of higher education institutions is strengthened. Institutions fulfil the objective of facilitating access to learners from professional life and a range of non-traditional learning environments, and thus contribute to making lifelong learning a reality.

Figure 3 – Example of the use of credit for LLL – Scottish Qualifications and Credit Framework (SCQF)[20]

The SCQF guidelines encourage the use of validation of non-formal or informal learning:

- for personal and career development (formative recognition)
- for award of credit (summative recognition)

The latter involves assessing, and then *credit rating* learning gained through experience which took place before a learner embarks on a formal programme or qualification. Credit rating is the process through which the credit value of learning is established. In general this means that the receiving institution determines the number of credits a learner can be awarded within a particular programme within that institution or organisation.

The process of awarding credit to non-formal or informal learning has these three stages:

1. Initial advice and guidance (what does the process involve for the learner, what credit limits there are for non-formal/informal learning, what are the costs, roles and responsibilities of learner and tutor/advisor; and different learning pathways to qualification)
2. Support (reflective process; understanding learning outcomes; identifying own learning outcomes; evidence gathering and selection)
3. Recognition/assessment (assessment of evidence of achievement of learning outcomes and assessment criteria)
4. Award of credit (credit awarded through this process is of same value as credit gained through formal learning)

20 This summary is based on the presentation by Ruth Whittaker, Caledonian Academy, Glasgow Caledonian University, made during the Bologna seminar on Learning Outcomes based Higher Education (21-22 February 2008, Edinburgh). The full presentation can be found on: http://www.ond.vlaanderen.be/hogeronderwijs/bologna/BolognaSeminars/Edinburgh2008.htm

5. Quality assurance and ECTS

The primary responsibility for quality assurance lies with each institution.[21] Internal quality assurance involves all procedures undertaken by higher education institutions to ensure that the quality of their programmes and qualifications meets their own specifications and those of other bodies legitimately empowered to make specifications. External quality reviews undertaken by quality assurance agencies provide feedback to institutions and information to stakeholders. Taken together, internal quality assurance and external quality review aim to implement the *Standards and Guidelines for Quality Assurance in the European Higher Education Area.*[22]

The use of ECTS is in line with the *Standards and Guidelines for Quality Assurance* and notably standards 1.2 and 1.7, which state that:

- Institutions should have formal mechanisms for the approval, periodic review and monitoring of their programmes and awards.[23] The quality assurance of programmes and awards is expected to include:

- development and publication of explicit intended learning outcomes[24]

- careful attention to curriculum and programme design and content.[25]

- Institutions should regularly publish up-to-date, impartial and objective information, both quantitative and qualitative, about the programmes and awards they are offering.[26]

The implementation and use of ECTS by higher education institutions should be quality assured through appropriate processes (e.g. internal and external quality reviews and students' feedback).

21 Realising the European Higher Education Area. Communiqué of the Conference of Ministers responsible for Higher Education in Berlin on 19 September 2003.

22 European Association for Quality Assurance in Higher Education (2005) Standards and Guidelines for Quality Assurance in the European Higher Education Area: http://www.ond.vlaanderen.be/hogeronderwijs/bologna/documents/Standards-and-Guidelines-for-QA.pdf

23 Standards and Guidelines, p. 16

24 Ibidem, p.16

25 Ibidem, p.16

26 Ibidem, p.19

Figure 4 – Good practice on ECTS and quality assurance

Regarding the quality assurance of ECTS and of related processes, it is good practice that higher education institutions' quality assurance processes ensure that for all their higher education programmes:

- educational components are expressed in terms of appropriate learning outcomes, and clear information is available concerning their level, credits, delivery and assessment
- studies can be completed in the time officially allocated to them (i.e., the workload associated with a semester, trimester or academic year is realistic)
- annual monitoring examines any variations in patterns of achievement and results gained
- students are provided with detailed information and advice so that they have the appropriate prerequisites and co-requisites for any studies undertaken and are not allowed to select educational components that are at an inappropriate level or that they have previously studied at the same level.[27]

With regard to mobile students and recognition this means that:

- credit transfer processes are included in the normal monitoring, review and validation procedures
- appropriate staff are designated as responsible for credit transfer and recognition matters
- Learning Agreements are completed in all cases; their development, and any subsequent changes to them, should be subject to sensitive yet robust approval processes[28]
- mobile students undertake normal educational components from the existing Course Catalogue; they follow the validated full assessment regime for those components and are graded alongside home students
- detailed transcripts are provided recording the credits and grades awarded
- recognition is given to all credits associated with successfully completed educational components undertaken as part of any approved learning agreement; results should be issued and transmitted promptly
- objective procedures exist for interpreting the grades awarded, so that also grades – and not just credits – are properly reflected in any final qualifications gained.

27 Prerequisites: required prior knowledge, usually defined in the form of the successful completion of other (previous) educational components. Co-requisites: educational components which require that some other components be undertaken at the same time or immediately following the successful achievement of the learning outcomes corresponding to that component.

28 The notion of sensitive 'fair recognition' and not strict equivalence should be used in developing learning agreements, as associated with the 1997 *Convention on the Recognition of Qualifications concerning Higher Education in the European Region*, Explanatory Report: http://conventions.coe.int/Treaty/en/Treaties/Html/165.htm

6. ECTS key documents

From the key features:

"Credit transfer and accumulation are facilitated by the use of the ECTS key documents (Course Catalogue, Student Application Form, Learning Agreement and Transcript of Records) as well as the Diploma Supplement."

The ECTS key documents described in this section constitute a widely used and accepted way of communicating those elements of information which are useful for all learners (including mobile and non-mobile students), academic and administrative staff, employers and other stakeholders. Using ECTS key documents correctly ensures transparency and enhances quality in higher education.

Increasingly, institutions keep track of learners' achievements in a systematic way within a computerised student records system which integrates the data contained in the ECTS key documents and other documents such as the Diploma Supplement[29].

6.1. Course Catalogue

The first key document is the Course Catalogue. This is the regular guide for all students attending the institution.

The exact format of the Catalogue is to be decided by the institution. It may be considered more appropriate to separate the general information for students from the academic information. In any case, all information should be detailed, user-friendly and up-to-date. The Catalogue should be published on the institution's website so that all interested parties can easily access it. It should be published sufficiently in advance for students to make their choices.

A checklist of the recommended contents of the Course Catalogue is given below (section 6.1.1). The checklist indicates the full range of information which should be provided. It is essential that information about the qualifications offered, the teaching, learning and assessment procedures, the level of programmes, the single educational components and the learning resources available to students be well documented and easily understood.

All learners should be able to identify an individual who will be able to give them relevant advice, at either institutional or departmental/subject level. It is therefore important that the Catalogue should include the names of people to contact, with information about how, when and where to contact them.

Transparency and accessibility apply equally to language. The publication should be available on the website, not only in the local language, but preferably also in another widely-used language in order to enhance transparency at international level[30]. Links to examples of Course Catalogues can be found on the following web page http://ec.europa.eu/education/lifelong-learning-policy/doc48_en.htm

29 The Diploma Supplement is also part of the package of Europass transparency tools.
http://europass.cedefop.europa.eu/europass/home/hornav/Introduction/navigate.action

30 The second language required for institutions applying for the ECTS label is English.

6.1.1 Checklist for the Course Catalogue

Part 1: Information on the institution:

- name and address
- academic calendar
- academic authorities
- general description of the institution (including type and status)
- list of programmes offered
- general admission requirements
- general arrangements for the recognition of prior learning (formal, informal and non-formal)
- general registration procedures
- ECTS credit allocation based on the student workload needed in order to achieve expected learning outcomes
- arrangements for academic guidance.

Part 2: Information on programmes

General description:

- qualification awarded
- level of qualification
- specific admission requirements
- specific arrangements for recognition of prior learning (formal, non-formal and informal)
- qualification requirements and regulations
- profile of the programme
- key learning outcomes
- occupational profiles of graduates with examples
- access to further studies
- course structure diagram with credits (60 per full-time academic year)
- examination regulations, assessment and grading
- graduation requirements
- mode of study (full-time, part-time, e-learning...),
- programme director or equivalent.

Description of individual course units:

- course unit title
- course unit code
- type of course unit (compulsory, optional)
- level of course unit (e.g. first, second or third cycle; sub-level if applicable)
- year of study (if applicable)
- semester/trimester when the course unit is delivered
- number of ECTS credits allocated
- name of lecturer(s)
- learning outcomes of the course unit
- mode of delivery (face-to-face, distance learning)
- prerequisites and co-requisites
- recommended optional programme components
- course contents
- recommended or required reading
- planned learning activities and teaching methods
- assessment methods and criteria
- language of instruction.
- work placement(s)

Part 3: General information for students:

- cost of living
- accommodation
- meals
- medical facilities
- facilities for special needs students
- insurance
- financial support for students
- student affairs office
- learning facilities
- international programmes
- practical information for mobile students
- language courses
- internships
- sports and leisure facilities
- student associations

6.2. Student Application Form

The ECTS Student Application Form has been developed for mobile students who will spend a limited study period in another institution. Students who intend to complete their studies at another institution should enrol according to the regular procedures of the institution concerned and will fill in other types of application forms.

The Student Application Form contains all the essential information about a mobile student that a prospective host institution needs. If an institution requires further information (for example, regarding housing, special health requirements) from incoming students, it may request it separately.

This Guide offers the standard Student Application form which can also be found on the following web page http://ec.europa.eu/education/lifelong-learning-policy/doc48_en.htm. Institutions may choose to adapt the standard form (adding their logo and other specific information), but they should ascertain that it contains all the elements and that, as far as possible, the sequence is respected.

6.3. Learning Agreement

In higher education institutions, students normally register for a programme of study and for a number of specific course units/modules on either an annual or a semester basis. In practice, this represents a Learning Agreement for home students. By registering the student, the higher education institution enters into an agreement to deliver the courses and to grant credits for the achievement of the expected learning outcomes.

6.3.1 Learning Agreement for mobile students

The ECTS Learning Agreement was originally developed for mobile students in order to provide a binding agreement before the mobility experience. When used for mobile students, Learning Agreements contain the list of course units or modules or other educational components the student is planning to take at the other institution, together with the code numbers and the ECTS credits allocated to the components.

An ECTS Learning Agreement is drawn up for a semester or a year of study and must be signed by the home institution, the host institution and the student. Those signing on behalf of the two institutions must be in a formal position of authority which allows them to commit the institutions. For the host institution, the commitment is to register the incoming student in the planned course units/modules and to provide the required learning activities; for the home institution, it is to grant recognition of the credits gained at the other institution. A student should not be asked to negotiate academic recognition with individual academic staff members. The Learning Agreement, together with the Transcript of Records, is designed to guarantee full recognition of the programme of study undertaken in the host institution.

A programme of study may need to be modified after the arrival of the mobile student. In such cases, the Learning Agreement should be amended as soon as possible and endorsed by the three parties: the home institution, the host institution and the student. Only in this way can the recognition of the period of study continue to be fully guaranteed.

This Guide offers the standard Learning Agreement which can also be found on the following web page http://ec.europa.eu/education/lifelong-learning-policy/doc48_en.htm. Institutions may choose to adapt the standard form (adding their logo and other specific information), but they should ascertain that it contains all the elements and that, as far as possible, the sequence is respected.

6.3.2 Learning Agreement for work placements - Training Agreement

Learning Agreements for work placements or Training Agreements are also essential for work placements that are a required part of programmes. They should contain the same basic elements as the standard Learning Agreement, although obviously there are differences.

The Training Agreement should indicate clearly the location of the work placement, the period of the placement, the work to be undertaken (job description), the learner's rights and duties, and the expected learning outcomes. It will also need to indicate what assessment and assessment criteria will be used in relation to the expected learning outcomes and who will be responsible for this, i.e. the role of the work placement provider (employer) and, whenever applicable, the host institution.

The Training Agreement should be signed by the three parties – the learner, the home educational institution and the work placement provider (employer). Where a host institution is involved it is also expected to sign the agreement. The primary responsibility lies with the qualification awarding institution. The Agreement should indicate the number of

ECTS credits which will be awarded on achievement of the expected learning outcomes.

This Guide offers the standard Training Agreement which can also be found on the following web page http://ec.europa.eu/education/lifelong-learning-policy/doc48_en.htm. Institutions may choose to adapt the standard form (adding their logo and other specific information), but they should ascertain that it contains all the elements and that, as far as possible, the sequence is respected.

6.4. Transcript of Records

Many institutions produce a transcript of records for each student at the end of each semester or year. This is an important document for the student and institution. It ensures that students have an accurate and up-to-date record of their progress, the educational components they have taken, the number of ECTS credits they have achieved and the grades they have been awarded. The ECTS Transcript of Records is such a certification, in an agreed format. It is an important formal document, providing evidence of progress and recognition.

For mobile students, the home institution firstly issues the Transcript of Records and sends it to the host institution for each outgoing student before departure, to provide information about the educational components already completed, their level and the results obtained. Subsequently, the host institution issues another Transcript of Records for each incoming student and sends it to the home institution at the end of their period of study, in order to formally certify the work completed, the credits awarded, and the local grades received during the mobility period.

Since the Transcript is a vital document for recording the progress of all students and for recognising learning achievements, it is crucial to determine who is responsible for producing it, how it is issued and how it is delivered.

This Guide offers the standard Transcript of Records which can also be found on the following web page http://ec.europa.eu/education/lifelong-learning-policy/doc48_en.htm. Institutions may choose to adapt the standard form (adding their logo and other specific information), but they should ascertain that it contains all the elements and that, as far as possible, the sequence is respected.

7. References for further reading

7.1. Credit and qualifications systems

European Instruments:

- *The framework of qualifications for the European Higher Education Area*
  http://www.ond.vlaanderen.be/hogeronderwijs/bologna/documents/QF-EHEA-May2005.pdf
  Background report: *A Framework for Qualifications of the European Higher Education Area,* Ministry of Science, Technology and Innovation, 2005
  http://www.ond.vlaanderen.be/hogeronderwijs/bologna/documents/050218_QF_EHEA.pdf

- *Recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning*
  http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2008:111:0001:0007:EN:PDF
  Other information on the EQF:
  http://ec.europa.eu/education/lifelong-learning-policy/doc44_en.htm#doc

- Convention on the recognition of qualifications concerning higher education in the European region (CETS 165, 1997)
  http://conventions.coe.int/Treaty/Commun/QueVoulezVous.asp?NT=165&CL=ENG
  Explanatory report on the Convention:
  http://conventions.coe.int/Treaty/en/Treaties/Html/165.htm

Publications at European level:

- Tuning Educational Structures in Europe (2007)
  http://tuning.unideusto.org/tuningeu/images/stories/template/General_Brochure_final_version.pdf
  Further information and outcomes of the Tuning project:
  http://unideusto.org/tuning
  or:
  http://www.rug.nl/let/tuningeu

Relevant Bologna Seminar Reports:

- Bologna Seminar on 'Development of a Common Understanding of Learning Outcomes and ECTS' Porto, Portugal, 19-20 June 2008 Final Report and Recommendations
  http://portobologna.up.pt/documents/BS_P_Report_20080915_FINAL.pdf
  Further information on the seminar (inputs, presentations):
  http://portobologna.up.pt/

- Bologna Seminar on 'ECTS based on learning outcomes and student workload' Moscow, Russia, 17-18 April 2008
  Conclusions
  http://www.ond.vlaanderen.be/hogeronderwijs/bologna/BolognaSeminars/documents/Moscow_April2008_conclusions_final.pdf

- Wagenaar, Robert (2006) 'An Introduction to the European Credit Transfer and Accumulation System (ECTS)', in: EUA, *Bologna Handbook. Making Bologna Work.* Berlin: European University Association
  http://www.eua.be/publications/bologna-handbook/

- Le Mouillour, Isabelle, commissioned by Cedefop (2005) *European approaches to credit (transfer) systems in VET.* Cedefop Dossier 12. Luxembourg: Office for Official Publications of the European Communities
  http://www.trainingvillage.gr/etv/Upload/Information_resources/Bookshop/424/6014_en.pdf

- Adam, Stephen (2004) *Improving the recognition system of degrees and study credit points in the European Higher Education Area.*
  Bologna Seminar on Recognition, University of Latvia, Riga, 3-4 December 2004, organised by Latvian authorities and the Council of Europe, supported by the EU Socrates programme. Final report and recommendations of the conference.
  http://www.aic.lv/rigaseminar/documents/Riga_Final_ReportP_S_Adam.pdf

- European Association for Quality Assurance in Higher Education (2005) *Standards and Guidelines for Quality Assurance in the European Higher Education Area*. Helsinki: European Association for Quality Assurance in Higher Education http://www.ond.vlaanderen.be/hogeronderwijs/bologna/documents/Standards-and-Guidelines-for-QA.pdf

- Gehmlich, Volker (2006) 'The Added Value of Using ECTS' in: EUA, *Bologna Handbook. Making Bologna Work*. Berlin: European University Association
  http://www.eua.be/publications/bologna-handbook/

7.2. Curriculum design

Volker Gehmlich, Andy Gibbs, Raimonda Markeviciene, Terence Mitchell, Graeme Roberts, Anne Siltala, Marina Steinmann (2008) *Yes! Go! A Practical Guide to Designing Degree Programmes with Integrated Transnational Mobility, DAAD* http://eu.daad.de/eu/mocca/06493.html

7.3. Learning outcomes

- Bologna Seminar on 'Learning Outcomes Based Higher Education - The Scottish Experience' Edinburgh, UK, 21-22 February 2008 *Conclusions and Recommendations*
  http://www.ond.vlaanderen.be/hogeronderwijs/bologna/BolognaSeminars/documents/Edinburgh/Edinburgh_Feb08_Final_Conclusions_and_Recommendations.pdf
  Final Report
  http://www.ond.vlaanderen.be/hogeronderwijs/bologna/BolognaSeminars/documents/Edinburgh/Edinburgh_Feb08_final_report.pdf

Further information on the seminar (inputs, presentations):

- http://www.ond.vlaanderen.be/hogeronderwijs/bologna/BolognaSeminars/Edinburgh2008.htm

- Adam, Stephen (2008) Learning Outcomes Current Developments in Europe: Update on the Issues and Applications of *Learning Outcomes Associated with the Bologna Process*. Edinburgh: Scottish Government
  Presented to the Bologna Seminar: Learning outcomes based higher education: the Scottish Experience (February 2008, Edinburgh).
  http://www.ond.vlaanderen.be/hogeronderwijs/bologna/BolognaSeminars/documents/Edinburgh/Edinburgh_Feb08_Adams.pdf

- Adam, Stephen (2004) *Using Learning Outcomes: A consideration of the nature, role, application and implications for European education of employing learning outcomes at the local, national and international levels*
  http://www.pedagogy.ir/images/pdf/using-learning-outcomes-eu.pdf

- Kennedy, Declan, Hyland, Aine, and Ryan, Norma (2006) 'Writing and Using Learning Outcomes: A Practical Guide' in: EUA, Bologna Handbook. *Making Bologna Work*. Berlin: European University Association
  http://www.bologna.msmt.cz/files/learning-outcomes.pdf
  Presented to the Bologna Seminar: Using Learning Outcomes (July 2004, Edinburgh).
  http://www.bologna-bergen2005.no/EN/Bol_sem/Seminars/040701-02Edinburgh/040620LEARNING_OUTCOMES-Adams.pdf

- Cedefop (2008) *The Shift to Learning Outcomes: Conceptual, political and practical developments in Europe*. Luxembourg: Office for Official Publications of the European Communities
  Synthesis:
  http://www.trainingvillage.gr/etv/Upload/Information_resources/Bookshop/494/4079_en.pdf
  The full report is to be published.

7.4. National publications

Each country has published, or is in the process of publishing, information on its national qualifications and credit systems. Two examples are Scotland and Ireland.

- The Scottish Credit and Qualifications Framework
  http://www.scqf.org.uk

- National Qualifications Authority of Ireland – National Framework of Qualifications
  http://www.nfq.ie/nfq/en/index.html

- HRK (2007) Bologna Reader II, Neue Texte und Hilfestellungen zur Umsetzung der Ziele des Bologna-Prozesses an deutschen Hochschulen, Bonn
  http://www.hrk.de/bologna/de/Bologna_Reader_gesamt.pdf

- Gehmlich, Volker (2008) Die Einführung eines Nationalen Qualifikationsrahmens in Deutschland – DQR – Untersuchung der Möglichkeiten für den Bereich des formalen Lernens, Osnabrück : Univ., Fak. für Wirtschafts- und Sozialwiss

- Meijers, van Overveld, Perrenet with the co-operation of Borghuis and Mutsaers (2005) Criteria for Academic Bachelor's and Master's Curricula
  http://www.jointquality.nl/content/descriptors/AC_English_Gweb.pdf

- Hildbrand, Tremp, Jäger Tückmantel (2008) The Curricula Reform at Swiss Institutes of Higher Education: An Analysis of the Current State and Perspectives in the Bologna Reform
  www.crus.ch/dms.php?id=5499

8. Glossary

The following glossary defines terminology for the purpose of this ECTS Users' guide.

Accumulation	The process of collecting credits awarded for achieving the learning outcomes of educational components or other learning activities.
Allocation of Credit	The process of assigning a number of credits to qualifications/ programmes or to other educational components.
Assessment	The total range of methods (written, oral and practical tests/examinations, projects and portfolios) used to evaluate learners' achievement of expected learning outcomes.
Assessment criteria	Descriptions of what the learner is expected to do, in order to demonstrate that a learning outcome has been achieved.
Award of Credit	The act of delivering learners the number of credits that are assigned to the component or a qualification. The award of credit recognises that learners' learning outcomes have been assessed and that the learner satisfies the requirements for the educational component or the qualification.
Competences	A dynamic combination of cognitive and metacognitive skills, knowledge and understanding, interpersonal, intellectual and practical skills, ethical values and attitudes. Fostering competences is the object of all educational programmes. Competences are developed in all course units and assessed at different stages of a programme. Some competences are subject-area related (specific to a field of study), others are generic (common to any degree course). It is normally the case that competence development proceeds in an integrated and cyclical manner throughout a programme.
Condoning	Condoning is the term used in some national contexts when an examination board exempts a student from reassessment in a failed (or marginally failed) component if other related components are passed with sufficiently high grades.
Contact Hour	Hours (typically a period of 45-60 minutes) spent by students on activities guided by teaching staff.
Credit (ECTS)	Quantified means of expressing the volume of learning based on the workload students need in order to achieve the expected outcomes of a learning process at a specified level.
Cycle	All qualifications in the European Higher Education Area are located within three cycles. One of the objectives indicated in the Bologna Declaration in 1999 was the "adoption of a system based on two main cycles, undergraduate and graduate." In 2003 doctoral studies were also included in the Bologna structure and referred to as the third cycle.
Cycle (Level) Descriptors	Generic statements of the broad expected outcomes of each of the three cycles. A good example of general cycle (level) descriptors are the so-called Dublin Descriptors, which have served as one of the foundations (along with ECTS) for the Framework for Qualifications of the European Higher Education Area.
Educational Component	A self-contained and formally structured learning experience (such as: course unit, module, seminar, work placement).
Formal learning	Learning typically provided by an education or training institution, structured (in terms of learning objectives, learning time or learning support) and leading to certification. Formal learning is intentional from the learner's perspective.

Informal learning	Learning resulting from daily life activities related to work, family or leisure. It is not structured (in terms of learning objectives, learning time or learning support) and typically does not lead to certification. Informal learning may be intentional but in most cases it is non-intentional (or "incidental"/random).
Learner	An individual engaged in a learning process (formal, non-formal or informal learning).
Learner-centred (approach or system)	An approach or system that supports the design of learning programmes which focus on learners' achievements, accommodate different learners' priorities and are consistent with reasonable students' workload (i.e. workload that is feasible within the duration of the learning programme). It accommodates for learners' greater involvement in the choice of content, mode, pace and place of learning.
Learning Outcomes	Statements of what a learner is expected to know, understand and be able to do after successful completion of a process of learning.
Level Descriptor	General statements of the typical achievement of learners who have been awarded a qualification at a certain level in a qualifications framework.
Module	A course unit in a system in which each course unit carries the same number of credits or a multiple thereof.
Non-formal learning	Learning that is not provided by an education or training institution and typically does not lead to certification. It is, however, structured (in terms of learning objectives, learning time or learning support). Non-formal learning is intentional from the learner's perspective.
Programme (educational)	A set of educational components, based on learning outcomes, that are recognised for the award of a specific qualification.
Progression	The process which enables learners to pass from one stage of a qualification to the next and to access educational programmes that prepare for qualifications at a higher level than those he/she already possesses.
Progression rules	Set of rules that define conditions for learners' progression within qualifications and towards other qualifications.
Qualification	Any degree, diploma or other certificate issued by a competent authority attesting the successful completion of a recognised programme of study.
National Qualifications Framework (higher education)	The single description, at national level or at the level of an education system, which is internationally understood and through which all qualifications and other learning achievements in higher education may be described and related to each other in a coherent way and which defines the relationship between higher education qualifications.
Quality Assurance	The process or set of processes adopted nationally and institutionally to ensure the quality of educational programmes and qualifications awarded.
Recognition of credit	The process through which an institution certifies that learning outcomes achieved and assessed in another institution satisfy (some or all) requirements of a particular programme, its component or qualification.
Recognition of non-formal and informal learning	The process through which an institution certifies that the learning outcomes achieved and assessed in another context (non-formal or informal learning) satisfy (some or all) requirements of a particular programme, its component or qualification.
Student	Learner enrolled in a formal educational programme
Transfer	The process of having credits awarded in one context recognised in another context for purposes of obtaining a qualification.
Workload	Indication of the time students typically need to complete all learning activities (such as lectures, seminars, projects, practical work, self-study and examinations) required to achieve the expected learning outcomes

Annex 1
Learners' perspective in using ECTS

One of the objectives of ECTS is to ensure that learners' achievements, aspirations and capacities are taken into account in the learning process. The implementation of ECTS should provide protection and fair treatment for learners.

In an institution using ECTS, learners are entitled to expect:

- **a course Catalogue** clearly describing the curricula, with expected learning outcomes and their components, including the **allocated ECTS credits**
- **assessment methods** that are coherent with the expected learning outcomes and the workload
- **information** about these assessment methods that is available well in advance
- **award of the number of ECTS credits** allocated to each educational component after the required assessment procedure has been passed successfully
- participation in the periodical **monitoring and revision** of the estimated workload and thus of the credit allocation
- **participation** of student representatives in the process of ECTS implementation
- possibilities for **guidance** and support
- an opportunity to have **prior learning achievements,** such as non-formal or informal learning or credits from other institutions, taken into account for further studies
- the right to academic appeal if credits are not awarded for components that have been successfully completed.

In cases of mobility:

- for periods of study abroad or in another institution based on a Learning Agreement – **full academic recognition** from the home higher education institution for credits achieved during the study period abroad, in accordance with the Learning Agreement,[31] without duplication of assessment procedures
- for periods of study abroad or in another institution without a Learning Agreement – **fair recognition** of credits awarded during that period of study and **consideration** of them with respect to the award of a qualification
- careful and fair consideration by the home institution of grades awarded by the host institution.

In cases of recognition of non-formal and informal learning:

- the award of **the same number of credits** as allocated to formal educational components with comparable learning outcomes.

31 http://ec.europa.eu/education/archive/million/charter_en.pdf

Annex 2
Suggestions for institutions on recognition of periods of study abroad in the framework of bilateral agreements

Selection of partner institutions

It is suggested to make exchange agreements with institutions:

- that offer adequate descriptions of their programmes, including credits, learning outcomes, teaching/learning approaches and assessment methods
- whose standards you consider adequate for your students, so that you can accept their teaching and assessment procedures without requiring any further work or assessment.

Agreements should not only be made with institutions offering similar programmes, but also with those providing programmes complementary to yours, thus making available further opportunities for your students.

Integration of mobility into programmes

In order to structure mobility into your curricula:

- identify the semester or year when a period of study abroad would best fit into the programme (mobility window)
- schedule in that semester/year the educational components the learning outcomes of which can be more easily achieved abroad (e.g. language courses, international or comparative courses, supplementary/elective courses, preparation of dissertation, work placements, etc)
- identify, within the partner institutions, departments or curricula where similar, complementary and coherent learning outcomes could be achieved.

Allocation of academic responsibilities

Appoint an academic in each department or subject area who has the authority to:

- approve students' programmes of study abroad and amend them as needed (sign the Learning Agreement)
- guarantee full recognition of such programmes on behalf of the responsible academic body (sign the Recognition sheet).

Interaction with single outgoing students

Before the departure of the student, the responsible staff member will:

- discuss with the student, and finally approve, a Learning Agreement containing a programme of study abroad for a semester or a year (about 30 or 60 credits); this programme will have similar, complementary or coherent learning outcomes in relation to the programme in the home institution, but it will not necessarily have the same content
- guarantee in advance that all credits gained abroad in the approved programme of study will be fully recognised, transferred into the home programme and used to satisfy the qualification requirements.

After the return of the student, the responsible administrator will:

- transfer all credits gained abroad in the approved programme of study (Transcript of Records) into the student's official learning programme at home, indicating the learning activities they refer to, with their original titles; the credits will subsequently be included in the Diploma Supplement, with a note specifying the institution where they have been gained

- use the credits gained abroad for accumulation purposes to satisfy specific curricular requirements, as previously agreed in the Learning Agreement; recognising credits gained abroad as additional credits would not fulfil the commitment to full academic recognition, and should only be done if the student brings back more than 30/60 credits.

Annex 3
ECTS Grading Table

Introduction

The first section of this annex describes the attempts made to design a reliable system for the interpretation and conversion of grades. The second section describes a simplified system called "The ECTS Grading Table". The simplified system builds on the earlier version and, like before, it requires universities to keep track of their grading practice and culture, which is good practice in many institutions across Europe. The ECTS Grading Table allows universities to ensure fair transfer and recognition of grades of mobile students. User comments on the new version are very welcome.

Background

It is well known that European educational systems have developed different approaches to grading which are deeply rooted in their pedagogical and cultural traditions. It is to be pointed out, moreover, that not only do they have different grading scales, but they also use them differently in the various institutions and subject areas. While it is essential to respect these differences, it is also important to make them transparent within the European Higher Education Area, so that grades attributed in all countries, institutions or subject areas can be properly understood and when necessary compared by people with different cultural backgrounds. Mobile students have a right to a fair treatment of their grades when credits are transferred from one institution/country to another, as grants or other benefits may depend on their level of performance. Transparency of performance levels is equally important for graduates applying for a job in their own or in another country.

To tackle this problem, in the past years ECTS guidelines suggested that, in addition to their national scale, European institutions might use a European grading scale as a translation device into other grading systems. Such European scale was based on the statistical distribution of passing grades in each programme, which showed how the national scale was actually being used in that context and allowed for comparison with the statistical distribution of grades in a parallel programme of another institution.

As a first step, the implementation of the ECTS scale required the collection of statistical data in the institutions who were willing to participate in the scheme to make their grades more transparent. In educational systems where ranking of students in each course unit/module was a standard procedure, statistical data could be provided for the very cohort in which the grade had been obtained. In the other cases, the statistical distribution was based on the grades given over the previous two or three years to a specific reference group - a single programme or a group of homogeneous programmes – from which a consistent grading pattern could be derived. These data, collected in a large number of institutions in Europe, have shown how national grading scales are actually being used. For example, teachers in French institutions are more consistently using the lower half of their scale, while their Italian counterparts are making more use of grades in the upper half of it. As for the subject area, the data from many Italian institutions showed that teachers in Engineering tend to mark lower than teachers in Humanities. Although these patterns had already been perceived by practitioners on an impressionistic basis, it is interesting to find that they are supported by statistical evidence. The grade distribution table developed for a specific reference group allows for a single grade currently obtained to be positioned in its own context, thus making it easier to understand the level of the student's performance and compare it with that of students with a similar position in other contexts.

As a second step in the implementation of the ECTS grading scale, the statistical distribution curve for each reference group was split into five segments (Top 10%, next 25%, next 30%, next 25%, lowest 10%) also called A, B, C, D, E, which could become a device for the direct translation of grades from a degree programme in a given country/institution into a similar one in another country/institution. For example, if, based on the statistical data, in a French degree programme the grade 14 was obtained by the top 10% of the students, the ECTS grade A could be added into a student's transcript alongside the grade 14. In this way the French grade 14 was understood as being one of the best grades obtained in that programme, comparable to the grade having a similar percentage in the same subject area in another country/institution, to which an A had also been attached – for example a 30 in an Italian institution.

In the light of the experience made with the ECTS 5-point grading scale in the past years, it can be said that the second step described above proved to be far too ambitious and difficult to implement, especially in those national grading systems with only five or fewer passing grades, which could hardly fit into the predetermined percentage structure provided by the ECTS scale. In fact, the use of the ECTS scale by European institutions has been rather limited.

Simplified system: The ECTS Grading Table

In order to simplify the procedure, while continuing to pursue the objective of making European grades more transparent, we propose using an "ECTS grading table", concentrating on the first step of the 5-point system. Thus institutions only need to provide in a standard table form the statistical distribution of their own grades. Therefore, the ECTS grading scale based on a predetermined percentage structure is to be replaced by a simple statistical table completed for each degree programme or group of homogeneous programmes.

In other words, instead of trying to fit existing grading practices in a standard distribution scale, universities need only to determine the actual percentage of students that receive each 'local' grade.

For example:

National/institutional grade	Total number awarded in the reference group	Percentage of the total number
10	50	5%
9	100	10%
8	350	35%
7	300	30%
6	200	20%
	1,000	100%

This **ECTS grading table** can be produced for national grading scales of any size, from data concerning a given reference group which are easily available in institutional records. When included in the Transcripts of Records and Diploma Supplements of the students, the table will facilitate the interpretation of each grade awarded to them and will not require any further calculation.

The new **ECTS grading table** allows more straightforward comparison of two or more grading systems and cultures. This can be illustrated by another example:

National / institutional grade country /system A	Grading percentage*	National / institutional grade country / system B	Grading percentage*
30 lode	5.6%	1	20%
30	15.7%	2	35%
29	0.5%	3	25%
28	12.3%	4	20%
27	11.8%		
26	9.0%		
25	8.2%		
24	11.3%		
23	2.7%		
22	6.0%		
21	2.3%		
20	5.7%		
19	1.9%		
18	6.9%		
Total	100%		100%

* Based on the total number of grades awarded in the degree programme concerned during two preceding years.

From this example, we see that a 30 awarded in the scale of A should be converted to a 1 in the scale of B. The grade 2 of B will translate into the grades 26-29 (average 27) of the country or system A.

To sum up, **the ECTS grading table allows for simple, transparent interpretation and conversion of grades** from one system or context to another, and therefore does justice to the level of academic performance of all learners. Used correctly, it bridges different grading systems as well as different cultures in the European Higher Education Area and beyond.

To use the **ECTS grading table** the following steps should be taken:

1. Identify the reference group for which the grade distribution will be calculated (usually a degree programme, but in some cases a wider or different grouping of students such as a Faculty or sector -- e.g. Humanities).

2. Collect all grades awarded over a period of (at least) two academic years for the reference group identified.

3. Calculate the grade distribution in terms of percentages for the reference group.

4. Include the grading percentage table of your degree programme in every Transcript of Records/ Diploma Supplement.

5. For transfer, compare the percentage table of the other institution's degree programme with your own. On the basis of this comparison individual grades can be converted.

The first four steps in the procedure concern all programmes and are purely administrative tasks. The academic responsible for credit transfer may get involved in step 5 when general guidelines for the conversion of grades are being established.

Annex 4
Key documents

This Guide offers the standard forms of the Student Application, the Learning Agreement, the Training Agreement, the Transcript of Records and the outline of the Diploma Supplement. Examples of updated and filled-in forms and of course catalogues can be found online at http://ec.europa.eu/education/lifelong-learning-policy/doc48_en.htm.

There you can also find other useful documents, such as a planning form for an educational module or a form for checking the workload of an educational component.

Education and Culture DG

lifelong learning Programme

ERASMUS Since 1987

LIFELONG LEARNING PROGRAMME / ERASMUS – ECTS

STUDENT APPLICATION FORM

(Photograph)

ACADEMIC YEAR: 20....................../ **20**..........................

FIELD OF STUDY: ....

This application should be completed in BLACK and BLOCK letters in order to be easily copied and/or telefaxed.

SENDING INSTITUTION: Name and full address: ....

....

....

Departmental coordinator – name, telephone and fax numbers, e-mail :..

....

Institutional coordinator – name, telephone and fax numbers, e-mail :..

....

STUDENT'S PERSONAL DATA (to be completed by the student applying)

Family name:.. Firstname (s): ....

Date of birth:..

Sex: M ☐ / F ☐ Nationality:.............................. Place of birth:..

e-mail address:..

Current address:.. Permanent address (if different): ....

....

Current address is valid until:.............................. ....

Tel. no (incl. country code nr.): .... Tel:..

LIST OF INSTITUTIONS WHICH WILL RECEIVE THIS APPLICATION FORM (in order of preference):

Institution	Country	Period of study		Duration of stay (months)	No. of expected ECTS credits
		From	To		
1.					
2.					
3.					

Name of student: ....

Sending institution : .... Country : ....

Briefly state the reasons why you wish to study abroad: ....

....

....

LANGUAGE COMPETENCE Note: A proof of knowledge of the receiving institution's language of instruction should be submitted

Mother tongue: .... Language of instruction at home institution (if different): ....

Other languages	I have sufficient knowledge to follow lectures		I need some extra preparation	
	YES	NO	YES	NO
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

WORK EXPERIENCE RELATED TO CURRENT STUDY (if relevant)

Work experience / position	Firm /organization	Dates	Country

PREVIOUS AND CURRENT STUDY

Diploma/degree for which you are currently studying: ....

Number of higher education study years prior to departure abroad: ....

Have you already been studying abroad ? Yes ☐ No ☐

If Yes, when? at which institution ? ....

The attached Transcript of records includes full details of previous and current higher education study.
Details not known at the time of application will be provided at a later stage.

Student's Signature .... Date ....

RECEIVING INSTITUTION

We hereby acknowledge receipt of the application, the proposed learning agreement and the candidate's Transcript of records.

The above-mentioned student is ☐ provisionally accepted at our institution

☐ not accepted at our institution

Departmental coordinator's signature Institutional coordinator's signature

....

Date: .... Date: ....

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LEARNING AGREEMENT

ACADEMIC YEAR: 20....................../ **20**......................... **STUDY PERIOD: from** .... **to** ....

FIELD OF STUDY: ....

Name of student: ....

Student's e-mail address: ....

Sending Institution: .... Country: ....

DETAILS OF THE PROPOSED STUDY PROGRAMME ABROAD/LEARNING AGREEMENT

Receiving Institution: .... Country: ....

Course unit code (if any) and page no. of the information package	Course unit title (as indicated in the course catalogue)	Semester (autumn/spring)	Number of ECTS credits

Student's signature.. Date ....

SENDING INSTITUTION

We confirm that the learning agreement is accepted.

Departmental coordinator's signature

....

Date:..

Institutional coordinator's signature

....

Date:..

RECEIVING INSTITUTION

We confirm that the learning agreement is accepted.

Departmental coordinator's signature

....

Date:..

Institutional coordinator's signature

....

Date:..

Name of student: ....

Sending Institution: .... Country: ....

CHANGES TO ORIGINAL LEARNING AGREEMENT (to be filled in ONLY if appropriate)

Course unit (as indicated in the course catalogue)	Course unit title (as indicated in the course catalogue)	Deleted Course Unit	Added Course Unit	Number of ECTS credits
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	

If necessary, continue this list on a separate sheet

Student's signature.. Date ....

SENDING INSTITUTION

We confirm that the above-listed changes to the initially accepted learning agreement are approved.

Departmental coordinator's signature

....

Date:..

Institutional coordinator's signature

....

Date:..

RECEIVING INSTITUTION

We confirm that the above-listed changes to the initially accepted learning agreement are approved.

Departmental coordinator's signature

....

Date:..

Institutional coordinator's signature

....

Date:..

Education and Culture DG

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TRAINING AGREEMENT and QUALITY COMMITMENT

I. DETAILS OF THE STUDENT

Name of student: ....

Subject area: .... Academic year: ....

Degree: ....

Sending Institution: .... Country: ....

II. DETAILS OF THE PROPOSED TRAINING PROGRAMME ABROAD

Host organization: ....

Planned dates of start and end of the placement preriod: from .... till: .... (.................. months)

Knowledge, skills and competence to be acquired: ....

Detailed programme of the training period: ....

Tasks of the student: ....

Monitoring and evaluation plan: ....

III. COMMITMENT OF THE THREE PARTIES

By signing this document the student, the sending institution and the host organisation confirm that they will abide by the principles of the Quality Commitment for Erasmus student placements set out in the document below.

The student ....

Student's signature: .... Date: ....

The sending institution ....

We confirm that this proposed training programme agreement is approved. On satisfactory completion of the training programme the institution will award ....ECTS credits and will record the training period in the Diploma Supplement.

Coordinator's signature: .... Date: ....

The host organization ....

We confirm that this proposed training programme is approved. On completion of the training programme the organisation will issue a Certificate to the student

Coordinator's signature: .... Date: ....

QUALITY COMMITMENT

For Erasmus student placements

This Quality Commitment replicates the principles of the European Quality Charter for Mobility

THE SENDING HIGHER EDUCATION INSTITUTION* UNDERTAKES TO:

Define the **learning outcomes** of the placement in terms of the knowledge, skills and competencies to be acquired

Assist the student in **choosing** the appropriate host organisation, project duration and placement content to achieve these learning outcomes

Select students on the basis of clearly defined and transparent criteria and procedures and sign a **placement contract** with the selected students.

Prepare students for the practical, professional and cultural life of the host country, in particular through language training tailored to meet their occupational needs

Provide **logistical support** to students concerning travel arrangements, visa, accommodation, residence or work permits and social security cover and insurance

Give **full recognition** to the student for satisfactory completed activities specified in the Training Agreement

Evaluate with each student the personal and professional development achieved through participation in the Erasmus programme

THE SENDING INSTITUTION* AND HOST ORGANISATION JOINTLY UNDERTAKE TO:

Negotiate and agree a tailor-made **Training Agreement** (including the programme of the placement and the recognition arrangements) for each student and the adequate mentoring arrangements

Monitor the progress of the placement and take appropriate action if required

THE HOST ORGANISATION UNDERTAKES TO:

Assign to students **tasks and responsibilities** (as stipulated in the Training Agreement) to match their knowledge, skills, competencies and training objectives and ensure that appropriate equipment and support is available

Draw **a contract or equivalent document** for the placement in accordance with the requirements of the national legislation

Appoint a mentor to advise students, help them with their integration in the host environment and monitor their training progress

Provide **practical support** if required, check appropriate insurance cover and facilitate understanding of the culture of the host country

THE STUDENT UNDERTAKES TO:

Comply with all **arrangements** negotiated for his/her placement and to do his/her best to make the placement a success

Abide by the **rules and regulations** of the host organisation, its normal working hours, code of conduct and rules of confidentiality

Communicate with the sending institution about any problem or changes regarding the placement

Submit a report in the specified format and any required supporting documents at the end of the placement

* In the event that the higher education institution is integrated in a consortium, its commitments may be shared with the co-ordinating organisation of the consortium

ERASMUS STUDENT CHARTER

The status of 'Erasmus student' applies to students who satisfy the Erasmus eligibility criteria and who have been selected by their university* to spend an Erasmus period abroad – either studying at an eligible partner university or carrying out a placement in an enterprise or other appropriate organisation. For study mobility, both universities must have an Erasmus University Charter awarded by the European Commission. For placement in enterprise the home university must hold an extended Erasmus University Charter (i.e. also covering rights and obligations relating to placements).

As an Erasmus student, you are entitled to expect:

- Your home and host universities to have an inter-institutional agreement.
- The sending and receiving institutions to sign with you and before you leave a Learning/Training Agreement setting out the details of your planned activities abroad, including the credits to be achieved.
- Not to have to pay fees to your host university for tuition, registration, examinations, access to laboratory and library facilities during your Erasmus studies.
- Full academic recognition from your home university for satisfactorily completed activities during the Erasmus mobility period, in accordance with the Learning/Training Agreement.
- To be given a *transcript of records* at the end of your activities abroad, covering the studies/work carried out and signed by your host institution/enterprise. This will record your results with the credits and grades achieved. If the placement was not part of the normal curricula, the period will at least be recorded in the *Diploma Supplement*.
- to be treated and served by your host university in the same way as their home students.
- to have access to the Erasmus University Charter and Erasmus Policy Statement of your home and host universities.
- Your student grant or loan from your home country to be maintained while you are abroad.

As an Erasmus student, you are expected to:

- Respect the rules and obligations of your *Erasmus grant agreement* with your home university or your National Agency.
- Ensure that any changes to the Learning/Training Agreement are agreed in writing with both the home and host institutions immediately they occur.
- Spend the full study/placement period as agreed at the host university/enterprise, including undergoing the relevant examinations or other forms of assessment, and respect its rules and regulations. Write a report on your Erasmus study/placement period abroad when you return and provide feedback if requested by your home university, the European Commission or the National Agency.

If you have a problem:

- Identify the problem clearly and check your rights and obligations.
- Contact your departmental coordinator for Erasmus and use the formal appeals procedure of your home university if necessary.

If you remain dissatisfied, contact your National Agency.

* "University" means any type of higher education institution which, in accordance with national legislation or practice, offers recognised degrees or other recognised tertiary level qualifications, or vocational education or training at tertiary level.

GENERAL CONDITION

Article 1: Liability

Each party of this agreement shall exonerate the other from any civil liability for damages suffered by him or his staff as a result of performance of this agreement, provided such damages are not the result of serious and deliberate misconduct on the part of the other party or his staff.

The UK National Agency, the European Commission or their staff shall not be held liable in the event of a claim under the agreement relating to any damage caused during the execution of the placement. Consequently, the UK National Agency or the European Commission shall not entertain any request for indemnity of reimbursement accompanying such claim.

Article 2: Termination of the Contract

In the event of failure by the beneficiary to perform any of the obligations arising from the agreement, and regardless of the consequences provided for under the applicable law, the institution is legally entitled to terminate or cancel the agreement without any further legal formality where no action is taken by the beneficiary within one month of receiving notification by registered letter.

If the beneficiary terminates the agreement before its agreementual end or if he/she fails to follow the agreement in accordance with the rules, he/she will have to refund the amount of the grant already paid.

In case of termination by the beneficiary due to "force majeure", i.e. an unforeseeable exceptional situation or event beyond the beneficiary's control and not attributable to error or negligence on his/her part, the beneficiary will be entitled to receive the amount of the grant corresponding to the actual time of the placement. Any remaining funds will have to be refunded.

Article 3: Data Protection

All personal data contained in the agreement shall be processed in accordance with Regulation (EC) No 45/2001 of the European Parliament and of the British Council on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data. Such data shall be processed solely in connection with the implementation and follow-up of the agreement by the sending institution, the National Agency and the European Commission, without prejudice to the possibility of passing the data to the bodies responsible for inspection and audit in accordance with Community legislation (Court of Auditors or European Antifraud Office (OLAF)).

The beneficiary may, on written request, gain access to his personal data and correct any information that is inaccurate or incomplete. He/she should address any questions regarding the processing of his/her personal data to the sending institution and/or the National Agency. The participant may lodge a complaint against the processing of his personal data with the Information Commissioner's Office with regard to the use of these data by the sending institution, the National Agency, or to the European Data Protection Supervisor with regard to the use of the data by the European Commission.

Article 4: Checks and Audits

The parties of the agreement undertake to provide any detailed information requested by the European Commission, the UK National Agency or by any other outside body authorised by the European Commission or the UK National Agency to check that the Placement and the provisions of the agreement are being properly implemented.

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TRANSCRIPT OF RECORDS

ACADEMIC YEAR: 20........................./ **20**.............................

FIELD OF STUDY: ....

NAME OF SENDING INSTITUTION: ....

Faculty/ Department: ....

ECTS departmental coordinator: ....

Tel: .... Fax: ....E-mail:..

NAME OF STUDENT: .... First Name: ....

Date and place of birth: .... Sex : M ☐ / F ☐

Matriculation date: .... Matriculation number: ....

E-MAIL ADDRESS: ....

NAME OF RECEIVING INSTITUTION: ....

Faculty/ Department of ....

ECTS departmental coordinator: ....

Tel: .... Fax: ....E-mail:..

Course Unit Code (1)*	Title of the course unit	Duration of course unit (2)*	Local grade (3)*	ECTS credits (4)*
	to be continued on a separate sheet			Total : ....

*(1) (2) (3) (4) see explanation on back page

Date:..

Signature of registrar/dean
administration officer:.. Stamp of institution: ....

NB : This document is not valid without the signature of the registrar /dean/administration officer and the official stamp of the institution

(1) Course unit code : Refer to the ECTS Course catalogue

(2) Duration of course unit :

Y = 1 academic year

1S= 1 semester	2S= 2 Semesters
1T=1 term/trimester	2T=2 terms/trimesters

(3) Grading:

a) Description of the institutional grading system:
b) Grading distribution in the department or programme (please specify) (For this section please refer to ECTS Users' Guide, Annex 3)

(4) ECTS credits :

1 academic year	= 60 credits
1 semester	= 30 credits
1 term/trimester	= 20 credits

THE DIPLOMA SUPPLEMENT

This Diploma Supplement follows the model developed by the European Commission, Council of Europe and UNESCO/CEPES. The purpose of the supplement is to provide sufficient independent data to improve the international 'transparency' and fair academic and professional recognition of qualifications (diplomas, degrees, certificates etc.). It is designed to provide a description of the nature, level, context, content and status of the studies that were pursued and successfully completed by the individual named on the original qualification to which this supplement is appended. It should be free from any value judgements, equivalence statements or suggestions about recognition. Information in all eight sections should be provided. Where information is not provided, an explanation should give the reason why.

1. INFORMATION IDENTIFYING THE HOLDER OF THE QUALIFICATION

1.1 Family name(s):

1.2 Given name(s):

1.3 Date of birth *(day/month/year):*

1.4 Student identification number or code *(if available):*

2. INFORMATION IDENTIFYING THE QUALIFICATION

2.1 Name of qualification and *(if applicable)* title conferred *(in original language):*

2.2 Main field(s) of study for the qualification:

2.3 Name and status of awarding institution *(in original language):*

2.4 Name and status of institution *(if different from 2.3)* administering studies *(in original language):*

2.5 Language(s) of instruction/examination:

3. INFORMATION ON THE LEVEL OF THE QUALIFICATION

3.1 Level of qualification:

3.2 Official length of programme:

3.3 Access requirements(s)

4. INFORMATION ON THE CONTENTS AND RESULTS GAINED

4.1 Mode of study:

4.2 Programme requirements:

4.3 Programme details: (e.g. modules or units studied), and the individual grades/marks/credits obtained:

(if this information is available on an official transcript this should be used here)

4.4 Grading scheme and, if available, grade distribution guidance:

4.5 Overall classification of the qualification *(in original language):*

5. INFORMATION ON THE FUNCTION OF THE QUALIFICATION

5.1 Access to further study:

5.2 Professional status *(if applicable):*

6. ADDITIONAL INFORMATION

6.1 Additional information:

6.2 Further information sources:

7. CERTIFICATION OF THE SUPPLEMENT

7.1 Date:

7.2 Signature:

7.3 Capacity:

7.4 Official stamp or seal:

8. INFORMATION ON THE NATIONAL HIGHER EDUCATION SYSTEM

(N.B. Institutions who intend to issue Diploma Supplements should refer to the explanatory notes that explain how to complete them.)

Annex 5
Overview of national regulations on the number of learning hours per academic year

Countries	Hours range/ academic year	Hours range/ credit	Status of the proclamation
Austria	1,500 h	25 h	Law
Belgium (Fl)	1,500/1,800 h	25/30 h	Decree (law on the Flemish level)
Belgium (Fr)	1440 h	24 h	Decree(law of the French Community)
Czech Re-public	1,500/1800 h	25/30 h	Good practice, recommendation of ECTS Key Features.
Cyprus	1500h/1800 h	25/30 h	New Law for Higher Education (under consideration in 2008)
Denmark	1,650 h	27/28 h	Letters from the Ministry
Estonia	1,560 h	26 h	University Act law
Finland	1,600 h	27 h	Act of the Council of State
France	1,650 h	25/30 h	Recommendation by the University Presidents' conference
Germany	1,800 h	30 h	KMK (Kultusministerkonferenz = Standing Conference of the Minis-ters of the Federal States). Element of Accreditation
Greece	1,500/1,800 h	25/30 h	Ministerial Decision
Hungary	1,620/1,800 h	30 h	Act on Higher Education and attaching Governmental Decree
Iceland	1,500/2,000 h	25/33 h	No proclamation, but understanding among universities
Ireland		20/30 h	Recommendation on the principles and operational guidelines de-vised by the National Qualifications Authority of Ireland
Italy	1,500 h	25 h	Ministerial Decrees
Latvia	1,600 h		Law
Lithuania	1,600 h		Law and Decree

Malta	1,500 h	25 h	In Educational Act, 2004 and subsidiary legislation
Netherlands	1,680 h	28 h	Law
Portugal	1,500/1,680 h	25/28 h	Decree 42/2005 of 22 February.
Norway	no range per academic year proclaimed/ decision of universities	no range per credit proclaimed	Law
Poland	1,500/1,800 h	25/30 h	Decree
Romania	1,520/1,640 h	25/27 h	Order of the Ministry of Education (from 1999)
Slovakia	no range per academic year proclaimed	25/30 h	Good practice, recommendation of ECTS key features
Slovenia	1,500/1,800 h	25/30 h	Law (2004)
Spain	1,500/1,800 h	25/30 h	Royal Decree (law)
Sweden	1,600 h	26/27 h	Higher education ordinance (Government regulation) states full time studies during 40 weeks
Switzerland	1,500/1,800 h	25/30 h	Swiss University Conference (SUC) Regulation for the implementation of Bologna
Turkey	1,500/1,800 h		Law
United Kingdom	1,200-1,800 h	20 h	national Qualification (and Credits) Frameworks

European Commission

ECTS Users' Guide

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المفوضية الأوروبية
TEMPUS

EDUWAT
Development of a Modern Higher Education System for Water Engineering in Syria

EDUWAT

Development of a Modern Higher Education System for Water Engineering in Syria

511251-TEMPUS-1-2010-1-DE-TEMPUS-SMHES

Annex 3

WORKSHOPS

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein

Tempus

Workshops

During the EU-TEMPUS Project EDUWAT “Development of a Modern Higher Education System for Water Engineering in Syria” were carried out 10 workshops.

Deliverable N°	***Title***	***Location***	***Language***	***Delivery Date***	***Dissemination level***
1.1 +1.3	Kick-off Workshop	DAM Damascus	AR, EN, DE	2011-01	International level
1.5	2. Workshop	TUD Dresden	EN,AR, DE	2011-05	International level
2.2	3. Workshop	BOKU Vienna	EN,AR, DE	2011-09	International level
1.9	4. Workshop	CULS Prague	EN,AR, DE	2012-03	International level
2.4 + 4.2	5. Workshop	CULS Prague	EN,AR, De	2014-03	International level
1.11	6. Workshop	MUS Plauen	EN,AR, DE	2014-07	International level
3.2	7. Workshop	TUD Dresden	EN,AR, DE	2014-09	International level
3.4	8. Workshop	BOKU Vienna	EN,AR, DE	2014-11	International level
6.3	Editorial Meeting	TU Dresden	EN,AR, DE	2015-02	International level
6.3	End Meeting	MUS Plauen	EN,AR, DE	2015-03	International level

Agenda of Kick-off Meeting

From 09/01-until 13/01/2011

EU-TEMPUS Project EDUWAT

Development of a Modern Higher Education System for Water Engineering in Syria

<table>
<tr><td>8. 01.11</td><td></td><td colspan="2">Arrival in Damascus</td></tr>
<tr><td>9. 01.11</td><td>until 09:00</td><td colspan="2">Arrival in Damascus</td></tr>
<tr><td></td><td></td><td colspan="2">Opening of Kick-Off Meeting
Session Chairman: Seif, W.: Damascus University</td></tr>
<tr><td></td><td>09:00</td><td colspan="2">• Welcome addresses
Mualla, W.: President of Damascus University
Zeno, A.: Dean of Faculty of Civil Engineering of Damascus University
Graeber, P.-W.: Project Applicant, Technische Universitaet Dresden</td></tr>
<tr><td></td><td>9:10 – 10:30</td><td colspan="2">• Importance of the TEMPUS project EDUWAT for Syria’s higher education system
Wahed, M.N. A.: Deputy Minister of High Education
• Overview about Tempus in Syria
Ayubi, R.: National Tempus Office, Syria
• Short introduction of partners</td></tr>
<tr><td></td><td>10:30 – 11:00</td><td colspan="2">Coffee break</td></tr>
<tr><td></td><td>11:00 - 13:00</td><td colspan="2">• Presentation of the project EDUWAT
Graeber, P.-W.: Technische Universitaet Dresden
• Explanation of budgets
Gerhardts, Ch..: Technische Universitaet Dresden
• Discussion</td></tr>
<tr><td></td><td>13:00 – 14:00</td><td colspan="2">Lunch time</td></tr>
<tr><td></td><td></td><td colspan="2">Self-presentation of all partners
Session Chairman: Grischek,T.: University of Applied Sciences Dresden</td></tr>
<tr><td></td><td>14:00 – 15:30</td><td>• MHE, DAM, ALBA, HIWM, AL, TIU, TUD, BOKU, HTWD,</td><td rowspan="3">• Administration of regulation,
Gerhardts, Ch..: Technische Universitaet Dresden</td></tr>
<tr><td></td><td>15:30 – 16:00</td><td>Coffee break</td></tr>
<tr><td></td><td>16:30 – 18:00</td><td>• URO, UO, CULS, ACSAD, GCEC, SMUL, MUS, SEED</td></tr>
<tr><td>10. 01.11</td><td>09:00 – 10:30</td><td colspan="2">Visiting of University Damascus, Faculty of Civil Engineering
Zeno, A.: Dean of Faculty of Civil Engineering of Damascus University</td></tr>
<tr><td></td><td>10:30 – 11:00</td><td colspan="2">Coffee break</td></tr>
<tr><td></td><td></td><td colspan="2">Presentations I
Session Chairman: Graeber, P.-W.: Technische Universitaet Dresden</td></tr>
<tr><td></td><td>11:30 – 13:00</td><td colspan="2">• Structure of HES in Syria
Wahed, M.N. A.: Deputy Minister of High Education
• Structure of HES in Damascus University
Seif, W.: Damascus Univeristy
• Structure of HES in Tishreen University Lattakia
Hassan, I.: Tishreen University University</td></tr>
<tr><td></td><td>13:00 – 14:00</td><td colspan="2">Lunch time</td></tr>
<tr><td></td><td></td><td colspan="2">Presentations II
Session Chairman: Eckstaedt, H.: University Rostock</td></tr>
<tr><td></td><td>14:00 – 15:30</td><td colspan="2">• Structure of HES in Al-Baath-University Homs
Shaker, A.: Al-Baath-University
• Structure of HES in Higher Institute of Water Management
Shibai, M. Higher Institute of Water Management
• Structure of HES in
Aldarir, An.N.: Aleppo University</td></tr>
<tr><td></td><td>15:30 – 16:00</td><td colspan="2">Coffee break</td></tr>
</table>

		Presentations III *Session Chairman: Shaker, A.: Al-Baath-University*
	16:00 – 18:00	• Structure of HES in Technische Universitaet Dresden *Graeber, P.-W.: Technische Universitaet Dresden* • Structure of HES in University Rostock *Eckstaedt, H.: University Rostock* • Structure of HES in University of Applied Sciences Dresden *Grischek, T.: University of Applied Sciences Dresden*
		Presentations IV *Session Chairman: Aldarir, An.N.: Aleppo University*
11. 01.11	09:00 – 10:30	• Structure of HES in Austria *Loiskandl, W.: University of Natural Resources and Applied Life Scienes* • Structure of HES in Czech Republic *Matula, S.: Czech University of Life Sciences* • Structure of HES in Poland *Ciesielszuk, T.: Opole University*
	10:30 – 11:00	Coffee break
		Presentations V *Session Chairman: Eckardt, A.: Staatsministerium Umwelt und Landwirtschaft*
	11:30 – 13:00	• Structure of HES and request to the universities by Arab Center for the Studies of Arid Zones & Dry Land *Droubi, A.: ACSAD* • Request to the universities by General Company for Engineering Studies and Consulting *Haboub, M.N.: General Company for Engineering Studies and Consulting* • Request to the universities by M & S Umweltprojekt *Maertner, B.: M & S Umweltprojekt*
	13:00 – 14:00	Lunch time
		Presentations VI *Session Chairman: Haboub, M.N.: General Company for Engin. Studies and Cons.*
	14:00 – 15:30	• Structure of HES and request to the universities by Environmental Ministry *Eckardt, A.: Saechsisches Staatsministerium Umwelt und Landwirtschaft* • Request to the universities by Stadtentwaesserung Dresden *Balmer, G.: Stadtentwaesserung Dresden*
12. 01.11	09:00 – 10:30	**Plenary Discussion** *Session Chairman: Graeber, P.-W.: Technische Universitaet Dresden* • Preparation of deliverable 1.4 + 1.5
	10:30 – 11:00	Coffee break
	11:00 – 13:00	**Conclusion Session** *Session Chairman: Grischek,T.: University of Applied Sciences Dresden* • Preparation of 2. Meeting • Summary of Kick-off meeting
13. 01.11		Excursion
14. 01.11		Departure from Damascus

TECHNISCHE UNIVERSITÄT DRESDEN

TEMPUS

EDUWAT

Agenda of 2nd Workshop in Dresden
From 06/06/-until 09/06/2011
EU-TEMPUS Project EDUWAT
"Development of a Modern Higher Education System for Water Engineering in Syria"

Sunday, 05.06.11		
10:35 12:00	Pick up of Syrian participants from Airports in Berlin by Issa Hasan M.Sc.	• Bln-Tegel: 10:35 Turkish airlines TK1721 • Bln-Schönefeld: 12:00 Syrian airlines RB439V
	Arrival in Dresden	**„Gästehaus "Am Weberplatz"** Weberplatz 3, 01217 Dresden Tel.: +49 351 - 4679 300
Monday, 06.06.11		
until 08:15	Arrival in Dresden for EU-Participants	**Gästehaus "Einsteinstraße"** Einsteinstraße 9, 01069 Dresden Tel.: +49 351 - 87 66 20
8:15	Pick up from Hotels	
09:00	**Opening of Workshop** *Session Chairman: Eckardt, A.:*	Saxon State Ministry of the Environment and Agriculture (SMUL) Neustädter Markt 19 (Blockhaus) 01097 Dresden **(NEW Address!)**
	Welcome addresses • Kupfer, F.: Minister of Environmental and Agriculture • Wahed, M. A.: Ministry of Higher Education Syria • Rödel, G.: Vice Rector of the Technische Universitaet Dresden • Graeber, P.-W.: Project Applicant, Technische Universitaet Dresden	
09:30	The Bologna Process *Graeber, P.-W. TU Dresden*	
10:30	Coffee break	
11:00	Report to 1.2 "Comparison of higher education systems" *Graeber, P.-W. TU Dresden*	
12:00	Lunch time	
13:15	Transfer by bus to TU Dresden	
	Presentations-Reports I *Session Chairman: Grischek,T.: University of Applied Sciences Dresden*	Technische Universitaet Dresden Institute of Hydrobiology, (Drude-Bau) Zellescher Weg 40 Room 72 01062 Dresden
14:00	Report to 1.4 "Development of higher education structure for Syria" *Graeber, P.-W. TU Dresden*	
15:30	Coffee break	
16:00 – 17:30	Report to 1.6 Definition of the modules for the new education *Graeber, P.-W. TU Dresden*	
14:00 -17:30	Administration of regulation, *Gerhardts, Chr.TU Dresden*	

Thuesday, 07.06.11		
09:00	Visit of the Department of Hydro Sciences *Graeber, P.-W TU Dresden*	Neubau Chemie - Bergstraße 66 Meeting Point: Foyer next to building “Hoersaalzentrum”
	Presentations – Reports II *Session Chairman: Graeber, P.-W. TU Dresden*	Technische Universitaet Dresden Institute of Hydrobiology, (Drude-Bau) Zellescher Weg 40 Room 72 01062 Dresden
11:00	Report to 1.7: “Developing of teaching materials” *Graeber, P.-W. TU Dresden* Report to 1.8 “Quality Management and Accreditation” *Graeber, P.-W. TU Dresden* Report to 2.1 “Comparison of research to quality and quantity” *Loiskandl, W. BOKU Vienna*	
12:30	Lunch time	TU-Mensa “Blau” Weberplatz
	Presentations – Reports III *Session Chairman: Eckstaedt, H. University Rostock*	Technische Universitaet Dresden Institute of Hydrobiology, (Drude-Bau) Zellescher Weg 40 Room 72 01062 Dresden
13:30 – 15:00	Report to 4.1 “Development of the triangle system” *Shaker, A. Al-Baath-University Homs*	
Wednesday, 08.06.11		
	Presentations – Reports IV *Session Chairman: Aldarir, An.N.: Aleppo University*	Technische Universitaet Dresden Institute of Hydrobiology, (Drude-Bau) Zellescher Weg 40 Room 72 01062 Dresden
09:00	Report to 6 “Realization and Validation of new structures” *Seif, W.: Damascus University*	
10:30	Coffee break	
11:00	**Conclusion Session** *Session Chairman: Graeber, P.-W. TU Dresden* Preparation of 3rd Meeting Summary of 2nd Workshop	
12:30	Lunch time	TU-Mensa “Blau“ Weberplatz
14:00-17:00	**Excursion I** Tour of the river bank drinking water plant in Dresden-Hosterwitz *Grischek, Th.: University of Applied Science, Dresden*	DREWAG Stadtwerke Dresden Wasserwerk Hosterwitz Wasserwerkstraße 2 01326 Dresden
17:00	Visiting park of castle Pillnitz	
19:00	Dinner in the restaurant “Körnergarten”	

Thursday, 09.06.11		
09:00-13:30	**Excursion II** Tour of a sewage treatment plant in Dresden-Kaditz *Pohl. J.: Stadtentwaesserung Dresden*	Scharfenberger Straße 152 01139 Dresden
13:30	Lunch	
14:15	Bus transfer to Großenhain	
15:00 - 17:00	**Excursion III** Visiting of a remediation of contaminated site *Maertner, B. M&S Umweltprojekt, Plauen*	Flughafen Großenhain, Sachsen
	Short visit of Castle Moritzburg on the way home	
Friday, 10.06.11		
08:00	Departure from Dresden Hotels to Airports in Berlin	Departure from Berlin: By Syrian airlines: RB440V at 11:25 hours: 9 persons confirmed By Turkish airlines: TK 724 V at 17:50 hours: 3 persons confirmed

Agenda of 3rd Workshop in Vienna
Vienna, 04/09 to 09/09/2011

EU-TEMPUS Project EDUWAT

Development of a Modern Higher Education System for Water Engineering in Syria

Time table		
Sept. 4 (Sunday)	Afternoon	Arrival in Vienna
Sept. 5 (Monday)	10:00 – 10:45	*Session Chairman: W. Loiskandl, Workshop organiser, BOKU* **Opening of Workshop** Welcome addresses B. Hinterstoisser, Vicerector H. Waidbacher, Head of Department P.-W. Graeber, Project Coordinator, TUD W. R. Agha, Representative Syrian Ministry of Higher Education,
	10:45 – 11:15	T. Guggenberger: Qualitätsmanagement
	11:15 - 11:45	B. Koch: Forschungsservice
	11:45 – 12:00	Discussion
	12:00 – 13:00	Lunch (Mensa)
	13:00 – 14:30	*Session Chairman : A. Shaker, ALBA* P.-W. Graeber: Resume of previous workshops W. Seif: Report from the meetings in Damascus (NTO, MHE) A. N. Aldarir: Report from the meeting in Aleppo W. Seif, A. Shaker, I. Hassan, A. N. Aldarir: Feedback from the home universities Discussion of results achieved so far
	14:30 - 15:00	Coffee break
	15:00 – 16:30	*Session Chairman: S. Matulla, CULS* P.-W. Graeber: Presentation of reports under activity 1 W. Loiskandl: Presentation of reports under activity 2
Sept. 6 (Tuesday)	09:00 - 10:30	*Session Chairman: P. Cepuder, BOKU* Introduction of Department Water, Atmosphere and Environment H.P Nachtnebel, IHWH R. Haberl, SIG H. Waidbacher, Hydrobiology P. Lechner, Waste management G. Kammerer, IHLW
	10:30 – 11:00	Coffee break
	11:00 – 12:00	W. Loiskandl: Visit of Laboratories of Department
	12:00 – 12:45	Lunch
	12:45 – 14:15	*Session Chairman: A. Strauss-Sieberth, BOKU* A. Shaker: Presentation of reports under activity 4 W. Seif: Presentation of reports under activity 6
	14:15 – 14:45	Transfer to Waste Incinerator
	15:00 – 17:00	Visit of “Hundertwasser” Incinerator (confirmation needed)
	19:00 – 22:00	Workshop Dinner

Sept. 7 (Wednesday)	09:00 - 10:30	*Session Chairman: W. Loiskandl, BOKU* Working in groups about new structure of education I
	10:30 – 11:00	Coffee break
	11:00 – 12:30	*Session Chairman: P.-W Graeber, TUD* Working in groups about new structure of education II
	12:30 – 13:30	Lunch (Mensa)
	13:30 – 15:00	Results of the working groups Preparation of further activities Closing remarks: P.-W Graeber, TUD, W. Loiskandl, BOKU
Sept. 8 (Thursday)	08:30 – 18:00	Fieldtrip Marchfeld, Field site of soil water content monitoring, farmers training, Retz
Sept. 9 (Friday)		Departure

Agenda of 4rd Workshop in Prague
26/03 to 29/03/2012

EU-TEMPUS Project EDUWAT

Development of a Modern Higher Education System for Water Engineering in Syria

Time table		
March 25 (Sunday)	Afternoon	Arrival in Prague, transport from the airport organised by CULS
March 26 (Monday)	10:00 – 10:45	*Session Chairman: S. Matula, Workshop organiser, CULS* **Opening of Workshop** Welcome addresses • M. Lostak – Vice-Rector of CULS/ M. Sedmikova – Vice-Rector of CULS • P. Tlustos, Dean of the Faculty of Agrobiology, Food and Natural Resourc. • P. Puncochar, General Director, Section of Water Management, Ministry of Agriculture of the CR • J. Fryc, General Director, Section of International Relations and European Matters, Ministry of Education, Youth and Sports of the CR • T. Babkova, Head ot the Dept. of International Cooperation - TEMPUS National Agency for European Educational Programmes of the CR • S. Matula, Local Project manager Head of Department of Water Resources of FAFNR, CULS • P.-W. Graeber, Project Coordinator, TUD • ????, Representative Syrian Ministry of Higher Education
	10:45 – 11:15	Short self-introduction of new guest
	11:15 – 12:00	*Session Chairman: H. Eckstaedt, URO* • P.-W. Graeber: Resume of previous workshops • W. Seif: Generally Report from the meetings in Syria • Discussion
	12:00 – 13:00	Lunch (Mensa - Eurest)
	13:00 – 15:00	*Session Chairman : W. Loiskandl, BOKU* **New structures of Bachelor and Master** • W. Seif: Report from DAM • Shaker: Report from ALBA • N. Aldarir: Report from AU • I. Hassan: Report from TIU
	15:00 – 15:30	Coffee break
	15:30 – 17:30	*Session Chairman: A. Eckardt, SMUL* • M. Al Sibai: Report from HIWM • MHE: Evaluation of the new structures by the MHE • P.-W. Graeber:Module descriptions, evaluation and accreditation, new teaching materials - WP1 • W. Loiskandl:Comparison of research to quality and quantity - WP2
Parallel: Gerhardts, Chr. *TUD* :**Administration of regulation**		

March 27 (Tuesday)	09:00 – 11:30	*Session Chairman: S. Matula, CULS* • Introduction of CULS and FAFNR • Visit of the Department of Water Resources – Field research station:
	11:30 – 12:30	Lunch
	12:30 – 14:30	***Working in groups about new structure of education - Bachelor*** • Th. Grischek / H. Eckstaedt: Water Management • W. Loiskandl / M. Wiatkowski: Hydrology • S. Matula / A. Eckardt: Soil and Groundwater
	14:30 – 15:00	Coffee break
	15:00 – 17:00	***Working in groups about new structure of education - Master*** • Th. Grischek / H. Eckstaedt: Water Management • W. Loiskandl / M. Wiatkowski: Hydrology • S. Matula / A. Eckardt: Soil and Groundwater
	19:00 – 22:00	Workshop Dinner, University Brewery
Parallel: Gerhardts, Chr. *TUD* :**Administration of regulation**		
March 28 (Wednesday)	09:00 – 10:30	*Session Chairman: P.-W. Graeber, TUD* ***Reports from the Working groups*** • Th. Grischek / H. Eckstaedt: Water Management • W. Loiskandl / M. Wiatkowski: Hydrology • S. Matula / A. Eckardt: Soil and Groundwater
	10:30 – 11:00	Coffee break
	11:00 – 12:30	*Session Chairman: Th. Grischek, HTWD* • A Shaker: Development of the triangle system - WP4 • W. Seif: Realization and Validation of new structures - WP6
	12:30 – 13:30	Lunch (Mensa - Eurest)
	13:30 – 15:00	• Preparation of further activities • Closing remarks: P.-W Graeber, TUD, S. Matula, CULS
March 29 (Thursday)	08:15 – 18:00	Fieldtrip: • Káraný – Drinking Water Plant for Prague, Head Manager • Prague – Old sewage treatment plant • Use of water and beer production in Brewery „Staropramen – Prague
March 30/31 (Friday)		Departure

Agenda of 5th Workshop in Prague
16/02 to 21/02/2014

EU-TEMPUS Project EDUWAT

Development of a Modern Higher Education System for Water Engineering in Syria

Time table		
February 16 (Sunday)	10:30 morning	Arrival to Prague, minibus transport from the airport to the Eglio Gárni Hotel, guide from CULS will wait at the airport with the banner EDUWAT and some info materials – miniguide&map of the city and public transport Free independent afternoon and evening in the City
February 17 (Monday) **Building "SIC" (Study and Information Centre) Room 259 1st Floor**	09:00 – 09:55	*Session Chairman: S. Matula, Workshop organiser, CULS* **Opening of Workshop** Welcome addresses University M. Lostak – Vice-Rector of CULS Prague, CZ P. Tlustos, Dean of the Faculty of Agrobiology, Food and Natural Resources, CULS, CZ Ministries Pavel Punčochář / L. Faigl, General Director/Officer of the Section of Water Management, Ministry of Agriculture of the Czech Republic Michaela Kleňhova, General Director of Section of Coordination and International Relations, Ministry of Education, Youth and Sports of the CR B. Peštová, Deputy Minister, Ministry of the Environment of the CR EU Projects CZ M. Vaisová Head ot the Dept. of International Cooperation – TEMPUS, National Agency for European Educational Programmes of the CR EDUWAT S. Matula, Local Project Manager, CULS, FAFNR, Head of Department of Water Resources of FAFNR, CULS, CZ P.-W. Graeber, Project Coordinator, TU Dresden, Germany Damascus University M. A. AlMardini, President of Damascus University, Syria, W. Seif, Syrian Deputy Project Coordinator. Damascus University, Syria
Room 259	09:55 – 10:25	Short self-introduction of new guest
In front of Room 259	10:25 – 10:45	Coffee break
Room 259	10:45 – 12:15	*Session Chairman: H. Eckstaedt, URO* P.-W. Graeber: Resume of previous workshops W. Seif: Generally Report from the meetings in Syria P.-W. Graeber: Inter project networking Discussion
MENSA	12:15 – 13:00	Lunch (Mensa - Eurest)
Room 259	13:00 – 15:00	*Session Chairman : W. Loiskandl, BOKU* **New structures of Bachelor and Master** W. Seif: Report from DAM A. Shaker: Report from ALBA A. N. Aldarir: Report from AU

		I. Hassan: Report from TIU
In front of Room 259	15:00 – 15:30	Coffee break
Room 259	15:30 – 18:00	*Session Chairman: A. Eckardt, SMUL* M. Al Sibai: Report from HIWM P.-W. Graeber: Module descriptions, evaluation and accreditation, new teaching materials - WP1 Report of an German Accreditation Agency Discussion about WP1
In front of Room 259		Parallel: Gerhardts, Chr. *TUD* :**Administration of regulation**

Febr. 18 (Tuesday) **Great Meeting Hall of the FAFNR**	09:00 – 11:45	*Session Chairman: S. Matula, CULS* Detailed introduction of CULS and FAFNR Visit of the Department of Water Resources – Field research station Suchdol, laboratories:
MENSA	11:45 – 12:30	Lunch
Great Meeting Hall of the FAFNR	12:30 – 15:00	***Working in groups about new structure of education - Bachelor*** Th. Grischek / H. Eckstaedt: Water Management W. Loiskandl / M. Wiatkowski: Hydrology S. Matula / A. Eckardt: Soil and Groundwater
Inside the hall	15:00 – 15:30	Coffee break
Great Meeting Hall of the FAFNR	15:30 – 18:00	***Working in groups about new structure of education - Master*** Th. Grischek / H. Eckstaedt: Water Management W. Loiskandl / M. Wiatkowski: Hydrology S. Matula / A. Eckardt: Soil and Groundwater
University Brewery	19:00 – 22:00	Workshop Dinner, University Brewery, including the small excursion, exlapanation and tasting of the produced beer. Organised by University Maltster Mr.Chládek
Parallel: Gerhardts, Chr. *TUD* :**Administration of regulation**		
Febr. 19 (Wednesday) **Meeting Room of Elio Gárni Hotel**	09:00 – 10:30	*Session Chairman: P.-W. Graeber, TUD* ***Reports from the Working groups*** Th. Grischek / H. Eckstaedt: Water Management W. Loiskandl / M. Wiatkowski: Hydrology S. Matula / A. Eckardt: Soil and Groundwater
Hotel	10:30 – 11:00	Coffee break
Meeting Room of Elio Gárni Hotel	11:00 – 12:30	*Session Chairman: Th. Grischek, HTWD* W. Loiskandl: Comparison of research to quality and quantity - WP2 A Shaker: Development of the triangle system - WP4 W. Seif: Realization and Validation of new structures - WP6
MENSA	12:30 – 13:15	Lunch
Meeting Room of Elio Gárni Hotel	13:15 – 15:00	*Session Chairman: P.-W. Graeber, TUD* Preparation of the final report

Febr. 20 (Thursday) **Meeting Room of Elio Gárni Hotel**	09:00 – 11:00	*Session Chairman: P.-W. Graeber, TUD* Preparation of further activities Closing remarks: P.-W Graeber, TUD, S. Matula, CULS
MENSA	11:30 – 12:30	*Lunch (optional)*
Prague City	12:30 – 17:30 17:30 -	City tour with a guide (optional) Free time in the City (optional)
Febr. 21 (Friday)	Free time, departure	Departure, minibus transport from the Eglio Gárni Hotel, guide from CULS will be there (16:00 leaving time!!)

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TEMPUS EDUWAT

Agenda of 6th Workshop in Plauen
29/06 to 04/07/2014

EU-TEMPUS Project EDUWAT

Development of a Modern Higher Education System for Water Engineering in Syria

Time table		
June 29 (Sunday)	Afternoon	Arrival in Plauen, Bus transfer from the airport Berlin-Tegel (about 11:30 a.m.) will been organised
June 30 (Monday)	09:00 – 10:30[*)]	*Session Chairman: Chr. Gerhardts, TUD* Chr. Gerhardts, TUD: Administration of regulation B. Maertner, M&S: Presentation of M&S Umweltprojekt GmbH
	11:00 – 12:00 City hall Plauen	*Session Chairman: B. Maertner, M&S Umweltprojekt* **Opening of Workshop** Welcome addresses R. Oberdorfer: Lord Mayor of the city of Plauen B. Maertner: Managing Director of M&S Umweltproject GmbH Chr. Gerhardts, Deputy Project Coordinator, TUD W. Seif, Syrian Deputy Project Coordinator, DAM
	12:00 – 13:30	Lunch
	13:30 – 18:00[*)]	*B. Maertner, M&S Umweltprojekt* Excursion to: drinking water plant Plauen, Pausaer street, city-waste water plant Plauen-Chrieschwitz und village-waste water plant Tirpersdorf,
	19:00 – 22:00	Workshop Dinner
July 1 (Tuesday)	09:00 – 10:30[*)]	*Session Chairman: A. Eckardt, SMUL* P.-W. Graeber: Resume of previous workshops K. Rafeld (*Director of University of Cooperative Education Plauen and Glauchau*): Dual Educational System W. Seif: Generally Report from the meetings in Syria All European-partners: Generally Report from the meetings in Europe
	10:30 – 10:45[*)]	Coffee break
	10:45 – 12:30[*)]	*Session Chairman: W. Loiskandl, BOKU* **New structures of Bachelor and Master** W. Seif: Report from DAM A. Shaker: Report from ALBA A. N. Aldarir: Report from AU I. Hassan: Report from TIU M. Al Sibai: Report from HIWM
	12:30 – 13:00	Lunch
	13:00 – 15:00[*)]	***Working in groups about new structure of education – Bachelor & Master*** (DAM, ALBA, TIU, AU)
	15:00 – 15:30[*)]	Coffee break
	15:30 – 18:00[*)]	*Session Chairman: P.-W. Graeber, TUD* ***Reports from the Working groups***
Parallel: Gerhardts, Chr. *TUD* :**Administration of regulation**		

July 2 (Wednesday)	09:00 – 10:30*)	*Session Chairman: Th. Grischek, HTWD* **Reports about the WPs / Draft of final report** WP1 – TUD WP2 – BOKU
	10:30 – 11:00*)	Coffee break
	11:00 – 12:30*)	*Session Chairman: H. Eckstaedt, URO* **Reports about the WPs / Draft of final report** WP3 – HTWD WP4 – ALBA
	12:30 – 13:00	Lunch
	13:00 – 15:00*)	*Session Chairman: M. Wiatkowski, UO* **Reports about the WPs / Draft of final report** WP5 – AU WP6 - DAM
	15:30 – 18:00	Visit of the former alum mine of Plauen with groundwater managing system, entrance Reichsstreet
July 3 (Thursday)	09:00 – 10:30*)	*Session Chairman: P.-W. Graeber, TUD* Preparation of further activities Closing remarks: P.-W Graeber, TUD
	10:30 – 11:00*)	Coffee break
	11:00 – 17:00	*B. Maertner, M&S Umweltprojekt* Lunch and Excursion to: Flood protection in the Upper Vogtland, Muldenberg reservoir/dam+ drinking water plant, Vogtland arena and Pirk storage reservoir
July 4 (Friday)	08:00	Departure Bus transfer to the airport Berlin-Tegel will been organised
*) M&S Umweltprojekt GmbH, Pfortenstraße 7, 08527 Plauen, phone:+49 (0) 3741 57219-0		

TECHNISCHE UNIVERSITÄT DRESDEN

TEMPUS EDUWAT

Agenda of 7th Workshop in Dresden
14/09 to 19/09/2014

EU-TEMPUS Project EDUWAT

Development of a Modern Higher Education System for Water Engineering in Syria

Time table		
September 14th (Sunday)	Afternoon	Arrival in Dresden
September 15th (Monday)	10:00 – 11:00 Festsaal/Rektorat Mommsenstr. 11 01069 Dresden	**Opening of Workshop** Welcome addresses R. Liedl, *Vice Dean for Study Affairs, Department Hydro Sciences, TU Dresden* A. Eckardt, *Saxony State Ministry of Environment and Agriculture* H. Alkurdi, *Vice Minister of the Ministry of Higher Education in Syria* P.-W. Graeber, *Project Coordinator, TU Dresden* W. Seif, *Vice Project Coordinator, Damascus University*
	11:00 – 12:00*)	Chr. Gerhardts, TUD: Administration of regulation
	12:00 – 13:30	Lunch (“Alte Mensa”)
	13:30 – 15:00*)	*Session Chairman: A. Eckardt, SMUL* P.-W. Graeber: Resume of previous workshops W. Seif: Generally Report from the meetings in Syria All European-partners: Generally Report from the meetings in Europe
	15:00 – 15:30	Coffee break
	15:30 – 17:00*)	Continue of reports
	19:00 – 22:00	Workshop Dinner (Restaurant “BAROCO”, Altmarkt 10, 01067 Dresden)
September 16th (Tuesday)	09:00 – 10:30*)	*Session Chairman: W. Loiskandl, BOKU* **New structures of Bachelor and Master** W. Seif: Report from DAM A. Abdou: Report from ALBA A. N. Aldarir: Report from AU I. Hassan: Report from TIU M. Al Sibai: Report from HIWM
	10:30 – 11:00*)	Coffee break
	11:00 – 12:30*)	*Session Chairman: Th. Grischek, HTWD* **Reports about the WPs / Draft of final report** WP1 – TUD WP2 – BOKU
	12:30 – 14:00	Lunch (“Alte Mensa”)
	14:00 – 14:30	*Session Chairman: H. Eckstaedt, URO* Kristen, M.: Saxony Economic Development Corporation
	14:30 – 15:30*)	*Session Chairman: H. Eckstaedt, URO* **Reports about the WPs / Draft of final report** WP3 – HTWD WP4 – ALBA
	15:30 – 16:00*)	Coffee break
	16:00 – 17:30*)	*Session Chairman: M. Wiatkowski, UO* **Reports about the WPs / Draft of final report** WP5 – AU WP6 - DAM
Parallel: Gerhardts, Chr. *TUD* :**Administration of regulation**		

TECHNISCHE UNIVERSITÄT DRESDEN

TEMPUS EDUWAT

September 17th (Wednesday)	09:00 – 12:30 HTW-Pillnitz	Visit of Department of Agriculture of the University of Applied Sciences
	12:30 – 14:00	Lunch
	14:00 – 16:30	Visit of Summer Residence Pillnitz
	16:50 – 18:00	River Boat trip Pillnitz - Dresden
September 18th (Thursday)	09:00 – 10:30*)	*Session Chairman: P.-W. Graeber, TUD* Discussion about Final Report and Annex IV
	10:30 – 11:00	Coffee break
	11:00 – 12:30*)	*Session Chairman: P.-W. Graeber, TUD* Preparation of further activities Closing remarks: P.-W Graeber, TUD
September 19th (Friday)	08:00	Departure
*)	TU Dresden, Chemistry-Building, room 183/184 (1st floor), mobile phone (+49 (0) 173 5655071	

Agenda of 8th Workshop in Vienna
Vienna, 23/11 to 27/11/2014

EU-TEMPUS Project EDUWAT

Development of a Modern Higher Education System for Water Engineering in Syria

Time table		
Nov. 23 (Sunday)	Afternoon	Arrival in Vienna
Nov. 24 (Monday) *Faculty Club*	08:15	Pick up in Hotel “Geblergasse”, walking to BOKU
	09:00 – 09:15	**Opening of Workshop** W. Loiskandl, Workshop organiser, BOKU P.-W Graeber, Project Applicant, TUD
	09:15 – 10:30	**Round table Discussion** (all partners) Recommendations from European Commission (TP 1 to 3)
	10:30 – 11:00	Coffee break
	11:00 – 12:00	Recommendations from European Commission (TP 4 to 5)
	12:00 – 13:00	Lunch
	13:00 – 14:30	Recommendations from European Commission (TP 6 to 7)
	14:30 - 15:00	Coffee break
	15:00 – 17:00	Recommendations from European Commission (TP 7 to 9)
Parallel: Gerhardts, Chr.: **Administration of regulation**		
	19:00 – 22:00	**Workshop Dinner**
Nov. 25 (Tuesday) *Seminarroom 4. Floor*	09:00 - 10:30	**Reports about the WPs / Draft of final report and Annex IV** WP3 – HTWD WP4 – ALBA
	10:30 – 11:00	Coffee break
	11:00 – 12:00	**Reports about the WPs / Draft of final report and Annex IV** WP5 – AU
	11:30 -12:00	**Dean**
	12:00 – 13:00	Lunch
	13:00 – 14:00	**Reports about the WPs / Draft of final report and Annex IV** WP6 - DAM WP2 – BOKU WP1 – TUD
	14:00 – 15:00	Accredidation and Quality Management
	15:00 – 15:30	Coffee break
	15:30 – 17:00	**Reports about the WPs / Draft of final report and Annex IV** WP2 – BOKU WP1 – TUD

Nov. 26 (Wednesday) *Seminarroom IWHW 4. Floor*	09:00 - 10:30	**Final discussion about study system** (all partners) Structure, implementation, quality management, accreditation, responsibility, teaching material, sustainability, advertisement,
	10:30 – 11:00	Coffee break
	11:00 – 12:30	Preparation of further activities Closing remarks: P.-W Graeber, TUD
	12:30 – 13:30	Lunch (Mensa)
Parallel: Gerhardts, Chr.: **Administration of regulation**		
	13:30 – 17:00	**Excursion Danube regulation**
Nov . 27 (Thursday)		Departure
Parallel: Gerhardts, Chr.: **Administration of regulation**		

Final Version

Agenda of 10th Workshop in Plauen
22/03 to 26/03/2015

EU-TEMPUS Project EDUWAT

Development of a Modern Higher Education System for Water Engineering in Syria

Time table		
March 22 (Sunday)	Afternoon	Arrival in Plauen
March 23 (Monday)	09:00 – 10:30*)	*Session Chairman: Chr. Gerhardts, TUD* Chr. Gerhardts, TUD: Administration of regulation B. Maertner, M&S: Presentation of M&S Umweltprojekt GmbH
	11:00 – 12:00*)	**Opening of Workshop** Welcome addresses R. Oberdorfer: Lord Mayor of the city of Plauen L. Beck: Director of environmental department Vogtland administration L. Neumann: Director of Berufsakademie Plauen B. Maertner: Director of M&S Umweltproject GmbH P.-W. Graeber, Project Coordinator, TUD W. Seif, Syrian Deputy Project Coordinator, DAM
	12:00 – 13:30	Lunch (restaurant "Matsch")
	13:30 – 15:00*)	*Session Chairman: A. Eckardt, SMUL* **Final report of the EDUWAT project** P.-W. Graeber: Higher education in the field of water engineering – WP1 W. Loiskandl: Research at the universities – WP2
	15:00 – 15:30*)	Coffee break
	15:30 – 18:00*)	*Session Chairman: P.-W. Graeber, TUD* Th. Grischek: Innovation – WP3 A. Abdou: Triangle of education, research and innovation – WP4 N. Aldarir: Dissemination, Capacity building – WP5 W. Seif: Sustainability – WP6
	19:00 – 22:00	Workshop Dinner (restaurant "Heinrichs", historical city hall)
March 24 (Tuesday)	09:00 – 10:30*)	**Working Groups** WP4, WP5, WP6 an Annex IV (all participants)
	10:30 – 11:00*)	Coffee break
	11:00 – 12:00*)	**Working Groups** WP4, WP5, WP6 an Annex IV (all participants)
	12:00 – 14:30	Lunch (restaurant "Pfaffenmühle") and short visit to the "Teufelskanzel"
	15:00 – 16:00	Visit/excursion to the "Drachenhöhle" Syrau
Parallel: Gerhardts, Chr. *TUD* :**Administration of regulation**		

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TEMPUS EDUWAT

March 25 (Wednesday)	09:00 – 10:30*)	*Session Chairman: Th. Grischek, HTWD* P.-W. Graeber: The importance of the unsaturated zone B. Maertner: Decision support systems for the application of small waste water treatment systems
	10:30 – 11:00*)	Coffee break
	11:00 – 12:30*)	*Session Chairman: P.-W. Graeber, TUD* P. Cepuder: Use of a nitrogen discharge model in groundwater protection advice O. Pattloch: Construction and Regeneration of drinking water production wells
	12:30 – 14:00	Lunch (restaurant “Altes Handelshaus”)
	14:00 – 18:00	Visit/excursion to the Göltzschtalbridge, the largest brick- bridge of the world
	19:00 – 22:00	Workshop Dinner (restaurant “Primavera”, Hradschin 13)
March 26 (Thursday)	Morning	Departure
*) M&S Umweltprojekt GmbH, Pfortenstraße 7, 08527 Plauen, phone:+49 (0) 3741 57219-0		

TEMPUS

EDUWAT
Development of a Modern Higher Education System for Water Engineering in Syria

EDUWAT

Development of a Modern Higher Education System for Water Engineering in Syria

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Annex 4

REFERENCES

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein	Tempus

SANA
Syrian Arab News Agency

Tempus Project for Developing Water Engineering Education Launched

Local News /
Jan 10, 2011 - 08:40 AM

Damascus, (SANA) – Tempus Project for developing a new higher education system in the field of water engineering was launched on Sunday in the framework of a four-day workshop at the Civil Engineering Faculty of Damascus University.

The program aims at qualifying the academic workers in the water sector, being an important priority of the Syrian economy, through establishing master and PhD degrees in water engineering at the Syrian universities.

Assistant Minister of Higher Education for Scientific Research Najib Abdul-Ahad underlined the importance of the project due to the vitality of water sector in light of fears of water shortage and scarcity of its sources.

He stressed the necessity of establishing projects to help maintain the running water as well as groundwater to cover the increasing needs of water at present and in the future.

Rector of Damascus University Wael Mualla said the growing demand for water, particularly in agriculture, requires well-qualified academics specialized in water engineering, making the establishment of master and PHD degrees a must.

He pointed out to the great experience students of the Syrian universities are gaining from European universities in the framework of the standing cooperation between the Syrian Ministry of Higher Education and Tempus Program.

R. Milhem / H. Said

The Tempus-project Kickoff for development of education in water engineering

10th January 2011

Damascus – SANA

Yesterday was the kickoff meeting of the tempus project for development of modern higher education system of water engineering in Syria through a four-day workshop at the civil engineering faculty in Damascus.

The project aims to improve the academics working in the water sector as one of the most priority sector in the Syrian economy, in addition to found master and doctorate programs in the field of water engineering at the Syrian universities and to avail of the overlapping of water engineering and natural sciences to create new areas of learning and scientific researches such as environmental technology.

The associate minister of higher education for scientific research Dr. Najib Abdul Wahed referred in the workshop that the importance of the project stems from the vitality of the water sector under fears of water lack, rarity of water resources, climate change as well as population growth. Dr. Abdul Wahed emphasized the necessity to found projects which guaranty the preservation of running water and groundwater to meet increasing demand of water now and in the future.

Dr. Wael Mualla, rector of Damascus University, said that the increasing water demand, especially in the agricultural sector, requires qualified professionals in field of water engineering and hence the idea of founding master and doctorate programs in this field, adding great value to the experience gained by Syrian university students in some European universities in the framework of cooperation between the Syrian ministry of higher education and Tempus program.

The national coordinator of the Tempus program Dr. Rami Al-Ayubi conducted a presentation about the program and the academic projects they have participated from Syria sice 2002 in the area of infrastructure development for scientific research and development of masters in many scientific fields.

The participants of the Project are the ministry of higher education, Syrian universities (Damascus, Aleppo, Teshreen and Albaath), general company for engineering and consulting studies, Arabic center for the study of arid zones and dry lands (ACSAD), higher institute of water management, Technische Universitaet Dresden, Rostock university, Apolonski university, university of agricultural sciences in Viena and University of biological sciences in Prag.

Tempus program is one of the programs financed by the European Union to develop systems of higher education in partner countries of the program and it depends on the transfer of experiences from European educational institutions to institutions of these countries through regional and national cooperation projects.

The project kickoff was inaugurated with attendance of Dr. Amjad Zeno (dean of civil engineering faculty) and Prof. Dr. Peter-Wolfgang Graeber from Technische Universitaet Dresden as project head, as well as researchers and professors involved at Syrian universities.

Published on *:: Syria National Tempus Office ::* (http://www.tempus-nto.org.sy/new)

New TEMPUS Project in the field of Hydrology

Link:
www.damascusuniversity.edu.sy [1]

A new TEMPUS project was launched at DU on Jan. 9th in the School of Civil Engineering. A four-day workshop inaugurated the project which aims to develop a new higher education Hydrology approach in Syria.

The project will seek to train academicians in this vital field by developing two graduate level degrees (Master and Doctorate). Capitalizing on an interdisciplinary approach, particularly with Basic Sciences was among the issues discussed, in order to create new niches for learning and research, such as Ecological Technology.

Deputy Minister of Higher Education for Scientific Research, Dr. Najeeb Abdul Wahed, pointed out in the opening session to the importance of this project in a world where water resources are becoming increasingly scarce, particularly in light of the impact of global climate change and the steady rise in population numbers around the world.

Prof. Wael Mualla, DU president, said that increasing demands on water, particularly in the field of agriculture requires professional hydrologists and water engineers, hence the idea of launching the new graduate programs in this field. He also appreciatively noted the significant experience acquired by Syrian scholars pursing their graduate degrees in European universities in the framework of existing cooperation between MHE and the TEMPUS Program.

Dr. Rami Ayyoubi, TEMPUS NTO in Syria presented an overview of TEMPUS in Syria, and of the various joint projects that Syrian universities participated in with TEMPUS since 2002.

Partners in this project include MHE, the four major public universities, the Public Agency for Engineering Consulting and Studies, ACSAD, the Higher Institute for Water Management, University of Dresden, Universitaet Rostok, Hochschule fuer Technik and Wirtschaft Dresden, Stadtenwaesserung Dresden – Gelsenwasser, M&S Umweltprojekt GmbH in Germany, Universitaet fuer Bodenkultur in Vienna, and the Czech University of Life Sciences in Prague.

In attendance were the Dean of DU's School of Civil Engineering, Prof. Amjad Zeino, and Project Manager

Prof. Peter Wolfgang Graber

from the University of Dresden, and a number of interested faculty members

Last time updated: 20/04/2011 - 12:51pm

Source URL: http://www.tempus-nto.org.sy/new/articles/new-tempus-project-field-hydrology

Links:
[1] http://www.damascusuniversity.edu.sy/en/damascus

تقرير حول مشاركة جامعة دمشق في ورشة العمل الخامسة لمشروع تيمبوس

تقرير حول المشاركة في ورشة العمل الخامسة لمشروع تيمبوس
" تطوير نظام التعليم العالي لمهندسي المياه في سورية - EDUWAT-TEMPUS "
المنعقدة في جامعة براغ لعلوم الحياة – براغ – جمهورية التشيك، خلال الفترة 2014/ 16-21/02

حضر ورشة العمل:
من الجانب السوري: ممثلون عن الجهات الشريكة في المشروع من جامعات دمشق وحلب وتشرين والبعث، ومن الشركة العامة للدراسات والاستشارات، والمركز العربي لدراسات المناطق الجافة والأراضي القاحلة (أكساد).
ومن الجانب الأوروبي: ممثلون عن الجامعات والوزارات والشركات الشريكة في المشروع من كلٍ من ألمانيا والنمسا وجمهورية التشيك وبولندا، اضافة الى ممثلين عن وزارات البيئة، والتعليم و الشباب والرياضة، والزراعة التشيكية.
وقد جاءت مجريات ورشة العمل على النحو الاتي:
اليوم الأول 17/02/2014: افتتاح فعاليات الورشة، و تضمن الافتتاح:

- ترحيب منسق مشروع EDUWAT-TEMPUS من جامعة براغ لعلوم الحياة بالمشاركين بالورشة.

- القاء كلمات لكلٍ من نائب رئيس جامعة براغ لعلوم الحياة، ونائب عميد كلية الزراعة الحيوية والغذاء والموارد الطبيعية في الجامعة، ومعاون وزير التعليم والشباب والرياضة لشؤون البحث والتعليم العالي، ومدير قسم الشؤون الاستراتيجية والأوروبية في وزارة التعليم والشباب والرياضة، وممثل عن قسم ادارة المياه في وزارة الزراعة، وممثلة عن قسم حماية المياه في وزارة البيئة، وممثلة عن مشاريع تيمبوس في مركز التعاون الدولي في مجال التعليم، ومنسق المشروع من جامعة براغ لعلوم الحياة، والمنسق العام للمشروع من جامعة دريسدن الألمانية.

- كلمة لرئيس جامعة دمشق تحدث فيها أولاً عن جامعة دمشق وكلياتها والاختصاصات التي تضمها، والدور المهم الذي تلعبه الجامعة في الجمهورية العربية السورية على أكثر من مستوى، ولاسيما ما يتعلق بالعملية التنموية والتعليمية والبحثية. ثم انتقل للتأكيد على أهمية مشاريع الاتحاد الأوروبي الداعمة للتعليم العالي في سورية، والتي يأتي في مقدمتها مشاريع تيمبوس، وراسموس بلاس الداعمة لتحسين البنى التحتية في التعليم العالي، وتطوير الهيكلية الادارية للجامعات، وتحديث المناهج التدريسية فيها على مستوى الكليات، واحداث درجات علمية جديدة تلبي متطلبات التعليم العالي المتقدم، واحتياجات سوق العمل. يُضاف الى ذلك نشر ثقافة الجودة والاعتمادية، ونقل خبرات الجامعات الاوروبية الى الجامعات السورية. كما أكد السيد رئيس الجامعة على حرص الجامعة على انجاز مشروع EDUWAT-TEMPUS وفق أفضل معايير الجودة المتبعة، للمساهمة بالتعاون مع الشركاء من الجانب الاوربي في تحقيق أهداف برنامج تيمبوس المنشودة في رفع سوية التعليم العالي لمواجهة التحديات العلمية والتنموية في الجمهورية العربية السورية. وفي الختام أشار السيد رئيس الجامعة EDUWAT-TEMPUS الى استعداد الجامعات السورية عامة، وجامعة دمشق خاصة للتنسيق مع الشركاء في المشروع من الجامعات والمؤسسات الأوروبية، والعمل سوية من أجل خلق فرص جديدة سواء في اطار برنامج تيمبوس، أوخارجه لمواصلة التعاون العلمي والبحثي والأكاديمي والثقافي وتبادل الخبرات في أكثر من مجال، وعلى أكثر من مستوى.

- القاء مجموعة من المحاضرات تناولت بشكلٍ رئيس المراحل، التي قطعتها جامعات دمشق وحلب وتشرين والبعث، والشركة العامة للدراسات والاستشارات، والمركز العربي لدراسات المناطق الجافة والأراضي القاحلة (أكساد) في انجاز مشروع EDUWAT-TEMPUS، وبخاصةٍ ما يتعلق بمقترحات هذه الجهات حول وضع هيكلية برنامج تعليمي جديد لدرجتي البكالوريوس والماجستير لثلاث اختصاصات هي ادارة الموارد المائية، والهيدرولوجيا، والتربة والمياه الجوفية، وذلك وفق نظام بولونيا المتبع بشكلٍ رئيس في برامج التعليم العالي ضمن دول الاتحاد الأوروبي.

اليوم الثاني 18/02/2014: تضمنت نشاطات هذا اليوم الفعاليات الاتية:

- زيارة قسم الموارد المائية في كلية الزراعة الحيوية والغذاء والموارد الطبيعية، والاستماع الى محاضرة من منسق مشروع EDUWAT-TEMPUS، حول القسم والمهمات التي يتولى القيام بها في الجامعة، ودوره في تنفيذ المشاريع المائية في جمهورية التشيك. وقد تضمنت المحاضرة الاشارة الى قيام القسم باعداد وتنفيذ برامج

دراسية خارجية ضمن مدارس صيفية، منها مدرسة صيفية تُقام في جامعة Ondokuz Mayis التركية حول موضوع " التربة والمياه "، وذلك في الفترة من 11 اب، وحتى 25 اب 2014 (مرفق نسخة من الاعلان عن المدرسة الصيفية)، وبناءً على رغبة الأستاذ الدكتور رئيس جامعة دمشق بمشاركة طلاب من الجامعة في هذه المدرسة، فان الجانب التشيكي وافق من حيث المبدأ على مشاركة طالبين فيها.

- الاطلاع على المخابر التابعة للقسم.
- زيارة المحطة الحقلية لأبحاث القسم.
- توزيع المشاركين من الأطراف السورية والأوروبية على مجموعات عمل، والبدء بمناقشة المقترحات الموضوعة مسبقاً من قبل جامعات دمشق وحلب وتشرين والبعث، والشركة العامة للدراسات والاستشارات، والمركز العربي لدراسات المناطق الجافة والأراضي القاحلة (أكساد) حول الهيكلية الجديدة المقترحة للبرنامج التعليمي المتعلق بدرجتي البكالوريوس والماجستير للاختصاصات المشار اليها أعلاه.

اليوم الثالث 19/02/2014: شملت أعمال ورشة العمل في اليوم الثالث منها القيام بما يأتي:

ـ تقديم مجموعات العمل لنتائج مناقشاتها حول الهيكلية الجديدة المقترحة للبرنامج التعليمي المتعلق بدرجتي البكالوريوس والماجستير لاختصاصات ادارة الموارد المائية، والهيدرولوجيا، والتربة والمياه الجوفية.

ـ الاستماع لمحاضرة من منسق مشروع EDUWAT-TEMPUS من جامعة BOKU النمساوية حول مقارنة البحوث كمياً ونوعياً (الفقرة WP2 من المشروع). تلا ذلك محاضرة من منسق المشروع عن جامعة دمشق حول تنفيذ واعتمادية الهيكلية الجديدة المقترحة للبرنامج التعليمي المتعلق بدرجتي البكالوريوس والماجستير للاختصاصات المشار اليها أعلا ه (الفقرة WP6).

ـ الاستماع لملاحظات الحضور حول أعمال ورشة العمل، واعداد التقرير النهائي عنها.

ـ وضع خطة العمل للمرحلة اللاحقة، واقتراح أن يكون الثاني من شهر حزيران القادم موعداً لورشة العمل التالية، ثم اختتما ورشة العمل.

اليوم الرابع 20/02/2014: جولة سياحية في مدينة براغ والاطلاع على أبرز المعالم الأثرية فيها.

اليوم الخامس 21/02/2014: الاستعداد للسفر، والعودة الى دمشق.

وفي الختام تجدر الاشارة الى أن الأستاذ الدكتور رئيس جامعة دمشق اجتمع على هامش ورشة العمل مع كلٍ من رئيس جامعة براغ لعلوم الحياة ونائب رئيس الجامعة للعلاقات الدولية، وعميد كلية الزراعة الحيوية والغذاء والموارد الطبيعية (Faculty of Agrobiology and Food and Natural Resources) في الجامعة. حيث نوقشت جوانب مختلفة للتعاون المشترك مابين الجامعتين في المجالات الأكاديمية والعلمية والبحثية، فأكد رئيسا الجامعتين على:

ـ التعاون ما بين الجامعتين في مجال تبادل أعضاء الهيئة التدريسية والطلاب.

ـ التعاون في مجال البحوث العلمية، والاشراف المشترك عليها.

ـ العمل على تأسيس درجات علمية مشتركة ما بين الجامعتين.

وفي هذا الاطار اقترح الأستاذ الدكتور محمد عامر المارديني أن تقوم جامعة دمشق باعداد مسودة مذكرة تفاهم تُرسل الى جامعة براغ لعلوم الحياة لمناقشتها، والاتفاق على صيغتها النهائية، ليجري التوقيع عليها لاحقاً من قبل رئيسي الجامعتين.

من جهته أكد عميد كلية الزراعة الحيوية والغذاء والموارد الطبيعية على امكانية التعاون ما بين كليته، وجامعة دمشق في مجالي الموارد المائية، والعلوم الزراعية منوهاً في الوقت ذاته الى ضرورة وضع صيغة تواصل يتفق عليها الطرفان للعمل المشترك من أجل تبادل الأساتذة والطلاب، والقيام ببحوث ودراسات علمية مشتركة.

كما قام رئيس الجامعة بزيارة سفارة الجمهورية العربية السورية في براغ والتقى بحضور السيد إبراهيم إبراهيم القائم بالأعمال في السفارة مجموعة كبيرة من الطلاب الموفدين والدارسين في جمهورية تشيكيا وقد تم في هذا اللقاء مناقشة جميع المشاكل التي تعترض هؤلاء الدارسين على أن يتم توجيهها إلى المعنيين تمهيداً لحلها بما فيه موضوع عودة الإشراف على الدارسين ومعادلة الشهادات وغيرها...

تاريخ آخر تحديث: الثلاثاء, 04 آذار/مارس 2014 10:59

TECHNISCHE UNIVERSITÄT DRESDEN

Fakultät Umweltwissenschaften, Fachrichtung Hydrowissenschaften

Entwicklung neuer Studiengänge für die Ausbildung von Ingenieuren und Wissenschaftlern auf dem Wassersektor in Syrien

Ausgangssituation

- Langjährige Zusammenarbeit und Hochschulvereinbarungen der Technischen Universität Dresden mit den Universitäten in Damaskus, Homs, Lattakia und Aleppo
- Syrien befindet sich derzeit in einer Phase der politischen, wirtschaftlichen und sozialen Veränderungen.

Situation auf dem Wassersektor

- Wasser wird auch in Syrien eine zunehmend knappe Ressource, nicht nur durch den Klimawandel, sondern auch durch den Wandel der Bevölkerungsstruktur, Verstädterung, Lebensstandard und Lebensqualität, geänderte Landnutzung und andere Faktoren.
- Der Wassersektor erfordert deshalb grundlegende Reformen auf nationaler Ebene. Diese sind in erster Linie durch eine effektive Nutzung des Wassers bestimmt.
- Um Wasser bewirtschaften zu können, muss der gesamte Wasserkreislauf verstanden werden.

Situation auf dem Bildungssektor

- Nationale Priorität hat in Syrien die nachhaltige Modernisierung der Hochschulbildung einschließlich der Verbesserung ihrer Qualität.
- Eine Annäherung an den Bologna-Prozess wird angestrebt.
- Eine bessere Synergie zwischen Bildungswesen und Arbeitsmarkt ist erforderlich, um die Kluft zwischen den Anforderungen des globalisierten Arbeitsmarktes und den vorhandenen Personalressourcen zu schließen.

المفوضية الأوروبية
TEMPUS

EDUWAT

Development of a Modern Higher Education System for Water Engineering in Syria

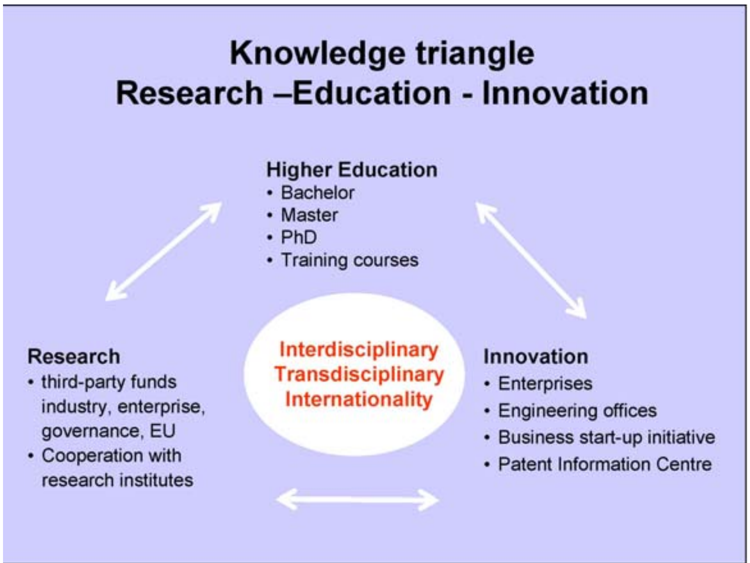
Zielstellung

Ausbildung hoch motivierter, nach internationalen Maßstäben ausgebildete Ingenieure und Wissenschaftler auf dem Wassersektor, als einer der vorrangigen Bereiche des syrischen Wirtschaftssystems, die den Anforderungen des modernen Arbeitsmarktes entsprechen

Lösungsweg

- Verbesserung der Qualifizierung und Kompetenz der syrischen Absolventen durch Einführung des Bologna-Systems, d.h. Bachelor- und Master-Studium in 5 Jahren, Modularisierung des Studiums, Studentenmobilität
- Neustrukturierung der Ausbildung auf dem Wassersektor zur Herstellung der Einheit von Ausbildung - Forschung - Praxis (Wissensdreieck) im Konsens mit den Prioritäten, die das Ministerium für Higher Education in Syrien herausgearbeitet hat
- Entwicklung neuer konsekutiver Studiengänge :
  - *Wasserwirtschaft* → Nutzung des Wassers,
  - *Wasser- und Kulturbau* → Bauen am / im Gewässer,
  - *Gewässerschutz, Wasserbewirtschaftung, Hydrologie* → Das Gewässer

  unter Nutzung bestehender Module der Fakultäten Bauingenieur-wesen und / oder Landwirtschaft,
- Überwindung der Fragmentierung der Ausbildung
- Entwicklung neuer Ausbildungs- und Forschungsfelder durch Interdisziplinarität und Transdisziplinarität von Natur- und Ingenieurwissenschaften
- Vernetzung der Universitäten und Unternehmen national und international zum Ausbau der Zusammenarbeit in Forschungs- und Ausbildung.
- Evaluierung und Akkreditierung der Studiengänge



Projektpartner

EU-Partner	Syrische Partner
TU Dresden HTW Dresden Universität Rostock BOKU Wien CULS Prag Universität Opole	Damascus University Al-Baath University Homs Aleppo University Tishreen University Lattakia Higher Institute of Water Management/Homs
M&S Umweltprojekt GmbH Plauen/Vogtland Gelsenwasser/ Stadtentwässerung Dresden	General Company for Engineering Studies and Consulting (GCEC) The Arab Center for the Studies of Arid Zones & Dry Lands (ACSAD)
Sächsisches Ministerium für Umwelt und Landwirtschaft	Ministry of Higher Education

Kontakt: Prof. Dr. Peter-Wolfgang Gräber, Technische Universität Dresden
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Mail: peter-wolfgang.graeber@tu-dresden.de Url: www.tu-dresden.de/fghhiaa →Systemanalyse

Gefördert durch Tempus

International - Syrien

KP bildet syrische Planungsingenieure und Brunnenbauer weiter

Gruppenfoto der Lehrgangsteilnehmer (links im Bild der wissenschaftliche Leiter des Lehrgangs Prof. Gräber, Bildmitte Olaf Pattloch)

Syrien sieht sich großen Herausforderungen bei der Versorgung der Bevölkerung mit sauberem Trinkwasser und der Bereitstellung quantitativ und qualitativ ausreichender Ressourcen für die Landwirtschaft gegenüber.

Über 90 Prozent der vorhandenen Wasserressourcen werden in der Landwirtschaft verwendet, aus der etwa 25 Prozent der Bevölkerung ihr Einkommen beziehen.

Die Einleitung von ungereinigten Abwässern in die bestehenden Gewässer führt zu einer Gefährdung der Agrarproduktion und der Trinkwasserversorgung.

Die Übernutzung der Wasserressourcen hat bereits zu einem deutlichen Sinken der Grundwasserspiegel geführt.

In einigen Landesteilen ist die Übernutzung so groß, dass die traditionelle Landwirtschaft gefährdet ist (Quelle: Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH).

Derzeit hat Syrien gravierende quantitative und qualitative Probleme in der Trinkwasserversorgung seiner Bevölkerung in den großen Ballungsgebieten, wie Damaskus, Aleppo und Homs. Die Ursachen dafür sind – wie oben aufgezeigt – vielfältig. Sie liegen zum großen Teil aber auch in einem mangelnden Bewusstsein zum vorsorgenden Grundwasserschutz begründet. Um die dort herrschenden Missstände zu beseitigen, bedarf es langfristig greifender Lösungsansätze.

Kurzfristig können aber mit zielgerichteten Einzelmaßnahmen schnelle Erfolge erreicht werden. Bei Besichtigungen der Wasserversorgungsanlagen vor Ort sticht dem Fachmann sofort ins Auge, dass z.B. nahezu alle Brunnen bereits dem Augenschein nach nicht fachgerecht ausgebaut sind und so verunreinigtes Fremd- bzw. Oberflächenwasser in die Brunnen eintreten kann.

Dr. Rappold (Bundesanstalt für Geologie und Rohstoffe BGR, Hannover) bei der Eröffnung der Veranstaltung und Vorstellung des Programms "Wasser".

Diese Missstände lassen sich durch verhältnismäßig einfache Brunnenbau- bzw. -sanierungsmaßnahmen beseitigen, so dass die Trinkwasserqualität kurzfristig erheblich verbessert werden kann.

Dipl.-Geogr. Pattloch beim Vortrag (im Vordergrund Herr Prof. Helal bei der Übersetzung ins Arabische). Die Folien wurden in Deutsch / Englisch [rechts] sowie in Arabisch [links] dargestellt.

Ziel der Technischen Zusammenarbeit zwischen Deutschland und den syrischen Partnern ist, durch einen integrierten Ansatz zum Wasserressourcen- management (einschließlich der Nutzung eines geeigneten Preis- und Subventionsmechanismus) die Lage bei der Versorgung mit Trinkwasser und der Bereitstellung von Wasserressourcen für die Landwirtschaft nachhaltig zu verbessern.

Die GTZ unterstützt die syrischen Partner hierbei durch die Entwicklung von Investitionsvorhaben für die Abwasserreinigung und die Trinkwasserversorgung, die Entwicklung strategischer Ansätze für die Investitionsvorhaben und den organisatorischen Aufbau des Sektors. Die Maßnahmen werden durch ein Trainingsprogramm für syrische Fachkräfte ergänzt.

Im konkreten Zusammenhang ist eine geeignete Ausbildung bzw. Schulung der Brunnenbautechniker und der verantwortlichen Planungsingenieure Voraussetzung für die Umsetzung und die Wirksamkeit der Programme zur

Technischen Zusammenarbeit. Deshalb hat die KP Ingenieurgesellschaft für Wasser und Boden mbH in Zusammenarbeiten mit der Technischen Universität Dresden den Lehrgang „Brunnenbau und Brunnensanierung in Karstgebieten“ konzipiert.

Der Lehrgang, der vom 18.-22.03.2007 an der AlBaath-Universität Homs stattfand, wurde von der Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH finanziell gefördert und mit freundlicher Unterstützung des Deutschen Entwicklungsdienstes (DED) sowie der Order of Syrian Engineers and Architects (OSEA) durchgeführt.

Aufgrund des großen Zuspruchs musste die Teilnehmerzahl im Vorfeld auf 40 begrenzt werden, um eine qualitativ hochwertige Aus- und Weiterbildung der syrischen Ingenieure sicherstellen zu können.

Dennoch erschienen am ersten Tag mehr als 70 Teilnehmer zum Lehrgang.

Blick ins Auditorium.

Die wissenschaftliche Leitung des Lehrgangs oblag Herrn Prof. Dr.-Ing. Habil. Peter-Wolfgang Gräber (BWK-LV Sachsen) vom Institut für Abfallwirtschaft und Altlasten der Technischen Universität Dresden. Hauptlektor war der öffentlich bestellte und vereidigte Sachverständige für Grundwassererschließung Herr Dipl.-Geogr. Olaf Pattloch von der KP Ingenieurgesellschaft für Wasser und Boden mbH (BWK-LV Bayern), der im Lehrgang auf seinen umfangreichen Erfahrungsschatz beim Brunnenbau und der Brunnensanierung in der Schwäbischen und Fränkischen Alb zurückgreifen konnte.

Die Lehrinhalte reichten von modernen Verfahren zur Standortauswahl, Bohrverfahren, Brunnenausbau, Pumpversuchsplanung, -durchführung und -auswertung bis hin zu neuesten Verfahren zur Brunnensanierung.

Seitens der Teilnehmer war eine sehr positive Resonanz auf die Lehrgangs- inhalte zu verzeichnen. In den Lehrgangs- pausen ergab sich jeweils eine angeregte Diskussion zu aktuellen Problemen bei laufenden Trinkwassererschließungen.

Es wurde deutlich, dass die bisherige Vorgehensweise bei der Trinkwasser-erschließung an das Bohren für die Erdölprospektion ausgerichtet ist.

Dipl.-Geogr. Pattloch im Dialog mit den Lehrgangsteilnehmern.

So ist z.B. das Setzen von Sperrrohren zur Verhinderung von ungewollten Wasserzutritten, das Kolben und Entsanden von Brunnen oder eine Filterkiesbemessung nicht üblich. Auch die Bestimmung von hydraulischen Kennwerten des Aquifer und des Brunnens ist nicht bekannt oder wird nicht durchgeführt.

Diese gravierenden Mängel in der Konzeption und Ausführung wurden besonders bei der Exkursion am 21.03.2007 zu aktuellen Trinkwasser- erschließungsarbeiten für die im Bau befindliche Industriestadt Hessia, deutlich.

Am letzten Lehrgangstag wurde der Lehrgangserfolg dann in einem Prüfungsgespräch kontrolliert sowie anschließend die Teilnahmezertifikate überreicht.

Aufgrund des großen Zuspruchs und des Erfolgs ist geplant, den Lehrgang in anderen syrischen und arabischen Ballungszentren zu wiederholen und auch eine berufsständische Weiterbildungsakademie zu etablieren.

Exkursion zu Brunnenbaustellen für Trinkwassererschließung.

Syrer auf Wasser-Exkursion im Vogtland

Freie Presse Stadt Plauen 01.07.2014

Wissenschaftler aus dem vom Krieg gebeutelten Land denken schon an den Wiederaufbau der zerstörten Infrastruktur. Ein Plauener sitzt mit im Boot.

VON TINO BEYER

PLAUEN – Syrische Wissenschaftler wollen mit Hilfe auch aus dem Vogtland die Wasserversorgung ihres Heimatlandes wieder auf die Beine bringen. Eine 25-köpfige Delegation von Hochschullehrern schaut sich deshalb seit gestern die vogtländische Wasser-Infrastruktur an. Besuche standen oder stehen in der Kläranlage in Plauen, in einem Wasserwerk in Tirpersdorf und an der Talsperre Muldenberg auf dem Programm. Auch ein Abstecher an die Talsperre Pöhl ist geplant. Bis Freitag dauert der Workshop, der im Rahmen eines von der Europäischen Union geförderten Projektes in Plauen stattfindet.

Krieg verschärft Situation

Ein internationales Team hat sich zum Ziel gesetzt, Studiengänge rund ums Wasser für Syriens Hochschulen zu entwickeln. Zu dieser Mannschaft gehört auch Bernd Märtner, Geschäftsführer der M&S Umweltprojekt GmbH in Plauen. Er holte die Syrer ins Vogtland. „Die Wasserversorgung in Syrien war schon vor dem Krieg nicht überragend", sagt er. Der Krieg habe die Situation noch einmal verschärft. „Trotz der schwierigen Situation in Syrien arbeiten wir mit ausdrücklicher Unterstützung der EU innerhalb des Projektes weiter, da eine gesicherte Wasserversorgung und -entsorgung die Basis für den Wiederaufbau des Landes nach den Kriegswirren ist."

Bernd Märtner
Geschäftsführer M&S Umweltprojekt GmbH Plauen

FOTO: ELLEN LIEBNER/ARCHIV

M&S Umweltprojekt ist als einziges privatwirtschaftliches Unternehmen in dieses Projekt eingebunden und bringt Erfahrungen aus der ingenieurtechnischen Praxis mit ein. Kopf des Teams ist Professor Wolfgang-Peter Gräber von der TU Dresden.

Neben den wassertechnischen Anlagen erfahren die Gäste aus dem Nahen Osten auch, wie die Ausbildung in Sachsen organisiert ist. Plauens Studienakademie-Leiter Konrad Rafeld stellt dazu das System der Berufsakademie vor. „In Syrien verlassen Absolventen ohne praktische Erfahrungen die Hochschule. Ein Defizit", sagt Bernd Märtner. Der Unternehmer schlüpft regelmäßig in die Rolle des Dozenten, vermittelt Studenten des Fachs Technisches Management in Plauen Wissen aus der Praxis.

Aufträge in Syrien als Ziel

Im Hauptberuf ist Bernd Märtner jedoch Unternehmer. Er macht deshalb kein Geheimnis daraus, dass er bei seinem Engagement auch wirtschaftliche Absichten verfolgt. Wenn in Syrien irgendwann der Wiederaufbau beginnt, will er mit seiner Firma dabei sein. Märtner: „Allerdings sind das schon sehr lange Linien."

Vogtlandanzeiger 02.07.2014

Duales Studium Vorbild für Syrer

Das EU-TEMPUS Projekt Eduwat zur Entwicklung eines modernen Bildungssystems für Fachkräfte im Bereich Wasser und Abwasser ist Thema des 6. Workshops dieser Art, der derzeit in Plauen stattfindet. Dem Plauener Fachmann für Umwelttechnik Dr. Bernd Märtner gelang es, das Forum in die Spitzenstadt zu bringen, an welchem 40 internationale Fachleute teilnehmen.

Plauen – Wie funktionieren die Trinkwasserversorgung und das Abwassernetz in Plauen? Wie steht es um die Ausbildung im Dualen System für die Studiengänge Bachelor und Master für künftige Fachkräfte im Wasser und Abwasserbereich? Derlei Themenbereiche stehen bei diesem 6. Workshop auf dem Programm der Teilnehmer im kleinen Saal des Plauener Rathauses. Außerdem besuchen sie, organisiert vom Zweckverband Wasser und Abwasser Vogtland (ZWAV) Standorte in Tirpersdorf, die Talsperre Pöhl, Muldenberg und Pirk und sogar das alte Bergwerk an der Reichsstraße. Die Tage in Plauen sind für die Gäste aus Tschechien, Polen, Österreich, Deutschland und Syrien besondere, registriert der Mitorganisator Bernd Märtner beeindruckt, zum einen der Vorträge und der Vorort-Termine in Plauen wegen, zum anderen aufgrund der Neugier und Aufgeschlossenheit vor allem der Gäste aus Syrien. „Ich denke, unsere Fachleute aus dem Nahen Osten fühlen sich bei uns wohl, sie sind von uns sehr warmherzig aufgenommen worden", so Märtner. Sie seien sehr interessiert am Dualen Studium. „So etwas gibt es noch nicht in Syrien, statt drei Jahre Ausbildung dauert es fünf Jahre bis zum Abschluss", erfährt Märtner von den internationalen Gästen. Die Teilnehmer des Workshops kommen auch über die fachliche Arbeit hinaus ins Gespräch. „Es ist enorm beeindruckend und macht betroffen, von den Syriern über den Alltag im Krieg zu erfahren. Man stelle sich vor, vor Monaten noch gingen diese Leute, die jetzt bei uns zu Gast sind, bei Granatgeräuschen in Deckung. Nun laufen sie weiter nach dem Motto, wenn es passiert, passiert es. Ich wünsche ihnen sofort Frieden", sagt Märtner. Auf dass die Fachleute in ihrem Heimatland ihr Engagement für eine gute Wasserversorgung und gedeihliche Ausbildung von Fachkräften in Ruhe umsetzen können. *fb*

Die internationalen Teilnehmer des Workshops im Rathaus, links Organisator Dr. Bernd Märtner. *Foto: fb*

Einfach andere Wege gehen

Workshop Ab morgen arbeitet ein internationales Konsortium in Plauen

Internationale Größen reisen morgen an. 37 Professoren mit etlichen Doktortiteln und ziemlich viel Kompetenz arbeiten eine Woche im Vogtland. Worum es geht? Professor Peter-Wolfgang Graeber von der Technischen Universität in Dresden erklärt: „Ich leite ein Konsortium, welches sich mit der Entwicklung von Bachelor- und Master-Studiengängen für die staatlichen Universitäten in Syrien befasst.“ Weshalb aber findet dieser Workshop in Plauen statt? Die Antwort hat ausgerechnet Ministerpräsident Stanislaw Tillich parat: „Ihr Plauener könnt mit eurer Berufsakademie ein Alleinstellungsmerkmal aufbauen. Ihr müsst aber Wege gehen, die alle Anderen nicht laufen.“ Gesprochen hatte der Sachsen-Boss diesen Satz erst vor drei Wochen, als er im Vogtland weilte. Der damalige Gastgeber Dr. Bernd Märtner (Geschäftsführer M&S Umweltprojekt) gilt als einer der Hauptaktionäre der (noch) kleinsten Studienakademie in Sachsen. Der Unternehmer arbeitet zugleich als Dozent an der BA und er entwickelt ständig neue Ideen: „Dieser Workshop hat schon in Damaskus, Prag, Opole und Wien Erfolge erzielt. Ich freue mich, dass die Veranstaltung nun bei uns stattfindet.“ Hintergrund: Trotz der schwierigen Situation in Syrien sucht das M&S Umweltprojekt mit Unterstützung der EU nach Möglichkeiten, die Wasserversorgung zu sichern. Sie gilt nach den Kriegswirren als Schlüssel für den Wiederaufbau des Landes. M&S ist als einziges privatwirtschaftliches Unternehmen ins Projekt involviert. Die Plauener Firma sichert 80 Ingenieur-Arbeitsplätze. **kare**

Foto: Karsten Repert

Eine funktionierende Berufsakademie in Plauen - Stanislaw Tillich (links) und Bernd Märtner glauben an diese Vision.

Lokalanzeiger-Plauen 28.06.2014

M&S Umweltprojekt: Workshop zu Wasserversorgung

Plauen – In der nächsten Woche findet in den Geschäftsräumen der M&S Umweltprojekt GmbH in Plauen ein internationaler Workshop statt. Nach der Durchführung der Workshops in Damaskus, Dresden, Prag und Opole und Wien freut sich Geschäftsführer Dr. Bernd Märtner dass es gelungen sei, diese Veranstaltung ins Vogtland zu holen. Ein internationales Konsortium unter Leitung von Prof. Gräber (TU Dresden) beschäftigt sich mit der Entwicklung von Bachelor- und Masterstudiengängen für die staatlichen Universitäten in Syrien. „Trotz der schwierigen Situation in Syrien arbeiten wir mit ausdrücklicher Unterstützung der EU innerhalb des Projektes weiter, da eine gesicherte Wasserversorgung (und -entsorgung) die Basis für den Wiederaufbau des Landes nach den Kriegswirren ist", teilt Märtner weiter mit.

Stadt-Anzeiger Plauen 26.06.2014

تقرير حول المشاركة في ورشة العمل الخامسة لمشروع تيمبوس

" EDUWAT-TEMPUS - تطوير نظام التعليم العالي لمهندسي المياه في سورية "

المنعقدة في جامعة براغ لعلوم الحياة – براغ – جمهورية التشيك، خلال الفترة 16-2014/02/21

حضر ورشة العمل:
من الجانب السوري: ممثلون عن الجهات الشريكة في المشروع من جامعات دمشق وحلب وتشرين والبعث، ومن الشركة العامة للدراسات والاستشارات، والمركز العربي لدراسات المناطق الجافة والأراضي القاحلة (أكساد).
ومن الجانب الأوروبي: ممثلون عن الجامعات والوزارات والشركات الشريكة في المشروع من كلٍ من ألمانيا والنمسا وجمهورية التشيك وبولندا، اضافة الى ممثلين عن وزارات البيئة، والتعليم و الشباب والرياضة، والزراعة التشيكية.
وقد جاءت مجريات ورشة العمل على النحو الاتي:
اليوم الأول 2014/02/17: افتتاح فعاليات الورشة، و تضمن الافتتاح:

- ترحيب منسق مشروع EDUWAT-TEMPUS من جامعة براغ لعلوم الحياة بالمشاركين بالورشة.

- القاء كلمات لكلٍ من نائب رئيس جامعة براغ لعلوم الحياة، ونائب عميد كلية الزراعة الحيوية والغذاء والموارد الطبيعية في الجامعة، ومعاون وزير التعليم والشباب والرياضة لشؤون البحث والتعليم العالي، ومدير قسم الشؤون الاستراتيجية والأوروبية في وزارة التعليم والشباب والرياضة، وممثل عن قسم ادارة المياه في وزارة الزراعة، وممثلة عن قسم حماية المياه في وزارة البيئة، وممثلة عن مشاريع تيمبوس في مركز التعاون الدولي في مجال التعليم، ومنسق المشروع من جامعة براغ لعلوم الحياة، والمنسق العام للمشروع من جامعة دريسدن الألمانية.

- كلمة لرئيس جامعة دمشق تحدث فيها أولاً عن جامعة دمشق وكلياتها والاختصاصات التي تضمها، والدور المهم الذي تلعبه الجامعة في الجمهورية العربية السورية على أكثر من مستوى، ولاسيما ما يتعلق بالعملية التنموية والتعليمية والبحثية. ثم انتقل للتأكيد على أهمية مشاريع الاتحاد الأوروبي الداعمة للتعليم العالي في سورية، والتي يأتي في مقدمتها مشاريع تيمبوس، وراسموس بلاس الداعمة لتحسين البنى التحتية في التعليم العالي، وتطوير الهيكلية الادارية للجامعات، وتحديث المناهج التدريسية فيها على مستوى الكليات، واحداث درجات علمية جديدة تلبي متطلبات التعليم العالي المتقدم، واحتياجات سوق العمل. يُضاف الى ذلك نشر ثقافة الجودة والاعتمادية، ونقل خبرات الجامعات الاوروبية الى الجامعات السورية. كما أكد السيد رئيس الجامعة على حرص الجامعة على وفق أفضل معايير الجودة المتبعة، للمساهمة بالتعاون مع الشركاء من EDUWAT-TEMPUS انجاز مشروع الجانب الاوربي في تحقيق أهداف برنامج تيمبوس المنشودة في رفع سوية التعليم العالي لمواجهة التحديات العلمية والتنموية في الجمهورية العربية السورية. وفي الختام أشار السيد رئيس الجامعة الى EDUWAT-TEMPUS استعداد الجامعات السورية عامة، وجامعة دمشق خاصة للتنسيق مع الشركاء في المشروع من الجامعات والمؤسسات الأوروبية، والعمل سوية من أجل خلق فرص جديدة سواء في اطار برنامج تيمبوس، أوخارجه لمواصلة التعاون العلمي والبحثي والأكاديمي والثقافي وتبادل الخبرات في أكثر من مجال، وعلى أكثر من مستوى.

- القاء مجموعة من المحاضرات تناولت بشكلٍ رئيس المراحل، التي قطعتها جامعات دمشق وحلب وتشرين والبعث، والشركة العامة للدراسات والاستشارات، والمركز العربي لدراسات المناطق الجافة والأراضي القاحلة (أكساد) في انجاز مشروع EDUWAT-TEMPUS، وبخاصةٍ ما يتعلق بمقترحات هذه الجهات حول وضع هيكلية برنامج تعليمي جديد لدرجتي البكالوريوس والماجستير لثلاث اختصاصات هي ادارة الموارد المائية، والهيدرولوجيا، والتربة والمياه الجوفية، وذلك وفق نظام بولونيا المتبع بشكلٍ رئيس في برامج التعليم العالي ضمن دول الاتحاد الأوروبي.

اليوم الثاني 2014/02/18: تضمنت نشاطات هذا اليوم الفعاليات الاتية:

- زيارة قسم الموارد المائية في كلية الزراعة الحيوية والغذاء والموارد الطبيعية، والاستماع الى محاضرة من منسق مشروع EDUWAT-TEMPUS، حول القسم والمهمات التي يتولى القيام بها في الجامعة، ودوره في تنفيذ المشاريع المائية في جمهورية التشيك. وقد تضمنت المحاضرة الاشارة الى قيام القسم باعداد وتنفيذ برامج دراسية خارجية ضمن مدارس صيفية، منها مدرسة صيفية تُقام في جامعة Ondokuz Mayis التركية حول موضوع " التربة والمياه "، وذلك في الفترة من 11 اب، وحتى 25 اب 2014 (مرفق نسخة من الاعلان عن المدرسة الصيفية)، وبناءً على رغبة الأستاذ الدكتور رئيس جامعة دمشق بمشاركة طلاب من الجامعة في هذه المدرسة، فان الجانب التشيكي وافق من حيث المبدأ على مشاركة طالبين فيها.

- الاطلاع على المخابر التابعة للقسم.

- زيارة المحطة الحقلية لأبحاث القسم.

- توزيع المشاركين من الأطراف السورية والأوروبية على مجموعات عمل، والبدء بمناقشة المقترحات الموضوعة مسبقاً من قبل جامعات دمشق وحلب وتشرين والبعث، والشركة العامة للدراسات والاستشارات، والمركز العربي لدراسات المناطق الجافة والأراضي القاحلة (أكساد) حول الهيكلية الجديدة المقترحة للبرنامج التعليمي المتعلق بدرجتي البكالوريوس والماجستير للاختصاصات المشار اليها أعلاه.

اليوم الثالث 2014/02/19: شملت أعمال ورشة العمل في اليوم الثالث منها القيام بما يأتي:

ـ تقديم مجموعات العمل لنتائج مناقشاتها حول الهيكلية الجديدة المقترحة للبرنامج التعليمي المتعلق بدرجتي البكالوريوس والماجستير لاختصاصات ادارة الموارد المائية، والهيدرولوجيا، والتربة والمياه الجوفية.

ـ الاستماع لمحاضرة من منسق مشروع EDUWAT-TEMPUS من جامعة BOKU النمساوية حول مقارنة البحوث كمياً ونوعياً (الفقرة WP2 من المشروع). تلا ذلك محاضرة من منسق المشروع عن جامعة دمشق حول تنفيذ واعتمادية الهيكلية الجديدة المقترحة للبرنامج التعليمي المتعلق بدرجتي البكالوريوس والماجستير للاختصاصات المشار اليها أعلا ه (الفقرة WP6).

ـ الاستماع لملاحظات الحضور حول أعمال ورشة العمل، واعداد التقرير النهائي عنها.

ـ وضع خطة العمل للمرحلة اللاحقة، واقتراح أن يكون الثاني من شهر حزيران القادم موعداً لورشة العمل التالية، ثم اختتما ورشة العمل.

اليوم الرابع 2014/02/20: جولة سياحية في مدينة براغ والاطلاع على أبرز المعالم الأثرية فيها.

اليوم الخامس 2014/02/21: الاستعداد للسفر، والعودة الى دمشق.

وفي الختام تجدر الاشارة الى أن الأستاذ الدكتور رئيس جامعة دمشق اجتمع على هامش ورشة العمل مع كلٍ من رئيس جامعة براغ لعلوم الحياة ونائب رئيس الجامعة للعلاقات الدولية، وعميد كلية الزراعة الحيوية والغذاء والموارد الطبيعية (Faculty of Agrobiology and Food and Natural Resources) في الجامعة. حيث نوقشت جوانب مختلفة للتعاون المشترك مابين الجامعتين في المجالات الأكاديمية والعلمية والبحثية، فأكد رئيسا الجامعتين على:

ـ التعاون ما بين الجامعتين في مجال تبادل أعضاء الهيئة التدريسية والطلاب.

ـ التعاون في مجال البحوث العلمية، والاشراف المشترك عليها.

ـ العمل على تأسيس درجات علمية مشتركة ما بين الجامعتين.

وفي هذا الاطار اقترح الأستاذ الدكتور محمد عامر المارديني أن تقوم جامعة دمشق باعداد مسودة مذكرة تفاهم تُرسل الى جامعة براغ لعلوم الحياة لمناقشتها، والاتفاق على صيغتها النهائية، ليجري التوقيع عليها لاحقاً من قبل رئيسي الجامعتين.

من جهته أكد عميد كلية الزراعة الحيوية والغذاء والموارد الطبيعية على امكانية التعاون ما بين كليته، وجامعة دمشق في مجالي الموارد المائية، والعلوم الزراعية منوهاً في الوقت ذاته الى ضرورة وضع صيغة تواصل يتفق عليها الطرفان للعمل المشترك من أجل تبادل الأساتذة والطلاب، والقيام ببحوث ودراسات علمية مشتركة.

كما قام رئيس الجامعة بزيارة سفارة الجمهورية العربية السورية في براغ والتقى بحضور السيد إبراهيم إبراهيم القائم بالأعمال في السفارة مجموعة كبيرة من الطلاب الموفدين والدارسين في جمهورية تشيكيا وقد تم في هذا اللقاء مناقشة جميع المشاكل التي تعترض هؤلاء الدارسين على أن يتم توجيهها إلى المعنيين تمهيداً لحلها بما فيه موضوع عودة الإشراف على الدارسين ومعادلة الشهادات وغيرها...

تاريخ آخر تحديث: الثلاثاء, 04 آذار/مارس 2014 10:59

ورشة العمل حول مشروع تطوير نظام التعليم العالي لمهندسي المياه في سورية . . أكساد يشارك فيها . . وجامعة براغ تطلب الانضمام إلى حلقة التعاون القائم مابين أكساد وجامعة دمشق

شارك المركز العربي لدراسات المناطق الجافة والأراضي القاحلة (أكساد) في فعاليات " ورشة العمل الخامسة من مشروع تيمبوس/ تطوير نظام التعليم العالي لمهندسي المياه في سورية - - TEMPUSEDUWAT ".

عُقِدَتْ الورشة في رحاب جامعة براغ لعلوم الحياة في العاصمة التشيكية براغ، فيما بين 17 و 2013/2/19م، وهدفت إلى مناقشة الجهات المعنية بالمشروع في الجمهورية العربية السورية (جامعات دمشق، وحلب، وتشرين، والبعث، والشركة العامة للدراسات والاستشارات)، والمركز العربي (أكساد)، بالمراحل التي قطعتها في إنجاز مشروع - TEMPUSEDUWAT ، وخاصة فيما يتعلق بمقترحات هذه الجهات حول وضع هيكلية برنامج تعليمي جديد لدرجتي البكالوريوس والماجستير لثلاثة اختصاصات هي إدارة الموارد المائية، والهيدرولوجيا، والتربة والمياه الجوفية، وذلك وفق نظام بولونيا المتبع بشكل رئيس في برامج التعليم العالي ضمن دول الاتحاد الأوروبي.

مثَّل أكساد في فعاليات الورشة وفد مؤلف من الدكتور وائل سيف مدير إدارة الموارد المائية، والدكتور يوسف مرعي خبير المنشآت المائية.

ونظراً لاهتمام جامعة براغ لعلوم الحياة بالتعاون القائم مابين المركز العربي (أكساد) وجامعة دمشق، على صعد الخبراء، وإنجاز الأبحاث العلمية المشتركة، ودعم أكساد للجامعة وإسهامه في إعداد ومراجعة ثلاثة مناهج دراسية للهندسة المائية في إطار مشروع تيمبوس، هي إدارة الموارد المائية، والهيدروجيولوجيا (مياه جوفية، وتربة)، والهيدرولوجيا، وبما يتوافق مع نظام التعليم العالي الأوروبي (Bologna System)، فقد أكد عميد كلية الزراعة الحيوية والغذاء والموارد الطبيعية في جامعة براغ، استعداد الكلية للانضمام إلى حلقة التعاون هذه، وطلب من رئيس جامعة دمشق تبويب مجالات التعاون المشترك الممكنة بالتنسيق مع أكساد، تمهيداً لتوقيع اتفاقية تعاون مشتركة بين الأطراف الثلاثة مستقبلاً.

Designermesse 4.500 Besucher durften auf dem Plamag-Gelände in die Zukunft blicken

Fläche, Dauer und Besucherzahl wurden verdoppelt. Die 2. Schau auf Design war ein wirklicher Publikumsmagnet. Über 4.500 Besucher nutzten das vergangene Wochenende, um sich zu informieren und auszutauschen. In den ehemaligen Plamag-Werkhallen wurden Kontakte geknüpft und natürlich auch eingekauft. Stadt-Pressesprecherin Silvia Weck: „Nicht wenige hatten gleich ein Wochenendticket gelöst und ließen dem ersten Besuch am Samstag einen zweiten am Sonntag folgen." Auch die Samstagabendveranstaltung, mitorganisiert von den Machern der Veranstaltungsreihe „Wilde Hilde", zog 800 Gäste an. Silvia Weck und Plauens Wirtschaftsförderer Eckhard Sorger: „Wir danken Uwe Fischer und seinem Team von der Firma Progressio. Es war eine tolle Veranstaltung, bei der sowohl Besucher als auch Aussteller total positiv gestimmt waren." Die positive Stimmung war überall spürbar. „Hier gibt es 3D-Drucker, die sich auch ein kleineres Unternehmen oder ein wohlhabender Privatmann leisten kann", staunte Peter Winkelmann aus Falkenstein. Der BLICK-Reporter traf unterdessen auf Michael Rannacher. Der Plauener Unternehmer war mit Lampe präsent, die allen Ernstes blendfrei leuchtet. Das heißt: Diese Lampe leuchtet beispielsweise einen Arbeitsplatz aus, ohne den Nutzer zu blenden. Und das Ganze kostet ebenfalls kein Vermögen. Viele solcher Unglaublichkeiten waren während der zweitägigen Zukunftsschau zu sehen. Um Rückschlüsse der Aussteller zu erhalten und diese berücksichtigen zu können, haben die Veranstalter entsprechende Befragungsbogen an die Aussteller ausgereicht. **kare**


Foto: Karsten Repert

So sieht er aus, der 3D-Drucker für zu Hause. Das Unternehmen NeXas Industriesoftware aus Lichtentanne präsentierte den X400 Kit zur „Schau auf Design".

Bad Elster. Wird im nächsten Sommer das Trinkwasser knapp? Was passiert, wenn das Vogtland eine Jahrhundertflut heimsucht? Solche gegensätzlichen Fragen beantwortet Jürgen Hadel. Der Öffentlichkeitsarbeiter mimt beim Zweckverband Wasser und Abwasser Vogtland (ZWAV) den „Erklärbär". Denn zum „Tag des Wassers" in Bad Elster wurde wieder einmal deutlich: Der Mensch dreht zu Hause den Hahn auf und er erwartet, dass rund um Uhr die Wasser rauskommt. Welch enorme Leistung in dieser noch sehr jungen Dauer-Errungenschaft steckt, darüber infor-

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ZWAV-Gewinnspiel über zwei tolle

Internationales Großprojekt mit Syrien

Vision Vogtländer bieten für die Zeit nach dem Bürgerkrieg Hilfe an

Plauen. Wenn in Syrien der Bürgerkrieg zu Ende ist, könnten die Vogtländer ein ganz wichtiger Partner werden. Wirtschaftsförderer Lars Beck, Plauens Oberbürgermeister Ralf Oberdorfer und Berufsakademie-Direktor Prof. Dr. Lutz Neumann boten am Montag Hilfe an.

Dass sich daraus dann geschäftliche Beziehungen zwischen Syrien und Plauen entwickeln, dafür möchte Dr. Bernd Märtner sorgen.

Der Geschäftsführer der M&S Umweltprojekt GmbH engagiert sich nicht nur in Deutschland, sondern auch im Ausland im Umweltschutzbereich. „Zu diesen Aktivitäten zählt unter anderem die Entwicklung eines modernen Bildungssystems für höhere Bildung im Wasser-Ingenieurbereich in Syrien", berichtet Bernd Märtner. Denn nach Beendigung des Bürgerkrieges muss als eine der ersten infrastrukturellen Maßnahmen in Syrien die Trinkwasser- und Abwasser-Entsorgung wieder aufgebaut werden. Es handelt sich derzeit übrigens um das einzig noch bestehende EU-Projekt mit Syrien. Zum Workshop hatten hochrangige Vertreter aus Wirtschaft und Politik sowie Repräsentanten von sechs syrischen und von sechs europäischen Universitäten nach Plauen gefunden. In der M&S-Firmenzentrale endete nach fünf Jahren Laufzeit das EDUWAT-Projekt erfolgreich. **kare**


Foto: Karsten Repert

Im Bild, vorn von links: Dr. Bernd Märtner, Prof. Dr. Lutz Neumann und Ralf Oberdorfer.

Bahnverkehr Anlieger gegen Bahnlinie

Selb. Eigentlich schien die Reaktivierung der Bahnstrecke von Selb nach Asch geräuschlos über die Bühne zu gehen. Für viele zu glatt, sollen doch schon im Dezember auf der Bahnlinie wieder Züge zwischen Selb-Plößberg und Asch verkehren. Nun meldet sich aber Rechtsanwalt Kollerer aus Kulmbach zu Wort. Der sagt: „Ich bezweifle, dass die Strecke heuer in Betrieb geht." Der Fachanwalt für Bau und Architektenrecht vertritt zwei Anlieger der Bahnlinie und die Bürgerinitiative mit etwa 30 Gegnern gegen das Vorhaben. Hauptpunkt ist der fehlende Lärmschutz an der Strecke. Eine Klage gegen den Bau der fehlenden Brücken ist bereits auf den Weg gebracht. Aus Kollerers Sicht besteht berechtigter Zweifel, ob eine seit

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