



MASTER DEGREE PROGRAM „ENVIRONMENT AND CLEAN TECHNOLOGIES”

Andrei CHICIUC*, Petru TODOS* and Oxana SAMOTEEVA**

* *Technical University of Moldova*

** *The Royal Institute of Technology, Sweden*

Abstract – The aim of realization of Master Degree Program „Environment and Clean Technologies”, with the specialty „Energy and Environment” was to assure a qualified training in the domain of environmental protection at the MSc level. Within the MSc program, institutionalized at the Faculty of Energetics of the Technical University of Moldova, there was engaged the didactic staff with a rich pedagogical and professional experience, as well as specialists from different domains of economy. Actually, this program is the only one in the Republic of Moldova which assures the specialists’ training in this domain, and as a result the entire society will benefit from graduates’ knowledge which will contribute to the improvement of ecological situation in the Republic.

Keywords: *environment, energy, clean technologies, master degree.*

1. INTRODUCTION

The first period of program's „Environment and Clean Technologies” development was dedicated to the elaboration of the study plan and of the analytical programs adapted to the educational system of the Republic of Moldova. In the same period, the majority of the didactic staff implicated in this program had probationary periods at KTH (Kungliga Tekniska Hogskolan - The Royal Institute of Technology, Sweden) and Technical University of Berlin. During these probationary periods professors from Republic of Moldova had the possibility to get acquainted with similar programs of EU partner universities, as well as with the didactic materials used for specialists training in the domain of Energy and Environment. As a result of requalifications, the didactic staff from the consortium has elaborated courses which should have been taught to master degree students of the TUM. Besides these elaborated and published courses, the library of the program has been completed with other didactic materials which are at the disposal of students, including numerous manuals bought in the EU and the USA.

First graduates have successfully finished the program, producing good results in both courses, and their thesis work. All accepted students graduated with good results (above the average). Students were very happy with the possibility of being taught by

highly qualified lecturers from KTH, BTU and Moldovan Universities, having a chance to experience new ways of teaching in both English and Romanian. They had permanent access to a well-equipped computer room with high speed Internet, which facilitated communication between themselves and with the involved staff. Every student had a chance to attend courses at KTH, for duration of 2-3 weeks. Five best students were collecting thesis materials and had done their first drafts of the thesis during their two month stay at KTH, being supervised by a lecturer from KTH and one from Moldova.

2. PROGRAMS AND COURSES

The MSc Program in Environment and Clean Technologies has been established at UTM. The specifics of the educational system in Moldova were studied and analyzed and according to these ones, the curricula and duration of courses and the whole program were set up.

The curriculum of the Master program includes two semesters of courses and a four months thesis work. The first semester provides general courses obligatory for all students, as for the second semester specialized courses are grouped in two blocks and the students have the possibility to choose one of the blocks according to their interests. General courses are meant to give a broad idea about sustainable development, environmental impact of different technologies and its assessment, as well as providing a few examples of suitable legislative framework for sustainable development.

Specialized courses are prepared and taught partly by our teachers in form of modules (about 24 hours/week, followed by exams) in order to facilitate the visits of teachers from EU; and partly as regular courses (mainly taught by partner country teachers). Thesis work consists of case study in a selected specialty, which gives an encouragement for further research in specified areas.

Obligatory English courses, as well as courses in Pedagogy and Psychology have been introduced in

the curricula at a later stage in order to give students more general education, as a preparation for their future teaching activities as well as to improve their communication skills. These courses were introduced according to the Moldovan Educational requirements for postgraduate studies.

The schematic view of the organization of studies can be seen below (Figure 1).

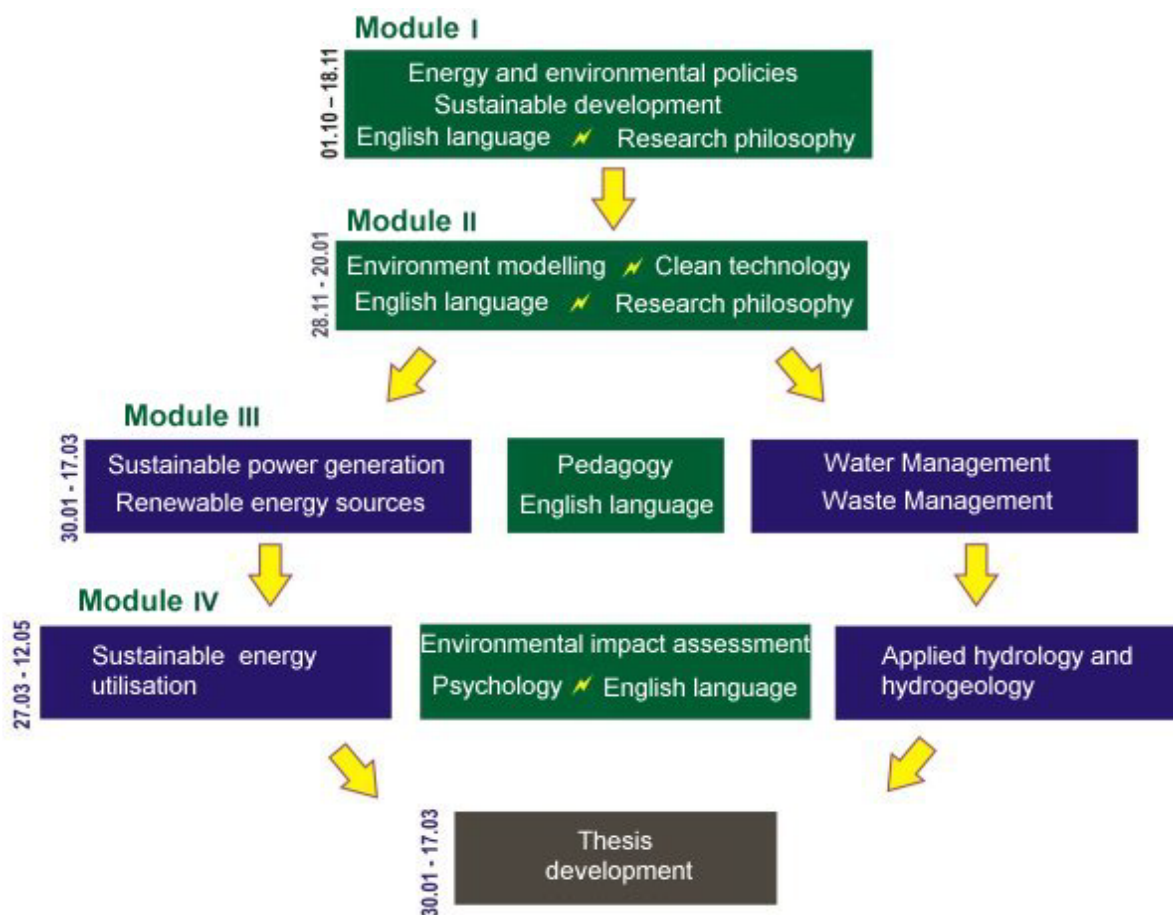


Figure 1: The organizational structure of the didactic process of the Master degree program „Environment and Clean Technologies”, specialty „Energy and Environment”

The main target groups of this project and of the MSc Program itself are the participant students. The students come to the program in order to increase the level of their education from BSc to MSc. Specialists from a wide range of areas related to Environmental, Energy and Technological fields, as well as fresh graduates are accepted for studies on a competitive basis and according to the eligibility conditions set prior to application. The first group of accepted/graduated students consisted of 19 people (2005-2006). New admission brought up 23 students (2006-2007).

Elaboration of didactic materials was done by every Consortium University member according to their possibilities and involvement. For every course a

course program was elaborated taking as a basis the programs of existing similar courses taught at KTH, BTU or at local Universities. The course materials were selected taking into account the recommendations of the teachers/professors previously involved in the given subject. Based on these, the library with recommended course literature for every subject was created. As for the lecture notes, every responsible for the course and their assistants have analyzed and re-worked numerous sources of teaching materials, lecture notes and books and have created their own lecture notes for each subject taught in the Program, which were consequently published and made available for students, as well as placed in the library.

Teaching methods were changed from the original in several ways:

- Teachers were presenting their own versions of the courses based on the materials that they collected at EU universities and adapted to local conditions. It indeed affected the course contents and the way these were taught by including some updated information, using software and new lab equipment in different courses.
- Supervisors and students doing their MSc thesis related to renewable energy, sound and noise pollution, electromagnetic pollution were using new laboratory equipment and measurement technique.
- Teachers of all courses were using multimedia in their educational process. Overhead and video projectors, computerized programs and e-mail as a communication tool were used extensively, which was almost never (with few exceptions) used in teaching activities before.
- Last but not least, curricula was organized using western system of modules and not as before, when one course could last for more than one semester and even a year. Teachers had to adapt their teaching mode to this new and compact scheme.

3. DISSEMINATION

During the first year of the project, the word about the future Master Program started to spread out through publishing brochures and posters about the Master Program. These were distributed at different faculties of the involved universities and institutions that could be possibly interested in the Program. The teachers were announced about the new MSc Program and they passed the word to their students. The web site of the Master Program was designed prior to the program start in such a way as to give full information about the admission procedure, Program's structure, courses, teachers, participants and news.

It is planned to widen the specific of students that are studying in the Program and to accept trainees from the industry and other energy-and-environment related institutions to take different courses of their choice against a tuition fee. This would help to diversify the target group, spread the information and will contribute to the sustainability of the Program.

4. SUSTAINABILITY

First and main result of the project with the direct implication in Environmental and technological future are the graduates of the program whose

involvement in the field can be followed-up already now: three of the first graduates are working at the Energy Department of TUM as researchers and lecturers, six are working at different research institutes in the field; four are working in different governmental programs and organizations (including ministries) related to the Environmental issues, four work at different energy-related companies (energy, water production and distribution) and only one is working in not related fields, but is in search for a job that would satisfy her requirements.

As for the created infrastructure, the furnished computer room and laboratories will be used by the next students in their study process. The books that are collected in the library and the lecture materials that are printed will be used for long time.

The developed curricula and courses will be delivered in the future to the master students, as well as to the people coming from industry, institutions and schools who would like to increase the level of their knowledge and train in some subjects. Those courses for trainees will be given for a tuition fee. Some students (those that are not covered by the budgetary scholarships) will also pay a fee, therefore making it possible for the Program to run.

Creating a good image for the Program by providing high-quality education, bringing local and European specialists for teaching, will be an extra incentive for attracting more students into the Program.

5. IMPACT

The Republic of Moldova has signed the UN Convention for Climate Change (1993) and the Kyoto Protocol (2003) but at that time it did not have sufficient human resources capable to understand and implement these conventions. The majority of the persons with the decisive power on the local and central levels, of the teachers in schools, colleges as well as higher Education institutions, Ministries and entrepreneurs were educated before 1991 within the centralized economy conditions. At that time and in such conditions, the notions of "energy" and "environment" were treated separately and the environmental problems were treated as being less important. In the best case, these persons were filling the lack of knowledge in the field with self-studies. There are the incentives for acting fast and efficient in order to prepare specialists in the field, and not just engineers educated with some knowledge of environment, but specialists in Energy and Environment who can correspond to the necessities and requests of the contemporaneous world.

The Republic of Moldova has adhered to the Bologna Protocol and now the Higher Education undergoes big changes and reforms. The Master Program that was established under this project's objectives represents the second cycle of the European educational scheme: Bachelor-Master-Doctoral studies. Presently, the undergraduate studies in Moldova last 4 years, Master studies, which are classified as undergraduate education - 1 year. It has been found difficult to prepare a master within one year, so it is decided in the nearest future to change to 2 years master studies, leaving the 4 years undergraduate preparation unchanged. This will make it possible to deepen the course contents and to diversify the education, giving also to students the possibility to spend more time on their thesis research work.

Acknowledgments

We would like to thank all the team for good work and cooperation, members of the Technical University of Moldova, Kungliga Tekniska Hogskolan and Technische Universitat Berlin, who have contributed to the promoting, preparing and successful realization of the Master degree program „Environment and Clean Technologies”. We would also like to thank with great considerations the grant holder of the Tempus JEP-24182-2003 project Mr. Johansson Lennart – Honored Senator of the TUM's Senate for his support, advice and supervision.

References

[1] <http://www.utm.md/master/>