Letter to the Editor

NEW STUDY PROGRAMMES FOR THE STATE AGRARIAN UNIVERSITY OF MOLDOVA

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Abstract

Purpose: to relate outcomes of an analysis of Master study fields at the State Agrarian University of Moldova (SAUM). The analysis was an integral part of an educational development project, which aimed at formulation of New Master Study Programmes. This task was also in line with harmonizing of study programmes at SAUM with EU standards and Bologna requirements within higher education in Europe.

Methodology: extensive survey of activities linked to teaching programmes was conducted. The methodology was based upon a logic sequence starting from the (first) evaluation of the current situation and going up to the (last) proposal of new master study fields.

Findings: two new Master (MSc.) study programmes were formulated as a very important output of the analysis and step towards improvements in SAUM study curricula which generally lack ecological and environmental dimensions. Two new study fields were formulated as: "Waste Management" and "Sustainable Use of Natural Resources". New study fields main parameters, study subjects and their syllabi, graduate´s profile, admission procedure, state examinations and examples of MSc. theses have been included into the proposal.

Practical implications: the above proposal will enrich the SAUM curricula with new study areas and extend job opportunities of the SAUM students. Attractiveness of new study fields for students has also been taken into account. The research project for development was the first one implemented at the SAUM and its outcomes are quite new having high added value.

Key words: curriculum analysis; study programmes; waste management, sustainable use of natural resources, subject syllabi

INTRODUCTION

As the European Higher Education Area (EHEA) develops thanks to the implementation of the Bologna Process, the Higher Education System in Moldova will receive greater exposure to western European approaches. Part of this will involve more and better study programmes with proper content and possibility of assessment. The staff quality in terms of both professional and pedagogical skills and qualifications gained by relevant activities in laboratories, fields and classrooms must be developed in harmony with the requirements laid on them. Based upon this principle, not only students but also lecturers and professors will need much training in different professional areas to get relevant background and experience.

It is to say that the State Agrarian University of Moldova in Chisinau has made considerable progress in implementing many elements of the Bologna Process. In particular it has made progress on introducing the two-cycle system of qualifications. There has been more progress on the introduction of Bachelor level, although there are inconsistencies, than the Master level which is still embryonic. Lack of legislation from the Government, especially in the Framework of Qualifications and the Master level, has undoubtedly slowed progress (Cambell and Rozsnyai, 2002). The European Credit Transfer System (ECTS) has been introduced and applied and this is the subject of a separate report. New courses have been formulated to reflect the changing needs of the rural areas and this process needs to continue.

The project "Support to Curricula Development at the State Agrarian University of Moldova and Harmonization its Education System with EU Standards" started in 2006 and belonged to funded in the frame of the Czech Development Cooperation (CzechAid) in Moldova by the Czech University of Life Sciences.

The area on which this article brings information is one of two main project leading topics which were focused during the whole project implementation: *study programmes (focus on environment and ecology) and pedagogic/research abilities of the SAUM staff*. During the first steps towards meeting the above targets the new study programmes were formulated. It can be considered as a certain preparation step for further measures as proposed by the Project: the *Establishment* of "*Laboratory of Bio-energy*".

The "*Laboratory of Bio-energy*" has more components and will surely get many interlinks within and outside SAUM. It has already become model university workplace producing good research results and serves a prototype for other laboratories of the similar character. The new study programmes make use of the *Laboratory* as a research-scientific background. It is very important for SAUM teachers but still more significant for Master and PhD students who should conduct research for their theses.

Challenges for European Partnership Approach

The European Partnership Approach is essential principle which is inbuilt in foundations of the Bologna Process. This is doubtless because this process represents no direct (and little indirect) threat to their national prerogatives (Berlin Communiqué, 2003). There are three broad challenges in this context: the first is that of gearing the various study programmes leading to Bachelor and Master qualifications to the activity of professional, economic, social and cultural sectors. The second relates to research activity, to production and dissemination of knowledge in the society (training of researchers and their integration into society). The third one is about the transmission and hierarchy of values together with the development of communication and expression tools for European society (Knudsen, Haug, Kirstein, 1999).

The above challenges should be regarded when formulating new study programmes because establishment of European Higher Education Area and the promotion of the European System of Higher Education world-wide must be taken in mind (Towards the European Higher Education Area, 2003). The policies to be adopted will be in the following areas: (1) Adoption of a system of easily readable and comparable degrees, also through the implementation of the Diploma Supplement. (2) Adoption of a system essentially based on two cycles. (3) Establishment of a system of credits such as European Credit Transfer System (ECTS). (4) Complementing the two-cycle system (Bachelor, Master) by Doctoral Study Level.

Another notion in the context with the European university level studies is EHEA (European Higher Education Area). From the very beginning this process includes also states which were not members of the EU. It had developed on the basis of the Bologna process. Its main stakeholders were different higher education institutions in Europe (including the former Soviet republics). The EHEA has become supported by ERA (European Research Area) both of them having political context. In fact there is an organic coexistence between both of them which creates base for the university studies (Bergen Communiqué, 2005).

The Interrelationships between EHEA and ERA

While the EHEA´s stakeholders are universities and higher education institutions and their constituents, including students, the ERA is much larger. It is because there are three main groups of ERA stakeholders: private companies and their research and development institutes, publicly financed non-university institutes and the universities. The universities constitute the "smallest common denominators" between ERA and EHEA. The EHEA provides the human resources for the ERA and the universities are linking the two concepts as important education and training centres as well as centres of research (Keeling and Robertson, 2007).

Thus, the Bachelor Study Programmes as university undergraduate set of services are less linked to the research; however the Master Study Programmes have fully to reflex the above principle of EHEA-ERA synergy. They have to correspond to the same basic principles laid on the courses at this level (Froment et al., 2006). This may further lead (as we have recently evidenced) to the joint first or second cycle degree programmes. Most of these may be characterized as joint curricula (Lauridsen and Zethsen, 2006).

Descriptors

The basic statement relating to the Master cycle qualifications comes out of the Dublin Descriptors. In fact it is in context with qualifications that signify completion of the second cycle. They can be awarded to students who demonstrate certain abilities. The new master programmes should match the qualifications as follow (Harvey and Newton, 2004; Joint Quality Initiative, 2004):

– *The graduates must easily demonstrate knowledge and understanding that is founded upon and (eventually) extends and is associated with Bachelor's level. They also provide a basis or opportunity for within a research context.*

– *They will be able to apply their knowledge and understanding and problem solving abilities in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.*
– *They will have the ability to integrate knowledge and handle formulate judgments with incomplete or limited information, but that include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments.*
– *They will be able to communicate their conclusions, and the knowledge and rationale underpinning these, to specialist and non-specialist audiences clearly and unambiguously.*
– *They have the learning skills to allow them to continue to study in a manner that may be largely self-directed or autonomous.*

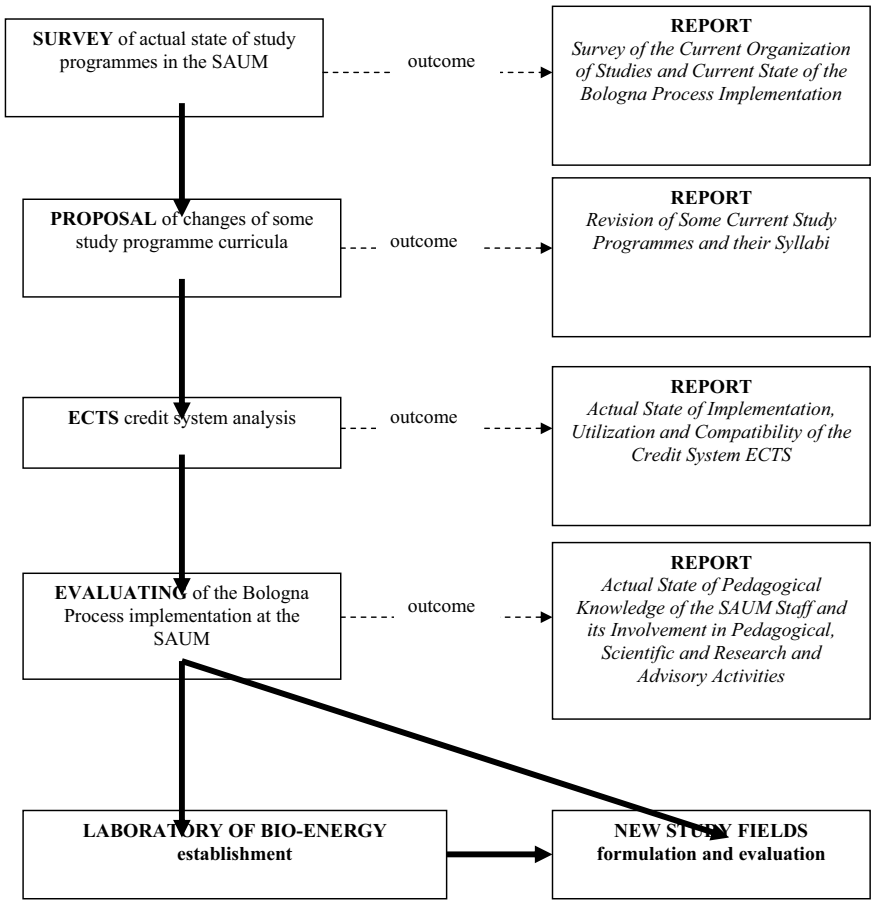
Focus on Master programmes

Master-level programmes can perform many functions. For example they can provide a post-Bachelor "capstone" for those seeking to round out their university studies. They can provide apprenticeship experiences for the people destined to become Doctoral studies or for others professional development of higher qualifications in the occupational fields. They also could serve as a kind of professional education for the people who want to start new careers. It could also be a kind of intellectual refreshment for re-entering the workforce group (Farguhar, 2004).

Such various functions of Master programmes as shown above are directly related to goals of the Bologna process, including lifelong learning, a student-centred approach, clientele diversification, research enhancement, international mobility, societal relevance, etc. Another question is its length. The Master degree programmes normally carry 90–120 ECTS credits, which depends on the Bachelor study length. At its practical implementation the most frequent Master degree length is two years and 120 ECTS credits (Conference on Master-Level Degrees, 2003).

Based upon the two-cycle education system the Bologna process can encounter problems in some areas where (especially in Eastern countries) some programmes of long, integrated type can still be found alongside the new

Figure 1: Methodology algorithm



Bachelor/Master programmes. It is true that some specific regulations are necessary in specific professions where the Bologna process is not the optimum one. However, nowadays, practically only medicine and some other (related) fields are of such inconsistent character.

MATERIALS AND METHODS

In order to craft an effective master programme implementation at the SAUM (State Agrarian University of Moldova in Chisinau) extensive survey of its activities linked to teaching programmes had been launched (see Figure 1). Its methodology was based upon the logic sequence starting from the (first) evaluation of the current situation and going up to the (last) proposal of new Master study fields.

As the first, survey of actual state of study programmes in the SAUM was launched. The above action especially focused on Agronomy and Engineering faculties. The assessment of curricula status, text-books, teaching aids and lecture room provisions have been worked out. Quality of lecturers (professors, associate professors, assistant professors) was also evaluated.

Effort to restructuring of existing study programmes followed. It consisted in proposed changes of some study programmes curricula of which were assessed as methodologically wrong. Shifts of study courses have been suggested, syllabi of some study courses changed. Mainly study subjects with ecologically-profiled subject-matter were revised.

The ECTS credit system was as well studied. Implementation of the system in SAUM was assessed and its use for student and teacher mobility and Diploma Supplements evaluated.

Further steps to the evaluating of the Bologna Process implementation and its impact on the pedagogical knowledge were undertaken. Actual state of pedagogical knowledge of the SAUM staff and its involvement in pedagogical, scientific, research and advisory activities was also subject to the evaluation.

The concluding activities and steps towards formulation of "New Study Fields" consisted in establishment of the "Laboratory of Bio-energy" as a research base for the Master study programmes for applied research, demonstration courses and advisory services in bio-energy". Employment opportunity and graduate's profile have been discussed in public with participation of 63 involved specialists (mainly SAUM staff) as completed by inquiry campaign at relevant local companies and institutions (SAUM and ACSA). In the meantime, formulation of new Master study programmes was taking place.

RESULTS AND DISCUSSION

Formulation of general principles

The new Master courses formulation was done after a rather long survey and preparation period during which information had been collected and processed. The information was used to orientate and justify the study courses. The following new study course background was formulated as follows:

– *The Master programmes follow first level qualification but not necessarily relate directly to it. They are based upon the BSc. study programmes as delivered by the SAUM faculties. There are no limitations given to graduates of other faculties to get enrolled to these two MSc. courses. The graduates of other Moldovan or foreign universities having technical, biological or economical profile are also invited to take studies within these study programmes.*
– *The MSc. study programmes proposed produce a workload of Master level ECTS credits of 120.*
– *They have Diploma Thesis requirement which requires students to undertake some original investigative work. The Thesis will be worth a minimum of 20 ECTS.*
– *The MSc. study programmes under question do not have a typical research-orientated approach but one that advances scholarship.*
– *They have clearly defined subject-specific and generic outcomes.*
– *The MSc. study programmes as proposed have not been developed in consultations with stakeholders. However, before they will be submitted to the accreditation they must be discussed and finally reflect the views of stakeholders.*
– *They are apparently relevant to careers in the industries, professions and government services for which they were designed.*
– *They are in an academic form which follows a mixed as supported by reasoned arguments;*
– *They demonstrate an advanced model which is clearly distinguished from the first cycle but not overlaps with a third level qualification.*

Qualifications that signify completion of the second cycle are awarded to students who:

– have demonstrated knowledge and understanding that is founded upon and extends and/or enhances that typically associated with the with the first cycle, and that provides a basis or opportunity for originality in developing and applying ideas within a research context;
– can apply their knowledge and understanding, and problem solving abilities in new or unfamiliar en-

vironments within broader (or multidisciplinary) contexts related to their field of study;
– have the ability to integrate knowledge and handle complexity, and formulate judgments with incomplete or limited information, but that include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments;
– can communicate their conclusions, and the knowledge and rational underpinning these, to specialist and non-specialists audiences clearly and unambiguously;
– have the learning skills to allow them to continue to study in a manner that may be largely self-directed or autonomous.

Study Fields Formulation

Sustainable Use of Natural Resources

Study Field Objective:

1. Solve problems of lack of specialists in the field of "sustainable use of natural resources management" with focus on the Moldovan Agriculture, Agri-food Sector and the whole Economy.

2. Prepare qualified specialists in the field of "sustainable use of natural resources management" on the **MSc.** level for sustainable development in Moldova.

Target Groups:

1. Graduates of the BSc., study courses of the SAUM "Faculty of Agronomy.

2. Graduates of other SAUM BSc. courses, oriented in ecology, natural sciences, techniques and technologies and environmentally.

3. Graduates on MSc. level who decided to upgrade their qualifications through the professional education in other MSc. programme.

All the above mentioned must be capable to demonstrate prerequisites: **BSc. Diploma + 180 ECTS.**

Duration:

Two academic years with semestral structure.

Instruction Language:

English/Romanian

Study Field Completion:

1. State examination composed of two obligatory and 2 optional subjects.

2. Defence of the MSc. thesis on individually selected topics.

Study Field Content:

9 obligatory subjects distributed over four semesters, plus one foreign language.

9 obligatory – optional subjects

2 optional subjects

Part of the studies abroad – preferred at partner institutions.

Practical training – recommended in EU countries.

Education Body:

Faculty of Agronomy.

Partner Institution:

Czech University of Life Sciences Prague, Czech Republic.

Admission Prerequisites:

– BSc. degree + **180** credits as necessary for bachelors graduated at SAUM

– BSc. degree, respectively completed MSc. University Education at Moldovan universities or abroad

Tab. 1: Subjects of Sustainable Use of Natural Resources MSc. Programme (First Year)

First Year

Name of the Subject	Hours L/T		closed by	ECTS
Obligatory subjects:				
1. Elementary Ecology	2/2		exam	6
2. Bioshere Resources and their Utilization	2/2		exam	6
3. Environmental Engineering and Assessment of Influences on the Environment	2/2		exam	6
4. Sustainable Energy and Renewable Energy Sources	2/2		exam	6
5. World Language	0/2		credit	3
Obligatory – optional subjects				
Five subjects (see list below)	2/2	5 x 5	exam	25
Optional Subjects				
Two subjects– to be selected from SAUM lectured subjects	mostly 0/2		exam	8
Credits total/year				**60**

Tab. 2: Subjects of Sustainable Use of Natural Resources MSc. Programme (Second Year)

Second Year

Name of the Subject	Hours L/T		closed by	ECTS
Obligatory subjects:				
1. Mechanization in Waste Management	2/2		exam	5
2. Water Management		2/2	exam	5
3. Eco-toxicology and Environmental Limits and Risks		2/2	exam	6
4. Renewable Raw Materials and Energy in Agriculture		2/2	exam	6
5. World Language		0/2	credit	3
Obligatory – optional subjects				
Three subjects – see list below		2/2	3 x 5 exam	15
Master Thesis				**20**
Credits total / year				**60**

– in this case **180 credits** must be collected during the former education.

2. Prerequisites during Studies:

– gaining **120** credits during two years study programme;

– completing obligatory courses and exams, practical training, submitting **MSc. Thesis**.

List of Obligatory – optional Subjects

– Sustainable strategy design and methods of analysis;
– Sustainable waste management;
– Sustainable agriculture and transport;
– Soil sciences and soil protection;
– Waste and environmental legislation;
– Biomass production and use;
– Statistical methods, Soil sciences and protection;
– Fundamentals of the forest sciences;
– Mechanization in waste management;
– Waste Engineering;
– Purification of Waste Water.

Waste Management

Course Objective:

1. Solve problems of lack of specialists in the field of "*waste management*" with focus on the agricultural wastes, urban sewage sledges and agricultural by-products in Moldova.

2. Prepare qualified specialists in the field of waste management on the **MSc.** level for the sustainable development in Moldova.

Target Groups:

1. Graduates of the BSc., study courses of the "Faculty of Agricultural Engineering and Transport".

2. Graduates of other SAUM BSc. courses, oriented technically, economically, respectively environmentally.

3. Graduates at the MSc. level who decided to upgrade their qualifications through the professional education in other MSc. programme.

All the above mentioned must be capable to demonstrate prerequisites: **BSc. + 180 ECTS.**

Duration:

Two academic years with a semestral structure.

Instruction Language:

English/Romanian

Course Conclusion:

1. State examination composed of 2 obligatory and 2 optional subjects.

2. Defence of the MSc. Thesis on individually selected topics.

Course Content:

9 obligatory subjects distributed over four semesters, plus one foreign language.

8 obligatory – optional subjects

2 optional subjects

Part of the studies abroad – preferred at partner institutions.

Practical training – recommended in EU countries.

Education Body:

Faculty of Agricultural Engineering and Transport.

Partner Institution:

Czech University of Life Sciences Prague, Czech Republic.

Admission prerequisites:

– BSc. degree + **180** credits as necessary for bachelors graduated at SAUM

– BSc. degree, respectively completed MSc. University Education at Moldovan universities or abroad – in this case 180 credits must be gained during the former education.

2. Prerequisites during studies:

– gaining **120** credits during two years study programme
– completing obligatory courses and exams, practical training, submitting MSc. Thesis.

List of Obligatory – optional Subjects

– Applied ecology
– Waste Engineering and Transport
– Soil Sciences and Soil Management
– Logistics in "Waste Management Sector"
– Transport and Law
– Sustainable waste management
– Sustainable strategy design and methods of analysis
– Biomass production and use
– Energy Use of Waste and Renewable Energy
– Environmental Conservation Technologies
– Informatics in "Waste Management"

Education Component of the Project

There have been many radical changes to teaching and learning in Higher Education in Western and Central Europe which, at the outset of the Project, had made little impact in the SAUM Faculties. The overall objective of

Tab. 3: Subjects of Waste Management MSc. Programme (First Year)

First Year

Name of the Subject	Hours L/T		closed by	ECTS
Obligatory subjects:				
1. Solid Wastes	2/2		exam	6
2. Environmental Engineering and Assessment of Influences on Environment	2/2		exam	6
3. Waste and Environmental Legislation	2/2		exam	6
4. Agricultural Wastes and Secondary Agricultural Products	2/2		exam	6
5. World Language	0/2		credit	3
Obligatory – optional subjects				
Five subjects (see list below)	2/1	5 x 5	exam	25
Optional Subjects				
Two subjects – to be selected from SAUM lectured subjects	1/2	2 x 4	exam	8

Tab. 4: Subjects of Waste Management MSc. Programme (Second Year)

Second Year

Name of the Subject	Hours L/T		closed by	ECTS
Obligatory subjects:				
1. Recycling of Wastes	2/2		exam	6
2. Waste Engineering	2/2		exam	6
3. Eco-toxilogy in "Waste Management"	2/2		exam	5
4. Purification of Waste Water	2/2		exam	5
5. World Language	0/2		exam	3
Obligatory – optional Subjects				
Three subjects (see list below)	2/1	3 x 5	exam	15
Master Thesis submission				20
Credits total / year				**60**

these changes has been to make the Higher Education significantly more student – centred, and to develop a more interactive learning/teaching system.

It was therefore necessary to update the educational technology available for teaching, and to develop confidence in its use, throughout SAUM structure. This was especially important in the situation existing before the Project was implemented where some audio-visual equipment was either not available or not working. An attractive and well – equipped Pedagogical Laboratory was established with good access to IT technologies.

Changes made in this professional preparation can clearly be expected to improve the education of SAUM students. The introduction of IT hardware, though challenging in many respects, is easy and likely to be favourably received. However, more difficult seems to create a new spirit of teaching and learning in which the lecturer have more participative learning approach with the students. Besides, it is considered as rather less important as the single source of information, whilst retaining responsibility for the quality of subject matter. Careful discussion and dialogue, together with demonstration and evaluation, and the support of the most senior members of the academic staff, have led to the start of a new approach to professionalism at SAUM.

CONCLUSION

1. There are three broad challenges for the European Partnership Approach which must be regarded when formulating Bachelor or Master study programmes. They are: proper programme structure, programme related research and high quality teaching methodology (communication and expression tools).
2. There are interlinks established between EHEA and ERA. It seems evident that the common denominators are universities as one of ERA stakeholders and also its suppliers of highly qualified human resources.
3. The basic statement relating the Master cycle qualifications comes out of the Dublin Descriptors. However, in general, the descriptors are very individual and it is why they must be defined for each formulated programme.
4. The Master-level programmes are multifunctional which must also be taken into mind when such programmes are formulated.
5. Methodology of a Master programme formulation must include an extensive survey of university "study environment" including employment opportunities and required graduate's profile.
6. Two Master study programmes main parameters have been formulated and doted with subjects. Syllabi if the subject were also worked out. Both of two programmes were supported with specialized "Laboratory of Bio-energy" as their research base.
7. It has been suggested that SAUM should orientate part of its study curricula to the ecology and environment sectors (both research/studies) and makes use of the formulated study programmes as their main part.
8. The new study programme included scientific and technical components, and also an educational input to change the approach to teaching and learning. This dual approach made an important contribution to SAUM.

ACKNOWLEDGEMENT

This work was supported by Grant No. 2330120607 of the National Agency for Agricultural Research and Research Project of Ministry of Education, Youth and Sports No. 6046070901.

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Received for publication on March 22, 2010
Accepted for publication on October 18, 2010

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