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BIOSYSTEMS ENGINEERING
IN EUROPE

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OVERVIEW OF THE INTERNATIONAL ATTRACTIVENESS OF THE EUROPEAN HIGHER EDUCATION AREA

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1. Internationalization Processes in European Higher Education
The internationalisation processes in the European Higher Education have been developed along two directions: the development of European Union HE Programmes from inside and European Union HE International Programmes worldwide [1].

European Union HE Programmes from inside
During the 80’s, the EU launched and developed an internal Europeanization process in HE institutions, through special Education Programs and tools that are still under continuous evaluation and refinement. Among them, one may distinguish [1]:

• The ERASMUS programme, started in 1987. It has forced the European universities to actively internationalize, discover each other and network by fostering mobility of students and teaching staff. During the period 1987-2006, 1.2 million students have benefited from the program for study abroad.
• The ECTS is now widely understood and accepted as the main credit transfer system in the EHE institutions.
• The Joint projects, Programme EU of learning through life, etc are steadily grown and developed further.

European Union HE International Programmes
EU-Education programmes have been developed worldwide, targeting the needs and opportunities of each specific region. The main international programmes of EU-Education include [1]:

• With North America: EU/US, EU/CND
• With Asia: Asia-Link, EU-Vietnam, etc.
• With the Mediterranean Area, Eastern Europe: TEMPUS/MEDA
• With Africa-Caribbean-Pacific Region : EDULINK
• With Latin America: ALFA and Alban

1 Antoinette CHARON WAUTERS, University of Lausanne, Switzerland, European Association for International Education IAU International Conference, ‘Internationalizationof HE New Directions, New Challenges’, Beijing-October 12-15, 2006
In addition, a relatively recent programme, ERASMUS MUNDUS [2], has been designed to make European HE more attractive to graduate students from third countries.

All these internationalisation processes were established in the framework of the Bologna process [1].

**The Bologna Process elements of internationalization in EHE institutions**

One of the key objectives of the Bologna Process is the promotion of the attractiveness of the European Higher Education [3]. The Bologna process promoted and reinforced several elements of internationalization in EHE institutions [1]:

An increasing creation of networks, alliances and partnerships for curriculum development, research and innovation has been achieved [4]. Here included are:

- Students: studying abroad, doing a traineeship abroad, linguistic preparation
- Universities/higher education institution staff: teaching abroad, receiving training abroad
- Universities/higher education institutions working through: intensive programmes, academic and structural networks, multilateral projects
- Business: hosting students placements, teaching abroad, participating in university cooperation projects

In addition, an increasing number of joint degrees have been recorded over the last years.

Discovering of vertical mobility of students and of the need for new degrees in order to attract good students – and/or fee paying students represents another internationalization element promoted through the Bologna Process.

Finally, the development of marketing and promotion of EHE abroad is intensified over the last years.

In addition, several spin-offs of reinforced elements of internationalisation in EHE institutions are described in [1]: Improvement of horizontal mobility of students, improvement of mobility of young researchers, internationalisation of staff, internationalisation ‘at home’, double degree/co-doctorate (co-tutelle), virtual mobility, cross-border education.

**The Bologna Process features contributing to raising the attractiveness of European HE**

Several Bologna Process features are considered as contributing to raise the attractiveness of European HE. Among them [1]:

- Better visibility to the University curricula at 3 different levels: 1st cycle (Bachelor), 2nd cycle (Master), 3rd cycle (Doctorate)

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3 Prague communiqué2001; http://www.bologna-bergen2005.no/Docs/00-Main_doc/010519PRAGUE_COMMUNIQUE.PDF
• Introduce mobility and transparency tools (ECTS credits and Diploma Supplement)
• Reduce the legal barriers to international mobility among Bologna countries as well as third countries
• Introduce international quality evaluation procedures in all Europe
• By its convergence process, help raising the profile of European HE and reflect a search for common answers to common problems.

The European Universities

According to [5], the European Universities face conflicting demands. In particular, the European Universities are required to:

• Be more local / more European / more global
• Increase mobility within Europe / attract more students and scholars from outside Europe
• Improve academic quality / be more responsive to labour market by providing more employable skills
• Provide compatible curricula across Europe / maintain cultural diversity
• ....and, of course, do all of it with decreasing /freezed public funds!

2. The International role of the European Universities

Manifesto: Empower European Universities

The Manifesto [5] has been drawn up by a group of concerned experts, who have ample experience in matters of higher education. On the 15th and the 16th of June 2010, these professionals met in Brussels to discuss the present state of European universities and the challenge to contribute more to Europe’s well being and prosperity in intensive discussions, sharing the common belief in an exciting future for Europe.

In the following section, the basic lines of the above mentioned manifesto are presented, adopted from ref. [5], as this is a very new development in the Educational Area of Europe and some of the points made are considered quite interesting for the emerging field of Biosystems Engineering. According to the authors of [5], Europe is in many respects in a crisis: a financial crisis, one of sustainability and one of demography. For universities there exists also an intellectual crisis, as the complexity of the present world – and how to cope with it - is insufficiently transmitted through teaching to the next generation. The universities are an important force to address these crises and to find new ways to surmount them.

Where we are

According to [1], during the last decades European universities have accommodated increasing numbers of students and are now educating almost 50% of the age group. The success among female students is striking.
Labor markets have been well supplied with trained staff, society has benefitted from the civic effects of education as well as from the proceeds of research in the form of new insights and new enterprises.

European student mobility has increased bringing the Europe of the citizen closer.

Europe could do better. The potential to achieve excellence and equality of opportunity are not sufficiently explored. Several areas of underperformance emerge.

The structure of European universities has serious flaws. The European higher education area suffers from strong national fragmentation. The HE system tends to be homogeneous, lacking diversity and variety in deliverance of education.

The weak cooperation between the actors of the so-called Knowledge Triangle (education, research and business) causes sectorial segregation.

The operational and management structure of many universities – especially in the CEE Countries, where there is no clear division of the functions between the professional governance and the Academic Senate – is too rigid.

When the underperformance of European universities is addressed usually the existing worldwide rankings are mentioned. Indeed league tables provide an alarm signal. This signal shows that Europe, with the exception of some countries like UK, Switzerland and Sweden, is not able to compete specifically in research publication.

The focus on such rankings neglects other important areas of underperformance. A major weakness of European universities is their lack of attractiveness for top talent.

Every year thousands of the best and brightest Europeans leave Europe to do their studies or research in the US because of a better study and research climate.

Overall drop-out rates are too high and mobility goals for students are not met, quite often because of insufficient mutual recognition of credits/degrees. University research contributes less to innovation in European universities than we wish for.

The number of female professors is too low, in spite of the emergence of an inverse gender gap at the student level.

Innovations in learning methods which would substantially enhance learning quality and efficiency are rare, while innovations in curricula and the development of new fields of study are not encouraged.

The feedback from students, alumni and society at large, including industry, towards curriculum reform is not always ascertained.

Universities do not engage enough in lifelong learning and are not effective enough in attracting new and non-traditional student groups.

**Why are we there?**

The authors of [1] consider that Europe’s universities work under operating conditions which are not conducive to achieve the attractiveness needed to realize fully Europe’s potential:
These conditions have to be analyzed to find the reasons for and to find adequate instruments against underperformance.

Universities are nationally organized while they train for an international labor market. Some are even governed by political whim and restricted in collecting the financial means to perform well. They are put in the straightjacket of sameness while students are searching for diversity, at the minimum between university and non university higher education.

According to [1], the Bologna agreement has been a breakthrough by creating an open European higher education space in which the wheels of competition could promote the best achievements.

But the Bologna process has been bogged down in the narrow-minded concept of national accreditation, quality control, language problems, government regulation and the budgetary constraints of higher education, so that true competition is severely handicapped.

Equality of opportunity is a far cry because special studies and study abroad programs are not available for those who do not have the financial means to benefit.

In all of these respects universities are insufficiently empowered to fully realize their potential. As a result European universities seem to miss the proper functioning of the main pillars of the EU single market principles, namely the free movement of:

- goods/services: joint degrees & mutual recognition of credits/degrees,
- capital: strong cooperation of universities and business/industry,
- people: mobility of students and lecturers/researchers.

Where we want to be

The authors of [1] express their wish to see a Europe which is attractive to the best and brightest, to the creative and reflective, the entrepreneurial and the governmental from all over the world and definitely from Europe itself, but also for those with potential talents are not so easily recognized.

They suggest that European universities & HE systems [1]:

- should provide education to the full range of talents in the relevant age groups, including those for life-long learning.
- not only educate workers which are well placeable in the labor market, but also prepare EU citizens to deal with the complexity of the world and of democratic societies.
- should provide the world’s best possible education and research and not feel relegated to a second place after the US or – as could happen in the next decade – to third place after the US and Asia.
- should attract more students from Europe itself, but also from other parts of the world because they provide the best education and research.
- offer education that should be based on effective learning and geared towards problem solving in teams on a global labor market embedded in responsibility for a sustainable future.
According to the authors of [1], the development of general education in the introductory part of renovated curricula has the potential to enhance cultural awareness and democratic citizenship among students.

Universities themselves need to develop a strong culture of placement, a sense of responsibility for the destiny of their students in society and in the labor market. In short, European universities should train for globalized leadership. This also requires steps to bring the European space for higher education and research closer, like portability of (student) grants and loans over national borders and a European Statute for a limited part of European universities.

It is recommended in [1], that the European governments and the European Commission should evaluate the finance of the net inflow of students from other member states. A portability of education costs is impractical. But, for example, compensation out of structural funds would create incentives to attract foreign students from member states.

How to get there

The Lisbon declaration in 2001 [6] exhorted Governments to expand their financial resources for higher education and research by public and private means. The goal of the Lisbon declaration was to make Europe the most competitive knowledge economy [1].

Ten years later and in the midst of an economic crisis the authors of [1] find that Governments have by and large been unable to move. Private funding for higher education is still one of Europe’s weakest spots.

They plead to raise the contribution of society to higher education (excluding R&D) to 2% of GDP by 2015, being well aware that the economic return on such investment is far above that of alternatives.

They state that growth and the stimulus of talents need to be strengthened.

This can only be achieved when universities can develop much more diversity in their missions and outlook.

Diversity, according to the authors of [1], demands a greater variety in decision-making and institutional strategy of universities, for which they need a greater autonomy. More autonomous universities need new governance and leadership. This also entails the release of the internal powers of the institutions to engage in the innovation of teaching and learning and in research.

Neither the oligarchic, self administering university, nor the bureaucratic university, governed by public rules and regulations are ideal.

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Ensuring the professional management approach by universities makes it necessary to draw a more distinctive line between the executive board and the Senate: the one being responsible for strategic and financial issues of the university, the other ensuring high academic standards.

Human resources management should be also improved.

The authors of [1] explain that in many countries a public servant/employee status of university staff based on an egalitarian promotion system stifles, rather than encourages academic excellence and meritocratic competition.

They suggest that [1], the arrangement for public funding of higher education should be designed to support such autonomy, including risk–taking and investment in innovation by such autonomous bodies, to achieve innovative diversity instead of homogeneity.

They also ensure that [1], Universities accept that this approach to autonomy and diversity demands clear accountability of their achievements and the responsible use of public funding.

In order to enhance the transparency of universities, especially in smaller EU member states, the national accreditation system should be broadened on a voluntary basis to include international accreditation bodies or experts – especially for the MA and the PhD.

Governments should rely on trust based on clear accountability for government finances and let the universities decide for themselves as entirely autonomous bodies how they organize the best possible teaching and research.

**Manifesto: Empower European Universities**

At the conclusions part of this Manifesto [1], the authors indicate that their recommendations can be better realized when European Governments commit themselves to a financing of universities which is balanced with the social and economic returns.

They suggest that [1], time has come for creating a differentiated world class system of higher education within the context of the European Higher Education and Research Area.

Governments and the EC are requested to take further steps in this direction e.g. by portability of (students) grants and loans over national borders and the introduction of a European Statute for a limited part of European universities.

The authors state that [1] they are in full agreement on these points, led by a wish to promote the empowerment of Europe’s higher education.

They hope to produce a basic guideline to assess the performance of EU member states to empower European universities by June 2011. A first progress report is scheduled to be prepared by June 2012, to be followed by successive progress reports.

These documents shall be produced by an NGO (Empower European Universities – EEU) for which the undersigned act as founding members in collaboration with independent correspondents in each of the 27 EU countries.
The European Universities/Departments offering programs of studies in the traditional field of Agricultural Engineering and now in the emerging discipline of Biosystems Engineering will follow with interest these very recent developments through the ERABEE network. This interest is very much promoted also by the fact that the corresponding international developments in the field of Biosystems Engineering are rapid and they affect the crucial transition from the traditional field of Agricultural Engineering to the discipline of Biosystems Engineering in Europe.
SYNOPSIS OF THE TOOLS FOR ENHANCING THE ATTRACTIVENESS OF EUROPEAN STUDY PROGRAMS IN BIOSYSTEMS ENGINEERING

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Introduction
On the 9th and 10th of September 2010 the 6th Workshop of the ERABEE Thematic Network was held in Clermont-Ferrand, France. This workshop was devoted to describe the situation of the tools for enhancing the attractiveness of European study programs in Biosystems Engineering. During this workshop the network partners presented their survey on the workshop’s topic in their own country. This survey was carried out according to specific guidelines, aimed at producing an understandable and comparable document. The guidelines were proposed by Working Group 4 members and consisted in a series of questions, which should be addressed by each partner.

In this paper a synopsis of the partner presentations, including the answers to the above questions, is presented in order to provide a complete picture for Europe as a whole.

1. Tools for enhancing the international attractiveness of European study programs in Agricultural/Biosystems Engineering (ABE). Please, describe:

a. The contents of information concerning ABE or relevant study programs and the means by which it is provided by the Universities of your Country to high schools (e.g. ppt presentation). The information about ABE or relevant study programs that are and/or will be distributed to various stakeholders in your Country, and also the multimedia tools used for this purpose.

The contents of information concerning ABE or relevant study programs are the following:

- 1st and 2nd cycle degree study programs offered by Universities;
- potential job positions for the graduates of the above study programs.

The means by which this information is provided by the European Universities to high schools and other stakeholders (e.g. students and related families, potential employers, including public and private sector bodies) are the following (ranked according to a decreasing percentage (refer to Figure 1)):

- flyers, posters and student guides (i.e. Bulgaria, Denmark, Finland, France, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Netherlands, Norway, Slovak Republic, Spain, Sweden, Turkey, United Kingdom);
- visits of students of high schools at Universities, mainly at the related research laboratories and equipment (i.e. Bulgaria, Denmark, Finland, Hungary, Ireland, Italy, Latvia, Lithuania, Norway, Slovak Republic, Spain, United Kingdom);
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- visits of University staff at high schools (i.e. Bulgaria, Finland, Greece, Ireland, Italy, Latvia, Slovak Republic, Spain, United Kingdom);
- education fairs and exhibitions (i.e. Denmark, Finland, France, Hungary, Ireland, Latvia, Lithuania, Netherlands);
- printed and digital newspapers and specific journals (i.e. Czech Republic, Finland, Ireland, Slovak Republic, Spain, Sweden);
- conferences, workshops and seminars (i.e. Estonia, Ireland, Lithuania);
- students forums and meetings (i.e. France, Lithuania).

**Figure 1.** The means by which the information concerning ABE or relevant study programs is provided by European Universities to high schools and other stakeholders (%).

Furthermore, multimedia tools used to promote degree study programs by the Universities are presented below (ranked according to a decreasing percentage; refer to Figure 2):

- web-sites of HEIs (i.e. Belgium, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Netherlands, Norway, Slovak Republic, Spain, Turkey, United Kingdom);
- power point presentations (i.e. Bulgaria, France, Ireland, Italy, Latvia, Lithuania, Norway, Slovak Republic, Sweden, Turkey, United Kingdom);
- videos (i.e. Bulgaria, Denmark, France, Italy, Latvia, Lithuania, Norway, Spain, Sweden, United Kingdom);
- television channels and cinemas (i.e. Bulgaria, Hungary, Norway, Slovak Republic, Spain).

**Figure 2.** The multimedia tools by which the information concerning ABE or relevant study programs is provided by European Universities to high schools and other stakeholders (%).
b. The information about ABE study programs that is available by means of the web-site of your institution.

The information about ABE study programs is also available by means of the web-sites of European Universities, such as (ranked according to a decreasing percentage; refer to Figure 3):

- description and scheme of the programs (i.e. Belgium, Czech Republic, Estonia, Finland, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Slovak Republic, Spain, Sweden, United Kingdom);
- description of admission process and prerequisites (i.e. Belgium, Czech Republic, Greece, Latvia, Lithuania, Slovak Republic, United Kingdom);
- career opportunities (i.e. Belgium, Italy, Latvia, Lithuania, Netherlands, Slovak Republic);
- aims (i.e. Belgium, Czech Republic, Greece, Italy);
- oriented information for each course (aims, previous knowledge, materials, prerequisites, activities and evaluation) (i.e. Belgium, Finland, Germany, Hungary);
- personnel, infrastructure and instrumentation (i.e. Estonia, Greece, Lithuania);
- research activities, divisions and laboratories (i.e. Greece, Lithuania);
- quality assessment (i.e. Lithuania);
- final exam (i.e. Slovak Republic).

![Figure 3. The information about ABE study programs available by means of the web-sites of European Universities (%).](image)

c. The methods of contacting (e.g. links with USAEE-TN and ERABEE-TN web-sites in the web-sites of the European Faculties of Engineering and Agriculture) the Faculties of Engineering and Agriculture of your Country, in order to provide them with the information about ABE study programs.

The methods of contacting the European Faculties of Engineering and Agriculture, in order to provide them with the information about ABE study programs, are the following,
ranked according to a decreasing percentage (Figure 4):

- links with USAEE-TN and ERABEE-TN web-sites in the web-sites of HEIs (i.e. Greece, Hungary, Italy, Latvia, Sweden);
- conferences, workshops and meetings (i.e. France, Hungary, Slovak Republic);
- web-sites of HEIs (i.e. France, Greece);
- personal contacts and permanent dialogue among teachers (i.e. France, Slovak Republic);
- translation of ERABEE newsletters, published on the web-sites of international relations offices (i.e. Bulgaria);
- synergies with other networks (i.e. Greece);
- meetings with professional associations (i.e. Greece).

**Figure 4.** The methods of contacting the European Faculties of Engineering and Agriculture, in order to provide them with the information about ABE study programs (%).

d. The ways for promoting the practical training of students at enterprises involved in the field of ABE in your Country.

The ways for promoting the practical training of students at enterprises involved in the field of ABE in Europe are the following, ranked according to a decreasing percentage (Figure 5):

- practical training, for the 1st and/or 2nd cycle study programs, at a company or research laboratory or public sector services (also abroad) (i.e. Belgium, Bulgaria, Czech Republic, Estonia, France, Greece, Hungary, Italy, Latvia, Lithuania, Poland, Slovak Republic, Spain, Turkey, United Kingdom);
- degree thesis of 1st and/or 2nd cycle study programs to be carried out together with a company (i.e. Denmark, Italy, Lithuania);
- conferences, seminars and information days involving enterprises, and field trips at enterprises (i.e. Estonia, Latvia);
- exchange of information through University student career service and union, and network of the former students employed in the industry (i.e. Estonia, France);
- guest lecturers from the industry (i.e. Denmark);
• sending of information about practical training to companies (i.e. France);
• trade shows (i.e. France);
• participation to industrial projects (i.e. Hungary);
• PhD programs funded by private or public bodies (i.e. Italy);
• pre-university training (i.e. Sweden).

Figure 5. The ways for promoting the practical training of students at enterprises involved in the field of ABE in Europe (%).

e. The schemes for promoting the mobility of students, graduates, PhD students and staff within and outside Europe (e.g. by disseminating the web-based database about the European study programs in Biosystems Engineering, established in the framework of USAEE-TN, and promoting the establishment of new bilateral Erasmus agreements to be reported in the updated matrix of bilateral ERASMUS agreements).

Table 1. The schemes for promoting the mobility of students, graduates, PhD students and staff, both within and outside Europe (%).

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilateral Erasmus agreements for students and staff (shown in the matrix of Erasmus bilateral agreements among ERABEE-TN partners, included in the report “Enhancement scheme of student and staff mobility between EU Universities and improvement of inter-University communications and knowledge transfer”);</td>
<td>100</td>
</tr>
<tr>
<td>International cooperation of Universities offering 1st, 2nd and 3rd cycle study programs (NORBE via NOVA University network, NOVA-BOVA, ELLS) (Denmark, Finland, Lithuania, Sweden);</td>
<td>17</td>
</tr>
<tr>
<td>EU-US projects concerning student and staff Faculty mobility (e.g. TABE-Net) and exchange agreements (e.g. Virginia Tech) (Greece, Ireland, Italy, Spain);</td>
<td>17</td>
</tr>
<tr>
<td>Study Abroad packages or programs and travel grants for Master or PhD students or for carrying out part of study program (thesis research and practical training) in a developing Country (Belgium, Denmark, France, Hungary);</td>
<td>17</td>
</tr>
<tr>
<td>Leonardo da Vinci for teachers, Tempus and Erasmus Mundus External Cooperation scheme between EU and Third Countries for students and staff (Belgium, France, Ireland, Lithuania);</td>
<td>17</td>
</tr>
</tbody>
</table>
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practical training at European enterprises, realisation of national and international funds for studies with international industrial companies, and projects abroad (Greece, Lithuania, United Kingdom): 13

summer schools, teachers' visits to foreign HEIs, international student conferences and scientific conferences for Faculty academic staff (Denmark, Latvia, Lithuania): 13

scholarships for foreigners (Estonia): 4

joining MAST international programs (e.g. University of Minnesota - US) (Finland): 4

Alfa Programme for Latin America, Marie Curie programmes and joint research initiatives with Asian Countries (e.g. China, Iran) to fund student/staff mobility (Ireland): 4

web-based database about the European study programs in Biosystems Engineering, established in the framework of USAEE-TN (Italy): 4

participation to international research programmes (e.g. EU FRAMEWORK, EUREKA, INTAS, NATO, AGENDA 21) (Lithuania): 4

f. The ways of disseminating career opportunities for ABE graduates (including research fellowships and research projects).

| University web-sites (links to other web-sites and career database) (i.e. Belgium, Czech Republic, Denmark, Ireland, Latvia, Slovak Republic, Spain, Sweden): | 47 |
| meetings between students and potential employers (i.e. Belgium, Finland, Latvia, Lithuania, Slovak Republic, Sweden): | 35 |
| University career development centres (i.e. Ireland, Lithuania, Netherlands, Spain): | 24 |
| University bulletin boards, newspapers and notices (i.e. Czech Republic, Slovak Republic, Sweden): | 18 |
| student networks (i.e. France, Lithuania, Sweden): | 18 |
| personal contacts with researchers of other national and foreign HEIs (i.e. France, Lithuania, Spain): | 18 |
| practical training during the degree study programs (i.e. Italy, Latvia, United Kingdom): | 18 |
| web-based information services (i.e. Germany, Ireland): | 12 |
| University information panels (i.e. Latvia, Slovak Republic): | 12 |
| forums between students and human resources manager (i.e. France): | 6 |
| employment agencies (i.e. France): | 6 |
| professional associations (i.e. Ireland): | 6 |
| research projects for graduates (i.e. Lithuania): | 6 |
| social networks (i.e. Netherlands): | 6 |
| University teachers (i.e. Sweden): | 6 |

Table 2. The ways of disseminating career opportunities for ABE graduates (%).

g. The ways of announcing open European or international academic positions in the field of ABE.

Nowadays, the ways of announcing open European or international academic positions in the field of ABE are the following (ranked according to a decreasing percentage; refer to Figure 8):

- web-sites and posters of HEIs, research centres and EU institutions (i.e. Hungary, Ireland, Italy, Norway, Slovak Republic, Sweden);
- personal contacts with ABE colleagues of other HEIs or research centres (i.e. France, Greece, Italy);
- international publications and press (i.e. Belgium, Sweden);
- ERABEE network (i.e. France, Greece);
- University Erasmus offices (i.e. Greece, Hungary);
- pan-European mobility networks (i.e. Estonia);
- meetings during international conferences (i.e. France);
- foreign affairs offices (i.e. Hungary);
- web-based employment agencies (i.e. Ireland);
- newspapers (i.e. Slovak Republic);
- web-sites of international organisations, for instance EurAgEng (i.e. Sweden).

**Figure 6.** The ways of announcing open European or international academic positions in the field of ABE (%).

**h. Other tools of attractiveness (open topic, optional).**

Other tools for enhancing the attractiveness of European ABE degree study programs are the following:

- financial salary;
- double diplomas;
- University cultural, social and sports activities and events for foreign students.

**2. Implementation of ABE study programs in your Country aimed at promoting their international image (TUNING Template).**

**a. Changes in degree profile(s):** Please, outline any significant change occurred during the last two years relevant to ABE study programs in your Country with respect to the situation described during the previous ERABEE Workshops. Were these changes aimed at increasing the attractiveness of the study programs or were they influenced by stakeholders (e.g. employers) and/or ERABEE-TN activities? Eventually describe the outcomes of those changes.

During the last two years significant changes relevant to ABE study programs occurred in the majority of European Countries (63%), with respect to the situation described during the previous ERABEE Workshops (Figure 9).
Some examples of significant changes relevant to ABE study programs occurred in European Countries during the last two years, with respect to the situation described during the previous ERABEE Workshops, are the degree study programs established by European HEIs, listed in Table 3.

Table 3. European study programs in Agricultural/Biosystems Engineering (ABE) established during the last two years, with respect to the situation described during the previous ERABEE Workshops.

<table>
<thead>
<tr>
<th>Country</th>
<th>HEIs</th>
<th>Degree study programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Czech Republic</td>
<td>Faculty of Engineering of CULS Prague</td>
<td>M.Sc. in Machinery for Landscape Reclamation and Maintenance, M.Sc. in Maintenance Engineering</td>
</tr>
<tr>
<td>Denmark</td>
<td>Aarhus University</td>
<td>Master in Biosystems Engineering</td>
</tr>
<tr>
<td>Finland</td>
<td>Helsinki University</td>
<td>International Master in Environmental and Natural Resources</td>
</tr>
<tr>
<td>Ireland</td>
<td>UCD</td>
<td>Level 9 Master in Biosystems Engineering</td>
</tr>
<tr>
<td>Portugal</td>
<td>Evora University</td>
<td>Master in Biosystems Engineering</td>
</tr>
<tr>
<td>Slovak Republic</td>
<td>Faculty of Engineering of Nitra University</td>
<td>B.Sc. and Eng. in Agricultural Engineering, B.Sc. and Eng. in Agricultural Engineering and Commercial Activities, B.Sc. in Technologies for Processing of Agricultural Products, B.Sc. in Machinery for Agroenvironment</td>
</tr>
<tr>
<td>Spain</td>
<td>Leon University, Polytechnic University of Cataluna</td>
<td>Masters in ABE of 60 (Leon) and 120 ECTS (Cataluna), plus B.Sc. on ABE topics offered by more than 30 Universities</td>
</tr>
</tbody>
</table>

Other examples of significant changes relevant to ABE study programs occurred in European Countries during the last two years, with respect to the situation described during the previous ERABEE Workshops, are the following:

- Latvian University of Agriculture offered an adjusted study program in Agricultural Engineering, plus new modern laboratories and the modernisation of the existing ones;
- Lithuanian University of Agriculture reduced the amount of 1st (from 6 to 3) and 2nd (from 4 to 2) cycle study programs in Agricultural Engineering;
- Wageningen University in Netherlands offered a block of 30 credits in the 1st and 2nd semesters of the degree study programs.
Moreover, the above changes mostly aimed at increasing the attractiveness of the study programs (67%), but they were partially positively affected by ERABEE-TN activities (50%) and less influenced by stakeholders (i.e. employers) (17%) (Figure 10).

The outcomes of the above changes were the following:
- growing interest of applicants/students;
- reduction of credits;
- increased workload of the undergraduate thesis;
- consolidation of the international image of HEIs and degree study programs offered.

b. Learning, teaching & assessment: Please, provide examples of best practice in learning, teaching and/or assessment, aimed at achieving competences relevant to ABE and promoting the international image of the related study programs.

<table>
<thead>
<tr>
<th>Example</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU-US projects concerning student and staff faculty mobility (e.g. TABE.NET project) (i.e. Greece, Ireland, Italy, Spain);</td>
<td>40</td>
</tr>
<tr>
<td>teaching as a mixture of lectures, laboratory teaching, exercises, problem solving sessions, team work, reports and oral presentations (i.e. Denmark, Greece);</td>
<td>20</td>
</tr>
<tr>
<td>problem-based learning (i.e. Ireland, Norway);</td>
<td>20</td>
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<tr>
<td>summer courses (i.e. Belgium);</td>
<td>10</td>
</tr>
<tr>
<td>personal guidance and monitoring at B.Sc. level (i.e. Belgium);</td>
<td>10</td>
</tr>
<tr>
<td>guided exercise colleges with personal assessment (i.e. Belgium);</td>
<td>10</td>
</tr>
<tr>
<td>service for support in teaching (i.e. Belgium);</td>
<td>10</td>
</tr>
<tr>
<td>student self-assessment (i.e. Bulgaria);</td>
<td>10</td>
</tr>
<tr>
<td>research-based teaching (i.e. Denmark);</td>
<td>10</td>
</tr>
<tr>
<td>possibility of including Master students in solving research questions, through project themes and thesis writing (i.e. Denmark);</td>
<td>10</td>
</tr>
<tr>
<td>alignment of teaching, learning and examination (i.e. Denmark);</td>
<td>10</td>
</tr>
<tr>
<td>problem oriented teaching methods (i.e. Denmark);</td>
<td>10</td>
</tr>
<tr>
<td>introductory course to national culture and teaching methods (i.e. Denmark);</td>
<td>10</td>
</tr>
<tr>
<td>participation to international PhD courses (i.e. Finland);</td>
<td>10</td>
</tr>
<tr>
<td>participation to international and national PhD programs (i.e. Finland);</td>
<td>10</td>
</tr>
<tr>
<td>learning as a mixture of lecture attendance, participation to class discussions, literature survey, problem solving, teamwork, research and writing dissertations, reports and papers (i.e. Greece);</td>
<td>10</td>
</tr>
<tr>
<td>assessment as a mixture of coursework assignments, laboratory and fieldwork reports, oral presentations, work</td>
<td>10</td>
</tr>
</tbody>
</table>
3. Please, describe the tools for promoting the multi-linguism in ABE study programs in your Country (e.g. courses and/or dissemination materials offered in languages different from the native ones, etc.).

<table>
<thead>
<tr>
<th>Tools</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placement reports or diaries, written essays or reports, written or oral final exam (i.e. Greece)</td>
<td>10</td>
</tr>
<tr>
<td>Participation of Erasmus students to classes offered in national and English languages (i.e. Greece)</td>
<td>10</td>
</tr>
<tr>
<td>Module evaluation (i.e. Hungary)</td>
<td>10</td>
</tr>
<tr>
<td>Special examinations for exchange students (i.e. Hungary)</td>
<td>10</td>
</tr>
<tr>
<td>Assessment as a mixture of teamwork, literature survey, expenditure minimisation, device design, innovation, operational safety, system performance, report writing and biomaterials use (i.e. Ireland)</td>
<td>10</td>
</tr>
</tbody>
</table>

4. Please, describe the topics of rare and/or disappearing knowledge that can be used as a tool for enhancing the attractiveness of ABE study programs.

<table>
<thead>
<tr>
<th>Topics</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional farming activities and soil and water conservation (i.e. Greece, Hungary, Ireland, Portugal, Spain)</td>
<td>38</td>
</tr>
<tr>
<td>Historical farm buildings (i.e. Greece, Hungary, Italy, Lithuania, Spain)</td>
<td>38</td>
</tr>
<tr>
<td>Equipment and buildings for the traditional production and processing of agricultural and food products (e.g. beer and brewing) (i.e. Czech Republic, Greece, Ireland, Italy)</td>
<td>31</td>
</tr>
<tr>
<td>Agritourism (i.e. Hungary, Italy, Lithuania, Spain)</td>
<td>31</td>
</tr>
<tr>
<td>Agricultural museums (i.e. Hungary, Italy, Lithuania, Spain)</td>
<td>31</td>
</tr>
<tr>
<td>Old rural land infrastructures (e.g. irrigation systems, channels, bridges, fences, wells, dry-stone walls, roads, terraces for sloping land cultivation, fountains, man or animal powered mechanisms and machines, wind mills, hydro power plants and biomass ovens) (i.e. Italy, Lithuania, Spain, Sweden)</td>
<td>31</td>
</tr>
<tr>
<td>Old agricultural machinery and techniques (i.e. Lithuania, Spain, Sweden)</td>
<td>23</td>
</tr>
<tr>
<td>Technologies for producing biomaterials and ecological food (i.e. Greece, Lithuania)</td>
<td>15</td>
</tr>
<tr>
<td>Agricultural tools for developing countries (e.g. traditional ploughs) (i.e. Italy)</td>
<td>8</td>
</tr>
<tr>
<td>Development of Agricultural Engineering from horse power to unmanned robots in developed Countries (i.e. Finland)</td>
<td>8</td>
</tr>
<tr>
<td>Mulching using natural products (i.e. Greece)</td>
<td>8</td>
</tr>
<tr>
<td>Sheep and goat housing in traditional facilities at Less Favoured Areas (i.e. Greece)</td>
<td>8</td>
</tr>
<tr>
<td>Growing, harvesting and processing of medicinal plants (i.e. Slovak Republic)</td>
<td>8</td>
</tr>
<tr>
<td>Farm-based technologies of basic food production and processing (i.e. Slovak Republic)</td>
<td>8</td>
</tr>
<tr>
<td>Emerging energy sources and improved energy systems (i.e. Sweden)</td>
<td>8</td>
</tr>
</tbody>
</table>
“Protecting and enhancing the value of our cultural heritage contributes to preserve the memory of the national community and its territory and to promote the culture development” (Italian Cultural Heritage and Landscape Law).

Historical rural buildings characterise the agricultural and forestry landscape of the European regions where they are located and, therefore, must be protected and enhanced.

Agritourism or rural tourism is a farm activity based on the conversion of historical farm buildings or houses into B&B lodges, farm hotels and restaurants.

Alternatively a historical farm building can be converted into an agricultural museum. In fact, old tools and machines testify the history of agricultural mechanisation and the evolution of farming according to the technological development.

Various types of animal drawn “Ard” plough, which is a primitive ox drawn plough, are still used by the farmers of many countries of Africa, e.g. Ethiopia, and of some countries of Asia and Latin America.

The redundancy and dereliction of the rural architectural heritage affects not only buildings but also other man-made elements of the rural landscape, such as fences, dry-stone walls, wells, etc. Craft training for the care of traditional buildings and dry-stone walls is generally a low level one or even missing, because of skill shortages about traditional materials.

Based on the above reasons, rare and/or disappearing knowledge in ABE study programs is a fundamental chapter of study, research and planning of this Engineering branch, including historical rural buildings, old agricultural machines and tools, infrastructures, e.g. fences, dry-stone walls, terraces for sloping land cultivation, channels and irrigation systems.

Therefore, the recovery, conservation and reuse of historical rural buildings, old tools and machines, e.g. agritourism and agricultural museums, is part of an action for protecting and safeguarding the rural territory and environment, its roots and history, in order to promote its social and economic development.
ENHANCING THE ATTRACTIVENESS OF EUROPEAN STUDY PROGRAMS IN BIOSYSTEMS ENGINEERING AT THE K.U.LEUVEN

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Tel. ++32-16-32.14.46; Fax: ++32-16-32.85.90
‡Division Measure, Model & Manage Bioresponses (M3-BIORES)

Abstract
Providing information towards stakeholders of the Biosystems Engineering study program at the K.U.Leuven is organised at faculty level and not focused on the proper (A)BE curriculum. However, Bachelor students and students from abroad should find any necessary information in order to help them in deciding and choosing this program at master level. Program options for practical work within the industry or abroad are largely available. Master programs emphasise on personal and independent work, but support is available where essential. Career opportunities are also centralised at faculty level. A repositioning and actualisation of the Biosystems Engineering program can be expected for 2011-2012 and should enhance it’s attractiveness in a major way. Considering the students’ actual motivation, reintroducing disappearing knowledge topics should not guarantee an enhanced attractiveness.

1. Introduction – use and meaning of the abbreviation (A)BE.
All provided information concerns the Master in Biosystems Engineering at the K.U.Leuven and the related Department of Biosystems:
• Division of Mechatronics, Biostatistics and Sensors (MeBioS) and
• Division M3-BIORES: Measure, Model & Manage Bioresponses
Instead of using ABE as abbreviation for Agricultural Biosystems engineering, the abbreviation (A)BE is used, indicating that at K.U.Leuven the choices, relations and bindings of this study program towards traditional agricultural production systems are maintained but also that they are extended to other fields of interest as pure biological engineering and even human engineering.

2. Tools for enhancing international attractiveness
2.1. Communication towards stakeholders
Until now, all information towards stakeholders (as well high-schools preparing and motivating students to continue their formation at university engineering departments, as potential employers, is mainly part of the information provided to them at faculty
level. However, as the potentials, insights and needs into biosystems engineering more and more surpass the boundaries of agricultural, rural and environmental (agricultural and applied biological sciences …) applications, the needs towards providing information or gathering it at more specific levels increases. This should be considered in a near future.

2.2. Available study program information

- A general information leaflet ‘Master Folder’ is available as a free download, at the university’s website as well for the full (Dutch) Master program¹ as for some complementary English Master Programs such as Food technology².

- The study program of Master in Biosystems Engineering is one of the seven major masters organised by the faculty of Bioscience engineering. Information of this (and the other) master is also available at the university’s website, as well for the program in Dutch³ as some complementary English program’s⁴ (e.g. Master of Food technology, Master of Nanoscience and Nanotechnology …). The description of the study program is insight and decision oriented with detailed information regarding the aims and exit qualifications, the start qualifications, the prerequisites and a detailed scheme of the program itself.

- For each course all essential insight/choice/decision oriented information is available on the website, as aims, previous knowledge, course material, prerequisites, activities and evaluation⁵.

2.3. Contact Tools

Actually there are no specific perceptible ‘outside the university’ actions (as url-links or advertisements) undertaken in order to promote contacts with the discipline. However, the effects of the following non or less perceptible (in a general way) actions may not be under-appreciated:

- The representation and its impact at decision levels, of the two related divisions (MeBios and M3-BIORES) and all concerned research laboratories at national and regional consultation committees, meetings, seminars, .. which results in a broader and growing knowledge of the potential of the Biosystems Engineering [A(BE)] study program.

- Scientific research proposals – concerning existing (A)BE domains or by preference related to brand new topics - and the related competition for funding or grant aid, are mostly presented by young graduates towards industrial and/or official instances, and may that way lead towards a better knowledge, perception and growing appreciation of the (A)BE discipline and its graduates.

- The presence of those two related divisions at public or professional manifestations in order to present their functionality and research results.

³ http://onderwijsaanbod.kuleuven.be/opleidingen/n/SC_51016779.htm
⁴ http://onderwijsaanbod.kuleuven.be/opleidingen/e/F_50000547.htm
⁵ e.g. http://onderwijsaanbod.kuleuven.be/syllabi/e/IO00AE.htm
The representation of the two concerned divisions (MeBios and M3-BIORES) within the TI (Technological Institute) of the Royal Flemish Engineers Association (KVIV). This institute – at a smaller scale comparable with VDI – is a broad platform intended for professional information, continued professional formation and public relationship towards all possible stakeholders. It is also famous for organising engineering related congresses, seminars and study-tours.

2.4. Practical training of students

Master students may opt – but not mandatory – to attend some practical training of 4 or 6 weeks in a company during the summer holiday between the first and second Master's year. A practical training lasting 4 weeks is made equal to an elective course of 3 credit points. The 6 weeks training equals 4 credit points.

The procedure is as follows:\footnote{http://onderwijsaanbod.kuleuven.be/syllabi/v/e/I0O71AE.htm}:

- Students seek the Faculty for a professional mentor; this is a member of the senior academic staff (SAS).
- Students seek, preferably after agreement from the professional mentor (but not obligatory) work placement in a company. If the company agrees with the practical training, a placement tutor is appointed within the company, who determines a training assignment after discussion with the students and the professional mentor. The placement tutor possesses a university certificate and the training assignment had to be relevant to the training of bioscience engineers.
- The work placement, the training assignment, the names of the professional mentor and the placement tutor, and the agreements concerning the practical training, are reported to the Faculty through a training form.
- After the practical training, students draw up a personal training report. The professional mentor, after consultation with the placement tutor, assesses the practical training. Elements like “capability of working independently, initiative development, work quality, efficiency and integration in a professional environment, quality and quantity of the results and quality of the interpretation of the results” are part of the assessment.
- Rules of confidentiality are – if necessary – determined between the professional mentor, the placement tutor and the students.

2.5. Mobility schemes

At the beginning of their second master study program, students may opt for some research (at least for 3 months) fitting within the scopes of international cooperation projects at a European partner institute. In that case, students may ask to obtain the Erasmus statute.

- At faculty level about 20% of the students leave in the first semester of their third bachelor for some months to a European partner institute within the Erasmus scheme.
- At (A)BE engineering level this percentage is believed to be even higher as most of the (A)BE-students seem to prefer a good practical formation to brilliant study results.
Education and Research in Biosystems or Agricultural and Biological Engineering in Europe; a Thematic Network (ERABEE-TN)

Project Number: 134306-LLP-1-2007-1-GR-ERASMUS-ENW

- **Non-Erasmus schemes**:  
  - Students intending to do part of their study program (thesis research, practical training) in a developing country, may apply for travel grants of 1000 euro. Travel grants provide an excellent opportunity for young people to experience life in the South.
  
  - As a travel grant student, their assignment in the South should take at least one month. One of the local organisations will welcome them and guide them during their stay. This could be a university, an NGO, a government institution or a hospital. In addition, their K.U.Leuven promoter or supervisor will support their project abroad.
  
  - Students holding a Bachelor’s degree can go to the South on a VLIR-UOS travel grant, whether they are in a Master’s program or pursuing doctoral studies

- **Erasmus scheme**: For the academic year 2010-2011, Biosystems Engineering students may choose between one the following cooperating universities under column Biosys².

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<td>NTNU</td>
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<td>Gøteborg</td>
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<td>Salamanca</td>
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<td>Praag, ICT</td>
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<td>Wenen, DOKU</td>
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<td>Zaragoza</td>
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<td>Lissabon, UTL</td>
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<td>Lissabon, Univ. Nova</td>
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<td>Wageningen</td>
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<td>Valencia</td>
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<td>Lyngby, DTU</td>
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</tbody>
</table>

- **Erasmus PhD scheme**: (A)BE-PhD students may apply for 3 to 12 months research at a partner institute.

- **Erasmus lecturers scheme**: (A)BE staff at K.U.Leuven may apply for participating in the Erasmus exchange scheme for lecturers

- **Erasmus Mundus External Cooperation scheme**: The Erasmus Mundus External Cooperation Windows aim at mutual enrichment and a better understanding between the European Union and Third Countries. They are designed to promote institutional co-operation in the field of higher education between the EU and Third Countries through a mobility scheme addressing student and academic exchanges for the purpose of studying, teaching, training and research.

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2.6. Dissemination of career opportunities, fellowships, research projects and academic repositioning
There are no specific ways at K.U.Leuven-(A)BE-level to detect and disseminate career opportunities to graduates.

- At Faculty level, each year the ‘Landbouwkring’, the students’ own organisation, invites all graduating students at a meeting between them and potential employers.
- The faculty also provides online broad information concerning career opportunities within the university and outside it, with a lot of links to other websites.
- The faculty provides also online its own career database for free.

On the other part, (A)BE is playing a crucial and centralising part in disseminating the opportunities for fellowships and participation within research projects.

Academic staff mostly obtains information concerning open European or international academic positions from international publications.

3. Implementation of (A)BE study programs at the K.U.Leuven in order to promote the international and attractive character.
For some years now, there were no significant changes in the curricula, but a major re-orientation and actualisation in the study program may be expected for 2011-2012. More specifically, in 2007 the dean of the Faculty of Bioscience Engineering at the Katholieke Universiteit Leuven has initiated a working group with a main objective to restructure and rethink the master of Biosystems Engineering in order to make the master in Biosystems Engineering much more attractive to Bachelor students. This exercise is necessary for the survival of the master in Flanders, because the actual number of Master students in Biosystems Engineering does not meet the expected future minimum threshold value (25 students starting in the first Master year). The new structure, would probably consist of:

- A “truncus communis” at (A)BE-Master level (with ‘general’ engineering courses as thermodynamics, optics, biosensor technology, physical properties of biomaterials, identification and control of bio-technical processes, mechatronic design, …).
- 4 orientations:
  - ‘Sustainable Agricultural engineering’,
  - ‘Food chain Engineering’,
  - ‘Virtual life’ (including courses such as Metabolisms, Macro- and Nanofluidics, ecosystems modeling, etc.) and
  - ‘Green energy’.

4. Learning, teaching and assessment from the promoting point of view.
K.U.Leuven provides to the students a broad range of accompaniment skills:

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- summer courses (preparing to the 1st bachelor year)
- personal guidance and monitoring at bachelor level
- guided exercise colleges with personal assessment at all levels
- the Service for support in Teaching (DOO)\(^1\) operates at faculty level with a team of teaching and laboratory assistants (postdoc level) in order to provide support to all main 'biosystem' courses at bachelor-level as 'system analysis', 'physical transport', …

However, at master level, the study program emphasises on capabilities of working independently and initiative development, but the concerned lecturers stay at any moment - where essential - available for personal support, guidance and assessment.

5. Multi-linguism in (A)BE study programs
   - Actually about 50% of the courses at (A)BE-master level are given in English, while the other part is given in Dutch, the native language at K.U.Leuven.
   - From 2011-2012 on, when the new master program (see also point 2) should take effect, 100% of the concerned courses, as well within the truncus communis as the 4 orientations, should be given in English.

6. Rare and disappearing knowledge as an attractiveness tool?
As most of the students at (A)BE are NOT originating from agricultural or agriculture related parents, it’s remarkable how weak their knowledge about agriculture as a production and feeding systems is. Most of them on the contrary actually seem to develop a very strong interest for ‘new technologies’. So one can wonder if re-introducing accents on classical agricultural techniques should produce any positive effect on the attractiveness of the (A)BE study program.

\(^1\) http://www.biw.kuleuven.be/fadcid/
ENHANCING THE ATTRACTIVENESS OF EUROPEAN STUDY PROGRAMS IN BIOSYSTEMS ENGINEERING IN BULGARIA

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Annually, in each candidate student campaign representatives from the Department of Mechanization attend secondary schools in the agrarian sector and those who are a constant source of candidate students for the Agricultural University - Plovdiv. Through a means like presentation and conversation, the teacher informs the students about the candidate reception requirements for training and professional perspectives that award bachelor’s, master's and doctoral degrees in Agrarian Engineering in Bulgaria and abroad.

Like the Agricultural University – Plovdiv in the University of Rousse are organized annual visits to secondary schools by representatives of the Department of Agricultural Engineering, which is presented in full details of training in both specialties - Agrarian Engineering and Agricultural technique and technologies.

Open days are organized during which the candidate students have the opportunity to observe the conditions of training and material equipment of the university.

In support of information awareness of candidate students there were shot with video footage of actual work with students majoring in Agrarian Engineering and Agricultural Engineering, placed to be running on the information network of the university, as well and regional television channels.

Prospectuses are prepared for specialty Agrarian Engineering and are distributed in agricultural regions of Bulgaria.

The information about ABE study programs that is available by means of the website of the University not now.

About the methods of contacting the Faculties of Engineering and Agriculture for the Agricultural University Plovdiv the information sheets are translation of done from (ERABEE - Newsletters) and are published on the website of the International Relations rubric column.

The ways for promoting the practical training of students at enterprises involved in the field of ABE in your Bulgaria are different for every institution.

Depending on the specialty (Agricultural Engineering and Agricultural Engineering) a plan is prepared with detailed instructions and tasks meant be performed during the internship. All indications are authenticated by the Dean of the Faculty of Industrial Agrarian faculty part of University of Rousse.

Explanatory meetings are organized by teachers who are designated as heads of production practices, in which are handed out instructions for the internship. Students
are given the opportunity to choose by themselves the location and timing of the internship, on condition that the practice lasts for four weeks and is done in agricultural enterprises. After completion of training practice the students prepare a report which they defend in the beginning of the winter semester.

Production practices in the Agricultural University - Plovdiv are held in production structures of the sector agrarian engineering in the Plovdiv region. Students solve real engineering problems, for which they prepare and defend survey.

About the schemes for promoting the mobility of students, graduates, PhD students and staff within and outside Europe until now for Agricultural University - Plovdiv, there are no concrete actions in this matter. No interest is paid to bilateral ERASMUS agreements, because the participants are given only the scholarship from ERASMUS, which is insufficient for the mission and they must pay out of their personal funds. For University of Rousse the schemes are published on the website of the Centre for European Integration, International Cooperation and Mobility http://erasmus.uni-ruse.bg/en/?cmd=gsIndex. For the ways of disseminating career opportunities for ABE graduates it will be well to use the site existing www.erabee.aua.gr, in which to be added up rubrics for: - career opportunities - research fellowships - research projects, - other

These entries are to be built as forums, in order to enable easy communication between agricultural and biological engineers from across Europe.

About implementation of ABE study programs in Bulgaria in the studying curriculum in Agrarian Engineering in Agricultural University - Plovdiv subjects were included, which are typical of the eponymous subject. This is one of the reasons for the growing interest of applicants - students for specialty during entrance campaign in 2010.

Table 1. Attractiveness of the speciality Agrarian Engineering in Agricultural University – Plovdiv; the number of applicants for a student place for the last 5 years

<table>
<thead>
<tr>
<th>Years</th>
<th>Places</th>
<th>Number applied in the first request</th>
<th>Number applied for 1 student place</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>36</td>
<td>112</td>
<td>3.11</td>
</tr>
<tr>
<td>2007</td>
<td>36</td>
<td>75</td>
<td>2.08</td>
</tr>
<tr>
<td>2008</td>
<td>36</td>
<td>62</td>
<td>1.72</td>
</tr>
<tr>
<td>2009</td>
<td>36</td>
<td>28</td>
<td>0.78</td>
</tr>
<tr>
<td>2010</td>
<td>36</td>
<td>32</td>
<td>0.89</td>
</tr>
</tbody>
</table>

Good practice in Agricultural University - Plovdiv is the student self-assessment in case of test to test examination. Students choose by themselves their own examinator. The teacher taught him of the way of checking and evaluating of the test examination results until the checking of his results. Then the examinator examines the results of his own colleagues, a teacher observes (controls) his activity.

About the tools for promoting the multi-linguism in ABE study programs in the University of Rousse and Agricultural University – Plovdiv a master’s course is worked out in agrarian engineering in English now.
Abstract
The information about Agricultural/Biosystems Engineering (ABE) and relevant study programs offered by Faculty of Engineering (FE) at Czech University of Life Sciences Prague (CULS) are usually distributed by different means to the potential students. Traditional method is distribution of printed materials. The information available by means of the web-site is based on the complete service which can be used by potential students starting by collection of all useful information and going to application for entrance. New study programs “Machinery for Landscape Reclamation and Maintenance” and “Maintenance Engineering” relevant to ABE study programs were prepared in FE CULS Prague during last years. There were prepared in the context of Bologna process with the aim to increase the attractiveness of the study programs for new students. There is study M.Sc. program “Technology and Environmental Engineering” and Doctoral study program “Technology and Mechanization of Agriculture” which are taught in English available for Czech and foreign students. These study programs include also new emerging disciplines of ABE, are e.g. expanding new branches of environmental engineering technology, biomaterials, renewable energy sources, biofuels, and mechatronics.

1. Tools for Enhancing the International Attractiveness of European Study Programs in Agricultural/Biosystems Engineering (ABE)

a) The information concerning ABE and relevant study programs are usually distributed by different means to the potential students. Traditional method of publicity about study programs including ABE is distribution of printed materials (booklets, brochures and leaflets). These materials are available in Study Department of the faculty. In the case of ABE study programs are all materials available in Study Department of Faculty of Engineering (FE) at Czech University of Life Sciences Prague (CULS). Principal newspapers in the Czech Republic also inform young generation about all study programs, specialisations and courses, and also about the quality of the University/Faculty (scientific and research activities, systems of admission and general content of entrance examinations and percentage ratio of success in entrance), usually during the winter and spring, which is the most important period for the students from High Schools to obtain these information.

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b) The other, and during the last years the main source of information, is distribution by
the internet web pages, which are available on the www pages of each university. Students from the High Schools who are finalizing their studies and who suppose to
continue study at the Universities can start the search in www pages of the Ministry of
Education, Youth and Sport of the Czech Republic where is central list of all High
School Institutions in Czech Republic. Following step is to go to the University and
Faculty which could be interesting for them and collect all information about the study
programs offered by these Faculties.

c) The information about ABE study programs available by means of the web-site is
based on the complete service which can be used by potential students starting by
collection of all useful information and going to application for entrance.

System is following:

webCULS Prague - webFaculty of Engineering – Applicants for study:

- electronic application form
- information about study at FE
- information about study programs
- consulting centres for distance studies
- admission process in this year
- admission process to doctoral study in this year

Description of all study programs (including programs related ABE) is web FE CULS
Prague. There are study programs offered by the FE at CULS Prague, which could be
typical example of ABE. According to their curricula it could be:

<table>
<thead>
<tr>
<th>Existing Study Programs: FE at CULS Prague</th>
<th>Programs of studies (ABE): EurAgEng</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Machinery</td>
<td>Mechanical systems and mechanisms</td>
</tr>
<tr>
<td>Waste Disposal Technology and Techniques</td>
<td>Waste management</td>
</tr>
<tr>
<td>Technological Equipment of Constructions</td>
<td>Structural systems and materials</td>
</tr>
<tr>
<td>Information and Control Technology in Agri-food Complex</td>
<td>Information technology and automation</td>
</tr>
<tr>
<td>Machinery for Landscape Reclamation and Maintenance</td>
<td>Mechanical systems and mechanisms</td>
</tr>
<tr>
<td>Maintenance Engineering</td>
<td>Mechanical systems and mechanisms</td>
</tr>
</tbody>
</table>

Admission process is described from the point of view as formal terms, dates of
entrance examinations, criteria of evaluation of entrance examination, examples of test
of entrance examination (mathematics and physics)

d) The practical training of students at enterprises involved in the filed of ABE study
programs is organised by a staff member of Department focused on the problems
related to study specialisation. The choice of an enterprise for practical training is made
either by students individually or they can follow the teacher's recommendation.

e) The information about opportunity for students to participate in study abroad is
disseminated by web-based database about the bilateral Erasmus agreements. Selection
procedure of students for study abroad is based on the knowledge of foreign
Education and Research in Biosystems or Agricultural and Biological Engineering in Europe; a Thematic Network (ERABEE-TN)

Project Number: 134306-LLP-1-2007-1-GR-ERASMUS-ENW

language and results during the past study periods. The information about the bilateral Erasmus agreements and terms of selection interview is presented in webpages and also on the bulletin board of the FE.

f) The information about career opportunities for ABE graduates are usually presented on the bulletin board of the FE. The information about research projects and research fellowships are presented in webpages and also on the bulletin boards of the FE and of Departments´ bulletin boards.

g) The European or international academic positions in the filed of ABE are not special announced by the CULS.

h) One of the efficient methods of information distribution to the High School students practiced during last years is personal visit of High Schools by teachers and PhD students during the spring before leaving examinations in High Schools. Teachers who have relation to the High School (e.g. old school-leavers) bring different information materials for students (booklets, brochures and leaflets) and during the visit show them the video presentation, describe the study programs, opportunities of work after graduation (different study programs a specialisation, including ABE) and answer all questions.

2. Implementation of ABE Study Programs in Czech Republic Aimed at Promoting their International Image

Two new study programs relevant to ABE study programs were prepared in FE CULS Prague during last years. There were prepared in the context of Bologna process with the aim to increase the attractiveness of the study programs for new students. The new study program Machinery for Landscape Reclamation and Maintenance (MLRM) reacts to the contemporary situation in agriculture when most of agricultural activities are considered in the context of landscape cultivation including its reclamation and maintenance. Besides traditional agricultural and forestry production there are landscape re-cultivation and other activities including spare-time and sport self-realization. Energy utilization of biomass technology has recently become an important part of machinery in general. All activities involved in this branch of engineering are related not only to traditional technologies and machinery, but also to new and unconventional technologies which are necessary to be developed, technologically utilized, maintained and used for commercial purposes. This study program is accredited in first level (Bc.) since 2009, the accreditation of second level (MS.c.) is expected in year 2011.

The other new study program Maintenance Engineering (ME) was established on the basis of the needs of practice during 2008. This field was successfully accredited without any comments of Accreditation Commission of the Ministry of Education in the spring 2009. Its preparation was fully supported both CMS (Czech Maintenance Society), as well as EFNMS (European Federation of National Maintenance Societies) and its realization was speeded up with the results of two-year international project "EuroMaint", which clearly identified a need of educational and training requirements for university degree experts in the field of maintenance. The graduates of this field may find work as a head of the enterprises of agricultural, forestry and construction of primary production related to maintenance and besides that
in various types of environmental and municipal companies, in all types of technical services and in all sectors of industrial production and services. Furthermore, the graduates are able to work as maintenance managers, chief engineer mechanics, asset managers, facility managers, the heads of vehicle service, etc.

3. Promotion the Multi-linguism in ABE Study Programs

Students with excellent knowledge of English who finished the B.Sc. study can continue at two-year M.Sc. study program “Technology and Environmental Engineering” which is taught in English. This study program is accredited since the academic year 2004/5. The majority of students participating in the courses are incoming students in the frame of Erasmus program, further several Czech students, who finished the first level of study at the University without accreditation of second level, and group of students form Africa (Ghana, Ethiopia). The Doctoral study program “Technology and Mechanization of Agriculture” is recently accredited not only in Czech language, but also in English. It will enable to foreign students follow this study program without knowledge of Czech language. It is expected that the number of these students will be increased in the next years. The information about study programs including ABE are distributed in the form of printed materials (booklets, brochures and leaflets) and also by means of the website and internet.

Important in the European scale is participation of CULS Prague in Euroleague for Life Sciences (ELLS). ELLS is a network of leading universities cooperating in the fields of Natural Resource Management, Agricultural and Forestry Sciences, Life Sciences, Veterinary Sciences, Food Sciences, and Environmental Sciences. Presently the ELLS network includes the following founder members:

- The Royal Veterinary and Agricultural University (KVL), Copenhagen, Denmark
- University of Hohenheim (UHOH), Stuttgart, Germany
- Swedish University of Agricultural Sciences (SLU), Uppsala, Sweden
  
http://www.slu.se/
- University of Natural Resources and Applied Life Sciences (BOKU), Vienna, Austria
- Wageningen University and Research Centre (WUR), Wageningen, The Netherlands
- Czech University of Life Sciences, Czech Republic (CULS)
- Warsaw Agricultural University, Poland (SGGW).

The focus of ELLS is on joint teaching and learning, student and staff mobility, and quality assurance. These activities will result in highly qualified graduates, who are prepared for the demand of the European and international market. Furthermore, through the sharing of expertise and resources, this network will enhance the national and international position and potential of all partner universities, as part of the development and implementation of their degree programmes.

The ELLS objectives are:

- to offer students additional values by expanding the existing activities and by developing new joint programmes in the field of Life Sciences,
- to support the high quality of education by the sharing of expertise and facilities,
• to provide transparent and easily accessible information about joint ELLS study programmes
• to increase the student mobility by simplifying the process of the student exchange.

4. Topics of Rare and/or Disappearing Knowledge that can be used as a Tool for Enhancing the Attractiveness of ABE Study Programs

Problems, which are solved in the area of new emerging disciplines of ABE, are e.g. expanding new branches of environmental engineering technology, biomaterials, renewable energy sources, biofuels, and mechatronics are studied at the Faculty of Engineering in the second and third level of study.

One of special traditional products well-known also in the other countries is Czech beer and brewing. In comparison with modern industrial processing, traditional beer production is based on really natural processes, which are known and used for centuries. Special courses focused on the history and tradition of Czech brewing, description of history of brewing in Czech Kingdom, foundation of small citizen breweries, impact of wars, guilds in Czech countries, theory of brewing, and processing of main raw materials are included in study programs at Faculty of Engineering of CULS Prague. The target is to get students familiar with brewing and history of Czech beer. The brews are done on tutorial brewery of Czech University of Life Sciences in Prague. According to the previous experience, students are very interested in these courses. These courses are prepared also for foreign students of study program taught in English.

6. References:
http://www.tf.czu.cz
http://www.czu.cz/
ENHANCING THE ATTRACTION OF EUROPEAN STUDY PROGRAMS IN BIOSYSTEMS ENGINEERING IN DENMARK

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Abstract
Each European country has its own BSc. and MSc. program within agricultural and/or Biosystems Engineering. This paper mainly describes the education Biosystems Engineering at Aarhus University, some of the challenges that were met during the development of this new education and some of the perspectives. It is concluded that a general agreement on having all MSc-educations in Biosystems Engineering in Europe taught in English would enhance the possibility of exchanging students. Furthermore, this could allow each country to specialize in the topics were they have scientists and research at the highest international level. Teaching at the master level must be based on research based knowledge transfer.

1. Enhancing attractiveness of Biosystems Engineering
The education should appeal to young people and include an exiting program. However, job opportunities must be present for the students to ensure a long term interest. Good jobs after graduation will give an image of a recognized education. Young people are seeking success at a low age and they are looking for highly ranked universities for their education. High ranking comes with a high international class of science and we have to meet these challenges in order to attract the best students. Copenhagen University is number 46 at the ARWU list (Academic Ranking of World Universities) and Aarhus number 98 in 2010. Within agriculture, Aarhus University ranks number 7 in Europe and number 11 in the World. This is very important especially for students from Asia. The general public perception of agriculture is important for the acceptance of an education within this area. About 75% of the Danish population is positive to agriculture and the Scandinavian countries as such have a positive reputation within animal welfare and environmental issues.
1a. Information to high schools and BSc-educations

Engineering is a lifestyle and we should inspire kids as early as possible. This is a general task of the society. The university has high school students as a target. We try to get in contact with them through open days at the university where they can meet researchers and coming teachers. It is also important that students are present to give their updated version of what a university life is. We have several education fairs where all universities and higher educational institutes present their programs. Written material will have a direct form that appeals to young people. The faculty of agricultural sciences at Aarhus University has a special program called “Researcher for a day”. The high school students enrol in a one day program where they have to prepare background knowledge before they show up, take samples and analyse them, analyse the results and write a report. Students are very enthusiastic and gain a lot of knowledge within agriculture through the program. We have recently started using PhD-students as guest teachers at our high schools to establish a link between youth and research and make high school students aware of the possibility of having a research career. All higher educations are posted at a central website from where students can apply electronically for their further education (www.ug.dk).

Field Robotic Event is a competition taking place each year in June or July. Students construct their own small autonomous vehicle that is able to manoeuvre in a maize field. The students compete in four or five different classes. There is a competition for students from elementary or high school based on robots built with the intelligence from Lego Mind Storm. The robot should follow a given route and obstacles may appear. BSc-students compete in three classes with increasing demands. The robots will have to navigate in maize rows in the basic class and drive as far as possible without interference of the students. Turning at the end of a row is a challenge for navigation equipment. The advanced classes will be for students with skilled vehicles. The Field Robotic Event will take place in Herning in Denmark in June 2011 during the agricultural fair show which is visited by about 40,000 visitors. We will use the opportunity to promote our education in Biosystems Engineering.

Table 1. Description of the challenges for participants in the Field Robotic Event 2011.

<table>
<thead>
<tr>
<th>Category</th>
<th>Junior</th>
<th>Basic</th>
<th>Advanced</th>
<th>Implement</th>
<th>Freestyle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty</td>
<td>Easy</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Curved maize rows on table</td>
<td>Curved maize rows of 5 meter length</td>
<td>Straight maize rows with missing plants and angled headlands, obstacle deep track</td>
<td>Straight rows with a thistle appearing between rows</td>
<td>No limitations</td>
</tr>
<tr>
<td>Sensors</td>
<td>No GNSS</td>
<td>No GNSS</td>
<td>No GNSS</td>
<td>All sensors allowed</td>
<td>All sensors allowed</td>
</tr>
</tbody>
</table>
We also have direct contact with potential BSc-students through offering specific courses on automation and on bioenergy technologies. The direct contact is needed in order to attract students to write their thesis within an agricultural subject. We have half a day at the engineering college for presentation of our thesis catalogue which normally results in 3-8 contracts. We were too late this summer in offering summer courses, but we will repeat the offer next summer and keep students posted in decent time.

Denmark offered 10 COP15 scholarships during the Copenhagen climate conference in 2009. Eight educations with a climate perspective were granted and Biosystems Engineering at Aarhus University had one of the very clever students. The faculty of agricultural sciences had more than 200 applicants and this was probably the best advertisement we could have for international students outside EU. A closing remark on this is that students will come if we pay them for it, but the commercial value may be higher than the costs of a scholarship.

1b-1c. Websites
The website is an important communication platform and will be visited much more frequent than flyers will be read. We have not optimised our pages for the search machines yet, but it is obvious that we will get the most hits on the websites below. The department of Biosystems Engineering at Aarhus University will use the simpler and more direct addresses in the future and see to that pages are updated frequently. All information about the education and research behind Biosystems Engineering will be made easily accessible and the site will be flavoured with interesting video clips. We do not link to other sites currently, but that will be changed as well.

- [www.BiosystemsEngineering.au.dk](http://www.BiosystemsEngineering.au.dk)
- [www.Biosystems.au.dk](http://www.Biosystems.au.dk)

1d. Practical training of students
We will fill the students with the best updated knowledge within the chosen specialization. However, it is also of high importance that students acquire academic skills at the high end of Blooms taxonomy. After graduating as Master of Science, the student must be able to analyse, select, validate and criticise a given engineering problem. The study program for master students includes training in paper writing. They start out with structured written exercises; they are given constructive feedback either from fellow students or from the teachers, and end up writing their thesis in a form of a peer-reviewed paper. The intention is that the research work of their thesis can be published in an international journal. Guest lectures from the industry are used and the
thesis may be carried out together with a company. Specific training in a company is not included in the Biosystems Engineering education.

1e. Promoting mobility and internationalisation

Mobility needs to be strengthened. Aarhus University and the Faculty of Agricultural Sciences are prioritizing this area greatly – as mobility will not only increase the number of students in the programs, but also contribute to the quality of the courses through the international perspectives the students bring in. Our strategy has been to focus on the following means in particular to achieve increased internationalisation and mobility:

1) **Semester packages of 30 ECTS.** We have developed 2 semester packages (Study Abroad packages) in both Sensor Technology and Bioenergy which will be marketed to international students and our partner universities. By packaging the courses within an overall subject theme, we hope this will serve as appetizer to European and overseas students and make it easier for our university partners to advise their students. The course packages are described in great detail, which should facilitate the credit transfer application process for the students. Another aim with the semester packages is that they can become elements in potential Double Degree programs with selected international partners.

2) **Summer schools.** The education program in Biosystems Engineering has developed 2 summer school options in “Automated vehicles in plant production” and “Biogas from agricultural resources” which caters to the short term students. Additionally, KU-LIFE runs a course on Biosystems Instrumentation. We think there is a great demand internationally for the short term courses and anticipate that a portion of these students will return later either as exchange students or as full degree students when they get the taste of what we can offer in our programs.

3) **More Erasmus exchange agreements.** We aim to establish a number of Erasmus exchange agreements with European partners to enhance the possibility of sending and receiving students and with the Erasmus grant. The Erasmus exchange program also facilitates the transfer of credits between institutions and is a very transparent system for the students to move within. The student services of Aarhus University for international students are of high quality with e.g. housing guarantee, mentor programme, orientation and language courses and social activities.

4) **NOVA and NORBE.** University of Copenhagen, LIFE and Aarhus University, The Faculty of Agricultural Sciences are both members of a strategic Nordic network called NOVA (Nordic University for Agriculture, Forestry and Veterinary Sciences) – i.e. a virtual university network. Within the umbrella of NOVA, we have established a thematic network on Biosystems Engineering – NORBE - which offers courses in English at bachelor, master and PhD level and where students can apply for Nordplus mobility funding to attend the courses. This has been a very successful network and has increased the flow of students between the Nordic institutions.
1f-1g. Dissemination of career opportunities

All open positions at Danish universities are posted at the universities’ websites. Positions are described in short and with a link to a full description. It is our experience that the pages are visited frequently and that we get qualified applications. We have not posted positions specifically at engineering sites.

2. Implementation and promotion of study programs

The Master of Science education Biosystems Engineering at Aarhus University is now two years old and the first students graduated in the summer 2010, see table 2. The education lasts two years (120 ECTS) and the first two semesters interchange in order to double the number of students per class.

<table>
<thead>
<tr>
<th>Year - season</th>
<th>2008 - S</th>
<th>2009 - W</th>
<th>2009 – S</th>
<th>2010 - W</th>
<th>2010 - S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danish students</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Int. students</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Graduated</td>
<td>2</td>
<td>4</td>
<td>12</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td>Total enrolled</td>
<td>2</td>
<td>4</td>
<td>12</td>
<td>18</td>
<td>22</td>
</tr>
</tbody>
</table>

Table 2. Number of Danish and International master students enrolled in Biosystems Engineering at Aarhus University. Students enrol summer or winter.

The department of Biosystems Engineering at Aarhus University counts 17 PhD-students covering subjects from automation within plant and animal science to environmental technologies used for manure treatment and biogas production. The program started in 2007 and the department expects to have about 20 PhD-students enrolled at all times.

2b. Learning, teaching and assessment

Teaching at Biosystems Engineering is based on research. Teachers are dedicated scientists and they provide the latest knowledge within their field. Our teaching program reflects some of our main research areas which imply that we have updated equipment and facilities for applying a research based knowledge transfer. We have the possibility of including master students in solving some of our research questions mainly through project themes and thesis writing. Alignment is a keyword in the learning process and this implies that teaching, learning and examination are aligned. We present the learning goals at the beginning of a course and use this to grade the students at their exams. The teaching is a mix of lectures, exercises, group work, reports and oral presentations. We make it clear to the students that they have to work in order to learn. The goal of the teaching is that students reach the highest level of taxonomy, thus being able to discuss problems, evaluate different methods, postulate and argument, create, select methods and predict outcomes. We consider the academic learning skills just as important as the scientific knowledge whereby students are capable of analysing unknown problems and gain new knowledge.
Teaching methods in Denmark are problem oriented and studying hard does not mean that students can memorise a text book. They should rather be able to place themselves outside the problem and analyse it in a critical way. Problem oriented teaching has been a challenge for our international master students and we offer them a one week introductory course to Danish culture and teaching methods. Besides, practical issues as accommodation, ID-card, and opening a bank account are important to handle quickly during their first week at the university.

3. All MSc-programs should be taught in English

The Danish Master program is taught in English. Teachers are fluent in English and all written material is in English. We will only teach in Danish if all students understand Danish fluently. Use of English as teaching language is necessary in order to attract international students. Furthermore, most text books are originally written in English – and therefore cheaper than the Danish translated versions - and supplementing literature from reviewed journals are also written in English. Danish students are taught English from 3rd grade and do not have any problems in following the teaching. A general agreement on having all MSc-educations in Biosystems Engineering in Europe taught in English would enhance the possibility of exchanging students. Furthermore, this could allow each country to specialize in the topics were they have the highest international standard. Most of our BSc-courses are taught in Danish and this minimizes the opportunities for foreign students to pick from this group of courses.
ENHANCING THE ATTRACTIVENESS OF EUROPEAN STUDY PROGRAMS IN BIOSYSTEMS ENGINEERING IN THE ESTONIAN UNIVERSITY OF LIFE SCIENCES

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Abstract
Study Information System (SIS) of the Estonian University of Life Sciences (EULS). The SIS is a database that supports the organization of studies: web-based; meant for the whole university; SIS keeps and systemizes data concerning the studies at the University at the EULS. The Estonian University of Life Sciences (EULS) and other Estonian universities have integrated Study Information System (SIS) to collect and to exchange information between other universities, lecturers and students.

1. Tools for enhancing the international attractiveness of European study programs in Agricultural / Biosystems Engineering (ABE equal BST).

i) The contents of information concerning ABE or relevant study programs and the means by which it is provided by the University of your Country to high schools (e.g. ppt presentation).

The information about ABE or relevant study programs that are and/or will be distributed to various stakeholders in your Country, and also the multimedia tools used for this purpose.

The university Study Information System (SIS) has been created environment, opportunities, that depending on the user's rights to obtain the necessary information about the BST (Bio-systems Technology) curriculum and courses.

The BST curriculum passed graduates had mentality of keepers and retainers to the environment and to the rural and they are developers of the technical field. The subjects obtain a comprehensive overview of the biotechnical system (environment-plant-animal-machine), the basic concepts, theoretical principles and research methods. The graduate will be able to identify the technical, environmental and interdisciplinary connections between biology and he knows about the current state of biological raw materials used in handling technical problems and implementation opportunities.

Also EULS in cooperation with companies of research and development institutions who are activities in agricultural and biosystems areas to has arranged one-day seminars and information days.

Between the university and urban public transport companies are contracted agreements for advertise the specialty of BST curricula in the public service vehicles and in the public transport stops.
ii) The information about ABE study programs that is available by means of the website of your institution.

The EULS have official website where are located hyperlinks, which direct the interested BST curriculum personages, student candidates, students, lecturers to referred websites information. Also on the web-sites of Institute of Technology and College of EULS are locate introductory prospectus of the BST curriculum for institute and college student candidates.

iii) The methods of contacting the Faculties of Engineering and Agriculture of your Country, in order to provide them with the information about ABE study programs (e.g. link the web-sites of USAEE and ERABEE in the websites of the European Faculties of Engineering and Agriculture)

At present time the EULS have no rights to enter or attach database of the university curriculum materials which are located in the websites of USAEE-TN or ERABEE-TN. The Institute of Technology participates on international teamwork of ERABEE and would like get full rights and promoting the BST curricula in the websites of USAEE-TN or ERABEE-TN.

iv) The ways for promoting the practical training of students at enterprises involved in the field of ABE in your Country.

The Institute of Technology of EULS organized regular conferences, seminars and information days involving the students, heads of curriculum and enterprises in BST areas. It also takes place exchange of information between students, universities and enterprises through the university Students Career Service and the university Student Union.

The Students Career Service of the Estonian University of Life Sciences was founded with the main objective of providing help to graduating students in making contacts with the employers and finding best jobs according to their qualification. Employers can choose and recruit the graduates as well as students. The aim is achieved by creating a database, counseling students, introducing Students Career Service to the employers, enhancing cooperation with municipalities and State Employment Agencies but also through international contacts. The Students Career Service welcomes contacts with employers and companies all over Estonia in order to support regional development.

The Students Career Service aims to act as a bridge between employers and University. In addition to recruiting highly qualified personnel, employers have the possibility to get to know more about the EMU, study plans and various academic matters.

The Students Career Service organizes lectures and distributes information on themes like composing CV and applications, behavior at employment interviews, different law problems, possibilities of individual psychological counseling, situation on labor market in general etc. In addition to scheduled events individual help is provided to students.

[2] The Institute of Technology of EULS has organized seminars to BTS curriculum development and practice vacancies of sites letters of intent from the purpose of award. The new emergency BTS curriculum development seminars have taken part in the agriculture/biosystems technology dealing with companies operating in Estonia.
The schemes for promoting the mobility of students, graduates, PhD students and staff within and outside Europe.

For students, alumni, graduates, academics and other scientific employees mobility (foreign travels, exchanges, housings, etc.), to ensuring one of the many possible ways in EULS is the Lifelong Learning Program (LLP) in the higher education the subprogram ERASMUS. The ERASMUS program is designed to improve the quality of higher education and to expand the European dimension, to support international cooperation with universities and businesses, to develop innovative trends in higher education, higher education, increase mobility in Europe and improve the comparability and compatibility of studies and qualifications throughout the European Union.

The Ministry of Education and Research of the Republic of Estonia and Archimedes Foundation annually offer scholarships to foreign nationals, pursuant to bilateral intergovernmental or inter-ministerial agreements concluded with the following countries: Czech Republic, French Republic, Hellenic Republic, Italian Republic, Kingdom of Belgium (Flemish Community), Kingdom of Belgium, Kingdom of Denmark, People's Republic of China, Republic of Georgia, Republic of Hungary, Republic of Latvia, Republic of Lithuania, Republic of Poland, Republic of Turkey, State of Israel, Swiss Confederation, Ukraine. [3]

The Erasmus program will give lectures to teachers Estonian universities from EU Member States, the European Economic Area and the current candidate countries, institutions of higher education, when is awarded Bilateral Agreements with Erasmus.

f. The ways of disseminating career opportunities for ABE graduates (including research fellowships and research projects).

The EULS works with Higher Education Development Centre Archimedes Foundation, whose principal activities are designed to coordinate national initiatives which support students, teachers and researchers, presented to the Estonian higher education abroad, and carried out a number of other higher education internationalization support functions.

The Centre for International Mobility (CIMO) Scholarships programs for post-Master's level studies and research at Finnish universities at Finland. CIMO offers scholarships to international students acquired master's degree students, researchers, university lecturers and the administration.

The researcher mobility program "Mobilitas (Mobility)" basis can apply for post-doctoral and senior scientist grants (research grant) to research works in Estonia and abroad. The program "Mobilitas (Mobility)" is intended to stimulate international research and knowledge exchange.

g. The ways of announcing open European or international academic positions in the field of ABE.

The Archimedes Foundation involved collaboration with the Estonian University of Life Sciences, the University of Tartu, Tallinn University of Technology, the Tallinn University, Estonia, the pan-European network of Mobility EURAXESS Estonia EURAXESS Network Services.

The EURAXESS Services Network of topics covered is broad, covering areas such as visas and residence permits, recognition of qualifications, vacancies spheres of science,
taxation, social security, health services. Information is designed to improve access to national European Mobility and Mobility Portal in 35 countries.

2. Implementation of ABE study programs in your Country aimed at promoting their international image (TUNING Template).

Learning, teaching & assessment: Please, provide examples of best practice aimed at achieving competences relevant to ABE and promoting the international image of the related study programs.

On the bases of the new BTS curriculum is developing in accordance curriculum (courses) participated in teaching process with the five EULS institute and the as well as highly qualified and experienced teachers. Since the BST study program carried out under the instruction takes place for the first time (year), then there is no feedback at learning process.

3. Please, describe the tools for promoting the multi-linguist in ABE study programs in your Country (e.g. courses and or dissemination materials offered in languages different from the native ones, etc.).

Unfortunately, the teaching on the bases of the BST curriculum is only in Estonian language and not directed for non-Estonian-speaking students, and also the course materials distribution in various languages does not take place.

References:

ENHANCING THE ATTRACTIVENESS OF EUROPEAN STUDY PROGRAMS IN BIOSYSTEMS ENGINEERING – THE FINNISH VIEW

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Abstract
At the University of Helsinki (UH), the Faculty of Agriculture and Forestry takes care of the general student information of the agricultural and forestry education and gives student advice. The agricultural engineering/biosystems engineering (ABA) education is a part of the education of the Department of Agricultural Sciences. The department has prepared a leaflet and web pages to introduce the subject. Research based teaching and high international ranking of the UH are key issues to increase the attractiveness of the ABA programs.

The international contacts and mobility of students and teachers are promoted by e.g. participating NORBE cooperation, ERASMUS programs and Field Robot Event. The study program of ABE includes two practical training periods enabling the contact to working life for the students. The ABE subject has also contacts with the national and international agricultural machinery industry via Agrotechnology network, which is established to promote the agricultural engineering field and to find new research subjects. In 2010, UH launched an international Master’s Degree Program in Environmental and Natural Resources (MENVI) and environmental engineering in agriculture study line is involved in MENVI.

1. Tools for enhancing the attractiveness of ABE study programs

1.1 Available information about ABE study program at UH
At the University of Helsinki (UH), the promotion of student recruit is divided into several steps. The Faculty of Agriculture and Forestry takes care of the general student information and gives student advice. The departments take care of their own subjects and the information material of them as well as they prepare the information material for the faculty needs. The faculty has employed an informer to work proper information material and to contact media. The ways to inform for the study programs are web pages (http://www.mm.helsinki.fi/opiskelijaksi/index.html, http://www.mm.helsinki.fi/english/studies.html)
and leaflets. Once a year, the faculty organizes also an open day and info occasion for high school students.

At UH, the agricultural engineering / biosystems engineering education is a part of the education of the Department of Agricultural Sciences (http://www.helsinki.fi/agriculturalsciences/). The department was established in the beginning of year 2010. At the moment, the study plans are reorganized in order to get more efficient and compatible system. There will not, however, be any remarkable changes in the contents of ABE study program. Teaching is based on the research which guarantees that the teachers are teaching the latest knowledge and they are enthusiastic about their research.

The Department of Agricultural Sciences offers ABE studies as part of their study program and the information material is prepared by the department itself. For instance, brochures introducing the study programs have been prepared. Department has also introduced the study program at the exhibitions (e.g. farm) and for different kind of visitor groups (e.g. students groups). Likewise, it has arranged some occasions where the stakeholders and media people are invited to the department to introduce the ongoing research projects for them. After the occasion, the media has published several articles from the work done at the department. Some PhD students have also visited in the high schools to introduce the study possibilities and programs provided by the department.

The attractiveness of ABE program is promoted with web material and agricultural journal articles as well as expert articles in newspapers. The main tool is the own web pages of the subject because young people seek information normally from internet. The ABE web pages are besides Finnish also in English and Swedish (http://www.helsinki.fi/agriculturalsciences/studying/agrotechnology.html). The study program is published at the web site together with course descriptions. Also signing to the courses can be done via internet. The education is mainly in Finnish but some courses are available in English if foreign people attend the lectures.

1.2 Mobility of students and teachers, and practical training

The University of Helsinki (member of LERU) is a large multidisciplinary research university. It has regularly been ranked among Europe’s 10 to 15 best universities on worldwide ranking lists of research universities. This also increases the attractiveness to study ABE at the UH. The subject of Agrotechnology has long experience in teaching cooperation between the Scandinavian countries promoting the mobility of students and teachers. The NORBE cooperation via NOVA-university network (http://www.nova-university.org/) makes possible to give information of courses in common database. NOVA University is a virtual university established by the Scandinavian agricultural and forestry universities. NORBE is shortened from NOrdic School of Biosystems Engineering. NORBE consists of five well respected universities in Norway, Sweden, Iceland, Finland and Denmark having three partner universities in the Baltic States. NORBE is cooperating with leading Nordic and International companies and research stations within Biosystems Engineering area. The NORBE organizes especially PhD courses.

Other schemes for promoting the mobility of students and teachers are bilateral ERASMUS agreements with e.g. Turkey and Spanish. ERASMUS agreements are one
way to work or do the practical training aboard. The students have encouraged to perform the practical training included in the study program at MSc aboard. Some of students have found the position via private contacts. BSc level students can join the MAST international program of the University of Minnesota at USA (http://mast.cfans.umn.edu/). This international exchange program combines the practical training in agriculture with a classroom experience through the University of Minnesota.

ABA students of UH have participated the international Field Robot Event (FRE). The next FRE will be organized in Denmark in 2011 (www.fre2011.dk). The aim of the FRE is to present the future of precision agriculture and horticulture. The students of HU have designed and assembled the field robot in cooperation with the students of Aalto University (former Technical University of Helsinki).

1.3 Contacts to working life and career opportunities
At UH, the study program of ABE includes two practical training periods enabling for the students a practical contact with working life for a couple of months. The university has the possibility to arrange practice in the companies by paying part of the student salaries. This establishes contacts with the companies and gives posts for the students. The ABE subject has also contacts with the national and international agricultural machinery industry via Agrotechnology network, which is established to promote the agricultural engineering field and to find new research subjects.

Students have also so called subject clubs. ABE students have formed Technology Agrarian -student club for promoting studies and student life. The club arranges meetings and excursions and takes care of student supervision especially with new students. Graduated ABE students are forming also alumni for the subject. This would promote the subject when new and old students meet. Alumni meetings with students are also one way of disseminating career opportunities for ABE students.

2. Implementation of ABA study programs aimed at promoting its international image and multi-linguism
At UH, the present promotion is concentrated on national purposes. The subject of ABE does not have enough resources for foreign student education. This is, however, in change because the university is promoting English master programs. The agricultural engineering specialization line is considering joining as a subject to the international master program of agricultural science.

In 2010, the University of Helsinki launched an international and interdisciplinary Master’s Degree Program in Environmental and Natural Resources (MENVI) (http://www.helsinki.fi/menvi/). The aim of the program is to educate environmental experts with outstanding scientific skills. The programme consists of four study lines one of them being environmental engineering in agriculture. For PhD students, participation to the international PhD courses (like NORBE) and international and even national Doctor Programs (working language often English) increases the international image of studies.
3. Rare and/or disappearing knowledge as a tool for enhancing the attractiveness of ABA study programs

At present, the ABE subject is involved in student club project to collect historical data of ABE education in Finland. The aim of the project is to collect historical events and changes in the study programs as well as important episodes during the subject life. Also fast development of agricultural engineering from horse power to unmanned robots in the developed countries during the last 60 to 70 years can be interesting ‘success story’ of ABA.
Abstract
This paper presents first some tools to enhance the attractiveness of European study programs in BE in France, and of course in AgroSup Dijon. More specifically, it describes how is organized the higher education in France, notably the competition between Universities and Higher Educational Institutes. It appears difficult to differentiate between the Master students and the Engineers, since the development of the LMD European scheme. However, the means to provide information on these European programs are the same whatever the cursus is. It is in most cases done using Websites and personal contacts, but in some institutions an International Relationship Direction has been put in place to help teachers and researchers to promote their works, and also to facilitate students or staff mobility. Emerging projects could be put in place, not only in France.

1. Tools for enhancing the international attractiveness of European study programs in Agricultural/Biosystems Engineering (ABE).

   a. The contents of information concerning ABE or relevant study programs and the means by which it is provided by the Universities of your Country to high schools (e.g. ppt presentation). The information about ABE or relevant study programs that are and/or will be distributed to various stakeholders in your Country, and also the multimedia tools used for this purpose

   It is quite difficult to have all the information from all the ABE Universities in France and overall to compare them. Indeed, in France, as previously described in the others ERABEE workshops, technical studies are either proposed by Universities, or by Higher Educational Institutes (HEI) with different selection ways. For the access to the Universities, only the Bachelor is demanded. In contrary, for HEI, there are three main possibilities: after a 2-years University studies, after a technician diploma or after a 2-years scientific studies. In ABE context, only HEI are concerned with European study programs and the rest of the paper will only speak about these HEI.
The table 1 summarizes the different ABE or relevant study programs in the Higher Educational Institutes in Agronomy.

<table>
<thead>
<tr>
<th>Degree</th>
<th>Agro Paris Tech</th>
<th>Agro Campus Ouest</th>
<th>SupAgro Montpellier</th>
<th>ENSAIA (Nancy)</th>
<th>ENITAB (Bordeaux)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Life Sciences and Technologies</td>
<td>With Doctoral Schools of the Universities of Paris</td>
<td>With Doctoral Schools of the University of Rennes</td>
<td>With Doctoral Schools of the University of Montpellier</td>
<td>With Doctoral Schools of the University of Nancy</td>
</tr>
<tr>
<td></td>
<td>Management and Treatment of water, soils and wastes</td>
<td>2 masters in human and social sciences</td>
<td>1 master in sciences and technologies</td>
<td>European Master in Wine growing and oenology Vinifera EuroMaster with Universities of Giessen, Wiesbaden, Madrid, Turino, Milano, Palermo, Padova, Udine and Verona , Lisboa</td>
<td>European Master in Sustainable Development: Agris Mundus</td>
</tr>
<tr>
<td></td>
<td>European Master “Animal Breeding and Genetics” with the Universities of Wageningen, Vienna, Christian-Albrechts of Kiel, of Uppsala, of UMB As (Norway)</td>
<td>1 master in economics and management</td>
<td>1 international master in rural development</td>
<td>Mathematics and Biostatistics</td>
<td>FAGE (Forestry Agricultural - Environment)</td>
</tr>
<tr>
<td></td>
<td>European Master “Sustainable Tropical Forestry” with the Universities of Bangor, Copenhagen, Dresden, Padova, and ENGREF of Montpellier</td>
<td>Integrated Farming</td>
<td>Integrated Wine Growing</td>
<td>Master Marketing, Commerce (in agri-food – apprenticeship only)</td>
<td>BAAN (Biotechnology, Food Science, Nutrition)</td>
</tr>
<tr>
<td></td>
<td>European Master Erasmus Mundus “European Forestry” (piloted by University of Eastern Finland)</td>
<td>Integrated Wine Growing Sales Manager in wines and dealers</td>
<td>Management of the quality systems of the wine-producing and growing path</td>
<td>Automated management of the water treatment systems</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>Analytical and experimental biology of plant and animal microorganisms (BAEMOVA)</td>
<td>Integrated Farming</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Interprofessional cooperation of coastal landscape (CIZC)</td>
<td>Landscaping</td>
<td>Integrated Vine Growing</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>jobs in calf production consulting</td>
<td></td>
<td>Integrated Politicking</td>
<td>Integrated Management</td>
<td>Integrated Agriculture</td>
</tr>
</tbody>
</table>

Table 1. ABE Study programs in the main HEI in France.
Concerning the means to provide or distribute ABE study programs in France, all the HEI use the same ways with some differences on the quality of their impacts. We can find for example:

- Student Forums with PPT Presentations to explain principally the specializations, the employment rate and the delay between the end of the studies and the first job. Video recording can be used to furnish testimonies. A specific survey is generally done 6 months, 1 year and until 4 years after the output of a promotion.
- In complement to student’s forums, we send documents to High School to be distributed to the future students.
- Contacts/partnership with Industrials through for example APRODEMA.
- Each year, the journal “L’étudiant” provides the classification of all the HEI (technical, agronomical or others).
- Some trade shows like SIMA (International Show on Agricultural Machine), SIA (International Agricultural Show), SITEVI (International Show on Wine growing machines and techniques) … for the International shows organized in France.

Contrary to Business Schools, the Universities concerned with ABE domain have never used technical press to promote their own trainings except AgroParisTech which is more dedicated to Environment and Sciences.

In conclusion, a complete survey has been done by the Study Direction of AgroSup in which it appears that we note the exponential development of training paths in partnership with enterprises (apprenticeship).

**b. The information about ABE study programs that is available by means of the web-site of your institution.**

Our website is currently always under construction due to the amalgamation between our two Higher Educational Institutes in Agriculture in Dijon: Enesad (more agronomic) and ENSBANA (exclusively agri-food engineering). The creation of AgroSup Dijon (ASD) is effective since the 1st of March 2009, but currently we have again two specific cursus due to the two different student’s audiences.

In term of ABE study programs, in parallel with Engineers trainings, ASD offers the possibility to follow different Professional Licences (PL) and Masters. The complete list is given in Appendix 1.

Specifically we describe below 3 PL and 1 Master:

- PL in Technical and Economical Management of Agricultural Engineering which answers to targeted jobs, different from those sought for BAC+2 or engineers, in five main sectors: Agriculture, Maintening/services, Distribution/Marketing, Production and Teaching/consulting/communication.
- PL in Environnement Protection with a specialization in the water and waste treatment.
Project Number: 134306-LLP-1-2007-1-GR-ERASMUS-ENW

- PL in Agriculture, Sustainable development, New technologies. The objective is to provide complementary skills in the domain of crop productions, environment and applied CIT\(^1\) (professional software, GPS, GIS). The jobs targeted are (non-exhaustive list): Technical manager in "Agri-Environmental" consulting, in crop experimentations, in Agriculture/Environment/National planning and development; Teacher or training advisor …

All these PL offer a tutorial project during the training and a practical training. The project will be an right opportunity for the students to manage a whole project, in relation with enterprise. The programs are given in Appendix 2.

We also have a MaTEA\(^2\)'s Master which will be describe more accurately below. This Master is done in partnership with the University of Goriachkin in Moscou (Moscow State AgroEngeneering University). The training consists in 4 semesters including practical training periods and academic ones.

We offer the opportunity to our students to follow minor courses in Moscow during one semester. The program of the Master is given below:

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\(^1\) Communication and Information Technologies
\(^2\) Technical and Economical Management of the Agricultural Engineering
Education and Research in Biosystems or Agricultural and Biological Engineering in Europe; a Thematic Network (ERABEE-TN)

Project Number: 134306-LLP-1-2007-1-GR-ERASMUS-ENW

**SEMINAR 1** (400h, 20 weeks, 30 ECTS)
- UE 1: Applied Sciences and scientific approach (8 ECTS)
- UE 2: Equipment Techniques and Sciences (I) (8 ECTS)
- UE 3: Agricultural Productions (7 ECTS)
- UE 4: Economy, Management, language (7 ECTS)

**SEMINAR 2** (200 h, 10 weeks, 10 weeks for practical training; 30 ECTS)
- UE 5: Equipment Techniques and Sciences (II) (8 ECTS)
- UE 6: Pluridisciplinary approaches, project management, communication (8 ECTS)
- UE 7: Practical training in an Enterprise or a Research organism (14 ECTS)

**SEMINAR 3** (400h, 20 weeks, 30 ECTS)
- UE 8: Equipments Sciences and technologies (7 ECTS)
- UE 9: The Agricultural engineering in their technico-economical context (15 ECTS)
- UE 10: Knowledge about the sector of AE, communication (8 ECTS)

**SEMINAR 4** (Practical training, 18 weeks minimum, 30 ECTS)

Changes in 2012: the Economical courses will be done in the second semester of the M1 so as to allow the students to do their marketing case study directly at the beginning of the second year. Moreover, we envisage to welcome more students with professionalization contracts, apprenticeship …

Concerning the job opportunities, we noted that in Europe the AE sector needs high level managers at the interface between production and equipments distribution, and also in the consulting jobs. The main job opportunities are then:

- Product or Development Manager
- Communication Manager
- Training Manager
- Sales Representative or Manager
- Maintening or Responsable Purchase Manager
- Financier or Marketing Manager
- …

To facilitate the attractiveness of foreign students, we propose to accommodate these students in one of our two student’s residences for a weak rent.

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1 Unité d’Enseignement (Training Unit)
c. The methods of contacting (e.g. links with USAEE-TN and ERABEE-TN web-sites in the web-sites of the European Faculties of Engineering and Agriculture) the Faculties of Engineering and Agriculture of your Country, in order to provide them with the information about ABE study programs.

In France, the use of Websites appears as the main method to contact our HEI, which have all an International Relation Direction (IRD). Concerning specifically ASD, our IRD is currently doing a hard work of networking for the teachers and the students (links with the ICA network (http://www.ica-europe.info/)).

Personal contacts is also another way and by the way of the ERABEE Network this could be easy. In France, we developed since 2007 what we call “RMT” for “Réseau Mixte Technologique” (Technological joint Network). The objectives of the 16 RMT financed by the French Agricultural Ministry are to regroup all the persons (teachers, consultants, researchers, engineers) of a specific domain to work together on the same projects. For example, ASD is involved in the RMT “Agricultural Engineering and Energy” for a better management of the energy consumption of the mobile machines in the farms.

Finally, international congresses are also a possibility, but there are generally more turned into the Research topics than into the Educational ones.

d. The ways for promoting the practical training of students at enterprises involved in the field of ABE in your Country.

Practical trainings are obligatory in HEI, due to the decision of the CTI1. Indeed, the CTI lays that at least one practical training (PT) period is done abroad. These last one can be done either in enterprises or in research laboratory. Moreover, most of the HEI in France gets an Insertion Cell which, provides job surveys for the students, recovers “taxe d'apprentissage” which corresponds to the financial participations of the enterprises to specific trainings.

Two other ways for promoting PT of students are well developed in France: the network of the former students who are currently in the industry and the sending of information about the different PT periods for the different studying years to HR or Director of Companies (contents and expectations).

The last way is the trade shows during which the students can discuss with enterprise managers and give them their CV.

e. The schemes for promoting the mobility of students, graduates, PhD students and staff within and outside Europe (e.g. by disseminating the web-based database about the European study programs in Biosystems Engineering, established in the framework of USAEE-TN, and promoting the establishment of new bilateral Erasmus agreements to be reported in the updated matrix of bilateral ERASMUS agreements).

Generally, the IRD of each HEI use classical European and/or international tools such as ERASMUS, LEONARDO or TEMPUS (for example with East Europe Countries on Sustainable Development, but also soon with Latin America). That means that each IRD answers to calls for tenders.

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1 Commission des Titres d'Ingénieurs
Concerning the LEONARDO project, ASD has developed a professionalization program for the AE teachers, who can receive a designated amount for one week abroad. This system has nevertheless been used only a few times since ten years. It also exists some bilateral agreements with other universities which will be described in the workshop.

Since a practical training period abroad (called “stage agriculturel’ in ASD) is obligatory, some specific scholarships are available for the students, depending on their own financial resources but also on the region in which they study. For example, in the Burgundy region, our students can receive 80 €/week abroad (until 30 months !) and a BRECI scholarship from the Agriculture Ministry of 450 € per student for only one mobility whatever the duration.

The AUF Agency\(^1\) can also provide financial solution to help the mobility of the students and the graduates, but also the staffs. Concerning the PhD Students, they can obtain some resources from Doctoral Schools only for one displacement abroad. For more amount, they have to find other solutions.

\(f.\) The ways of disseminating career opportunities for ABE graduates (including research fellowships and research projects).

For this specific part, the Insertion Cell organize each year a Recruitment forum in which students meet Human Resources manager to discuss about practical training or directly about job opportunities.

For the teachers/researchers but also for Professionals, it exists an ERASMUS scholarship based on an analysis of the labor market abroad.

In most cases however, the dissemination of career opportunities for ABE graduates is tied to the network of former students or personal contacts with foreign researchers.

Finally, the APECITA (Agence pour l’Emploi des Cadres Ingénieurs des Techniques Agricoles) provide a lot of job offers which can be also sent to executive search consultant.

\(g.\) The ways of announcing open European or international academic positions in the field of ABE.

The creation of the ERABEE network constitutes the best way to announce open European or international academic positions, even if personal contacts could represent another interesting way of investigations together with meeting in international congresses.

Other tools of attractiveness could concern the financial salary (which depends in France local and regional policy) and also the possibility for a teacher/researcher to come in a foreign country with its family. For the students, the possibility to obtain a double diploma, as we do with the MaTEA Master, could be a real motivation to go abroad.

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\(^1\) Agence Universitaire de la Francophonie
2. Implementation of ABE study programs in your Country aimed at promoting their international image (TUNING Template).

Changes in degree profile(s): Please, outline any significant change occurred during the last two years relevant to ABE study programs in your Country with respect to the situation described during the previous ERABEE Workshops. Were these changes aimed at increasing the attractiveness of the study programs or were they influenced by stakeholders (e.g. employers) and/or ERABEE-TN activities? Eventually describe the outcomes of those changes.

Learning, teaching & assessment: Please, provide examples of best practice in learning, teaching and/or assessment, aimed at achieving competences relevant to ABE and promoting the international image of the related study programs.

We have a lot of Higher Educational Institutes of Agronomy in France which deliver Engineer diploma, generally a French specificity. To be sure to be recognized in a European and International context, we have to develop the Master Degrees to answer to the LMD scheme and to enhance the attractiveness.

To our opinions, no major changes have been occurred during these last two years, even if concerning the international Masters (Master “Article 15” in France) in ABE, two of the four previously accepted by the Ministry have been erased. These Masters are not very developed because of constraints tied to the global number of students to have, the proportion of foreign students compared to French one, the correlation between courses and research (evaluation by the AERES French Agency (Agence d'Evaluation de la Recherche et de l'Enseignement Supérieur) which evaluate not only the educational background (contents and expectations) but also the research and the adequacy between the two domains. We note that it is sometimes difficult to have a perfect adequacy because our research are generally very targeted on specific field of investigation).

Nevertheless, the alimentary crisis has increased the problem of energy management and should modify – for long-term?, the trainings and the courses. This is exactly the same thing with the CIT.

Seaward of changes, some emerging projects have been proposed either by the APRODEMA or the Cemagref (like training in Machine security or human protection). Concerning the APRODEMA, it has noted that the enterprises had a lack in term of French international managers specialized in marketing. Indeed, on the big manufacturers, a few of great managers are French, which is particularly due to the languages which are not mastered by our students. One solution could be to propose a 1-year training in Marketing/External Trade supported by AgroSup Dijon which will be decomposed in four trimesters: one in France, one in Italy, one in Germany, the last one corresponding to a kind of practical training.

This is not a new idea because, Claas had put in place a similar welcoming program for European students in its plants in Germany. In the same time, John Deere had also developed this kind of program between Europe and US. These opportunities are quite interesting but need a lot of energy and partnership between enterprises and Faculties or HEI.
Finally, we note in France a feminization of employment: since 20 years the percentage of girls in ABE studies has evolved from 40% to 75% and for the next years it could possible to have a ratio of 80%-20%!! This major change has to be took into account in the trainings we propose, and especially for the Agricultural engineering.

3. Please, describe the tools for promoting the multi-linguism in ABE study programs in your Country (e.g. courses and/or dissemination materials offered in languages different from the native ones, etc.).

In France, the classical way to promote multi-linguism in ABE study is to oblige students to do practical training periods abroad during two or three months. In complement, we generally offer English, Spanish and German courses in our HEI to students who are motivated. In ASD, we propose moreover to take some courses in others languages (Russian, Chinese, Italian ...) with students of these countries who are in the University of Burgundy for their own studies. As far as we know, this opportunity is not always used by students, even if it is not developed in other HEI. Our objective concerning the MaTEA is to propose next year a MUNDUS. For the moment, our courses are in French but the development of international trainings will oblige us to propose English courses, which appears as an incredible handicap for many teachers. That is why ASD has developed a specific Innovative Cell to coach the teachers and help them to be well with English.

4. Please, describe the topics of rare and/or disappearing knowledge that can be used as a tool for enhancing the attractiveness of ABE study programs.

In France, our trainings are nowadays more economical than technical to answer to the job opportunities in the ABE domain. This is to our opinion a mistake and technical skills on the machines and/or agricultural equipments should be developed. Another thing could be to return to field experimentations, in the sense of interactions between machine and soil/plant/animals. The use of CIT has probably erased all the previous skills based on the use of mechanical materials.
APPENDIX 1: List of the LMD trainings in ASD

PL

- Formateur en milieu professionnel
- Maintenance des systèmes pluritechniques
- Protection de l'environnement
- Agriculture, durabilité, nouvelles technologies
- Management de la Production dans les Industries Agroalimentaires

Master

- Master sciences, technologie, santé
  mention science des aliments
  mention environnement-terre-évolution
- Master droit, économie, gestion
  mention sciences économiques : spécialité "économie et gouvernance des territoires" EGT
- Master psychologie
  mention psychologie cognitive : spécialité "ingénierie des apprentissages en formation professionnelle et nouvelles technologies"
- Master Management Technique et Economique des Agroéquipements (MaTéa)

+ specialized master
- Sciences et management de la filière équine (MESB)
- Connaissance et Commercialisation Internationale des Vins (CCIV)
- Action publique pour le développement durable des territoires et de l'agriculture (ACTERRA)
- Marketing Alimentation Santé (MAS)
### APPENDIX 2: Programs of the specific PL of AgroSup

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#### MORALTIES D'ÉVALUATION ET DE CONTRÔLE DES CONNAISSANCE

Année Universitaire: 2007-2008

Le dossier des études conduisant à l'obtention de la licence professionnelle a été déposé au 17 novembre 1999; pour au 30-3-2005, signée à menton des enseignants.

Le contrôle d'évaluation de la licence professionnelle a été constitue du l’année 1 de l’UEB (I) et du 2 et 3 SEM de l’UEB (II) et III. Les étudiants ont été évalués sur la base de la valorisation des résultats des études de l'UEB (I) et II et III.

Les unités d'enseignement sont effectuées en fonction de l'objectif qui peut varier dans un rapport de 1 à 3. Les séances d'apprentissage sont comptabilisées de plusieurs éléments d'enseignement, c'est-à-dire qu'il est effectué d'un report à un autre.

Les apprendants ont été contrôlés en cas de connaissances et de compétences, ils doivent être posséder le certificat final et être évalué à 10 sur 20.

Le lieu d'étude professionnel n'a pas été retenu, les unités d'enseignement dans lesquelles la mention de 10 a été attribuées vers des compétences. Les unités d'enseignement ont été évaluées à 10 sur 20.

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Objectifs de la formation et débouchés :

- Ce diplôme réunie aux attentes des professionnels, industriels ou collectivités, qui ont de plus en plus besoin de jeunes diplômés de niveaux B1 et B2 ayant une formation en environnement et développement durable.
- Les candidats auront une formation en environnement et développement durable.
- Les candidats auront une formation en environnement et développement durable.

Compétences acquises à l'issue de la formation :

- Capacité à adresser les aspects techniques et problématiques liés à l'environnement et aux déchets, et à les contrôler de manière professionnelle.
- Capacité à adresser les aspects techniques et problématiques liés à l'environnement et aux déchets, et à les contrôler de manière professionnelle.

Modalités d'accès à l'année de formation :

- Cette formation est ouverte aux candidats à la formation initiale, en contrat de professionnalisation et en contrat de travail.
- Les candidats auront été sélectionnés par la Commission pédagogique.
- Les candidats auront été sélectionnés par la Commission pédagogique.

Organisation et descriptif des études :

- Les études d'adaptation (UE 1) sont mises en place dans le développement de l'UE 1, et les UE 2, UE 3 et UE 4 en fonction du domaine.
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**Project Number:** 134306-LLP-1-2007-1-GR-ERASMUS-ENW

**Education and Research in Biosystems or Agricultural and Biological Engineering in Europe; a Thematic Network (ERABEE-TN)**

### Objectifs de la formation et d'intégration

La formation professionnelle « Agronomy Engineering » nouvelle technologie, vise à former des ingénieurs en sciences ou en ingénierie agronomique. Ainsi, en combinaison avec la formation ouverte et continue, le projet vise à développer une offre de formation qui répondra aux besoins des formateurs, des employeurs, et des étudiants dans le cadre de la coopération et de la formation continue.

### Tableau de répartition des enseignements et des contenus de connaissances assimilés

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### Tables de répartition des enseignements et des contenus de connaissances assimilés

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### Mise en œuvre

Chaque UE est développée sur des bases de données qui sont disponibles sur le site de l'Université. [http://www.********.fr](http://www.********.fr)

La formation est délivrée en ligne aux étudiants en formation initiale, en remplacement de la professionnalisation ou de la formation continue, et elle peut être suivie à distance. Les crédits sont délivrés selon le calendrier de l'UE, y compris en ligne ou à distance, et le nombre de crédits délivrés est celui correspondant à la date du calendrier de l'UE. En outre, les crédits délivrés sont des crédits qui sont obtenus lors de la réalisation de la formation continue et qui répondent à la formation initiale dans l'une des modalités de contrôle.

**Mobilisation des ressources**

Chaque UE dépend de ressources propres à l'UE et, en outre, des ressources communes à l'UE ou à l'UE concernée. Le projet vise à faire une mobilisation des ressources propres à l'UE ou à l'UE concernée.

**Notes**

- Les UE 1 et UE 2 peuvent être suivies en ligne ou à distance.
- Les UE 3 et UE 4 peuvent être suivies en ligne ou à distance avec des modalités de contrôle spécifiques.
Deuxième session : les étudiants n’ayant pas obtenu la moyenne de 10 sur 20 à la première session d’examen passent une épreuve de rattrapage pour chaque unité d’enseignement (UE1 à UE5) où ils ont obtenu une note inférieure à 10 sur 20.

Ils peuvent toutefois conserver le bénéfice des UE pour lesquelles ils ont obtenu une note égale ou supérieure à 8 sur 20.

Dans une UE non acquise et constituée de plusieurs matières, l’étudiant ne repasse que la ou les matières dont la note est inférieure à 10.

Les notes obtenues à la deuxième session se substituent aux notes de la première session. La compensation entre unités d’enseignement est la même que pour la première session.

Lorsque la licence professionnelle n’a pas été obtenue, les unités d’enseignement dans lesquelles la moyenne de 10 a été obtenue sont capitalisables. Ces unités d’enseignement font l’objet d’une attestation délivrée par l’établissement.
ENHANCING THE ATTRACTIVENESS OF GERMAN
STUDY PROGRAMS IN BIOSYSTEMS ENGINEERING

Jens Fehrmann
TU Dresden, Faculty of Mechanical Engineering, Professorship Agricultural Systems Technology, 01062 Dresden, Germany

1. Eduserver „Bildungsserver Agrar“ within the internet

Today’s society of knowledge requires a correct qualification and whose stability as the most important prerequisites for individual chances in the future professional life. In order to reach this objective, manifold information about opportunities for educational training in Germany is essential and necessary. The internet offers a very good platform for educational advertising. For the agricultural sector (ABE is still part of it) in Germany the eduserver “Bildungsserver Agrar” was created in collaboration of the federal ministry, the information service “aid infodienst” and the federal states and associations of the agricultural sector. (http://www.bildungsserveragrar.de)

The eduserver Agrar was released to the public in January 2007. Many german agricultural and horticultural associations (DBV, ZVG, VLK) participated on the conceptual design of the platform. Objective is to organize a nationwide transparency to education in the agricultural sector. The eduserver Agrar bundles the available manifold information to educational Training and corresponding information to the topic.

2. The categories of the platform

In the following the single categories of the eduserver Agrar will be described in more detail.

a. News

Importance by the portal provider is attached to the publication of latest news, where characteristics and innovations within the 14 green professions are described, details to new study programmes and further professional qualification and well as background information to education in the agricultural sector are given. With a click to the corresponding category all news to a certain area of the eduserver will be composed.

b. Statistics

Information to educational statistics as well as to universities statistics and statistics to universities of applied sciences are given under this category.

c. Educational Policy

Within the educational policy often topics are discussed, which are of importance for the agricultural sector. Those topics are picked up here and explained and discussed. The European Qualification Framework (EQF) and the educational and higher
educational reform package are hot topics at the moment. Also e-learning has been playing an important role for years and is under discussion on the portal. Users can also find statistical information to education under this chapter.

d. Education

According to information of the German Farmers Organisation the number of new educational contracts in the “Green professions” in the educational year 2006/2007 has risen by 7 % nationwide. In comparison to other economical branches the agricultural sector had the highest gain. Fortunately the offers for educational training are still higher than the demand.

The federal ministry will support this positive development by means of the eduserver. Only through engagement, motivation and providing the necessary information the trainees can reach the qualification, required by companies and industrial enterprises. All 14 existing “green professions” are comprehensively introduced in the portal. For all, who are looking for an apprenticeship, there is a database with open places.

e. Professional Education

In current times the knowledge is duplicating in very short times and therewith a lifelong professional qualification necessary. Users can get information about possibilities of professional education in companies and educational institutions. The measures for professional education are offers within the “Grünen Bildungskatalog”. This catalogue is part of the eduserver, but can also be reached by www.gruenerbildungskatalog.de.

f. Academic Studies

A composition of study programmes, final degrees and different study regulations can be found here. The current existing uncertainty about final degrees and study programmes will be increased by a growing number of specialisations and compulsory courses. The eduserver will help to get sufficient information to every topic. Study programmes at universities and universities of applied sciences are comprehensively introduced. New study programmes will be presented. The Federal Agency for Agriculture and Food is working on a description of study programmes, specialisations and courses, where the differences will be elaborated.

g. Internship

Objective for the internship in the agricultural sector is the education of junior staff members for the higher agricultural services in agricultural administrations. Within the eduserver Agrar the further development will be shown and alternatives will be discussed.

h. Job Market

An important part of the eduserver is the job advertisement. All with public funding financed positions can be advertised free of charge.

i. Legal Regulations

All legal regulations concerning the educational sector can be found in the latest version on the portal.
Education and Research in Biosystems or Agricultural and Biological Engineering in Europe; a Thematic Network (ERABEE-TN)

Project Number: 134306-LLP-1-2007-1-GR-ERASMUS-ENW

j. Funding
For the whole educational sector a whole string of funding opportunities exist. For students there is the BAFoeg and a variety of educational loans as scholarships and particularly gifted students. There are also existing funding opportunities for small and medium sized enterprises as well as for research. The eduserver AGRAR offers an overview, combined with interesting literature, deadlines and links.
1. Tools for enhancing the international attractiveness of European study programs in Agricultural/Biosystems Engineering (ABE). Please, describe:

1.1 The contents of information concerning ABE or relevant study programs and the means by which it is provided by the Universities of your Country to high schools (e.g. ppt presentation). The information about ABE or relevant study programs that are and/or will be distributed to various stakeholders in your Country, and also the multimedia tools used for this purpose.

Currently, information to high schools or stakeholders for the Department of Natural Resources Management and Agricultural Engineering (NRM&AE) at the Agricultural University of Athens (AUA) is available through the web site of organisations addressed to candidates of Greek Universities: e.g. [http://www.mysep.gr/?p=3328](http://www.mysep.gr/?p=3328) and private schools offering tutoring to pupils who take exams to enter the Greek Universities (e.g. [http://www.pyr.gr/sxoles/axiopiisis-fisikon-poron-georgikis-mixanikis.htm](http://www.pyr.gr/sxoles/axiopiisis-fisikon-poron-georgikis-mixanikis.htm) [http://www.e-paideia.net/programofstudies/item.asp?c=1941&p=1&i=31842&ix=0](http://www.e-paideia.net/programofstudies/item.asp?c=1941&p=1&i=31842&ix=0)). AUA has prepared flyers which introduce the whole University to high school pupils. In addition presentations are shown in high schools on a demand basis. One out of eleven staff members undertakes the responsibility to present the University (i.e. undergraduate and graduate studies, administrative issues, professional opportunities, etc.). These presentations include information about all six Departments of AUA offering degree programs of studies, including the NRM&AE Department. Among the topics presented included are specific topics on: (1) Precision Agriculture, (2) Bio-fuels and (3) Natural Resources Management offered by the Department.

1.2 The information about ABE study programs that is available by means of the website of your institution.

The Department, through the University’s web site ([http://www.aua.gr](http://www.aua.gr/)) (http://www.aua.gr/gr/dep/a3i/ in Greek; [http://www.aua.gr/gr/dep/a3i/index_EN.html](http://www.aua.gr/gr/dep/a3i/index_EN.html) in English) provides all information related to undergraduate study program objectives and scopes, divisions and laboratories, education and research, personnel and infrastructures and instrumentation. Furthermore, it provides information related to the graduate studies and more specifically about the specializations available and various administrative issues (i.e. entrance prerequisites, duration, number of students, etc.). Additional

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information is provided through the web-site of TABE-NET, addressed to American and European students.

1.3 The methods of contacting (e.g. links with USAEE-TN and ERABEE-TN web-sites in
the web-sites of the European Faculties of Engineering and Agriculture) the
Faculties of Engineering and Agriculture of your Country, in order to provide them
with the information about ABE study programs.

Through the E4, TREE and EUR-ACE synergies contacts have been established with
the Faculty of Engineering at the Aristotle University of Thessaloniki. Also, a meeting
with representatives of the Technical Chamber of Greece was held in summer 2008 so
as to introduce and explain the discipline. Colleagues from the Faculties of Agriculture
at the Aristotle University of Thessaloniki and at the University of Thessaly are well
aware of our study program because close relations and mutual cooperation have been
established through the USAEE and ERABEE Thematic Networks. Additional
information is provided and shared among all these institutions through the relevant
web-site links.

1.4 The ways for promoting the practical training of students at enterprises involved in
the field of ABE in your Country.

Students studying at the Agricultural Engineering division of the Department have the
obligation for a four month practical training either at the Laboratories of the Division or
at enterprises involved in issues related to their studies (e.g. greenhouses, green works
infrastructure, farmstead equipment, mechanization and automation, irrigation systems,
renewable energy resources, etc.) or at services of the public sector (e.g. Ministry of
Agriculture, Research Institutions, etc).

1.5 The schemes for promoting the mobility of students, graduates, PhD students and
staff within and outside Europe (e.g. by disseminating the web-based database
about the European study programs in Biosystems Engineering, established in the
framework of USAEE-TN, and promoting the establishment of new bilateral Erasmus
agreements to be reported in the updated matrix of bilateral ERASMUS agreements).

The Department participates along with three more European Departments (University
College Dublin, Universidad Politécnica de Madrid and University of Bari) and two USA
Departments (Virginia Tech and University of Illinois at Urbana-Champaign) in TABE-
Net, an EU-USA project concerning student and staff/faculty mobility. Experiences will
enhance the global perspectives and will create a cohort of students aware of, and able
to work in, a global employment market (during its four year eligibility period 24 students
will have the opportunity for funded travel scholarships each way across the Atlantic). In
addition, the Department is actively involved in new initiatives for cooperation with other
European Universities and international Departments offering high level programs of
studies in Biosystems Engineering to promote Educational synergies and exchange of
students at the undergraduate and graduate level and staff mobility. Students may also
pursue practical training at European countries through internships at European enterprises
supported by the corresponding EU funded programme.
f. The ways of disseminating career opportunities for ABE graduates (including research fellowships and research projects).

The career service offices of all three Greek Universities offering ABE studies usually disseminate the career opportunities. Unfortunately, for the time being, the ABE graduates from all three Greek Universities are awarded the general Agronomist degree. This fact, along with their rather narrow engineering background knowledge, does not allow them to find easily jobs in the area of Agricultural or Biosystems Engineering. Usually they are employed for all-purpose Agriculture related jobs. As a result not many career opportunities are available while no reliable statistics exist.

On the contrary, temporary career opportunities in research projects are available in areas such as: (1) Bio-fuels (e.g. bio-diesel, bio-ethanol), (2) Bio-based materials and (3) Quality of products (e.g. dehumidification of fresh agricultural products during cold storage, refrigerated storage and air drying; modified atmosphere, active or passive, in whole and cut agricultural products). Projects related to these areas are shown below and are usually funded by European or National funds:

- **Alternative fuels for industrial gas turbines**
- **Experimental study of the use of crude vegetable oils as fuels in internal combustion engines of agricultural machines.**
- **Rural sustainable development through integration of Renewable Energy Sources in poor European regions.**
- **Pellets Atlas: Development and promotion of a transparent European Pellets Market – Creation of a European real-time Pellets Atlas.**
- **HORTIBIOPACK: Development of innovative biodegradable packaging system to improve shelf life, quality and safety of high-value sensitive horticultural fresh produce.**
- **Mechanisms of the biodegradation in soil of biodegradable polymers designed for agricultural applications.**
- **Labelling agricultural plastic waste for valorising the waste stream.**
- **Biodegradable drip irrigation system.**
- **Study of combined photochemical degradation and possible biodegradation in soil of polyethylene with pro-oxidants mulching films.**
- **New biodegradable plastics for mulching and low-tunnel cultivation.**

In many cases, researchers have found their way to the labour market and started a career taking advantage of their experience and involvement is such research projects.

g. The ways of announcing open European or international academic positions in the field of ABE.

European academic positions can be found within the ERABEE web-site ([http://www.erabee.aua.gr/index.htm](http://www.erabee.aua.gr/index.htm)) using the ‘Open Positions’ button found in the public area. In addition, announcements are circulated through the University’s Erasmus office or electronically through personal contacts.
h. Other tools of attractiveness (open topic, optional).
European research projects allow the establishment of strong ties between European research teams and the Department of AUA and this, in turn, promotes the image of the Department and of the program of studies offered. Senior researchers and post-docs participating in such research programs or working at AUA, acting as a host institute, disseminate their experiences when they are back home enhancing in this way the attractiveness of the research activities of the Department in hot topics of the Biosystems Engineering area.

2. Implementation of ABE study programs in your Country aimed at promoting their international image (TUNING Template).

2.1 Changes in degree profile(s): Please, outline any significant change occurred during the last two years relevant to ABE study programs in your Country with respect to the situation described during the previous ERABEE Workshops. Were these changes aimed at increasing the attractiveness of the study programs or were they influenced by stakeholders (e.g. employers) and/or ERABEE-TN activities? Eventually describe the outcomes of those changes.

No changes relevant to ABE study program have happened during the last two years. Very lately, because of the internal evaluation report, discussion was intensified, but did not end up to any conclusions. Most probably any changes will be enforced from the Ministry of Education through a planned major restructuring of the Greek Higher Education according to relevant announcements made in July 2010. Open public discussion on the proposed changes, to be announced in detail in September, is expected to last until the end of the year before final decisions are taken. In an attempt to remain in contention with international developments the most appropriate solution seems to be the organization of two new independent, contemporary and accredited Departments, namely: (1) Environment and Natural Resources and (2) Biosystems Engineering.

2.2 Learning, teaching & assessment: Please, provide examples of best practice in learning, teaching and/or assessment, aimed at achieving competences relevant to ABE and promoting the international image of the related study programs.

A wide range of teaching techniques is used in all three Greek Universities offering ABE studies. Apart from the ubiquitous lecture, other/parallel or complementary methods used include: (1) Laboratory teaching, (2) Tutorials, (3) Problem-solving sessions, (4) Classroom based presentations, (5) Fieldwork and (6) Homework. Student learning activities range from attending lectures and participating in class discussions promoted by the lecturer, surveying literature (i.e. books, journals, etc.) to conduct searches relevant to topics under consideration, learn to pose problems as well as solve those set by the lecturer, practice technical or laboratory skills, work with other students to co-produce a report/design/answer to a problem and finally conduct research and write dissertations, reports, papers, of increasing difficulty (in terms of size and complexity of the material)
A range of modes of assessment is used, namely: (1) Coursework assignments, (2) Laboratory reports, (3) Fieldwork reports, (4) Oral presentations, (5) Work placement reports or diaries, (6) Written essays or reports, (7) Written or oral final exam.

The participation of Erasmus students in some classes offered in both Greek and English languages, or though individual tutoring, promotes significantly the international image of the program of studies offered by the Department.

3. Please, describe the tools for promoting the multi-linguism in ABE study programs in your Country (e.g. courses and/or dissemination materials offered in languages different from the native ones, etc.).

Within the context of reforms to take place, the Minister of Education has announced a planned legal action that will allow Greek Universities to offer undergraduate and graduate classes not only in Greek, but also in English thus promoting the internationalization of Greek study programs. Faculty staff of the Department of Natural Resources Management and Agricultural Engineering has been using English for more than ten years in various classes offered to SOCRATES / ERASMUS students.

4. Please, describe the topics of rare and/or disappearing knowledge that can be used as a tool for enhancing the attractiveness of ABE study programs.

Over the centuries, topics that could be used as tools to enhance the attractiveness of ABE study programs have been developed. Among them: (1) mulching using natural products instead of using oil-based plastics, (2) sheep and goats housing in traditional facilities at Less Favoured Areas (LFAs), (3) traditional production and processing of agricultural products (e.g. wine, cheese), (4) traditional farming activities and soil and water conservation, etc. Architectural-aesthetic integration of farm structures into the rural landscape, studies on ancient agricultural practices and technologies (ancient olive groves, olive oil extraction, pumps, irrigation, etc.) and utilisation of natural products as materials could serve as tools to implement various agricultural engineering applications and indirectly enhance the attractiveness of ABE study programs in the direction of supporting the emerging Bio-based Economy.
ENHANCING THE ATTRACTIVENESS OF EUROPEAN STUDY PROGRAMS IN BIOSYSTEMS ENGINEERING IN HUNGARY

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Abstract
Enhancing the attractiveness of European study programs in agricultural/biosystems engineering requires a great international effort but also in Hungary. The information on the study programs includes their detailed content and the way of dissemination. It has a special focus on the web-based databases. The practical training of students at enterprises has a rather big priority. It has also an important task to provide updated national and international career information for the graduates. In Hungary, among the recent activities for broader dissemination an English language BSc, MSc and PhD programs on agricultural/biosystems engineering and food industry was elaborated.

1. Tools for enhancing the international attractiveness

1.1. The content of information concerning ABE
As a matter of fact, in the field of Agricultural/Biological engineering education systems still there are quite big differences in European institutes. The common European market conditions along with the Bologna process conditions, no doubt, will require narrowing the gap between the different institutions. The developed common curricula will be applied in more and more extent, and that will lead also to the comparability of the recognition process across Europe.

There several steps taken in order to strengthen the dissemination of the developed curricula. Such actions are as follows:

- provide courses for Erasmus students,
- extend the number of students outside from EU,
- introducing the BSc courses also in English beside the local, national language,
- extend the co-operation with other universities, for example introducing double-degree programs.

In order to advertise the new study line along with the detailed curriculum different actions were also initiated as:

- recruiting in secondary schools,
- producing information brochures,
- organizing open days at the university,
- advertising via television channels,
- taking part in the biggest national education exhibition yearly (EDUKACIÓ),
- joint actions with companies, technical societies and other organizations.
The structure of the degree programs includes all the details of the methodological aspects, didactic concepts, teaching methods, learning conditions, examination procedures, study programs, etc.

It would be a great idea to develop a common ppt presentation about Biosystems Engineering and translate it into national languages. Distribution of such materials for potential students and also for stakeholders could help to increase the awareness and attractiveness of Agricultural/Biological engineering education systems all through Europe.

1.2. The information available about ABE

All the information discussed in the previous sections is available on the University/Faculty/Institutes websites. Such information could be load down or get it electronically from the university PR office.

1.3. The method of contacting institutions

In Hungary the Faculty of Mechanical Engineering, Szent István University, Gödöllő takes the lead of BSc, MSc and PhD educational programs on agricultural/biosystems engineering. So, the following institutions take part in the program:

1. Faculty of Mechanical Engineering, Szent István University, Gödöllő,
2. Agricultural Faculty of the Tessedik Sámuel High School in Mezőtúr,
3. Mechanical and Agricultural Faculty of the High School of Nyíregyháza,
4. Food Processing Industrial High School Faculty of the University of Szeged.

All the links and special information available for the educational partners to access the relevant websites including the national and the project/oriented ones, e.g. USAEE-TN and ERABEE-TN.

Besides the electronic access possibilities yearly there are organized at least one conference and/or meeting where the educational issues are also discussed between the partners.

Additional way of information access channel is the professors are lecturing also in the partner institutions.

1.4. The ways for promoting the practical training of students

Within the BSc studies, originally minimum 6 weeks of practical training was a required criteria. A practice outside the institute could be awarded with 30 credits. The most important thing is to be mentioned that the practical placement period has been extended for 15 weeks time along with an additional semester.

The MSc course includes a 4 week period of placement in industry which is organized in relation with the thesis work.

There is an additional possibility for MSc students to take part in industrial projects. It can be done during their second year of studies. Only 10% of selected students can take part in who had achieved a good progress in their previous studies. The duration is one or two semesters. During that period they are delegated to the companies and, they carry on with their studies as distance education students. They get some extra funds. They can hope to get a job after their final graduation with the associated
companies. After the second year experience based also the feedback from the enterprises, it seems that the Faculty will continue to extend this kind of education including higher number of students.

1.5. The schemes for promoting the mobility of students
The novel line of the qualification is the so-called study abroad program. All the students (BSc, MSc and PhD) with outstanding proficiency and knowledge of foreign languages can take part in it. They spent a semester at foreign universities and also they had done their diploma or thesis work there. There are exchange programmes with several universities like Gent, Nitra, Purdue, Vienna, Wageningen, etc. The cooperation like that could offer also mobility for the teaching staff doing also some research work abroad. Erasmus program can provide a good framework for that. The student taking part in courses abroad have the same situation if they were participating at any other course in different Hungarian universities. The Faculty has already elaborated credit agreement with a few universities here in Hungary. Concerning to the foreign courses the Credit Committee makes the final decision on the acceptance of the equivalent credits based on the studies carried out abroad. The main precondition for the equivalence of a course is the 75% coincidence in the content of the course material.

The application of the above method is rather simply, and it does not cause any difficulties for the students taking part in outside courses. The number of the courses performed outside the mother institution is significantly increasing including the agricultural/biosystems engineering field, as well. More and more students make an application to carry on some part-education outside, and especially foreign universities. The Gödöllő University has several number of bilateral Erasmus agreements, which provides opportunities also for professors to take part in mobility programs and guest-lecturing.

1.6. The ways of disseminating career opportunities
The exact forecast of the nation-wide demand for BSc degree specialists is very difficult. In one side it is clear that the enterprise form and the property size change, and the other side it should be take into account that the management of the small and medium-sized enterprises could be carried out by specialists graduating from biosystems engineering field. Besides the 20 state financed students per year nation-wide, there will be enrolled another 20 students in self-financed way. Taking into account the normal dropouts, yearly 30-35 graduated students assure the reinforcement of the experts in the agricultural engineering and food technology areas.

It is beneficial, however, for the ABE graduates, especially at MSc level, under the recent regulations, easily can get jobs initially offered for mechanical engineers. At the same time, the studying period for agricultural engineering requires less effort. The developed common curricula will be applied in more and more extent including Hungary, and that will lead also to the comparability of the recognition process across Europe. It is supposed a sensible influence on the employability. The recognition process applied will help to the agricultural/biosystems engineering graduates to enter
to the labour market, and find appropriate job. Concerning to the MSc and PhD level graduates additional research opportunities and fellowship possibilities are announced regularly.

1.7. The ways of announcing open European or international academic positions
Announcing and disseminate European and international fellowships and other academic positions are organized electronically via different websites and displayed posters at the campus, as:
- University/Faculty/Institutes,
- Foreign Affairs Office,
- Erasmus Office,
- Central Library website.

2. Implementation of ABE study programs in Hungary
2.1. Changes in degree profiles
In Hungary, in the biosystems engineering (specifically named agricultural engineering and food processing) study line more institutions take part providing appropriate educational and research infrastructure. Due to the Bologna process requirements new type of BSc, MSc and PhD education systems were developed in the field of biosystems engineering. The Faculty of Mechanical Engineering, Szent István University, Gödöllő takes the lead of that programs. Additionally, the National Agricultural Engineering Institute located also at Gödöllő, provides a reasonably high level of research infrastructure. It is efficiently used by the university researchers and students, as well.

The biggest action was elaborating a national wide common BSc and a second level MSc curricula for agricultural engineering and food processing, as a joint effort of the participating institutions listed before, which was accepted by the Hungarian Accreditation Committee in 2006. Since that time the BSc education in such field has already been started with about 35-40 students/semester at Gödöllő. It is considered as a really good start of this kind of education.

The BSc courses are composed of six + one semesters meanwhile the MSc courses last four semesters. The theoretical part of the PhD education takes place during three years. Additional two year period is intended for the thesis part. Along with introduction to the Bologna system the restructuring the Faculty has already been initiated. Instead of the former departments an institute based structure was developed. The new institutes were established according to the relevant new modules. In such a way the institutes will have more responsibilities for education issues.

Since the introduction of the Bologna regulation there were no significant changes in the agricultural/biosystems engineering education system. The developed core curriculum with regards to the Biosystems Engineering discipline is still valid under the recent conditions for all three educational cycles. The most important thing to be mentioned is that the practical placement for BSc students has been extended for 15 weeks time along with an additional semester. The practical part of the education is strongly supported in such a way.
The evaluation of the experiences of the BSc education is going on as the graduates came out second time right now in 2010. Based on that evaluation, further adjustments will be carried out. The 7th semester will be reconsidered as we are loosing some candidates for MSc.

2.2. Learning, teaching and assessment
The main institution to educate students in agricultural and food processing engineering in Hungary is the Faculty of Mechanical Engineering, Szent István University Gödöllő. The agricultural/biosystems engineering programme has been developed in a close cooperation with introducing the new three level (BSc, MSc and PhD) education system in accordance with the Bologna process. The credit system was introduced with full accordance with the ECTS which is the part of the entire national approach. The quality assurance is applied with the newly developed system, as well.

Some comments to the assessment procedure are as follows:

- It is required for students to register for modules from a specific semester(s) onwards.
- Modules are rated yearly; an overall evaluation is performed in every three year.
- In a few cases there are special examinations (e.g. class or oral tests) for exchange students who have registered for one or more semesters.

3. Tools for promoting the multi-linguism in ABE study programs
In Hungary the ABE programs are available in English in all the three level of education e.g. BSc, MSc and PhD. It is a good sign that the number of the Hungarian students also increasing who following the English language ABE programs. At PhD level writing thesis work in English is getting normal.

It is a rather strong condition, an intermediate level of state exam or another equivalent one from a living language (preferably English) is required to be graduated even at BSc level of studies.

4. Topics of rare and/or disappearing knowledge
It is rather important for a society saving his own heritage via educational programs. In Hungary there are strong efforts to take seriously this job. However, due to the influence of the modern, new subjects especially influenced by the information society make this matter more and more difficult.

Concerning to the local effort it is a good idea to get courses and some research on farm activities. It allows chance to involve knowledge also on the historical farm building, as well.

Another important aspect is that the rural tourism is developing fairly well. The government itself invests some money into this field. To provide an acceptable quality level for such sites the use of renewable energy sources can give some additional possibilities.

Almost all the universities in Hungary which have some agricultural background there are collections of old technological equipment. Under the auspice of the Faculty of Mechanical Engineering, Szent István University, Gödöllő, Hungary an agricultural
museum is in operation. It has a substantial collection of old machinery which is time to time is put into operation to show the long life viability of those technologies for the young generation. It is open also for the public.

References:


Relevant web-sites:
Hungarian National Doctoral Council: www.doktori.hu
Szent István University Gödöllő, Hungary: www.szie.hu
Doctoral School of Agricultural Engineering, Szent István University, Hungary www.mtdi.szie.hu
Faculty of Mechanical Engineering, Szent István University Gödöllő, Hungary www.gek.szie.hu
Department of Physics and Process Control, Szent István University, Hungary http://fft.szie.hu
ENHANCING THE ATTRACTIVENESS OF STUDY PROGRAMMES IN BIOSYSTEMS ENGINEERING PROGRAMMES AT UNIVERSITY COLLEGE DUBLIN

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Abstract
Tools for enhancing the international attractiveness of Irish study programmes in Agricultural/Biosystems Engineering (ABE) are reviewed. Increasingly web based initiatives are employed to disseminate information to potential students. Also a number of national initiatives in Ireland such as the Steps to Engineering programme have been developed to promote awareness of Careers in Engineering to primary and secondary level students.

The main mobility programmes which facilitate staff and student mobility to/from UCD Biosystems Engineering are also outlined. Recent changes in ABE study programmes are discussed together with an overview of new initiatives in Learning, Teaching and Assessment.

1. Tools for enhancing the international attractiveness of European study programmes in Agricultural/Biosystems Engineering (ABE)
University College Dublin (UCD) has one entry point for the majority of its Engineering programmes. Students apply through the national CAO Applications Systems [1] and select degree option DNO77 Engineering. After successfully completing a common first year in UCD Engineering, they are given unrestricted choice to specialise in Biosystems, Chemical, Civil, Electrical/Electronic or Mechanical Engineering (Figure 1). UCD has also recently introduced six new taught Masters programmes in the areas of Biomedical, Civil, Electronic and Computer, Energy Systems, Engineering with Business and Mechanical Engineering.

The main marketing and advertising strategies employed for UCD Engineering student recruitment include; UCD Engineering & UCD Biosystems Engineering professionally produced web sites and brochures, UCD advertisements in digital and print media, visits to schools & universities by UCD Biosystems staff and students to give presentations on An Introduction to Biosystems Engineering, participation in national marketing initiatives organised by Engineers Ireland including Engineering Week, Experience Engineering week long courses held each year in UCD during the school holidays to introduce students to Engineering and participation in other Engineers Ireland student dissemination events e.g. Steps to Engineering. Further details on all UCD Engineering programmes including curricula and careers information are available on-line through the UCD Engineering Programme Office [2].
The Steps to Engineering [3] initiative was established in 2000 to encourage primary and post primary students to explore the world of science and engineering. The value of the programme has been formally recognised by the Irish Government and is a key element of the National "Discover Science & Engineering" programme. The Steps programme is managed by Engineers Ireland and is supported by the Department of Education & Science, Forfás, FÁS and a number of major engineering employers. STEPS to engineering, with the help of dedicated volunteers promote engineering to students of all ages through various initiatives.

![Figure 1: Overview of the Bachelor and Masters Engineering programmes available at UCD.](image-url)
In 2009, over 85,000 Irish students nationwide participated in Steps to Engineering organised events. With many new and exciting projects in the pipeline this academic year promises to further encourage young people of Ireland to consider engineering as a possible career choice. This initiative is viewed by the Engineering profession in Ireland as being very successful at promoting careers in Engineering.

UCD Biosystems Engineering has also developed a range of Powerpoint presentations to give students an introduction to Biosystems Engineering including an overview of curricula and potential career opportunities. Digital material available through the Career Resources section of the American Society of Agricultural and Biological Engineers [4] including the "Discover Biological and Agricultural Engineering" presentation was a useful resource in developing these presentations. The inclusion of student profiles in promotional material was also found to be very useful for marketing the UCD Biosystems Engineering programmes (Figure 2).

Mobility of students and staff at UCD Biosystems mainly occurs through externally funded EU programmes. Examples include exchanges funded under the Tabennet, Tempus, Alfa Programme for Latin America and Marie Curie programmes (Figure 3). The overall goal of the TABENET project is to advance internationalization of Biosystems Engineering (BSEN) curricula and develop a global awareness within the discipline. Activities include identifying core threads of the discipline, creating a database of multinational examples that will globalize core BSEN courses, and developing several innovative courses. Student (24 students will have the opportunity for funded travel
Education and Research in Biosystems or Agricultural and Biological Engineering in Europe; a Thematic Network (ERABEE-TN)

Project Number: 134306-LLP-1-2007-1-GR-ERASMUS-ENW

scholarships each way across the Atlantic) and staff/faculty mobility experiences will enhance the global perspectives and will create a cohort of students aware of, and able to work in, a global employment market. Students will study abroad for a minimum of one semester and maximum of one academic year. The participating institutions are Virginia Polytechnic Institute and State University (VT) and University of Illinois at Urbana-Champaign (UIUC) and University College Dublin (UCD), Agricultural University of Athens (AUA), Universidad Politecnica de Madrid (UPM), and University of Bari (UniBar). UCD Biosystems is also an active participant in student and staff mobility through the Marie Curie programme under FP6 and FP7 mainly in the International Fellowships and Training Networks calls.

There is also formalised student/staff exchange agreement between Virginia Tech(USA) and UCD which is funded by both universities and has operated for the past 5 years. In addition, UCD Biosystems Engineering has recently agreed joint research initiatives with China Agricultural University and the Iranian government to fund student and staff mobility. In previous years the EU Tempus and Comett programmes have funded student and staff mobility to and from UCD Biosystems Engineering.

**Figure 3:** List of EU FP7 People Marie Curie Actions some of which are employed to facilitate student and staff mobilities to/from UCD

Career opportunities for UCD Biosystems Engineering graduates are disseminated by the UCD Career Development Centre [6]. The UCD Career Development Centre provides a high quality information, advice and guidance service to University College Dublin students and recent graduates. This includes help in; Developing career management skills, Job search including job vacancies, work experience and internships, job applications and interviews, Identifying graduate study options,
application and entry procedures. In addition Engineering Career opportunities are advertised through Engineers Ireland. Graduate research opportunities are advertised on the UCD Biosystems Engineering web site and also through www.findaphd.com and/or www.findamasters.com. The latter two web sites are very effective in attracting overseas student applications. Academic positions are generally advertised through the UCD university web site and also through www.jobs.ac.uk.

2. Implementation of ABE study programs in Ireland aimed at promoting their international image

Engineers Ireland has recently specified the programme outcomes which apply to Master’s degree engineering programmes (Level 9) aimed at satisfying the education standard which will apply to the title of Chartered Engineer from 2013. To meet these requirements, UCD Biosystems Engineering has totally revised its ABE study programme to include a Level 9 masters degree in Biosystems Engineering. This has necessitated the development of new modules and restructuring of existing modules to meet this new accreditation criteria.

The overall objective of the revised UCD Biosystems Programme is to equip students with the analytical skills necessary to develop a successful professional career within the Bioresource and related industries both in Ireland and abroad. The Bachelor programme progresses from the biological and engineering sciences of Biosystems, Thermodynamics and Computer Science in earlier stages, to Food and Bioprocess Engineering, Mechanisation and Renewable Energy Systems and Environmental Engineering later in the programme. In the later stages, students may diversify in areas of interest. A significant component of Stages 2, 3 and 4 is the requirement to carry out project work that is typically experimental, design or computer based. Students are allocated a personal tutor and supervisor to help with the development and completion of these projects.

An example of new developments in Learning, Teaching and Assessment aimed at achieving competencies relevant to ABE is the introduction of a new problem-based learning module called the Biosystems Engineering Design (BSEN10010 – 5 credits). The focus of this module is on designing and building a working, bench-scale device that solves a practical problem relevant to Biosystems Engineering. It provides an early opportunity for students to learn about engineering design, research, project management and teamwork. The module aligns well with the university’s policy to introduce alternative teaching and learning strategies compared to the conventional lecture. Enrolled students from a wide variety of programmes are split into teams of up to seven and meet an assigned mentor, normally a PhD student or postdoctorate researcher, each week during a semester to solve a specified problem. The objectives thus far have focused on water-driven electricity generation, treatment of greywater from domestic buildings, and biofiltration of malodours from food waste. The assessment criteria include teamwork, introduction to the research literature, minimisation of expenditure, device design, innovation, operational safety, system performance, report writing and appropriate use of biological and recycled materials. External experts evaluate each entry and substantial cash prizes are awarded to the top teams. Students receive individual academic grades based on their contribution.
Feedback on the module has been very positive from both inside and outside the University. The introduction of an online project journal for each student in the module facilitates the monitoring of student progress. In summary, the innovative use of problem-solving in this recently developed module has enhanced the learning experience for a diverse range of students and exposed them to a range of research activities. The winning student group has taken part in international student competitions at CIGR conferences.

3. Tools for promoting the multilinguism in ABE study programs in Ireland
In UCD Biosystems Engineering all Engineering modules are taught through English. However students may also register for one of a wide range of elective language modules in each year of their programme. Overseas students may also take additional courses and modules in English at UCD to improve their language skills. In recent years many overseas students have completed our Biosystems Engineering programmes including students from Russia, China, Iran, Brazil, Chile, Peru, Nigeria, Kenya and Ethiopia.

4. Topics of rare and/or disappearing knowledge that can be used as a tool for enhancing the attractiveness of ABE study programs.
Examples of rare knowledge in Irish Biosystems Engineering studies include soil mechanics for agricultural engineering applications and traditional agricultural/processing practices. In some cases publicly funded museums in Ireland are making strong efforts to document and preserve rare knowledge in these areas. However currently these areas are not used as a tool for enhancing the attractiveness of ABE study programmes.

References
[1] www.cao.ie
ENHANCING THE ATTRACTIVENESS OF ITALIAN STUDY PROGRAMS IN BIOSYSTEMS ENGINEERING

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Abstract
Tools for enhancing the international attractiveness of Italian ABE study programs are the bilateral agreements among many Italian Universities and other Erasmus ones. The information about ABE or relevant study programs are distributed to various stakeholders in Italy, e.g. students and related families, potential employers, and is also available by means of the web-sites of Italian Universities.
During the last two years significant changes relevant to ABE study programs occurred in Italy, as a consequence of the new regulations established by the Italian Ministry of Education, University and Research. The outcomes of these changes are the ABE study programs running in the academic year 2009/10. An example of best practice in learning, teaching and assessment, aimed at achieving competences relevant to ABE and promoting the international image of the related study programs, is the TABE.NET project.
Tools for promoting the multi-linguism in ABE study programs in Italy are: dissemination materials of some courses, courses of joint degree study programs between Universities of different countries, admission examinations and PhD thesis in languages different from the native one.
Topics of rare and/or disappearing knowledge that can be used as a tool for enhancing the attractiveness of ABE study programs are: historical farm buildings, agritourism, agricultural museums, old food processing equipment and buildings, agricultural tools for developing countries, old rural land infrastructures.

5. Tools for enhancing the international attractiveness of Italian study programs in Agricultural/Biosystems Engineering (ABE)
The Italian 1\textsuperscript{st}, 2\textsuperscript{nd} and 3\textsuperscript{rd} cycle study programs in Agricultural/Biosystems Engineering (ABE) running in the academic year 2009/10 are listed in Tables 1, 2 and 3 and are reported on the web-based database about the European study programs in Biosystems Engineering, established in the framework of USAEE-TN [1].

\textsuperscript{1} Antonio Comparetti, Phone +39 091 7028173, Fax +39 091 484035, e-mail comparetti@unipa.it
Table 1. Italian 1st cycle study programs in Agricultural/Biosystems Engineering (ABE) running in the academic year 2009/10.

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<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bologna</td>
<td>Sciences of Agricultural and Forestry Land and Environment</td>
<td>-</td>
<td>0</td>
<td>26</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>Milan</td>
<td>Agricultural Technologies for Environment and Land</td>
<td>-</td>
<td>0</td>
<td>28</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Padua</td>
<td>Land Restructuring and Landscape Protection</td>
<td>2</td>
<td>8-20</td>
<td>12-32</td>
<td>20-52</td>
<td></td>
</tr>
<tr>
<td>Palermo</td>
<td>Agricultural Engineering</td>
<td>-</td>
<td>5</td>
<td>30</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Perugia</td>
<td>Landscape Technical Management</td>
<td>-</td>
<td>24</td>
<td>27</td>
<td>51</td>
<td></td>
</tr>
<tr>
<td>Viterbo</td>
<td>Sciences and Technologies for Forest and Nature Protection</td>
<td>2</td>
<td>6</td>
<td>18-28</td>
<td>24-34</td>
<td></td>
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</tbody>
</table>

Table 2. Italian 2nd cycle study programs in Agricultural/Biosystems Engineering (ABE) running in the academic year 2009/10.

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Bari</td>
<td>Sustainable Rural Development</td>
<td>-</td>
<td>0</td>
<td>21</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Bologna</td>
<td>Planning and Management of Agricultural, Land, Forestry and Landscape Ecosystems</td>
<td>3</td>
<td>3-9</td>
<td>21-28</td>
<td>24-37</td>
<td></td>
</tr>
<tr>
<td>Palermo</td>
<td>Agricultural Engineering</td>
<td>-</td>
<td>9</td>
<td>25</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>Perugia</td>
<td>Sustainable Rural Development</td>
<td>-</td>
<td>0</td>
<td>44</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>Pisa</td>
<td>Planning and Management of Town Green and Landscape</td>
<td>-</td>
<td>9</td>
<td>15</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Sassari</td>
<td>Agricultural Systems</td>
<td></td>
<td>Agricultur al Engineeri ng</td>
<td>0</td>
<td>35</td>
<td>35</td>
</tr>
</tbody>
</table>
Table 3. Italian 3\textsuperscript{rd} cycle study programs in Agricultural/Biosystems Engineering (ABE) running in the academic year 2009/10.

<table>
<thead>
<tr>
<th>University</th>
<th>Faculty</th>
<th>Department</th>
<th>Cooperating institutions</th>
<th>PhD school</th>
<th>PhD program</th>
<th>Curricula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bari</td>
<td>Agriculture</td>
<td>PRO.GE.S.A.</td>
<td>Faculties of Law and Engineering</td>
<td>Land and Environment Governance</td>
<td>Engineering of Agricultural and Forestry</td>
<td>Land and Environment Governance; Agriculture, Forestry, and Environmental</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Land and Environment</td>
<td>Planning; Watershed Basins; Green Area Planning</td>
</tr>
<tr>
<td>Bologna</td>
<td>Agriculture</td>
<td>Agricultural Engineering &amp; Economics</td>
<td>Agricultural University of Athens (Greece)</td>
<td>Agricultural Sciences</td>
<td>Agricultural Engineering</td>
<td></td>
</tr>
<tr>
<td>Catania</td>
<td>Agriculture</td>
<td>Agricultural Engineering</td>
<td>Agricultural University of Athens (Greece)</td>
<td>Agricultural Sciences</td>
<td>Agricultural Engineering</td>
<td></td>
</tr>
<tr>
<td>Florence</td>
<td>Agriculture</td>
<td>Agricultural and Forestry Engineering</td>
<td>Technological Innovation for Agricultural, Food and Environmental Sciences</td>
<td>Agricultural Sciences</td>
<td>Agricultural Engineering</td>
<td>Agricultural Mechanisation and Energy Sources; Rural Buildings and Planning; Valourisation of Water Resources; Physics Applied to Agricultural and Food Engineering</td>
</tr>
<tr>
<td>Milan</td>
<td>Agriculture</td>
<td>Agricultural Engineering</td>
<td>Agricultural Mechanics and Mechanisation</td>
<td>Agricultural Sciences</td>
<td>Agricultural Engineering</td>
<td></td>
</tr>
<tr>
<td>Padua</td>
<td>Agriculture</td>
<td>Faculty of Medicine</td>
<td>Land, Environment, Resources and Health</td>
<td>Agricultural Mechanics and Mechanisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Palermo</td>
<td>Agriculture</td>
<td>I.T.A.F.</td>
<td>Environmental Hydrology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reggio Calabria</td>
<td>Agriculture</td>
<td>Agricultural, Forestry and Environmental Sciences and Technologies</td>
<td>Rural Development, Sciences and Technologies of Agricultural, Forestry and Animal Husbandry Production</td>
<td>Agricultural, Forestry and Environmental Engineering</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
One tool for enhancing the international attractiveness of Italian study programs in Agricultural/Biosystems Engineering (ABE) is the project TABE.NET, to which the University of Bari participates, together with the Agricultural University of Athens (Greece), the Polytechnic University of Madrid (Spain) and the University College of Dublin (Ireland), in EU, and Illinois University and Virginia Tech, in US.

An example of tool for enhancing the international attractiveness of Italian ABE study programs is the 1st cycle double degree study program in Agricultural Engineering offered by the Agriculture Faculty of Palermo University and Sevilla University (Spain). Other tools for enhancing the international attractiveness of Italian ABE study programs are the bilateral agreements among many Italian Universities and other Erasmus ones.

According to the data published by the European Commission, during 21 years of activity, from 1987 to 2008, Erasmus programme reached 1,846,600 students [2]. In 2008/09 academic year 19,376 Italian students benefited from Erasmus study and placements (9.8% of Erasmus countries), while Italian Universities hosted 17,496 students from other countries (8.8% of Erasmus countries) [3].

Yet, within ERASMUS bilateral agreements, specific data about ABE study programs are not available.

The contents of information concerning ABE or relevant study programs are the following:

- 1st and 2nd cycle degree study programs offered by Universities;
- potential job positions for the graduates of the above study programs.

The means by which this information is provided by Italian Universities to high schools are the following:

- visits of students attending the 5th and last year of high schools at Universities, mainly at the related research laboratories and equipment;
- visits of University staff at high schools, addressed to students attending the 5th and last year.

The information about ABE or relevant study programs are distributed to various stakeholders in Italy, e.g. students and related families, potential employers, including public and private sector bodies. Traditional tools, i.e. flyers, and also multimedia tools about the degree study programs offered by Universities, e.g. ppt presentations and movies, are used for this purpose.

The information about ABE study programs is also available by means of the web-sites of Italian Universities.
The methods of contacting the Italian Faculties of Engineering and Agriculture, in order to provide them with the information about ABE study programs, are links with USAEE-TN and ERABEE-TN web-sites (e.g. Bari University) in the web-sites of Italian Faculties of Engineering and Agriculture themselves.

The ways for promoting the practical training of students at enterprises involved in the field of ABE in Italy are the following:

- practical training, established by law for the 1st and 2nd cycle degree study programs;
- degree thesis of 1st and 2nd cycle study programs;
- 3-year PhD programs funded by private or public bodies (providing the PhD student with a scholarship of about Euro 20,000 per year).

The ways for promoting the mobility of students, graduates, PhD students and staff, both within and outside Europe, are the following:

- web-based database about the European study programs in Biosystems Engineering, established in the framework of USAEE-TN, to be disseminated throughout Europe [1];
- new bilateral agreements, to be established and promoted, besides those reported in the matrix of bilateral Erasmus agreements (Appendix 1).

The schemes for promoting the mobility of students, graduates, PhD students and staff, both within and outside Europe, are the following:

- research fellowships;
- research projects;
- short term (shorter than one year) contracts;
- practical training during the last year of degree study programs.

The ways of disseminating career opportunities for ABE graduates are the following:

- web-sites of Universities, research centres and EU institutions;
- E-mails sent by ABE colleagues of other Universities or research centres.

Other tools for enhancing the attractiveness of Italian ABE degree study programs are papers published on newspapers and journals describing the study programs themselves, etc.

Moreover, in order to enhance the attractiveness of any degree study program, the Italian Universities organise cultural, social and sports activities and events for foreign students.

6. Implementation of ABE study programs in Italy aimed at promoting their international image (TUNING Template)

During the last two years significant changes relevant to ABE study programs occurred in Italy, with respect to the situation described during the previous ERABEE Workshops. These changes were the consequence of the new regulations established by the Italian Ministry of Education, University and Research, aimed at rationalising the study programs offered by Italian Universities [4, 5]. Moreover, these changes were partially aimed at increasing the attractiveness of the study programs, based on the experience of the implementation of 3+2 education system.
These changes were indirectly influenced by stakeholders (i.e. employers), whose needs were taken into account by the Ministry of Education, University and Research, and minimally also by ERABEE-TN activities. The outcomes of these changes are shown in Tables 1, 2 and 3.

An example of best practice in learning, teaching and assessment, aimed at achieving competences relevant to ABE and promoting the international image of the related study programs, is the above mentioned TABE.NET project.

7. Tools for promoting the multi-linguism in ABE study programs in Italy

The tools for promoting the multi-linguism in ABE study programs in Italy are the following:

- dissemination materials of some courses offered in languages different from the native one, i.e. English;
- courses of joint degree study programs between Universities of different countries, e.g. that in Organic Farming and Quality Management offered by the Faculty of Agriculture of Palermo University together with the University of Ain Shams - Cairo, Egypt, taught in languages different from the native one, i.e. English and Arabic;
- admission examinations for foreign candidates and PhD thesis for foreign students possibly carried out in languages different from the native one, e.g. English and French.

8. Topics of rare and/or disappearing knowledge that can be used as a tool for enhancing the attractiveness of ABE study programs

The topics of rare and/or disappearing knowledge that can be used as a tool for enhancing the attractiveness of ABE study programs are the following:

- historical farm buildings;
- agritourism;
- agricultural museums;
- old food processing equipment and buildings;
- agricultural tools for developing countries, e.g. traditional ploughs;
- old rural land infrastructures, e.g. irrigation systems, channels, bridges, fences, wells, dry-stone walls, roads, terraces for sloping land cultivation, fountains, man or animal powered mechanisms.

All these topics are widespread in the Italian territory and included in the study and research activities of the Italian University Faculties of Agriculture, Engineering and Architecture.

“Protecting and enhancing the value of our cultural heritage contributes to preserve the memory of the national community and its territory and to promote the culture development” (Italian Cultural Heritage and Landscape Law).

Historical rural buildings characterise the agricultural and forestry landscape of the European regions where they are located and, therefore, must be protected and enhanced.
Agrotourism or rural tourism is a farm activity based on the conversion of historical farm buildings or houses into B&B lodges, farm hotels and restaurants. Alternatively a historical farm building can be converted into an agricultural museum. In fact, old tools and machines testify the history of agricultural mechanisation and the evolution of farming according to the technological development. Various types of animal drawn “Ard” plough, which is a primitive ox drawn plough, are still used by the farmers of many countries of Africa, e.g. Ethiopia, and of some countries of Asia and Latin America.

The redundancy and dereliction of the rural architectural heritage affects not only buildings but also other man-made elements of the rural landscape, such as fences, stone walls, wells, etc. In Sicily (Italy), for example, dry-stone walls in excellent conditions can be found only in the province of Ragusa. Craft training for the care of traditional buildings and dry-stone walls is generally a low level one or even missing, because of skill shortages about traditional materials.

Based on the above reasons, rare and/or disappearing knowledge in ABE study programs is a fundamental chapter of study, research and planning of this Engineering branch, including historical rural buildings, old agricultural machines and tools, infrastructures, e.g. fences, dry-stone walls, terraces for sloping land cultivation, channels and irrigation systems.

Therefore, the recovery, conservation and reuse of historical rural buildings, old tools and machines, e.g. agritourism and agricultural museums, is part of an action for protecting and safeguarding the rural territory and environment, its roots and history, in order to promote its social and economic development [6].

References:

[1] Web-based database about the European study programs in Biosystems Engineering, established in the framework of USAEE-TN.  
http://sunfire.aua.gr:8080/ects/Welcome.do

http://www.programmallp.it/box_contenuto.php?id_cnt=896&id_from=1


http://www.miur.it/Miur/UserFiles/Universita%20Linee%20Guida%20definitive.pdf

[5] Letter n. 160 of the 4th September 2009 of the Ministry of Education, University and Research “Further measures for rationalising and qualifying the degree study programmes, in the perspective of their accreditation”.

A. Comparetti (2010). Rare knowledge in Biosystems Engineering: a heritage to be preserved and implemented in the European degree study programs. BEST Event on Education, Ljubljana, Slovenia, 10 July.
Appendix 1. Matrix of bilateral agreements among Bari and Palermo Universities and other Erasmus ones, running in the academic year 2010/11.

| Partner name       | G | B | DK | D01 | D02 | D03 | E01 | E02 | F01 | F02 | IRL | I01 | I02 | NL | A | P | SF | S | UK | NO | BG01 | BG02 | CZ | LV | LT | HU | RO | SI | MT | SK | T | ES | PO |
|--------------------|---|---|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|---|---|---|---|---|----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|
| G-ATHENS           |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| B-LEUVEN          |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| DK-COPENHAGEN    |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| D01-STUTTGART    |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| D02-HANNOVER     |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| D03-DRESDEN      |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| E01-MADRID       |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| E02-LEON         |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| F01-DIJON        |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| F02-ENFA         |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| IRL-DUBLIN       |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| I01-BARI         | S | G | G |    |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| I02-PALERMO      | S | G | G |    |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| NL-WAGENINGEN    | S | G | G |    |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| A-WIEN           |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| P-EVORA          |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| SF-HELSEINKI     |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| S-UPPSALA        |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| UK-HARPER ADAMS  |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| NO-AS            |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| BG01-PLDVIV      |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| BG02-ROUSSE      |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| CZ-PRAUGE        |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| LV-JELGAVA       |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| LT-KAUNAS        |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| HU-GODOLLO       |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| RO-CLUJ-NAPOCA   |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| SI-MARIBOR       |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| MT-MALTA         |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| SK-NITRA         |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| T-IZMIR          |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| ES-TARTU         |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |
| PO-LUBLIN        |   |   |    |     |     |     |     |     |     |     |     |     |     |    |   |   |   |   |   |    |     |     |    |    |    |    |    |    |    |    |    |    |    |    |

G = General agreements; S = Specific agreements for Agricultural/Biosystems Engineering Faculties/Departments.
Abstract
The international attractiveness of Latvian study programs in Agricultural/Biosystems Engineering could be enhanced through the information provided by the Latvia University of Agriculture and Faculty of Engineering in exhibitions and through the webpage as well as through promoting and maintaining the mobility of students and staff by ERASMUS program and organizing conferences. The multi-linguism in Agricultural/Biosystems Engineering study programs in Latvia University of Agriculture should be promoted more effectively in order to increase the number of international students in the Faculty of Engineering.

1. Tools for enhancing the international attractiveness of Latvian study programs in Agricultural/Biosystems Engineering for Quality Assurance and Assessment Frameworks of Biosystems Engineering studies

1.1 The contents of information concerning Agricultural/Biosystems Engineering study programs provided by the Latvia University of Agriculture
There are several ways how the information about Agricultural/Biosystems Engineering (ABE) study programs is given to the pupils of Latvian secondary schools. The first way is the annual international exhibition "School", which takes place every year in the International Exhibition Centre Kipsala in Latvian capital Riga [1]. This year the exhibition took place from 25th to 28th February, but in 2011 the exhibition will happen from 3rd to 6th March. In the exhibition participates almost all Latvian education establishments, both universities and higher education establishments, as well as a major part of secondary vocational education institutions. Each higher education establishment participating in exhibition have prepared information leaflets, bulletins and other publications about offered study programs that are free for pupils of secondary schools, which are the main target audience of the exhibition and the main visitors.

Another way how the information about the study programs comes to pupils of secondary schools is the annual Open Door Days, which the Latvia University of Agriculture organizes each year in the spring. Also during this event the pupils of secondary schools or students of secondary vocational education institutions have the opportunity to obtain information on concerned study programs, as well as became familiar with the study environment.

A third way how the pupils of secondary schools can obtain information on the ABE curriculum are the web pages of the Latvia University of Agriculture and the Faculty of Engineering [2]. In the There are also presentations about the Faculty, study programs
and learning environment [3] as well as informative video and study opportunities about the Faculty in the Faculty website [4]. The web page of the Faculty also offers information about students' social life and about Faculty' days organized by the students [5].

The ESF (European Social Fund) project "The preparation and implementation of materials and events of professional orientation in the Faculty of Engineering of Latvia University of Agriculture" was realized at the Faculty of Engineering in 2006/2007. There were organized career days in 19 secondary schools in all Latvian districts within this project, where students were informed about the study programs of the Faculty. A brochure with information about the Faculty and offered study programs [6] as well as video about the Faculty and study opportunities in the Faculty of Engineering [7] was prepared in the frame of this project.

1.2 The information about ABE study programs available in the web-site of the University and the Faculty.

In the website of the Latvia University of Agriculture there are available general information about the study programs: title of the program, specializations, study level, type (full-time or part-time), length, accreditation end date, awarded degree, short description of program, carrier opportunities, admission requirements and criteria for contest.

The web-page of the Faculty of Engineering has the same information on study programs as University' web-site but additionally there are given the name of study program adviser and his contact information for acquisition additional, more detailed information and content of study program.

The web-site of the Faculty of Engineering has the brief description and links to web-sites of the projects USAEE-TN and TN-ERABEE [8].

![Figure 1. The links to the web-sites of USAEE-TN and TN-ERABEE projects in webpage of the Faculty of Engineering](image)

1.3 The ways for promoting the practical training of students at enterprises involved in the field of ABE in Latvia.
One of the ways how the practicing of students in enterprises related to ABE is promoted is the direct contacts of teaching staff of study programs with business leaders and representatives. Such contacts are formed both by cooperation and participation of teaching staff in company events and participation of business people in events and processes organized by the Faculty. The staff of the Faculty of Engineering both works as consultants and in cooperation with business people prepare joint publications in professional journals. While the entrepreneurs are both the members of examination commissions and some of them are the students in bachelor’s or master’s studies.

To some extent for creating and maintaining links with the entrepreneurs, the Faculty maintains the tradition for more than 20 years, each spring calling for get-together party the faculty graduates, who graduated 20 years ago. Every year an informative book is being prepared about the study time of this course and time after graduation. The books of previous year are available on the Faculty website [9].

The field trips are regularly practiced in the enterprises related to area of study program during the study process in all degree programs. These trips also allows for students to discover and develop contacts with companies of interest, which can then serve as a practice site and eventually become a job place for young professionals.

1.4 The schemes for promoting the mobility of students, graduates, PhD students and staff within and outside Europe.

The main tool for promoting and maintaining the mobility of students and staff in the Latvia University of Agriculture is the Erasmus mobility program. Within the Erasmus program both the students and academic staff has opportunity to spend some time in the EU's universities. The second tool is an international scientific conferences - both abroad and at home. The Faculty of Engineering of the Latvia University of Agriculture organizing an annual international scientific conference on "Engineering for Rural Development" during the May since 2002 [10]. The conference proceedings are prepared and issued for each conference, which is included in several major international bibliographic databases [11]. Faculty academic staff actively participates in both local and foreign international scientific conferences.

Students have the opportunity to participate in international student conferences. The Faculty of Engineering in cooperation with the Faculty of Social Sciences organizing an international student conference "Students on Their Way to Science" last five years. This year was the fifth conference [12], which was attended by students, master and doctoral students from 17 countries. Totally there ware presented 159 papers in plenary session and nine sections. This is a very good student mutual networking event.

1.5 The ways of disseminating career opportunities for ABE graduates.

The opportunity for students to get acquainted with career opportunities is provided in different ways. The first option is through internships at the practice. Often the practice placements for Faculty’ students is offered by entrepreneurs, who need specialist resources. During the practice, the entrepreneurs and students get to know each other and often the place of the practice also become the student's next job place. The
entrepreneurs often turn to the Faculty with requests for specialists. Then there are given the opportunity to entrepreneurs to meet with students and present by self their needs and desires. The company job offers regularly are exposed on the information panels of the Faculty. The website of Latvian University of Agriculture has a section "For employers" [13]. In this section business and institutional leaders are prompted to insert the job announcements, which will be visible for students and industry professionals. The employer, who wants to insert information with a job offer, has a chance right there at the standard matrix to record information regarding the proposed job. The announcement is received by www.llu.lv editor. If the advertisement complies with the requirements of the page, it is published within one working day. In case of problems the editor gets in contact with the author of the advertisement via e-mail indicated. When the advertisement is published, the submitter of advertisement has informed via e-mail.

2. Implementation of ABE study programs in Latvia
Starting from the first September of 2009, the studies take place according to adjusted study plan of Agricultural Engineering [14]. Compared to the previous version of study plan it is reduced the total amount of 178 credits to 160 of the plan. Due to reduction there is the number of courses withdrawn from study program: Sociology, Elective course in Humanities, Mathematical Modelling, Fundamentals of Engineering and Accounting. There is introduced one new study course - Mechatronics. Significant changes in the degree profile with respect to the situation described during the previous ERABEE Workshops have not been made.
The result of changes made in the study program - the length of study program reduced to the standard amount of 160 credit points, the study program is extended with required Mechatronics course and increased time for the development of undergraduate thesis from 3 weeks to 10 weeks. The best changes in the study process during the recent years are related to establishment of a new modern laboratories and modernization of existing laboratories. The new teaching and research laboratories: Computer-based Measurement, Computer Modeling, Computer Aided Design Laboratory with licensed software were created in the frame of two European Social Fund projects within the section of learning process modernization during the period from 2006 to 2008 [15].
There were substantially upgraded several existing laboratories: Electrical Engineering, Mechanics, Material Strength, Machine Dynamics, Vehicle, Engine and Vehicle Electrical Equipment laboratory.

In the frame of the projects were prepared 19 textbooks and 52 teaching aids. All this led to a substantial jump in the quality improvement of the study process and in the enhancement of the students’ competence.

3. The tools for promoting the multi-linguism in ABE study programs in Latvia University of Agriculture

Law on Higher Education [16] states that the state financed universities implement study programs in the national language. Not more than one-fifth of the total amount of study programs can be implemented the EU official languages.

"Multi-linguism" is encouraged by the expansion of contacts with foreign universities, their students and teaching staff, as well as the rise of foreign language proficiency level of teaching staff.
References:
2. Study programmes of the Faculty of Engineering. [Link](http://www.llu.lv/?ri=2927/).
4. Faculty of Engineering [video]. [Link](http://www.llu.lv/?mi=307&op=view_video&id=74/).
13. For employers. [Link](http://www.llu.lv/?mi=375).
Abstract
Lithuanian University of Agriculture uses various ways to enhance attractiveness of study programmes of Agricultural Engineering via printed publications, multimedia and internet. University organizes conferences, open door days, researchers’ nights, exhibitions and fairs for introduction of the profession of Agricultural Engineering, infrastructure of the University, study and research projects, core curricula of the study programmes, learning outcomes and employment opportunities. Additional information about studies and research in Agricultural Engineering is available in the web-sites of the University and the Faculty of Agricultural Engineering, University facebook site. Promotion of the practical training for students at enterprises involved in the field of Agricultural/Biosystems Engineering is possible by direct relations between departments and enterprises, assistance of the Career centre of the University, direct contacts between students and enterprises, cooperation with International department of the University for international practical training, cooperation with professional associations. The site of International department of the university informs students about opportunity of practices abroad. Students can apply ERASMUS support for such practice. There are more schemes for promoting mobility of students, graduates and staff of the faculty of Agricultural Engineering within and outside Europe. They can use various study, research and exchange programmes, bilateral agreements between universities, cooperation with international enterprises. Experiences of the partners of ERABEE thematic network in the field of studies and research of Agricultural/Biosystems Engineering were used for preparation of the application grant for the introduction a new study programme “Biomass engineering” with a topics of Bioenergy and Biomaterials.

1. Tools for enhancing the international attractiveness of European study programs in Agricultural/Biosystems Engineering (ABE).
Lithuanian University of Agriculture is only one university in Lithuania providing university studies in Agricultural Engineering. There are in use various medium to enhance attractiveness study programmes of Agricultural Engineering to different
Education and Research in Biosystems or Agricultural and Biological Engineering in Europe; a Thematic Network (ERABEE-TN)

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stakeholders or social partners (enterprises, associations, schools, colleges, universities and research institutes):
- Conferences;
- Workshops;
- Open door days;
- Researchers nights;
- Exhibitions and Fairs of studies (national and University);
- Alumni meetings;
- Common projects.

During those events the University has an opportunity to distribute information about the research and studies in Agricultural Engineering – leaflets, brochures, multimedia presentations, videos. Content of informational means depends on goals of the event or cast of the participants. General content of the information is:
- Attractiveness of the profession of Agricultural Engineering;
- Infrastructure of the University and Faculty of Agricultural Engineering;
- Study and research projects in Agricultural/Biosystems Engineering;
- Introduction to all study programmes in Agricultural Engineering;
- Introduction to core curricula of the study programmes;
- Learning outcomes;
- Further studies and employment opportunities.

Nowadays is more attractive information that is available on the web-site. Lithuanian University of Agriculture and faculty of Agricultural Engineering use two links for the internet information about studies of Agricultural/Biosystems Engineering:
- University web-site (http://www.lzuu.lt/if/lt) [1];
- The University web-site for entrants contains wide information about:
  - The rules for general admission to undergraduate and integral studies of the Higher Education Institutions;
  - Additional conditions for admission to Agricultural Engineering programmes;
  - Introduction to the study system;
  - Core curricula of study programmes in Agricultural Engineering;
  - Infrastructure of the faculty;
  - Research activities at the departments of the faculty (for Master students);
  - Quality assessment of study programmes at the faculty of Agricultural Engineering;
  - Opportunities of International studies in the field of Agricultural Engineering;
  - Partnership between faculty and social partners;
  - Traditions and developments in the faculty;
  - Living and leisure conditions in the campus;
  - Data on employment of the graduates.

Additional information about studies and research, calls for practices and international exchange is available in the web-site of the Faculty of Agricultural Engineering (http://www.lzuu.lt/if/lt) [3]. Unfortunately the main information is presented in
Lithuanian language. Only introduction of the faculty and information about International activities is available in English. There is also information about participation of the faculty on the USAEE and ERABEE thematic networks and links to the web-sites. We hope that Agricultural Engineering will gain more attractiveness with orientation to Bioenergy and Biomaterials.

There are two practices at the enterprises for students of Agricultural Engineering. The length of each practice is 4 weeks. First practice (after forth semester) has a name Technological and introduces students to the working and social environment of enterprises. The second practice (Engineering and Design) follows after sixth semester and focused to deepen skills in the chosen specialization and collection of information for the final thesis.

There are various ways for promoting the practical training of students at enterprises involved in the field of Agricultural/Biosystems Engineering:

- Direct relations between departments and enterprises (social partners);
- Assistance of the Career centre of the University;
- Direct contacts between students and enterprises;
- Cooperation with International department of the University (for international practical training);
- Cooperation with professional associations.

University Career centre or the Faculty receive offers from enterprises for practices each year. The Faculty of Agricultural Engineering has bilateral agreements with some enterprises for practical training. This way is most efficient to plan practical training and to control the quality of the practices.

The faculty is interested to activate practices abroad. Unfortunately there are minor traditions and contacts with international enterprises and weak language skills of students. The University has opportunity to support students for abroad practice using ERASMUS exchange scheme. The number of practices abroad is slowly growing and students are very satisfied with a quality and conditions of those practices.

There are more schemes for promoting mobility of students, graduates and staff of the faculty of Agricultural Engineering within and outside Europe [4]:

- Participation in students’ and teachers exchange programmes: ERASMUS, Leonardo da Vinci, NOVA-BOVA (Networks between Nordic and Baltic states);
- Participation in the international research programmes: EU FRAMEWORK, EUREKA, INTAS, NATO;
- Teachers’ visits to universities and related institutions abroad;
- Participation in the Baltic Sea research programme Baltic 21 – AGENDA 21;
- To exhaust all possibilities of Bilateral Agreements with more than 50 universities abroad;
- Establishment of joint Bachelor, Master and PhD programmes with European universities in the field of Agricultural/Biosystems Engineering;
- Realizing National and International funds for studies and research in EU, Central and Eastern Europe, USA and Canada;
- To develop cooperation in research and studies with International industrial companies: DELAVAL, KEMIRA, JOHN DEERE, VALTRA-VALMET and others.
Present situation shows that graduates of Agricultural Engineering can easily find job positions in a labour market of Lithuania. Additional specialisation might improve value of the graduates. We expect growing labour market in the area of new bio-resources for biomaterials, biofuels and bioenergy. Graduates of new specialisations can apply job positions on biomass logistics and processing, biofuels production and application, biowaste treatment and bioenergy industries. There is a growing interest for our graduates from the research institutions working on National and International projects related with Biomass Assessments, Bioconversion, Biofuel technologies etc. There are some ways of disseminating career opportunities for ABE graduates:

- Cooperation with associations of enterprises in the country and abroad;
- Cooperation with Alumni;
- Involving graduates into research projects;
- Cooperation with other Universities and Institutes in Lithuania and abroad;
- Assistance of the Career centre of the University.

2. Implementation of ABE study programs in Lithuania aimed at promoting their international image

Some significant changes occurred with a study programmes of Agricultural Engineering in the Lithuanian University of Agriculture. These changes were aimed by new rules of admission to the university studies and new practice for financing of studies. Lithuania has introduced system “For general admission to undergraduate and integral studies of the Higher Education Institutions”. This system created very active competition between the universities and faculties, because students can apply limited number of grants for engineering studies. Agricultural engineering studies are not very popular between most motivated graduates of secondary schools. In such situation the number of entrants to the Faculty of Agricultural Engineering decreased by 50 % during last 2 years. Administration and staff of the faculty is trying to promote the attractiveness of the studies of Agricultural Engineering by different ways:

- Improving information and advertising means;
- Changing number and content of the study programmes;
- Consolidating infrastructure of the faculty;
- Developing research and study relationships with foreign universities;
- Increasing a research value in the balance of the Faculty budget.

Faculty reduced number of programmes of Agricultural Engineering from 6 to 3 for the 1st cycle and from 4 to 2 for the 2nd cycle of studies. Faculty applied grant for the transition of 2 study programmes (Engineering of Agricultural Technologies and Engineering of Agricultural Post Harvesting Technologies) to study programme of Biomass Engineering oriented to Bioenergy and Biomaterials. For preparation of the application this grant was used core curricula prepared during USAEE project and experience of the partner of ERABEE TN - Hohenheim University [5]. Experiences of the partners of ERABEE thematic network in the field of studies and research of Agricultural/Biosystems Engineering that presented during ERABEE-TN workshops and described in the proceedings are very useful for the content of the programme.
3. The tools for promoting the multilinguism in ABE study programs in Lithuanian University of Agriculture

Multilinguism is a very important tool for students and graduates. It helps to use more informational sources, increases opportunity of employment in the national and international labour markets, develops the person and his communication skills. Courses of foreign languages with a total load of 12 ECTS are mandatory for the first cycle students of Agricultural Engineering. Students during the studies can choose one or more foreign languages: English, German, French, and Spanish.

University also offers other ways to promote multilinguism during the studies of Agricultural Engineering:

- ERASMUS (and other) mobility;
- Common courses with visiting ERASMUS students;
- BOVA and NOVA courses in Lithuania and abroad;
- Special (selected) courses for students interested to study abroad;
- Practical training abroad or at international companies in Lithuania;
- Teachers and staff training in foreign languages.

The University is planning to apply grant for the development of international relations – to create join programmes for the Bachelor, Master and PhD levels.

4. The topics of rare and/or disappearing knowledge that can be used as a tool for enhancing the attractiveness of ABE study programs

The topics of rare disappearing knowledge of Agricultural Engineering in Lithuania might be:

- Old agricultural machinery and techniques;
- Wind mills, Hydro power plants and Biomass ovens, machinery with horse power;
- Farm buildings and infrastructure;
- Technologies of production biomaterials and ecological food.

Old techniques might be found and used for education and promotion of attractiveness on small museums, agricultural tourism sites and schools. On these sites is possible to organise courses, lectures or seminars about rural (agricultural) engineering history. Farmers, private companies and associations also preserve old farms and infrastructure, machinery and techniques. Faculty of Agricultural Engineering offers mandatory course “History of Techniques” on the first year of studies.

References:
5. Biobased products and Bioenergy // [https://www.uni-hohenheim.de](https://www.uni-hohenheim.de)
ENHANCING THE ATTRACTIVENESS OF EUROPEAN STUDY PROGRAMS IN BIOSYSTEMS ENGINEERING IN MALTA

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Abstract
The National Strategy for Research and Innovation for 2007-2010, entitled ‘Building and Sustaining the Research and Innovation Enabling Framework’ is the pivot on which the Maltese efforts to enhance the attractiveness of Science and Technology is based. Four main entities, namely The Malta Council for Science and Technology, University of Malta, Ministry of Education, Youth and Employment and National Student Travel Foundation come together to complement each other and the national educational system through a variety of different but complementary activities. Information is freely available to students from the websites of the various entities.

Introduction
International benchmarks issued by the EU, the World Economic Forum, and other international organizations of stature showed that some 10 years ago Malta was, with the exception of ICT, not only not improving but regressing in terms of its competitiveness and the supporting role played by Research and Innovation. Malta did not have a permanent multimedia, interactive infrastructure designed to capture the imagination on the wonders of Science Engineering and Technology (SET). A comprehensive and multi-pronged science popularization strategy is of fundamental importance. The sustainability and aggression of such a strategy over a period of twenty years is a necessity to achieve impact in Malta. The National Strategy for Research and Innovation for 2007-2010, entitled ‘Building and Sustaining the Research and Innovation Enabling Framework’ is the pivot on which the Maltese initiative of enhancing the attractiveness of Science and Technology is based. Four main entities, namely The Malta Council for Science and Technology (MCST), University of Malta (Yom), Ministry of Education, Youth and Employment (MEYE) and National Student Travel Foundation (NSTF) come together to complement each other and the national educational system. Information is freely available from the websites of the various entities. Contact information including contact person, phone number and e-mail addresses are also posted on the site adjacent to the particular programme of interest. The following is an overview of the enhanced efforts to draw in more students into the SET fields.
The Malta Council for Science and Technology
The Maltese Government established a public entity ‘The Malta Council for Science and Technology’ in 1988, with the mandate to act as the national focal point for science and technology policy. In an effort to include and involve stakeholders, prominent members of the private and public sectors and academia sit on the board of MSCT. In fulfilling its mission, MCST has over the years focused on promoting stronger networking between these sectors and develop public-private sector partnerships. Currently, the organizational structure is being enhanced in view of making more efficient use of national Science and Technology (S&T) resources. In addition to the original specific mandate of advising government on S&T policy, MCST’s remit has developed and expanded to include:

- Responsibility for National Strategy in the field of Research and Innovation (R&I) and the ownership of the National Strategic plan 2007 – 2010.
- Responsibility for Policy in the area of Research and Innovation, and represents government in the following EU fora related to R&I:
  - CREST - facilitates the progress of policy coordination throughout Europe.
  - Joint Research Centre Board
  - DG Research working parties
  - European Institute of Technology working parties
  - European Strategic Forum on Research Infrastructure
- The management and administration of the National Research and Innovation Funding Programme
- The responsibility as National Contact Organisation for creating awareness and providing support for EU’s Research and Development Framework Programme.

In 2005, MCST underwent a Strategic Audit and the outcome recommended the articulation of a National Research and Innovation Strategic Plan that reflects the national economy as directed by Government so as to ensure that State R&I financing is channelled to these priority areas that can truly become local drivers of economic growth. During the consultation process of the drafting of this Strategy, the high leakage of students is the result of a number of failures of our educational system was emphasized. The tedious way SET disciplines were taught; the educational institutions persistence that only the best and the brightest should pursue such studies; and the subsequent impression that SET disciplines are difficult and hence should be avoided where highlighted. In 2006, the MCST launched the National Strategy for Research and Innovation (NSRI) for 2007-2010, entitled ‘Building and Sustaining the Research and Innovation Enabling Framework’.
University of Malta

The NSRI strongly supported the Yom and recommended the following:

- The R&I National Investment program is to act as a leverage to reward those departments and institutes within the University of Malta that secure international as well as local industry / business funding for their research activities.
- The Yom should consider initiating a Campus agreement in the designated platforms of strategic importance with Universities or Institutes of international repute in order to strengthen its research facilities as well as provide joint undergraduate and post-graduate programs.
- The Yom should seek to reach a level of excellence in the designated platforms of strategic importance that will allow it to attract Masters, MPhil and PhD foreign students from within and outside the Mediterranean region.
- The UOM should seek to establish an Alumni Network in the SET disciplines to strengthen both its international as well as local networking abilities.

The Yom has responded and embraced these recommendations with the result that:

- Links have been forged with the Chamber of Commerce, the Federation of Industry and the Employment & Training Corporation in order to determine how the University, industry, business and the public sector can develop a mutually beneficial dialogue.
- The UOM is a member of the European University Association, the European Access Network, the Association of Commonwealth Universities, the Utrecht Network, the Santander Network, the Compostela Group, the European Association for University Lifelong Learning (EUCEN) and the International Student Exchange Programme (ISEP). A large number of bilateral cooperation agreements with universities overseas are active through which staff and students may also participate in programmes such as Erasmus, Leonardo and Comenius.
- International Masters Programmes are being offered on a Dual Degree basis, with each Masters being accredited by the University of Malta and at least another leading North American or European University. These programmes seek to achieve a wider exchange of cultural viewpoints, networks and experiences and at the same time provide students with global work opportunities.
- The Communications & Alumni Relations Office has been established and acts as a central hub through which UOM alumni can network.

Ministry of Education, Youth and Employment

In its effort to encourage and support students in broadening their educational exposure the MEYE has within its structures the following units:
The European Union Programmes Agency to support Maltese individuals and entities in availing themselves of funding under the various educational programmes provided by the European Commission.

The Eurodesk to relay for European information to young people and their intermediaries. It provides information on volunteering or exchange opportunities, how to work or study abroad, how to find European funding and contacts and any other information which the youths might need.

The Euro-Mediterranean Youth Platform aims at creating a network of all those involved in the youth sector in Europe and the Mediterranean. It strives towards bringing young people from the region together in an environment of tolerance and mutual understanding, facilitating networking between them, assisting in the capacity building of their organisations, increasing their participation, sharing relevant information with one another, and exchanging good practice. The Platform provides various networking facilities such as assistance in finding partners, a Magazine in three languages, a FORUM for discussion, and profiles on the situation of young people in each country.

The NSRI recommended that MCST together with MEYE commission an independent review to assess how S&T disciplines are taught at pre-primary, primary and secondary levels of education and benchmark such education with countries enjoying a high level of success in S&T. Additionally the development and implementation of a twenty-year science popularization strategy was recommended. The science popularization is managed by MCST and includes:

- Science in the Community Events – consisting of mini S&T Festivals organized by MCST together with six Local Councils. The public is invited to attend and interact with the science exhibits; participate in animated discussions about inventors and renowned scientists Local NGOs, S&T players, private companies and local schools are all involved. The event is free of charge and science animators explain the scientific concepts behind each exhibit.

S&T Festival consists of a variety of activities that are usually spread all over the UOM grounds. The public is invited to interact with the science exhibits on display and to explore and uncover the scientific principles exhibited. Many organizations are present to show the importance of science in daily work. Talks and speakers covering a broad range of topics, from cutting-edge technologies to focused talks are delivered by experts from various scientific fields and local entities.

- Edutainment - an entertaining way of passing on an educational message. MCST is using this novel approach by engaging professional scientific animators to entertain, educate and share their passion for science with all present. The animators will be performing live experiments.
National Student Travel Foundation
The National Student Travel Foundation (NSTF) was created in 1977 with the main objective being: “The direction and development of educational, cultural and social travel and exchange for students, scholars and youth at all educational levels in the nation, the expansion and improvement of services and promotion of a better understanding on an international level.” The NSRI recommended that:

- MCST assumes the role of official sponsorship to the NSTF in the management of the Young Scientists Competition in order to
  - support the aggressive marketing of the Young Scientists Competition;
  - support the successful winner in the European Young Scientists Competition; and
  - provide financial support to business incubation of the successful winner’s solution if it meets criteria relating to business driven R&I within the designated platforms of strategic importance.
- NSTF together with MCST and MEYE launch an annual Science, Technology Design and Mathematics National Competition directed at the secondary level of education in public, private and church schools.

Presently NSTF complements the education efforts of local primary, secondary, post-secondary and tertiary educational institutions through a number of projects. The aims of NSTF Science project is: “to generate awareness and interest amongst students at all education levels of the nation in the importance of science and scientific research to one's daily life and to experience and promote science out of the classroom through hands-on projects, exhibitions, experimentation, research and discussion from both a scientific and ethical perspective”.

NSTF Science Week 2010
NSTF has been involved in science since in 1984 by selecting students who excelled in science at post-secondary level to participate in the London International Science Fortnight. The foundation has taken up the recommendations in the NSRI and has over the past years developed a Science Programme together with the Malta Chamber of Scientists and MCST to increase the interest of students in S&T, and encourage them to read for degrees in science and take up careers within this sphere.

The peak of all these programmes is the NSTF Science Week organised in collaboration with MCST and consists of: NSTF contest for young scientists, NSTF school contest for young scientists, NSTF Science art contest, and NSTF little scientists village. Students with the winning projects will then go on represent Malta at the EU Contest for Young Scientists in Lisbon, the Expo Science Europe in Moscow and the Belgian Science Expo.
ENHANCING THE ATTRACTIVENESS OF EUROPEAN STUDY PROGRAMS IN BIOSYSTEMS ENGINEERING – THE NETHERLANDS

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Abstract
Wageningen University and all study programmes are very internationally oriented. First, most of the master programmes have a mandatory internship of 24 credits and the students are stimulated to go abroad. Second, the new structure of the programmes by September 2010 make it for especially the bachelor students more easy to go a certain period abroad to follow courses at an other university. Third, all master programmes are fully taught in the English language, making it possible for foreign students to come to Wageningen University for a master programme.

Much effort is put in promoting Wageningen University. The websites play a very important role in informing prospective students on the possibilities offered by Wageningen University. In addition there are paper brochures available with information on all master programmes. Wageningen University is also present on several educational fairs to promote the study programmes.

1.TOOLS FOR ENHANCING INTERNATIONAL ATTRACTIVENESS

Each year Wageningen University produces brochures on each study programme. There is special brochure for each bachelor programme. Much effort is put in making an attractive brochure that attracts attention in the large amount of brochures that is available for the high school student. The brochure is limited in the information and is supported by a website with much more detailed information. The main purpose of the paper brochure is to get the attention of the student, i.e. to get into his or her shortlist of study programmes to consider after high school.

For the master programmes a brochure is prepared each year with an overview of all master programmes Wageningen University offers. The brochure contains a one page description of each study programme. The brochure is sent world wide to stakeholders and students interested in a master programme at Wageningen University.

The main tool to inform the stakeholders on the Biosystems Engineering program is nowadays the internet. Internet offers the possibility to provide detailed information on the study programme, not only on the content of the programme, but also other relevant information as future careers, experiences of current and past students. Wageningen University has a main website (www.wageningenuniversity.nl/uk) with the general information.
information and in addition each study programme has its own website (www.bat.wur.nl and www.mab.wur.nl). The structure of the website of each individual study programme is the same for all study programmes.

As of today there are no links to the websites of USAEE-TN or ERABEE-TN. All websites will be updated later this year and the links to these websites will be established so students can get easy access to similar programmes elsewhere in Europe.

The main tool for promoting the practical training for students are the students itself. A student that shows during his internship that he is valuable for the organisation, opens the door for new students to do their internship at the same company or organisation. In many enterprises active in the field of agricultural and biological engineering are graduates of the programme employed. These graduates are also an easy way of access to positions for internships. The study association organises about twice per five year a career day. Companies and organisations are invited to come to these days to present their company or organisation to the students. Two main points of attention during these days are internships and job positions.

The bachelor programmes of Wageningen University have by 2010 a mandatory unbroken period of 30 credits in which the student can do minor. This period can also be used to go abroad and follow courses at other universities in Europe. However, a serious limitation is the very limited number of courses on agricultural and biosystems engineering related topics offered in the English language at most universities across Europe.

A compulsory part of the master programme is an internship of 24 credits. Students are stimulated to go abroad. Internships are coordinated by a staff member who also assists students in finding an good position for an internship. Important is the network of the coordinator. The availability of the websites developed in the framework of the USAEE-TN and ERABEE-TN is an easy way to enlarge the network. Wageningen University has become very reserved in establishing new Erasmus agreements or continuing existing agreements. There must be real interest in this exchange of students in both directions to establish or maintain an agreement. Practice until now shows that many students across Europe come to Wageningen University but a limited amount of students go abroad to a university elsewhere in Europe. A main obstacle is the limited amount of relevant courses available in the English language. Students prefer to go countries were they speak English. Most students had at high school German and French making it somewhat easier to go countries where they speak one of these languages. If they have to learn a language, they prefer a language that is important in global perspective, for example Spanish, Russian, Japanese or Chinese.

Career opportunities for graduates are usually disseminated among the students for whom it is of interest. The same holds for European or international job positions on the field of agricultural and biosystems engineering. Within the social network LinkedIn there is a special group of only graduates of the programme; this offers also the possibility to disseminate job opportunities among graduates. An addition to the passive way of waiting until job positions are available, is the curriculum vitae booklet the study association compiles every year with the students that are expected to graduate the coming year. This booklet is sent to a large number of enterprises and organisation that may be interested in hiring and agricultural or biosystems engineer.
Wageningen University has appointed some marketeers to promote the study programmes of Wageningen University both in and outside Europe. Part of their job is to visit universities abroad to inform them on the possibilities of Wageningen Universities or to attend educational fairs to promote the programmes of Wageningen University.

2. IMPLEMENTATION OF AGRICULTURAL AND BIOLOGICAL ENGINEERING IN THE NETHERLANDS AIMED AT PROMOTING THEIR INTERNATIONAL IMAGE

Wageningen University changed in the past academic year the bachelor and the master programmes. The main objective of the changes was to create more flexibility in the programmes. More flexibility meant that it should become easier to incorporate new developments in the programmes. This larger flexibility consists of realising in each study programme a block of 30 unbroken credits in either the first or the second semester. This block of 30 unbroken credits offers the students the possibility to a minor but makes it also easier for the students to go abroad for a part of their study programme.

The change of the study programmes was also used to adjust the programme more towards the outcomes of the USAEE-TN and the ERABEE-TN. However, the very tight prescription of the framework programme made it not possible to completely meet the requirements of the framework programme. Another major effect of the USAEE-TN and ERABEE-TN was that the (English) name of the programme will be changed into Biosystems Engineering. The English name for the bachelor programme became Biosystems Engineering by September 2010 (the legal Dutch name is still Agrotechnologie and will not be changed). Since the legal name of the master programme is in English, this change will be implemented by September 2012 because it requires a change of the law.

3. PROMOTING MULTI-LINGUISM IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING PROGRAMMES

An important aspect of promoting multi-linguism is that all master programmes of Wageningen University are taught in the English language. An additional effect is that part of the courses in the bachelor programmes are taught in the English language too. In this way the bachelor students are gradually confronted with courses in English. A second additional effect is that students have much more opportunities to exercise their English language ability which is an advantage in global market.
Introduction
The Norwegian University of Life Sciences offers a wide range of BSc, MSc and PhD studies. However, there exists no formal ABE-education (Agricultural/Biosystems Engineering) at the university today. But it is possible to select courses e.g. within mathematics, physics, construction, design among others and end up as e.g. a construction engineer. These students are attractive for the agriculture engineering industry. The other kind of ABE-students is students following lectures in agronomy and selecting additional courses in agricultural engineering at our department in order to understand the total picture of agronomy including engineering and a proper use of machines. There are also two college universities in Norway, HINT and HEHM, offering BSc education within agricultural engineering. The number of these students has increased during the last years. The third group is students within bioenergy engineering and management. The number of these students has also increased much during the last 10 years. The answers given later in the text are related to the education offered above.

1. Tools for enhancing the international attractiveness of European study programs in Agricultural/Biosystems Engineering (ABE).
Almost all courses offered to the students mentioned above are taught in Norwegian. Thus the number of foreign students in these studies is rather poor. However, we frequently have students from Scandinavia who easily can understand Norwegian and foreign people learning Norwegian during their study. Therefore the information concerning ABE to English speaking countries is rather poor. But we have about 20 Master programs taught in English (where some programs content parts of engineering) and also the NOVA programs (in English) arranged together with the other Scandinavian countries. Normally the forthcoming students have an annually common deadline of 15'th April for sending their applications to higher education. Thus, timing of information and simple and attractive information to the potential applying students are of high importance in order to increase the number of applicants with this education as the first choice.
are rarely used PPT presentations for this purpose, but rather interesting web pages (easier updating), direct contact to students finishing high school, active participation due to sending information to potential students etc. The university also has an own mobile demo trailer including posters, leaflets, video show, and not at least experienced older students who can discuss with interesting people face to face. Some programs are presented as advertisements also in cinemas. Potential students are transported from colleges to the university in order to get a better understanding of programs offered and attractive positions when finished. Because there is not any adapted program only concentrated around agricultural engineering, there is not any own web pages directly focused on this. However the BSc program in agricultural engineering offered at the universities are well advertised and they have also got an increase of the number of students during the last session. The university and department have web pages presented in English.

c. The methods of contacting (e.g. links with USAEE-TN and ERABEE-TN web-sites in the web-sites of the European Faculties of Engineering and Agriculture) the Faculties of Engineering and Agriculture of your Country, in order to provide them with the information about ABE study programs.

Because the most programs are taught in Norwegian, these studies are not linked to international web pages today. However we may see a need of a closer cooperation in the future, especially through the last year MSc study including the master diploma work. If several countries could cooperate in this area, the education would be more international, the students would get a wider and deeper experience, the support from engineering industry would be improved (demo machines, project support, more realistic projects), better possibilities for trainee positions and further PhD-work together with the companies as well as possible international positions and working experience abroad. Thus, several countries already have discussed this possibility of cooperation during the former ERABEE-conferences.

d. The ways for promoting the practical training of students at enterprises involved in the field of ABE in your Country. Earlier the students needed approved practice before starting the education in ABE. However, this is not longer any requirement. Generally, at our university, we also recommend all students to take parts of their education abroad. For this purpose, the university has cooperation agreements with several universities around the world.

e. The schemes for promoting the mobility of students, graduates, PhD students and staff within and outside Europe (e.g. by disseminating the web-based database about the European study programs in Biosystems Engineering, established in the framework of USAEE-TN, and promoting the establishment of new bilateral Erasmus agreements to be reported in the updated matrix of bilateral ERASMUS agreements).

At the moment the university has about 3,500 students and 430 PhD students. Our department, the Department of Mathematical Sciences and Technology, has totally more than 800 students and 60 PhD students. The teaching staff may apply for financial support for an international stay at another university or research station of up to one year after being in their position at the department at least for 4 years. It is also possible to go abroad several times after being at the department for another 4 years.
The use of Erasmus agreements is frequently practiced on a voluntary base and where there are existing agreements between universities.

**f. The ways of disseminating career opportunities for ABE graduates (including research fellowships and research projects).**

Outstanding students may be honored with a grant paid from different companies to cover costs of master diploma expenses and focus on special problems. The students making the best diploma work are also honored by a price from the university.

**g. The ways of announcing open European or international academic positions in the field of ABE.**

All announcements for scientific people have to be announced internationally due to official guidelines. Also Phd stipends are frequently announced online internationally, but this is not any requirement.

**h. Other tools of attractiveness (open topic, optional).**

In March 2010 a report was made in order to reduce the climate gas evaporation from agriculture within 2020. The report focuses on agronomy as well as agricultural engineering, and concludes that it is a high need for MSc and Phd education and especially within agricultural engineering. An increase of students is needed in order to substitute retiring senior experts and cover the field within ABE properly. Also an increase in teaching and scientific staff in this area is of high importance. The number of scientists within this field has decreased dramatically during the 15 last years.

### 2. Implementation of ABE study programs in your Country aimed at promoting their international image (TUNING Template).

Norway has implemented the BSc, MSc and PhD cycles for all studies since 2003. We also offer a one year study and other courses for updating and refreshing important knowledge.

Within engineering the students earlier mainly had only basic theory in e.g. mathematics and physics in the beginning of the study. However, this frequently reduced the interest of study and lowered the motivation. The department is now aware of the problem. Thus, the first year now also contain a lot of project work including practice and creativity, e.g. building catapults and other devices showing influences of static and dynamic forces which result in an improved motivation and better understanding of the later following theory. Generally, problem based learning (PBL) is used in a higher extent today than earlier in order to give the students a higher output of knowledge.
3. Please, describe the tools for promoting the multi-linguism in ABE study programs in your Country (e.g. courses and/or dissemination materials offered in languages different from the native ones, etc.).

In the future it is expected that more courses and also programs will be taught in English. This will increase the international exchange of students. The PhD courses are mostly in English and the PhD students normally stay one or more years abroad at related universities and / or companies. A large part of the literature is already in English and this number is estimated to increase in the future.

4. Please, describe the topics of rare and/or disappearing knowledge that can be used as a tool for enhancing the attractiveness of ABE study programs.

Because of the low number of students in agronomic areas during the past years, there have been made several efforts in order to increase the amount of students. Examples to be mentioned are:

- In forestry the forest companies and associations (Skogbrukerlauget) offer all new students a grant of about 600 €, a portable computer and necessary literature, all free of charge. This has already increased the quantity of students in this area.
- In order to guide the MSc student diploma work into useful projects, several associations (e.g. Tine and Yara) offer several grants of about 6000 € each in order to attract special suited and eager students hopefully carrying out projects in these or related areas (milk, fertilizer etc).
- In 2010 our university together with two colleges has applied for a project called ‘Proper agricultural education within 2020’. The goals of this project are:
  - Coordinate the PR and the content and range of study programs offered within higher education in agriculture including engineering.
  - Make a survey of the state of art and need of effort in this field including the opinions from the youth as well as the industry, i.e. the upcoming potential students and the employees/companies.
  - Create polite scenarios showing the need of input; number of educated students, kind of students and resources required.

It is also important to handle all applicants in a proper manner in order to ensure that they start at our university. Quick and relevant information is of high importance. The quality of the study and the conditions for the students have to be of high standard in order to prevent a high percentage of students dropping out during the education. Generally, only about 20% of the students leave the study without finishing the education at the university. However, on a national level, up to 50% may terminate their study without any final exam. Efforts will be made in order to avoid this situation in the future.
Education and Research in Biosystems or Agricultural and Biological Engineering in Europe; a Thematic Network (ERABEE-TN)

Project Number: 134306-LLP-1-2007-1-GR-ERASMUS-ENW

References

Web links:
http://www.hint.no/english
http://www.hihm.no/hihm/English/Campus-Hamar
http://www.umb.no/study-options
http://www.nova-university.org/
ENHANCING THE ATTRACTIVENESS OF STUDY PROGRAMS IN AGRICULTURAL/BIOSYSTEMS ENGINEERING IN POLAND

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Abstract
In Poland there are eleven universities which offer study in Agricultural/Biosystems Engineering. The Bologna system was initiated in all universities. In order to increase the attractiveness of study there are offered various specialization and interfaculty courses.

Polish universities are seeking ways to increase the attractiveness of their studies and match the expectations of students and the economy. This is reflected also in the organizational changes - all agricultural universities in Poland changed their name from "Agricultural Academy" to "University of Life Sciences (Krakow has only one "Agricultural University"). Also, all faculties of agricultural engineering in the last five years changed their names to "faculty of production engineering." It is also introduced the Bologna system of study.

Universities conducting studies in the range of agricultural engineering in Poland, introduce various activities to increase their attractiveness. Faculties related to the course "agricultural and forestry", offered in the last five years the study from other directions for example “management and production engineering” or “education in technology and informatics”. They are focused on issues related to agricultural technology, technical support for rural areas, food processing, production and service of tractors and machinery, etc. There are also introduced so-called macro-modules that combine two fields of study, thereby increasing the attractiveness of their studies. On the University of Life Sciences in Poznań is offered study "informatics and agroengineering" connecting IT with the knowledge of agricultural engineering. Faculty of Environmental Management and Agriculture of West Pomeranian University of Technology in Szczecin offers in cooperation with the Faculty of Economic studies “management of agricultural technology” and the Warsaw University of Life Sciences-SGGW offers “technology of renewable energy” (table 1).

1 Edmund Lorencowicz, Phone: +48 603 708 999, FAX: +48 81 5318321, e-mail: edmund.lorencowicz@up.lublin.pl
### Table 1. Agricultural and forestry engineering study offered by polish universities (alphabetical order by city)

<table>
<thead>
<tr>
<th>University/Faculty</th>
<th>Courses/specialization</th>
</tr>
</thead>
</table>
| **Bialystok** University of Technology/ Faculty of Mechanical Engineering | Agricultural engineering  
Food engineering |
| University of Technology and Life Sciences in **Bydgoszcz**/Faculty of Mechanical Engineering | Engineering of agro and food processes  
Machines for preparing and protection of landscape |
| Agricultural University in **Krakow**/Faculty of Production and Power Engineering | Technology renewable energy  
Information technology in agriculture  
Information technology in forestry |
| **Koszalin** University of Technology/ Faculty of Mechanical Engineering | Food engineering  
Engineering of ecological agriculture  
Information technology in agriculture and forestry  
Engineering of services in rural area  
Technology and methods of plant protection  
Technology in landscape architecture |
| **University of Life Sciences in Lublin**/ Faculty of Production Engineering | Technical infrastructure in rural area  
Technology and infrastructure of food industry  
Informatics in agricultural engineering  
Food engineering  
Technology in motorization and energetic  
Renewable energy sources |
| University of Warmia and Mazury in **Olsztyn**/Faculty of Technical Sciences | **Agricultural and forestry engineering**  
Energetic and renewable energy sources  
Mechatronics in agriculture  
Agricultural and food processing machines |
| **Opole** University of Technology/ Faculty of mechanical engineering | **Agricultural and forestry engineering** |
| University of Life Sciences in **Poznan**/ Faculty of Agronomy and Bioengineering | Engineering of agroenergy  
Economy and organization of services in agriculture  
Agricultural technology  
Informatics and agroengineering (**macromodule**) |
| West Pomeranian University of Technology in **Szczecin**/ Faculty of Environmental Management and Agriculture | Infrastructure and ecotechnology  
Agroenergetic and informatics systems  
Technology and services in forestry  
Informatics and extension in agricultural and forestry technology  
Management of agricultural technology (**macromodule**) |
| **Warsaw** University of Life Sciences-SGGW/ Faculty of Production Engineering | Engineering and information technology in agriculture  
Engineering and information technology in forestry  
Technology of renewable energy (**macromodule**) |
| **Wrocław** University of Environmental and Life Sciences/ Faculty of Life Sciences and Technology | Agricultural and forestry engineering  
Food and agricultural products engineering  
Informatics in agricultural engineering  
Motorization technology in agricultural engineering |
Faculties conducting studies on “agricultural and forestry engineering” and the similar are closely related to the agricultural faculties. Among the 11 universities three has separate faculties related to agricultural engineering and there are located on life sciences universities (Agricultural University in Kraków; University of Life Sciences in Lublin and Warsaw University of Life Sciences). On the three universities studies are carried out on the faculties of agricultural or derivatives (University of Life Sciences in Poznań - Faculty of Agronomy and Bioengineering; West Pomeranian University of Technology in Szczecin - Faculty of Environmental Management and Agriculture; Wrocław University of Environmental and Life Sciences - Faculty of Life Sciences and Technology). At the two universities there are mechanical/technical sciences faculties (University of Technology and Life Sciences in Bydgoszcz - Faculty of Mechanical Engineering; University of Warmia and Mazury in Olsztyn - Faculty of Technical Sciences), However, these universities also teach in agriculture on other faculties. However, three universities (in Białystok, Koszalin and Opole) are typical technical universities (polytechnics) and agricultural engineering study are located on mechanical faculties. These universities have close contacts with the agricultural sciences through lecturers and scientific work carried out in cooperation with the universities and agricultural institutes.

Mandatory practices are carried out in farms, companies servicing agriculture and rural areas, processing plants, advisory centres, etc. Is also well developed foreign and apprenticeship schemes abroad. Mobility of the student base on the Erasmus program and other bilateral programs of EU and international cooperation. Also in the country is implemented program MostAr, which makes possible to study at other universities in Poland.

Table 2. Other fields of study like engineering agriculture offered by the faculties of polish universities oriented on agricultural sciences

<table>
<thead>
<tr>
<th>University/Faculty</th>
<th>Courses (specialization)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural University in Krakow/</td>
<td>Management and production engineering (production engineering and logistic)</td>
</tr>
<tr>
<td>Faculty of Production and Power Engineering</td>
<td></td>
</tr>
<tr>
<td>University of Life Sciences in Lublin/</td>
<td>Management and production engineering (management and agricultural production;</td>
</tr>
<tr>
<td>Faculty of Production Engineering</td>
<td>management and food production)</td>
</tr>
<tr>
<td></td>
<td>Education in technology and informatics (informatics in agricultural production;</td>
</tr>
<tr>
<td></td>
<td>computer systems in food processing)</td>
</tr>
<tr>
<td>University of Life Sciences in Poznan/</td>
<td>Informatics and agroengineering (macromodule)</td>
</tr>
<tr>
<td>Faculty of Agronomy and Bioengineering</td>
<td></td>
</tr>
<tr>
<td>West Pomeranian University of Technology in Szczecin/</td>
<td>Management of agricultural technology (macromodule)</td>
</tr>
<tr>
<td>Faculty of Environmental Management and Agriculture</td>
<td></td>
</tr>
<tr>
<td>Warsaw University of Life Sciences- SGGW/</td>
<td>Management and production engineering (production engineering; management and</td>
</tr>
<tr>
<td>Faculty of Production Engineering</td>
<td>organization of production)</td>
</tr>
<tr>
<td></td>
<td>Technology of renewable energy (macromodule)</td>
</tr>
<tr>
<td>University/Faculty</td>
<td>Courses (specialization)</td>
</tr>
<tr>
<td>-------------------------------------------------------------</td>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>Wroclaw University of Environmental and Life Sciences/</td>
<td>Management and production engineering</td>
</tr>
<tr>
<td>Faculty of Life Sciences and Technology</td>
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</tbody>
</table>

Table 3. Web pages of polish universities offered ABE study

<table>
<thead>
<tr>
<th>University/Faculty</th>
<th>Main web page of the university/ web page specific for ABE (language)</th>
</tr>
</thead>
</table>
| **Bialystok** University of Technology/        | http://www.pb.bialystok.pl/  
| Faculty of Mechanical Engineering               | http://www.trl.pb.edu.pl/  
|                                                 | http://www.utp.edu.pl/  
|                                                 | http://ur.krakow.pl/  
|                                                 | http://wipie.ur.krakow.pl/  
|                                                 | http://wipie.ur.krakow.pl/index/site/988 (eng)                                                                |
| **Koszalin** University of Technology/          | http://www.tu.koszalin.pl/  
| Faculty of Mechanical Engineering                | http://rekrutacja.wm.polo.technika.koszalin.pl/kierunekspec.html                                                |
|                                                 | http://www.tu.koszalin.pl/eng/mechanical.html (eng)                                                            |
| **Lublin** University of Life Sciences in        | http://up.lublin.pl/  
| Faculty of Production Engineering                 | http://wip.up.lublin.pl/  
|                                                 | http://up.lublin.pl/russian/ (rus)                                                                            |
| **Olsztyn** University of Warmia and Mazury in   | http://www.uwm.edu.pl/  
| Faculty of Technical Sciences                     | http://www.uwm.edu.pl/wnt/pl/index.php                                                                         |
| **Opole** University of Technology/              | http://www.po.opole.pl/  
| Faculty of Mechanical Engineering                  | http://www.technika-rolnicza.po.opole.pl/  
| **Poznań** University of Life Sciences in         | http://puls.edu.pl/  
| Faculty of Agronomy and Bioengineering             | http://www.up.poznan.pl/iir/  
|                                                 | http://en.puls.edu.pl/ (eng)                                                                                    |
| **Szczecin** West Pomeranian University of        | http://www.zut.edu.pl/  
| Technology in Faculty of Environmental Management  | http://www.zut.edu.pl/index.php?id=6083                                                                        |
| and Agriculture                                   |                                                             |
| **Warsaw** University of Life Sciences-          | http://www.sggw.pl/  
| SGGW/ Faculty of Production Engineering            | http://wip.sggw.pl/  
|                                                 | http://wip.sggw.pl/en/ (eng)                                                                                    |
## References

The information was received from the official websites of the Ministry of Science and Higher Education and selected universities.

<table>
<thead>
<tr>
<th>University/Faculty</th>
<th>Main web page of the university/web page specific for ABE (language)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wrocław</strong> University of Environmental and Life Sciences/</td>
<td><a href="http://www.up.wroc.pl/">http://www.up.wroc.pl/</a></td>
</tr>
<tr>
<td>Faculty of Life Sciences and Technology</td>
<td><a href="http://www.rol.up.wroc.pl/">http://www.rol.up.wroc.pl/</a></td>
</tr>
<tr>
<td></td>
<td><a href="http://www.up.org.pl/punkty_ects/">http://www.up.org.pl/punkty_ects/</a> (eng)</td>
</tr>
</tbody>
</table>
ENHANCING THE ATTRACTIVENESS OF EUROPEAN STUDY PROGRAMS IN BIOSYSTEMS ENGINEERING - THE PORTUGUESE CASE

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1. Tools for enhancing the international attractiveness of European study programs in Agricultural/Biosystems Engineering (ABE).

The attractiveness of the Agricultural/Biosystems Engineering courses in Portugal is low, and the promotion of the courses is difficult. And, to our knowledge, there is no national strategy to fight the difficulties in this type of promotion. Moreover, it is known that any farmer’s protest (e.g. fuel prices; the difficulty in selling their products, etc.) showed on any national television, even for only a couple of minutes, is more devastating in terms of negative image for the Agricultural Engineering courses, that any positive promotion of activities that we could make.

At national level the promotion of this type of courses is treated as so many others, that is, each individual University usually advertises their courses in national and regional newspapers, web pages and others just to attract students for the courses. We feel that the only positive promotion that can be made for this type of courses has to come from a promotion at an European level using attractive examples. However, the blowing winds for this type of courses and activity are not very favourable.

If we make a web search in “www.youtube.com” with the following keywords "Future of Agriculture" we will find a small number of videos when compared to other subjects. Moreover, if we look at the number of videos exhibitions we immediately understand that this is an issue that matters only to very few people and many of these videos are related to "organic farming". Two interesting videos that indicate some trends for the future of these courses and activities are presented below:

A view from FAO - http://www.youtube.com/watch?v=_tt3eECS_9o
A view from Franz Fischler: http://www.youtube.com/watch?v=KWp53dniJMQ&feature=related

It seems therefore that these two great international political leaders immediately isolate a few key ideas:

a) Europe cannot be the continent that will produce the food for the rest of the world because other geographical areas, with higher population growth, will replace Europe production using current European Technology;

b) Therefore, Europe will reduce its productive capacity considering the increasing production capacity from other countries and in consequence the need for technicians will be transferred to the other countries;
Agriculture must be sustainable, and in Europe, this type of activity will be highly environmentally regulated. Given these key ideas, it seems that the strategy of promoting the gradual substitution of the designation Agriculture Engineering to Biosystem Engineering is the right decision because the association between them is not immediate. This lack of association will avoid the automatic connection between the young people and the farmers problems presented recurrently on all TVs. On the other hand, future Europe farming will be more related to environmental regulations than to production capacity problems. The only agriculture activity where production capacity will play, perhaps, an important role in Europe is the energy crops (Bioenergy).

It seems therefore that the only chance for future grows on this type of courses is the ones associated with environmental regulations, technology and bio-energy. Promotion tools have to address these three important areas and have to present them through new forms of communication such as “facebook” and other social networks (e.g. http://www.facebook.com/Eng.de.Biossistemas) starting in the secondary school.

2. Implementation of ABE study programs in your Country aimed at promoting their international image (TUNING Template).

Regarding the situation presented before we can announce that in Portugal, and more specifically at the University of Évora, a master's degree in Biosystems Engineering has been accredited by the National Accreditation Agency. This course was approved in late July and there was little time for promotion. Even so, we were able to enroll 10 students in the 1st phase of applications. Comparing with the applications for the Agricultural Engineering Master, still going on in the same university, that only enrolled 4 students, it is obvious that the Biosystems Engineering Master had a higher attractiveness for students.

We believe that to promote the attractiveness of Biosystems Engineering we should seek international quality labels (e.g. EUR-ACE) because this is one of the factors that could be considered in the decision of students and parents.

3. Please, describe the tools for promoting the multi-linguism in ABE study programs in your Country (e.g. courses and/or dissemination materials offered in languages different from the native ones, etc.).

During the accreditation process of the Biosystems Engineering master's degree, the evaluation International panel suggested that the proposed Master should be offered in English. The course committee considered that this should be a step to take after the masters’ national consolidation and after considering the following steps:

a) Promote a 2nd cycle course accreditation with the designation of Biosystems Engineering;

b) Promote the European accreditation of the accredited course approved in a) (e.g. EUR-ACE label);

c) Launch a national edition, in partnership with other national institutions in order to promote this type of training at national level;

D) Launch an international edition in partnership with other Portuguese spoken institutions (e.g. Brazil, Africa, etc..) to popularize and increase the international experience of this master;
e) Launch an English edition, in partnership with other European institutions in order to consolidate the European and International level of this type of master.

Given this strategy it seems not an urgent priority the development of tools in languages other than Portuguese. However, we believe that multilingualism in Biosystems Engineering formation is very important and this will be pursued through the invitation of visiting specialists, belonging or not to the ERABEE network, as well as using educational materials in English and Spanish languages obtained through our international partners in order to increase the scope of their multi-linguistic training. These kind of international partnerships will have to be based mainly in distance learning platforms (e-b-t-learning).

We believe that one of the most important strategies of teaching / learning / assessment to follow in Biosystems Engineering courses should be the continued use of methodologies such as "Problem Base Learning (PBL)". Students have to be constantly confronted with problems, specially multi-linguistic and multi-national problems, because this is the real form of future self-learning and the only way to adapt to other World countries realities. Education should promote self-training and lifelong learning, because these are the most important skills of any kind of post-graduate training today.

4. Please, describe the topics of rare and/or disappearing knowledge that can be used as a tool for enhancing the attractiveness of ABE study programs.

Environmental and energy efficiency should be the engine of any productive activity in the future. Considering this fact, we think that some ancient cultural systems, like the consociation of crops (e.g. legumes with others, etc.) can be much more advantageous from the standpoint of environmental and energy efficiency than any mono-crop systems currently in use. These crops consociation knowledge is in our opinion a rare knowledge and with a tendency to disappear because it collides with mechanization. However, with current micro-robots developments in agriculture, such knowledge could be valuable for future agriculture sustainability (environment and energy efficient).
ENHANCING THE ATTRACTIVENESS OF STUDY PROGRAMMES IN AGRICULTURAL ENGINEERING IN SLOVAK REPUBLIC

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Abstract
In the first part of the paper there is characterised general situation in Slovak agriculture, which is negatively influenced by Common agricultural policy of the EU. Subsequently the attractiveness of the study programme Agricultural Engineering was reduced. Even in such situation the Faculty of Engineering of the Slovak University of Agriculture in Nitra tries to enhance the attractiveness of study programmes in Agricultural Engineering. In the next part there are characterised the contents of information concerning Agricultural engineering study programmes provided by the Slovak University of Agriculture in Nitra to high schools. The information about Agricultural Engineering study programmes that is available by means of the web-site of Faculty of Engineering is given. There are also outlined the ways for promoting the practical training of students at enterprises involved in the field of ABE at the Faculty. Tools for promoting the multi-linguism in Agricultural Engineering study programmes at the Faculty of Engineering are explained.

Introduction
Attractiveness of any study programme depends first of all on the chances which study programme offers the students after graduation. The extent of such offer is generally defined by the economical situation in respective resort. Before the year 1989 the main objectives of agricultural policy in Slovakia were as follows:

- self-sufficiency in production of products of the temperate zone,
- low prices of agricultural products for consumers,
- income parity between agricultural sector and the rest of the economy.

In order to support the development of the Slovak agriculture in the year 1969 there was established the Faculty of Agricultural Engineering at the Slovak University of Agriculture in Nitra. During last years at the faculty graduated more than 7000 graduates. The main aim of the Faculty was to educate highly qualified graduates with the university-level education for the needs of large scale farms. The graduates had no problems to find a job.

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Nowadays the Slovak farmers are facing the problems connected with the crisis in demand, coupled with a dramatic fall in the prices of all agricultural commodities. In times of the global economic downturn, when comparing the old and new EU members, Slovakia is at a disadvantage in agricultural subsidies. Slovakia should be self-sufficient in practically all the commodities grown in the temperate zone. However, as a consequence of discriminatory supporting rules and reform moves in Common agricultural policy, this is no longer fully true.

The consequences of present situation we can see at the Slovak University of Agriculture. Currently the Faculty of Engineering of the Slovak University of Agriculture in Nitra registers the decreased interest of the students to study the Agricultural engineering study branch. A car industry-oriented study branches are more attractive for young people. To work in agriculture in not enough attractive. It is the result of the general crisis of the Slovak agriculture caused by the unfair and discriminatory Common Agricultural Policy of the European Union based on neo-colonial principles in relation to the new member states of the EU.

It is expected that after a crisis and due to general lack of food in the world the study of agricultural/biosystems engineering will be more attractive for the students and it will create a new conditions for the progress of the study branch.

1. Tools for enhancing the international attractiveness of study programme in Agricultural engineering

   a. The contents of information concerning Agricultural ENGINEERING STUDY programmes and the means by which it is provided by the Slovak University of Agriculture in Nitra, to high schools

   Faculty of Engineering (until the year 2008 - Faculty of Agricultural Engineering) of the Slovak University of Agriculture each year prepares the updated complex information about the study programmes. This information is presented to the potential students studying at the secondary schools by the following ways:

   o visit of the representatives of the Faculty of Engineering to the high schools and presentation of the study programmes and university facilities in front the groups of potential students, their parents and educational advisors,
   o organizing of the special event “Day of Open Doors” at the Faculty of Engineering during which the potential students are visiting the Faculty,
   o sending of leaflets and posters about the Faculty and study programmes to the high schools,
   o presentation of the Faculty of Engineering in the local TV programmes,
   o presentation of the Faculty of Engineering in the local newspaper,
   o Study manual published by the Faculty of Engineering, Slovak University of Agriculture in Nitra for each current year. This publication contents the list of accredited study programmes for 1st, 2nd and 3rd level, detailed study plan (study subjects, credits, study hours, etc.). There are published also study rules in accordance with University Law No. 131/2002.
   o Among the very important events, which are organized by the Faculty of Engineering (until the year 2008 - Faculty of Agricultural Engineering) of the Slovak University of Agriculture in order to enhance the national and international
This event is organized by a Dean’s office two times during an academic year:
  o at the beginning of the November of the current year,
  o at the end of January of the current year.

For the participation on the event “Day of Open Doors” there are invited the students and teachers from the secondary schools and educational advisors from different agencies.

The event “Day of Open Doors” usually starts in the meeting hall of the Faculty of Engineering and the vice-dean for the study affairs gives the basic information about the Faculty and its departments. The representatives of each department there are present. During this first part of the event the visitors obtain the following information:
  o accredited study programmes,
  o prepared study programmes,
  o opportunities of graduates after completing his studies on the labour market,
  o possibilities of the graduates to study higher study programmes (engineers study programme and PhD. study programme),
  o advantages of study at the Faculty of Engineering.

In order to demonstrate the facilities of the Faculty of Engineering there is presented the DVD with the computer presentation in MS PowerPoint. There is also available the special leaflet containing all important information about the Faculty of Engineering. The information about deadline for submitting the applications for study, the deadline of entrance examination, content of entrance examination, etc., are given.

During the second part of the event “Day of Open Doors” the visitors can visit all departments and they can speak with the heads of departments, with teachers, technicians and student. They can receive the detailed information about the study conditions on the departments, about the laboratory facilities, but also about the research provided on the departments, about the international contact, about the involving of department in international projects.

The information about ABE or relevant study programs that are distributed to various stakeholders in Slovakia, and also the multimedia tools used for this purpose.

Among the tools that used at the Faculty of Engineering for the information of potential students about the study programmes belongs the newspaper issued fortnightly (bi-weekly) named “Polnohospodar” (Farmer), which is published by the Slovak University of Agriculture in Nitra. In the beginning of the each year in the period when student can apply for the study at the Faculty of Engineering there are published the following information:
  o list of accredited study programmes with the short characteristics differentiated by the study level (BSc., Eng, PhD.),
  o list of knowledge requirements,
  o deadline for the submitting of application for study respective study programme.,
  o contact address.
The newspaper “Polnohospodar” (Farmer) are distributed to secondary schools and it is also available for the Faculty visitors.

b. The information about Agricultural Engineering study programs that is available by means of the web-site of Faculty of Engineering

The most complex information about the possibilities of the study at the Faculty of Engineering of the Slovak University of Agriculture in Nitra it is possible to find on the website http://www.tf.uniag.sk/. This website gives the following information:

List of accredited study programmes:
Study branch: 5. 2. 46 Agricultural and forestry machinery
Study programmes 1. level (Bc.) - 6 semesters:
  • Agricultural engineering
  • Agricultural engineering and commercial activities
  • Equipment for processing of agricultural products
  • Machinery for pre agroenvironment
Study programmes 2. level (Eng.) - 4 semesters:
  • Agricultural engineering
  • Agricultural engineering and commercial activities

Graduates of the study programmes on 2. level can continue in their study within the PhD. study programme “Technology and mechanization of the agricultural production”.

Information about the final state exams:
The study at the 1st level is ended by state final exam which contains three study subjects and defence of the Bc. thesis. The graduates are awarded by the title Bachelor (“Bc.”).
The study at the 2nd level is ended by state final exam which contains four study subjects and defence of the Eng. thesis. The graduates are awarded by the title Engineer (“Eng.”).

Information about the entrance exams:
In this part the students can obtain detailed information about the basic prerequisites for the 1. level: successful completing the study at the secondary school, successful passing of the entrance exams. The students wishing to study at the 2nd level have to complete their study at the 1.level. Students coming from other study programmes then Agricultural engineering are requested to pass the entrance exam for 2nd level to confirm their knowledge of the core study subjects.

Information about the possibility of implementing graduate:
The graduate of Faculty of Engineering is able:
- to work as a technician and engineer at the field of quality management in agriculture and industry,
- to work as a technical manager,
- to work as a work safety technician in the field of processes in agriculture, industry and private sector,
- to work in public sector as a certified engineer, technician or department manager,
- to work as an engineer, who has sufficient technical knowledge and is creative in his work and is able to provide decisions to solve complicated technical and managerial problems,
- to work as a quality manager in companies in agriculture and industry having knowledge of standardisation of quality management in integrated management system,
- to work as an engineer in operation and maintenance of hardware and software, automated measurement and management in areas,
- to work as an engineer in management of transport and logistic systems having knowledge of current legislative,
- to manage the working groups and teams in the area of mobile and environmental machinery, to manage even large-size projects with the full responsibility,
- to solve technological and technical problems related to machinery operation knowing the production technologies with regard to quality of production, costs reduction and environment protection,
- to provide commercial activities based on machinery using and management of machinery operation in production and trade companies,
- to solve technical problems connected to production and distribution of energy from renewable resources,
- to work as a planner, technologist and designer in specialized project,
- to work as a researcher in research institutions and machinery testing stations,
- to work as a teacher vocational education system.

c. The methods of contacting the Faculties of Engineering and Agriculture in order to provide them with the information about Agricultural Engineering study programmes

The Faculty of Engineering of the Slovak University of Agriculture in Nitra is only faculty in Slovakia focused on the agricultural engineering. The Faculty has close contacts with similar faculties in Czech Republic:
- Faculty of Engineering, Czech University of Live Sciences in Prague,
- Faculty of Agronomy, Mendel University in Brno,
- Faculty of Agriculture, University of South Bohemia in Ceske Budejovice.

The Faculty of Engineering of the Slovak University of Agriculture in Nitra has very solid contacts with Slovak faculties of engineering:
- Faculty of Mechanical Engineering, Slovak University of Technology in Bratislava,
- Faculty of Materials Science and Technology in Trnava, Slovak University of Technology in Bratislava,
- Faculty of Mechanical Engineering, University of Technology in Kosice,
- Faculty of Manufacturing Technologies in Presov, University of Technology in Kosice,
- Faculty of Forestry of the Technical University in Zvolen,
- Faculty of Environmental and Manufacturing Technology, Technical University in Zvolen.
There are different methods of contacting – participation of the staff-members in scientific boards and councils, organization of the common workshops aimed on the issues of study programmes and permanent dialogue among the teachers with aim to increase of the attractiveness of study programmes.

d. The ways for promoting the practical training of students at enterprises involved in the field of ABE at the Faculty
Promoting of the practical training of students of the study programme Agricultural Engineering at the agricultural farms is realized in two forms:

- in the 4th semester of the 1.level (Bc. study programme) students have operational practice on the top farms, first of all on the University farm. They have an opportunity to know the production conditions in crop production and livestock production. They can work as tractor operator or combine harvester operator, etc. The students are allowed to find themselves the place for the operational practice and in such case the effect of operational practice is usually much higher.

- in the 2nd semester of the 2.level (Eng. study programme) students have managerial practice on the top farms, in the agricultural machines dealerships or other companies having relation to agricultural production, to biosystems engineering or food processing enterprises and companies. They have an opportunity to know the management of farms, companies and enterprises. They can work as young managers, assistant managers, etc.

e. The schemes for promoting the mobility of students, graduates, PhD students and staff within and outside Europe

In order to support the mobilities of the students studying the Agricultural

i) The student is entitled to apply to spend part of his study as "mobility" at a foreign partner institution. "The institution" can be an educational or a scientific one, associated with the Slovak University of Agriculture by bilateral or multilateral agreements which form the basis for such a study. The "mobility" can be carried out also at foreign universities which do not have an agreement with the Slovak University of Agriculture.

ii) When looking for the suitable institution the students can use the web-based database about the European study programmes in Biosystems Engineering, established in the framework of USAEE-TN.

iii) The student "mobility" (in all levels and forms of study) is a study abroad based on the LEARNING AGREEMENT.

iv) The precondition of the mobility at an institution is a trilateral agreement among the sending institution, the receiving institution and the student. The prerequisite of the mobility spent at an institution that does not have an agreement with the Slovak University of Agriculture is a mutual consent of the sending and the receiving institutions or Letter of Acceptance respectively. In the case of PhD. students, the tutor's approval is necessary.

v) The agreement is prepared upon a student's application. The student consults the application with the faculty coordinator and the vice-dean for education, a PhD. student also with the tutor. The planned study load should be of the same number of credits as awarded for a particular period of study at the sending faculty (30 credits per semester).
Education and Research in Biosystems or Agricultural and Biological Engineering in Europe; a Thematic Network (ERABEE-TN)

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The mobility is approved by the dean. The approved proposal of the agreement, together with the student application form, will be sent by the Slovak University of Agriculture to the receiving institution. It will confirm the agreement and determine the mobility duration (if not agreed otherwise). Upon return, student will submit the Transcript of Records to the Dean's office. The dean automatically recognizes the courses and credits awarded in accordance with the agreement. Credits are included in the year in which the mobility was carried out. The Transcript of Records forms a part of the student's documentation in the faculty's Study Affairs Office.

vi) Doing the scientific part of the PhD. study programme abroad and recognizing the credits is carried out according to the approved PhD. student's individual study plan, and in accordance with a proposed program, consulted with the tutor and approved by the receiving institution.

vii) The ways of disseminating career opportunities for ABE graduates (including research fellowships and research projects)

The information about the career opportunities for graduates of the Agricultural engineering study programme is usually disseminated by the following ways:
- meetings of the company representatives with the students,
- relevant information is published in the newspaper “Polnohospodar” (Farmer) issued fortnightly (bi-weekly) by the Slovak University of Agriculture in Nitra,
- information is uploaded on the Faculty web-site,
- information is published on the wall panels at the Dean office, at the Departments and in the student colleges.

As a most efficient method of the disseminating of the information about the career opportunities for graduates of the Agricultural engineering study programme, can be considered the personal meetings of the company representatives with the students and discussion about the details concerning jobs.

g. The ways of announcing open European or international academic positions in the field of Agricultural/Biosystems engineering

In case of open European or international academic positions in the field of Agricultural or Biosystems Engineering the information is usually published on the University web-site or in the newspaper “Polnohospodar” (Farmer) issued fortnightly (bi-weekly) by the Slovak University of Agriculture in Nitra.

2. Implementation of Agricultural/Biosystem engineering study programmes in Slovakia aimed at promoting their international image.

At the Faculty of Engineering was in last months successfully completed the process of accreditation provided by Accreditation commission, which is the body of Government of Slovak Republic. The faculty has obtained the accreditation of the following study programmes:
- study programme Agricultural engineering (Bc. and Eng. level),
- study programme Agricultural engineering and commercial activities (Bc. and Eng. level),
- study programme Technologies for processing of agricultural products (Bc. level),
- study programme Machinery for agroenvironment (Bc. level).
Accreditation of the above study programmes has confirmed the quality of the teaching, education and research activities. Results of accreditation have consolidated the international image of the faculty and study programmes. Currently there was prepared the conceptual framework of the study programme Biosystem engineering based on ERABEE-TN activities. This conceptual framework takes into account the changes that take in place in Slovak agriculture. Due to the general crisis of the Slovak agriculture there are no real conditions for introducing of such new study programme. It is estimated that stakeholders (e.g. employers) soon will initiate the need for education of biosystem specialists.

3. The tools for promoting the multi-linguism in Agricultural Engineering study programmes at the Faculty of Engineering of the Slovak University of Agriculture in Nitra

Within the SOCRATES/ERASMUS project during last 3 years at the Faculty of Engineering of the Slovak University of Agriculture in Nitra there were taught in English language an individual study subjects for the students coming from Turkey, Spain, Czech Republic, Germany and Poland. The teachers at the Faculty of Engineering have obtained sufficient experience and therefore at the Faculty of Engineering of the Slovak University of Agriculture in Nitra there was prepared a special module with the title “Basics of Farm Machinery” which should be taught in English language for 2 semesters with the total credit value 60 credits.

The following study subjects have been included into the module: Mathematics; Introduction of Programming; Physics; Selected Chapters from Physics; Elasticity and Strength; English language 1; Technologies for Animal Production 1; CAD System Introduction; Farm Machinery; Technologies for precision farming; English language 2.

4. The topics of rare and/or disappearing knowledge that can be used as a tool for enhancing the attractiveness of ABE study programmes.

Among the topics of rare knowledge that can be as a tools for enhancing the attractiveness of the Agricultural/Biosystems engineering study programmes can be considered:
- growing, harvesting and processing of medicinal plants,
- farm-based technologies of basic food processing and production (wine, vegetables, fruits, milk, meat, cheese, flour, etc.). Such technologies could allow the production of products directly on the farms and sell them directly without participation of the large trade chains.

It is expected that introducing a new topics of rare knowledge included into the Agricultural/Biosystems engineering study programmes can attract new students from regions with high rate of unemployment. Small private companies dealing in area of growing, harvesting and processing of medicinal plants and other special crops for industrial purposes can create new jobs. The same benefits can bring farm-based technologies of basic food processing and production.
5. Conclusions

Negative consequences of economic and financial crisis on the sector of Slovak agriculture may manifest in a decrease of production due to the export decrease, as well as investments. From this aspect, it is necessary to:

- systematically support broadening of primary processing and finishing of products for the consumer, especially specific regional products, the development of marketing infrastructure and broadening of market segments with a higher added value,
- co-ordinate the technical development with the synergy of agricultural and energetic sectors (renewable energy resources) and stimulate the bank sector towards encouraging support of agriculture and food sector,
- support a bigger connection of agriculture, forestry and fishery with the diversification of activities in the rural areas.

The quality of human resources, especially production managers will effect the ability of the sector of Slovak agriculture to overcome the problems and all negative consequences of economic and financial crisis. In this context, it is necessary to emphasize the importance of a sufficient number of qualified professionals for the field of agricultural and biosystems engineering. Professionals and experts from the field of biosystems engineering will decide the extent to which we succeed in implementing new, modern and economically efficient technologies. The enhancement of the attractiveness of study programmes in agricultural and biosystems engineering is very urgent.

References

ENHANCING THE ATTRACTIVENESS OF SPANISH STUDY PROGRAMS IN BIOSYSTEMS ENGINEERING

F. Ayuga¹, P. Aguado²

Abstract
This paper describes the different tools to improve and promote the Biosystems Engineering University Programs in Spain. The first chapter is a description of the ways in which Spanish universities disseminate the information of the Agricultural/Biosystems Engineering (ABE) University Studies and promote the mobility between students and Staff. The second chapter is a description of the implementation of ABE university studies in Spain. The third describes the tools for promoting the multilinguism in ABE university studies in Spain. The last chapter shows the rare and/or disappearing knowledge topics that can be used as a tool for enhancing the attractiveness of ABE university studies in Spain.

1. Tools for enhancing the international attractiveness of Spanish study programs in Agricultural / Biosystems Engineering (ABE)

At this moment in Spain there are only two universities offering studies under the name of “Biosystems Engineering”, which are the Polytechnic University of Cataluña and the University of Leon. However there are many universities offering studies in Agricultural Engineering or related disciplines with very similar contents to those included in the Biosystems Engineering Studies.

All these universities include in their official web site the main characteristics and the structure (syllabi) of the studies. Usually the offered studies are divided in the following groups:

- Official undergraduate programs (Official Bachelor)
- Official graduate programs (Official Master)
- Doctorate
- Own programs
- Continuous training (short courses)

In addition in Spain there is an official registry (https://www.educacion.es/ruct/home.do) for universities, university centres and university official studies. Such registry was created to make public the information of the Spanish University System. In this official web-site it can be found the syllabus of the officially recognized bachelor and master degrees and information about the doctorate programs.

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The methods to promote the studies in each university vary from one university to another. All universities have leaflets and promotional guides with information about the different degrees. Some of them have developed promotional videos, for example those developed for the agricultural engineering studies by the University of Leon (http://www.estia.unileon.es/index.php?option=com_content&task=view&id=50&Itemid=65). Other universities have developed even television programs about the engineering studies, such as the Polytechnic University of Madrid (each branch of engineering was a programme, release by TVE, the Spanish national public television).

All Spanish universities send promotional information to the high schools of their region and sometimes visit some of them. In addition almost all Spanish universities organize open days in which the last course high school students have the opportunity to visit the university and the centres in which they are interested. Different promotional activities are organized during these days.

Regarding to the promotion of the students training in enterprises, all the universities offer this possibility to their students; however there are very few degrees in which this training is compulsory. There is a national program for this training regulated by the Royal Decrees 1497/81 y 1845/94. This training does not involve payment or salary. However, this does not exclude the possibility of some economical aid, especially when it is intended to cover travel or subsistence costs. Students Insurance is covered by the corresponding university. This program is complemented with other programs (regional, local or university), some of them with economical aids for both students and companies. This is the case of the program of the Castilla y León region regulated by the decree 72/1993.

At this moment, the majority of the students take advantage of this training period within the different programs. Figure 1 shows the percentage of graduate students of Agricultural Engineering of the University of León that have made training in companies during their University studies. This figure corresponds to a work for the Spanish Education Ministry directed by Pedro Aguado (Tascón et al. 2010). The study was conducted in 2010 and the polled graduate students were those who had finished the Agricultural Engineering degree (bachelor of 3 years + master of 2 years) in the last five years.

Regarding to the mobility of the students within and outside Europe, the existing programs to promote the international mobility can be classified in those with and without academic recognition. That is that there are programs in which the courses passed abroad are recognized as a part of the studies and others that are not. This depends on the program and on the agreements between the universities. Obviously the former are more popular than the latter.
The most popular is the Erasmus program, that offers university-level students the chance to go to another European country to study and do work placements (traineeships). This program not only supports students, but also professors and business staff who want to teach abroad, as well as helping university staff to receive training. The promotion of this program have been very intensive in Spain in the last years, this has led to Spain be the country with most students participating in it. This can be seen in the statistics of the European Commission for the Erasmus program (http://ec.europa.eu/education/erasmus/doc920_en.htm), were it can be observed that de number of Erasmus exchanges with Spain represents 16,7% of the total.

One important initiative for the international mobility of the Agricultural/Biosystems engineering students in Spain is the project TABE (http://www.ucd.ie/tabe/). The project TABE (TransAtlantic Biosystems Engineering Curriculum and Mobility), within the EU-US ATLANTIS Programme, is targeted to advance in the internationalisation of Biosystems Engineering (BE) curricula and to develop a global awareness within this discipline. This project is based on and is a follow-up of the ERABEE-TN. Thanks to this project 24 students will have the opportunity for funded travel scholarships each way across the Atlantic. Students will study abroad for a minimum of one semester and maximum of one academic year. The participating institutions are Virginia Polytechnic Institute and State University (VT) and University of Illinois at Urbana-Champaign (UIUC) and for partner institutions of the ERABEE Network, the University College Dublin (UCD), the Agricultural University of Athens (AUA), the Universidad Politecnica de Madrid (UPM), and the University of Bari (UniBar).

Despite this wide variety of programs, many students do not participate in them yet. In figure 2, obtained for the previously mentioned work directed by Pedro Aguado, (Tascón et al. 2010), it can be observed the percentage of students that participate in international mobility programs in the agricultural engineering studies of the University of Leon. However, the number of international exchanges during the studies is increasing very fast in the last years, partly because of the intense promotion that the institution is making.
Regarding the labour assessment Spanish Universities usually have some Centre for information on employment, to communicate and guide their students in their attachment to the labour market, especially in seeking their first job. They develop two main lines of action:

- Graduates are registered to access job offers received at the University
- Companies may provide an effective service to fill jobs with graduates who best suit their needs and the required profile.

The web page of the University allocates information and links on grants, scholarships and job offers. For example it can be visited the webspages of the School of Agricultural Engineering in Madrid and Leon (http://www2.etsia.upm.es/etsia/ofertas and http://www.estia.unileon.es), that provides the student this kind of information including jobs and grants abroad.

Most of the numerous bilateral agreements of the Spanish Universities that offer ABE degrees with other European or foreign Universities in general are based in personal contacts of the academic staff. These contacts frequently come from common research or participation in research conferences, or staff mobility programs. Sometimes, the agreements are based on institutional contacts, in these cases leading to ample exchanges and double degrees.

USAEE and ERABEE networks have been useful for the two Universities participating, the Universidad Politécnica de Madrid and the Universidad de León, but had less impact on the other Spanish Universities.

2. Implementation of ABE study programs in Spain

This month starts a new academic year with the new program studies (supposedly in accordance with the Bologna declaration) implemented in all Spanish Universities. The new bachelor degrees on ABE topics have been offered in more than 30 Universities with a great variety of names. All bachelor degrees last 4 years (240 ECTS) and the new master degrees between 60 and 120 ECTS. Only two Universities have approved the new masters in ABE, but is expected a lot more in the next years. These two masters were approved with duration of 60 ECTS for the University of Leon and 120 for the Polytechnic University of Cataluña.

In most cases the new degrees were designed taking into account the guidelines established by the Spanish government in order to get some professional rights. The international attractiveness had little influence in the development of the program of
studies, but in a certain sense, the renewal of the program is always an opportunity to introduce modern topics and more attractive degrees.

3. Tools for promoting the multilingualism of ABE study programs in Spain

Law 4/2007, which amended Law 6/2001, established a new structure for university degree programmes and degrees in Spain in line with the aims set for building the European Higher Education Area (EHEA). This law was extended by the Royal Decree 1393/2007, which established the regulatory framework for the organisation and verification of recognised university degrees. This Royal Decree lay down that ANECA must establish the procedures, protocols and guidebooks for the verification of recognised degree programmes in accordance with the criteria established by the Royal Decree. It also lay down that ANECA must evaluate the study programme proposals, in accordance with these protocols and verification guides. All Spanish official university studies must be adapted to these regulations and start, at least with the first year, for the academic year of 2010-2011. In these protocols the inclusion of subjects in other languages in the studies proposals, even though it is not compulsory, is highly regarded. As a consequence, the number of university studies programmes and subjects taught in English in Spain is now increasing. This is an important issue because there are very few programmes in English in the Spanish universities.

The two mentioned masters in Biosystems Engineering are taught in Spanish. However the master of the University of Leon has a subject taught totally in English. The objective of this matter, apart from form students in the specific subject, is the student acquires linguistic competences.

4. Topics of Rare and/or Disappearing knowledge that can be used as a tool for enhancing the attractiveness of ABE study programs in Spain.

This part if the paper has been partially taken from a previous work by the same authors (Ayuga & Aguado, 2009). It is known that the cultural and natural heritage is one of the most important values of Europe and therefore must be preserved. Besides, if it is taken into account that over 56 % of the population in the 27 Member States of the European Union lives in rural areas, which cover 91 % of the territory, it can be realized that the agricultural and biological aspects are very important for the preservation of this heritage.

This heritage is also an important resource for the rural development as also it is the increasing interest of the population on the countryside way of life. That is why in all countries of the European Union many initiatives to preserve old agricultural practices, buildings, machinery and facilities have appeared in the last years.

In addition, the sustainable development is a fundamental priority of the European Union, and the preservation of the rural activities and preservation of the environment go hand-in-hand.

Some subjects related with the cultural and natural heritage preservation can be classified as rare knowledge topics. Some of these topics are the following:
There are also rare knowledge topics in Europe because of they are very particular. This is the case of the agricultural techniques used only in small parts of the European countries or those mainly used out of Europe, some examples are the following:

- About agricultural products and livestock production:
  - endemic species (local breedings),
  - species for the production of particular alimentary products,
  - tropical species, etc.

- Biosystems engineering in developing countries:
  - Storage infrastructures
  - Irrigation techniques,
  - rural roads,
  - water supply, etc.

In the last decades, there has been an increasing interest in the cultural and natural heritage preservation in Spain. There are several reasons for this:

- The increasing interest on environmental issues
- The change of traditional agricultural products to quality products with higher added value, that must be combined with a good commercial image
- The preservation of the agricultural traditions as a part of the cultural heritage preservation
- The recognition of the importance of the landscape an the rural architectonic heritage as resources with economical consequences
- The development of the agrotourism as an important complement of the economical activities in the rural areas
- The increasing image of the countryside as a place of beauty, rest and recreation
- The public policies for rural development (Leader, Proder,…)

Some subjects related with the cultural and natural heritage preservation in Spain can be classified as rare knowledge topics. Some of these topics are the following:

- Reuse and preservation of old rural buildings. The new uses can be also agrarian activities or other uses more related to the agrotourism (hotels, restaurants, etc). Sometimes agrotourism and agrarian production business are combined (industries with a museum, hotel and restaurant like wineries, cheese factories, ham factories, etc)
- Preservation of old agricultural machinery and tools (museums, decoration of industries, decoration of restaurants and hotels, etc)
- Old agricultural facilities (mills, old dams, old irrigation channels, salt evaporation ponds,…)
- Traditional agricultural practices (museums, videos, books, etc)
Agrotourism (hotels, apartments and rural houses combined with cultural and open air activities, like routes, sports, etc)

Regarding to the topics that are rare because of they are very particular, some examples are the following:

- Cotton cultivation in southern Spain
- Sugar cane cultivation in Granada province
- Tropical crops in the Canary Islands
- Cork production
- Vineyards in Lanzarote (La Geria), with their peculiar plant situation to gather mist drops.
- Vineyards in the slopes of Sil river (Ribeira Sacra)
- Iberian pigs production in open air and crude ham production
- Fighting bulls production.
- Greenhouses “sea” in Almeria province.
- Plastic covered reservoirs for irrigation
- Fish farms

References


Abstract
In Sweden for the moment no structured education in Agricultural or Biosystems Engineering (ABE) is in progress. During the last decades several attempts have been made to start up such programmes but no one has been successful. Information about the programmes and courses has mainly been distributed via brochures and web-sites. Today the University is also testing social media such as Face Book. Student and teacher mobility is promoted in various ways, e.g. the University has 297 exchange agreements. In order to promote multi-linguism at SLU it is recommended that some course literature at Bachelor as well as Master level should be in English. Additionally an expressed goal is that the MSc-programmes offered should be taught in English.

1. Tools for enhancing the international attractiveness of European study programs in Agricultural/Biosystems Engineering (ABE)
For the moment no structured education in Agricultural or Biosystems Engineering (ABE) is in progress in Sweden. Only single courses related to basic sciences and various engineering specialisations are given at the Swedish University of Agricultural Sciences (SLU). However, the University runs two engineering Master programmes in collaboration with Uppsala University where the students graduate from the latter university. These are: the Energy Systems Engineering and the Environment and Water Technology programme. Discussions are going on together with some technical universities to work out possible cooperation in ABE education and programmes. Additionally SLU is cooperating in the Nordic School of Biosystems Engineering (NORBE) an MSc programme cooperation between the agricultural universities in the Nordic countries. The aim is that NORBE should be an organizer and facilitator of a number of engineering courses and specializations anchored at the participating universities. The students will graduate from the university at which he/she is enrolled.

a. Information to high schools etc and other stakeholders
Information to high schools and other stakeholders is presented in various forms, e.g. brochures and booklets. Such written materials contain information about the master programmes given and also about the courses which can be taken. A ppt presentation is available describing the activities of SLU, however not specifically education. This presentation is in Swedish as well as in English. Finally the University spends a lot of effort in advertising programmes and courses in national newspapers as well as in magazines with young people as a target group.
b. Information about study programmes available as web-sites of our institution
Web-site information, also with down-loadable brochures and booklets, is available at the University web-site. The web-site also tries to promote studying in Sweden as well as emphasizing advantages in studying at SLU. Last year the university also have tried to use social media such as Face Book to interest young people for studying at SLU.

c. Methods of contacting the Faculties of Engineering and Agriculture for information about ABE study programs
Most information to other Faculties about education at SLU is oral. It is often complemented by web-links to our University site and to the USAEE and ERABEE sites. Also the web-site of EurAgEng is promoted now and then.

d. Ways of promoting practical training of students at enterprises
Today no mandatory training is included in the SLU university programmes. However pre-university training is required for some students in order to enter some programmes. Furthermore discussions have started to find ways for companies to be better involved in courses in general. This could be done by study visits, training periods, guest lecturing etc.

e. Schemes for promoting the mobility of students, graduates, PhD-students and staff within and outside Europe
Generally students mainly become exchange students within the Erasmus programme, the NOVA/Nordplus Network (The Nordic Forestry, Veterinary and Agricultural University Network) and ELLS (Euroleague for Life Sciences). SLU currently offers 297 exchange agreement (including bilateral ones) in 141 institutions in 33 countries situated in 6 continents. These exchange programmes often include exchange possibilities for staff and PhD-students. The University has established a special central international office for handling mobility. The international office has its own web-site (“Moveonline”) where students electronically can apply for participation in an exchange. Also staff members are assisted by the international office. The web-site is found on: http://wh-desk.slu.se/moveonline/move/moveonline/exchanges/search.php

f. Ways of disseminating career opportunities for graduates
The University has no organized way of disseminating job opportunities appearing outside the University. However, job opportunities often are communicated by the university teachers, the student unions and the trade unions. Information about research fellowships and projects within the University is disseminated via the University web-site and official notices. The latter often are distributed by the Departments.

g. Way of announcing open European or international academic positions
All academic positions vacant at SLU must be officially announced. This is done at the University web-site. Additionally the University regularly announces vacant academic positions in international press. Also the web-sites of internationally organisations, such as EurAgEng, are used.
h. Other tools of attractiveness
A future AEB programme will be characterised by:
- Require intensified marketing
- Having an unchanged high professional status
- In order to get increased international attractiveness the use of English is a must in education
- Expanding working possibilities, outside traditional agriculture and horticulture, e.g. in the municipal sector.

2. Implementation of ABE study programmes in Sweden aimed at promoting their international image (Tuning Template)

a. Changes in degree profile
Presently no AEB programme is offered in Sweden. However, there is a strong wish from various stakeholders that the University should start up an ABE programme because of an increased shortage of ABE engineers. In a recent meeting between representatives from the University and stakeholders it was expressed that such a programme should have a strong technological-biological connection. It was also pointed out that it should include international perspectives. Till now in order to increase the number of ABE students SLU has promoted participation in the NOVA/NORBE and ELLS networks. Especially efforts have been concentrated to establish and develop the NORBE network. However, the results of these efforts have not yet met the expectations and few additionally students have been recruited.

b. Learning, teaching and assessment
Up till now no good example of best practice in learning, teaching and assessment aimed at achieving competences relevant to ABE and promoting the international image of the related study programmes can be given from the Swedish situation.

3. Tools for promoting the multi-linguism in ABE study programs
Generally in order to promote multi-linguism at SLU it is recommended that some course literature at Bachelor as well as Master level should be in English. Additionally an expressed goal is that the MSc-programmes offered should be taught in English.

4. Topics of rare and/or disappearing knowledge to be used for enhancing attractiveness of ABE study programs
To our mind Rare knowledge can be defined as any part of scientific knowledge that is not adequately preserved or transmitted by universities or that is practiced by a small number of people and it may be in danger of extinction in the near future. Rare knowledge may also include new knowledge of rapid development which is assumed to become of increasing interest in the future. Examples of topics of rare knowledge that can be used as a tool for enhancing ABE programmes include:
- Emerging energy sources and improved energy systems – production and competitions (e.g. steam engines, windmills, watermills etc)
- Horsemanship (ploughing competitions, horse driving etc)
- Competitions using veteran tractors
- Constructing and building model wooden bridges.
Abstract

This paper is written in order to reveal the latest developments and discussions on transforming to Biosystems Engineering and enhancing the attractiveness of European studies in this field in Turkey. The latest university entrance and placement exam showed that the scores to enter the Biosystems engineering programs are higher than the scores of agricultural machinery but the difference is not very significant. The transition to Biosystems Engineering is mostly the result of a trend and influence of the changes that took place in the United States and Europe. The universities and the departments have started and expanded their collaboration with European universities and signed bilateral agreements. Erasmus and LLP offices set up by the universities help students to go abroad and have a different vision not only in Biosystems Engineering area but also at different scientific areas.

1. Tools for enhancing the international attractiveness of European study programs in Agricultural/Biosystems Engineering (ABE)

As mentioned in earlier papers, the hottest issue discussed at present in Turkey is the necessity of transition to Biosystems Engineering while either ending the education in both, the department of Agricultural Machinery and the department of Farm Structures and Irrigation at the faculties of agriculture or offering it under the colleges of engineering [1]. On the other hand, the following universities in the 2010-2011 academic year offered Biosystems Engineering education and each department accepted 31 students through the university entrance and placement exam. These departments are listed below.

*Uludag University, Faculty of Agriculture (min score: 359.09 – max score: 418.35)
*Namik Kemal University, Faculty of Agriculture (min score: 304.93 – max score: 368.22)
*Gaziosmanpaşa University, Faculty of Agriculture (min score: 287.13 – max score: 327.97)
*Mustafa Kemal University, Faculty of Agriculture (min score: 274.45 – max score: 356.56)
*Kahramanmaraş Sütçü İmam University, Faculty of Agriculture (min score: 281.30 – max score: 379.39)
Most of the universities still offer an education in the Department of Agricultural Machinery and they have not changed their names and their curriculum. The top five universities offering education in the department of Agricultural Machinery under the umbrella of Faculty of Agriculture based on the entrance exam are given below.

* Ege University, Dept. of Agricultural Machinery (min score: 273.23 – max score: 339.07)
* Ankara University, Dept. of Agricultural Machinery (min score: 254.87 – max score: 358.79)
* Akdeniz University, Dept. of Agricultural Machinery (min score: 248.63 – max score: 328.25)
* Selcuk University, Dept. of Agricultural Machinery (min score: 236.41 – max score: 302.61)
* Cukurova University, Dept. of Agricultural Machinery (min score: 231.28 – max score: 281.43)

Transition from Agricultural Machinery program to Biosystems engineering was due to the influence of the changes that took place in the United States and Europe. It was not market oriented and there is no real definition for the formation of graduates and at present, only Agricultural Machinery and Farm Structures and Irrigation programs are eligible for the transition. Some of the universities think that the transition to Biosystems engineering should be inevitable but it needs time. Another issue discussed is where the Biosystems engineering program should be offered. It is believed that closing the department of Agricultural Machinery and the department of Agricultural Structures and Irrigation and forming a curriculum as a mixture of the courses from these departments will not be an appropriate solution to offer a Biosystems engineering program. On the other hand, it is a fact that Turkey has a great potential of growing agriculture and agro-food sectors and there is an emerging labor market in this area.

Universities and departments are introduced to the public and high school students via web pages, booklets, flyers and presentations in high schools. Additionally face-to-face interviews are organized in order to inform students before they do their preferences in order to enter the universities right after the university entrance exam.

All of the universities and the departments including Biosystems engineering programs have web pages and the information about the departments and job opportunities is distributed and made available to public. Announcements of academic positions are usually made through web pages and also in public newspapers in Turkey. As in the case of Ege University, “Career Days” are held in order to bring together students and industrial sector to provide job opportunities for engineer candidates in all departments. Moreover, some universities help students about their career planning and scholarship opportunities in their education area. Many universities have already established ties with European Universities and have bilateral agreement. As in the case of Ege University, Faculty of Agriculture has 36 bilateral agreements and but the number of bilateral agreement with Biosystems engineering departments is very limited.

2. Implementation of ABE study programs in Turkey aimed at promoting international image

To promote their international images, the universities in Turkey have set up LLP and Erasmus offices to inform the students and to promote opportunities in many areas including ABE programs. Especially web sites of these universities have a very active role to meet the demand coming from the interested students.
Apart from the university web pages, the news and promotions about the ABE programs and their specifications in national and local magazines and their web pages have a significant effect on informing the public and related people about these programs.

Students have the opportunity to intern in the European countries since some of the agricultural faculties have private collaboration with related EU universities. For example, Ege University Faculty of Agriculture has collaboration with Justus Liebeg University-Giessen that gives a chance to students to make their summer practice in Germany. This opportunity provides students to make good contacts with the other colleagues in other countries and motivate students to be more enthusiastic in professional education.

The education system should be student oriented, not instructor oriented. This means that students must spend more time in the lab and have more homework, assignments and prepare reports and gain more skills in interpretation of the problems they deal with.

3. The tools for promoting the multilinguism in ABE study programs in Turkey
The undergraduate and graduate courses are in Turkish since all of the faculties of agriculture are under the umbrella of the state universities. But the faculty members teach in English and organize private teaching sessions for the students if any Erasmus student wants to enroll the course.

4. References

ENHANCING THE ATTRACTIVENESS OF EUROPEAN STUDY PROGRAMS IN BIOSYSTEMS ENGINEERING IN UNITED KINGDOM

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Abstract
The current situation in the United Kingdom as regards Agricultural and Biosystems Engineering is summarised in the report i.e. there is now only one university delivering 1st and 2nd cycle Agricultural Engineering courses and although there had been plans to institute a Biosystems Engineering degree these have now been deferred to an indeterminate date in the future.

Harper Adams University College uses a number of different methods for publicising its courses to the general public and schools and colleges in particular. There are written brochures, websites, videos and powerpoint presentations. The college is a firm believer in practical training and all students must undertake a twelve month sandwich period with a suitable employer. In comparison with many other European Universities there is relatively little mobility in terms of studying formal courses abroad but there is considerably more mobility in terms of undertaking ‘sandwich’ training abroad.

There have been no significant changes to Agricultural/Biosystems Engineering study programmes in the UK in the past few years – just the normal updating at intervals as would be expected.

There is concern in the UK at the disappearance of knowledge and skills in the field of ‘Soil and Water’ – as stated in "Dwindling science base poses threat to UK soil health" Royal Agricultural Society of England Report - October 23rd 2008

1. Tools for enhancing the international attractiveness of European study programs in Agricultural/Biosystems Engineering (ABE).

Introduction
As outlined at the first ERABEE Workshop, there is now only one University providing 1st and 2nd cycle Agricultural Engineering courses in the United Kingdom - that is Harper Adams University College – whereas 20 years ago there were at least four other universities offering courses in this area.

The Engineering Department of Harper Adams has always considered the reason why it succeeded in agricultural engineering, whereas others have had to withdraw, is due to the emphasis placed on ‘turning out’ graduates with a good blend of theoretical and practical knowledge who can make a good contribution to the operations of machinery manufacturers in the UK - whether national or international companies.

In recent years the number of students applying for 1st cycle studies in agricultural engineering has been rising steadily as agricultural engineering has been seen once more as a viable career path following the recovery of agriculture, and therefore machinery manufacture, from the economic problems of the 1990’s. Despite the
recession of the last two years the farm machinery manufacturing sector has not suffered too badly and the industry is still seen as the source of a worthwhile career. Because of these two factors – good recruitment and graduates obtaining worthwhile employment – there has not been the same incentive to move towards Biosystems engineering as perhaps there has been in some other countries and certainly there has never been any intention to replace agricultural engineering courses with Biosystems engineering courses. Nonetheless, there were, up until 2009, plans to introduce a Biosystems engineering course in addition to the more traditional agricultural engineering courses. However, the Engineering Department at Harper Adams also identified a shortage of engineers to work in the food processing industry and proposed suitable 1st and 2nd cycle courses in food engineering. The University authorities decided that the necessary resources were not in place to move forward with both Biosystems engineering and food engineering and it is Biosystems engineering courses that have been deferred to some future date. Thus at the present time, Biosystems engineering does not exist as such in the UK.

Information for schools etc
a) Prospectus – Harper Adams still utilises the traditional written prospectus to impart information about the university and its courses. There is also a separate brochure on Engineering courses.  
b) Website – the University website provides basic information about courses and entry requirements  
c) Videos – the website contains a large number of videos which cover a wide range of topics of interest to prospective students. They have the advantage over DVDs that they can be quickly prepared and/or updated.  
d) PowerPoint presentations – these are usually used for prospective student open days etc at the University or if staff visit schools and colleges. They are meant to give a minimum of information about courses and are more concerned with life at the University and entry requirements etc.  
e) The engineering department has prepared a ‘short guide’ to each course which provides a lot of detail about the course – curriculum content, assessment methods, placement details etc. These are booklets are only given to people expressing a strong interest in a course either at open days or by e-mail request etc.

Practical training
All Harper Adams courses include a compulsory twelve month sandwich training element and the engineering department is no exception. Owing to the good reputation of Harper Adams students and graduates there has never been any problem in finding all students a suitable placement. Companies have seen placements as a means of attracting and recruiting potential graduates at an early stage. In recent years there have been more offers of placements than students to fill them. That is until 2009 and 2010 when it has become very much more difficult to find placements in the engineering sector due to the current recession.
Mobility of students, graduates and staff.
Although Harper Adams receives a few overseas students to study engineering courses it is virtually unheard of for a British student to study abroad. This is largely due to the language problem but also the difficulty of judging the equivalence of overseas study. Even undertaking a project abroad is made difficult by the UK system of undertaking a project on a one day a week basis instead of a three or six month block. Undertaking a sandwich placement abroad however, is quite common – particularly in the English speaking countries such as USA, Australia, and New Zealand etc. Some placements are undertaken in the EU, often in countries such as the Netherlands and Greece where English is more widely spoken. These placements are usually organised by ‘Agriventure’ who specialise in international rural placements.

2. Implementation of Agricultural/Biosystems Engineering study programs in the UK aimed at promoting their international image.
Changes in degree profiles
There have been no significant changes to Agricultural/Biosystems Engineering study programmes in the UK in the past few years. As explained in section one, plans to implement a Biosystems Engineering degree, in addition to a successful Agricultural Engineering degree, have been postponed for the time being. One of the reasons for the proposed introduction of Biosystems Engineering was an attempt to broaden the range of entrants to agricultural engineering. Traditionally entrants in the UK come from a farming background and have studied Maths and Physics at school.

Learning, teaching and assessment
Graduates from the Harper Adams Agricultural Engineering degrees have been much in demand from the industry with 98% finding employment within six months in 2008. The years 2009 and 2010 have proved more difficult for graduate employment, but employers have always said that Harper Adams graduates have a comparable engineering knowledge to graduates from other universities but, in addition, have a “can do” attitude when presented with a problem. This is partly due to the farming background of most of the students, where any problem in the field has to be solved by the individual without any outside help. But it is also partly due to the emphasis placed on practical training and the setting of realistic assignments typical of the ones they will face in industry eg the re-design of a mini-digger boom to be 10% lighter but still carry out the same function.

3. Tools for promoting multi-linguism in Agricultural/Biosystems Engineering study programs
The study of languages is not compulsory in Agricultural/Biosystems Engineering courses but they are offered on a voluntary basis to those students interested in adding to their skills. French, Spanish and German are offered during the first two years of courses. German is by far the most popular language as a scholarship offered by Claas UK or by John Deere, with accompanying travel to German manufacturing plants, is seen as a highly desirable outcome. Both companies ask for a basic proficiency in German. However, all tuition in Agricultural Engineering is delivered in English only.
4. Topics of rare and/or disappearing knowledge that can be used as a tool for enhancing the attractiveness of Agricultural/Biosystems Engineering

As explained in an earlier workshop, there is concern in the UK at the disappearance of knowledge and skills in the field of ‘Soil and Water’.

”Dwindling science base poses threat to UK soil health”

“The UK’s soil and water research base has diminished catastrophically from its peak and is now failing to provide the required support for the nation’s farmers and land managers. There is little connection with production agriculture and apparently no coordinated vision for applied research”. That is the conclusion of a report published today by The Royal Agricultural Society of England and written by five of the country’s leading soils scientists.

Lead author, Professor Richard Godwin, who holds soil science chairs at Cranfield University, the Czech University of Life Science and Harper Adams University College”

The future prospects of good employment possibilities should provide the opportunity for encouraging student recruitment to a Biosystems Engineering course where the broader scientific knowledge acquired at the expense of design and manufacture will be of great value.