ESTONIAN QUALITY AGENCY
FOR HIGHER AND VOCATIONAL EDUCATION

EKKA

# Assessment Report

# Study program groups of Agriculture, Forestry and Fishery, and Veterinary Sciences

PhD studies

**Estonian University of Life Sciences**

2018

# Contents

# Introduction

**Quality assessment of study program groups in doctoral studies** is an external evaluation, assessing compliance of doctoral programs and the instruction based on them with legislation, national and international standards and trends; with the aim to make recommendations for improving the quality of instruction.

**The goal of quality assessment of a study program group** is supporting the internal evaluation and self-development of the institution of higher education. Quality assessment of study program groups is not followed by sanctions: expert assessments should be considered recommendations.

Quality assessment of a study program group takes place at least once every 7 years based on the regulation approved by EKKA Quality Assessment Council for Higher Education *Quality Assessment of Study Program Groups at the Level of Doctoral Studies.*

**The aim of the assessment team** was the evaluation of the Study Program Group (SPG) of Veterinary Sciences and the study program group of Agriculture, Forestry and Fishery at the level of doctoral studies at the Estonian University of Life Sciences.

The assessment team was composed of following members:

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| Peter von Fragstein und Niemsdorff *(Chair of the panel)* | Professor Emeritus of Organic Vegetable Production, former Dean of the Faculty of Organic Agricultural Sciences, University of Kassel (Germany) |
| Maria Fredriksson-Ahomaa | Professor (meat inspection and slaughterhouse hygiene), Department of Food Hygiene and Environmental Health, Faculty of Veterinary Medicine, University of Helsinki (Finland) |
| Rossella Di Palo | Professor, Department of Veterinary Medicine and Animal Production, University of Naples Federico II (Italy) |
| Bengt Kriström | Department of Forest Economics, Swedish University of Agricultural Sciences; Research Director, Centre for Environmental and Resource Economics (Sweden) |
| Tiina Köster | Employer representative/member from outside higher education institutions; agronomist, Võru Variety Testing Station, Agricultural Research Centre (Estonia) |
| Brian Danley | doctoral student; Department of Forest Economics, Swedish University of Agricultural Sciences (Sweden) |

The assessment process was coordinated by Tiia Bach (EKKA).

After the preparation phase, the work of the assessment team in Estonia started on Monday, 26 February 2018, with an introduction to the Higher Education System as well as the assessment procedure by EKKA, the Estonian Quality assurance organization for higher and vocational education. The members of the team agreed the overall questions and areas to discuss with each group at the university, who were part of the assessment process. The distribution of tasks between the members of the assessment team was organised and the detailed schedule of the site visit agreed.

During the following two days, meetings were held with the representatives of the Estonian University of Life Sciences from 27 to 28 February. The schedule for discussion on site for each of the various study programs only allowed for short time slots to be available for team members to exchange information, discuss conclusions and implications for further questions.

On Thursday, March 1, the team held an all-day meeting, during which both the structure of the final report was agreed and findings of team meetings were compiled in a first draft of the assessment report. This work was executed in a cooperative way and the members of the team intensively discussed their individual views on the relevant topics.

In the following sections, the assessment team summarise their general findings, conclusions and recommendations which are relevant across the two SPGs. In so doing, the team provides an external and objective perspective on the programs and the contexts within which they are delivered. Ultimately, the intention is to provide constructive comment and critique which may form the basis upon which improvements in the quality of the programs may be achieved.

# General findings and recommendations

## General Findings

EMÜ is the only university in Estonia providing a PhD curriculum in Agricultural Sciences (AS), Forestry (FOR), and Veterinary Medicine and Food Science (VMFS). It is a highly ranked research university, offering cutting edge research in several areas of a modern life science university. Researchers, teachers, students and others involved in daily operations all seem highly motivated and devoted to their task. In particular, PhD-students appear to work very closely with supervisors, the latter being chosen with a quite unique quality-enhancing mechanism. Resources are in some cases superior to international standards with excellent provision of labs, classrooms, and not the least, field stations. All lecture and seminar rooms, laboratories, scientific collections and offices are closely located. Other infrastructure critical to high-level research meets the standards of a top-class life science university. At many levels there are various adaptive and corrective mechanisms at play (e.g. international evaluations, student counselling and supervisor screening), enabling the university to make the most of its resources.

Finding students with the right talent as well as the right motivation to fill all PhD student positions is a challenge. It is not uncommon for a position to have only one applicant. Our interviews with program developers, supervisors, and PhD students alike showed that potential supervisors typically apply to be supervisors with a specific student in mind and that "sometimes the student position is not advertised at all" (program managers and developers.) In cases of only one internal applicant, there seems to be little or no safeguards to verify the student's merits for the position (page 15 & 16 of the self-evaluation report). One way of addressing the lack of students who are motivated to do a PhD program is by bringing in students who have not come through the EMÜ bachelors and masters programs. All curricula have increased their proportions of foreign PhD students from levels a decade ago; however, further steps can be taken to recruit the best internal and external candidates for PhD student positions.

There is simultaneously an assessment that there is an appropriate amount of foreign students now (interview with representatives of Research and Development Committee), but that the quality of potential foreign students should be higher (meeting with program managers and developers). One aim of this recommendation is to increase the quality of potential external PhD students and see that they are evaluated in a way commensurate to internal candidates.

Our recommendation is to formalize the student selection and admissions criteria process so that each specific student position is 1) announced to a domestic and global audience with a reasonable time-frame for application; 2) the admission criteria for each potential student position is included in the announcement, so that 3) top candidates for each position all go through the same official evaluation process and have that process documented, including in the case of only one internal applicant.

Even though the governmental stipends recently were increased by app. 60 %, within many discussions the urgent need for additional income sources was pointed out. There are various operational fields for filling the financial gap, inside as student contractor in other projects or as student teachers and outside the university. In any case this is a serious retardation of dissertation projects and an unavoidable loss of actuality of research topics due to the long waiting periods before scientific findings could be published The panel rates such circumstances as a negative trend for the institution, the elaborated topics, and, even more relevant and tenuous, for the young researchers.

EMÜ provides excellent conditions for academic teaching and research. Big efforts are being made for updating of lab facilities by huge investments for the replacement of out-dated equipment and the buildup of new working places. Research stations were not on the schedule of the visiting tour. As highly essential units for an academia dedicated to Life Sciences these places should not be neglected in that process of updating and secured working environment.

The basic module of the doctoral program was presented in a detailed manner in contrast to the special subjects. It might be that the high extent of possible variations in the special subjects was the reason for the missing presentation of their content. Examples for one or two student typologies could have been helpful. Actually the committee is not able to give comments on the content of these modules, their appropriate level of doctoral studies, etc.

As red line through all discussions, the wish for more flexibility of the time schedule of study program became apparent. The conflict between course obligations (attendance, dates of exams) and research obligations (time frame of experiments, monitoring or sampling tasks in open-field trials) was the mostly used argument for the plea of changing modes. A shift within the distribution of theoretical and experimental units could be an optional solution. Another question would be to digitalize classroom courses by streaming, to accept a system with less restriction, i.e. permitted absence of the half of all courses, and to demand successfully passed exams only before the procedure of defense is initiated. Beside this the use of learning platforms (i.e. Moodle) could optimize the learning environment not only by providing a depository for handouts and other course material but also by establishing discussion forums, self-learning tools, etc.

A high level of communication, extension and assessment characterizes the relationship between supervisors and their students. Nonetheless the share of withdrawals and long-lasting dissertations indicate fields of improvements in order to increase the efficiency of time and investment per scientific hour.

It is sensible that all academic teachers which are qualified for a supervising task are interested to be awarded with doctoral scholarships for the promotion of their own scientific career and profile. Studying the development of governmental funds for Higher Education the decreasing figures clearly expose the need for more successful submissions of research proposals. The training of these skills should become part of academic education from the master’s levels with potential intensification during a following doctoral study program.

The current system of selecting capable supervisors seems to be well established and accepted by all actors.

The high commitment of supervisors to their supervisees is noticeable

Within the period from 2012 to 2017 29, 12, and 11 dissertations within the AS, FOR, and VMFS-programs were successfully defended which is a noticeable positive development of EMÜ. 7, 42 and 18 % of AS, FOR and VMFS graduates were able to complete their dissertation within four years, another 48, 33 and 18 % after 6 years. Re-concluding this means that 45, 25, 65 % AS, FOR and VMFS graduates were hindered by unfavorable conditions. The AS and VMFS figures are of special relevance.

Of the 203 publications which were found at the WebofKnowledge platform by using the names of the young doctorate holders the demanded main authorship in at least one paper could not be justified for all graduates, but in 67 % of all papers the main authorship existed twice or more than twice for the same person.

Nowadays there is a trend to publish scientific data in a consortium of authors. Of the 203 above-mentioned papers only 7 % were written by less than 4 persons, 55 % by 4 to 6 persons, 38 % by more than 6 persons. Considering the optional share of each author the situation for young scientists becomes gradually critical within augmenting writing consortia. Supervisors should keep a critical eye on that fact in order to protect their PhD graduates and to enable a 100 % share by summing up all contributions per paper.

**Strengths**

- The quality control mechanism, in which the requirement to publish 3 papers is a generally agreed upon (by students / teachers / supervisors / researchers) metric. This will certainly have long-run benefits, provided that the publications are submitted to journals of high quality.
- Procedure for assessing the PhD-thesis is very good, with an external examiner (often international), provided there are pre-seminars at the department.
- A doctoral school that helps to build bridges between subjects and universities nationally and internationally.
- Well-equipped laboratories
- Interuniversity programs for funding student mobility
- Teaching is based on research
- All teachers are assessed
- Good working environment
- The teachers are very motivated and research oriented
- Selection of supervisors through competitions

- The doctoral students are highly motivated
- There is a possibility to design an individual study plan
- The performance of doctoral students is monitored annually
- Fund of supervisors partly bridge the time between finalised scholarship-period and the end of a dissertation period

**Areas of Improvement**

- The university-wide bio-economy strategy is not clear regarding its implications for the long-run development of the doctoral programs. There is a window of opportunity to connect the university-wide strategy with what is actually done at lower levels. Closely align the continued work on improving the PhD programs and the bio-economy strategy. For long-run implementation of these changes, additional human resources at both the junior and senior level are needed.
- The requirement for the initialization of the doctoral defense, three publications of the candidate in peer reviewed journals, should be slightly changed in order to accelerate the finalization of dissertations: one paper published, the second one accepted, and the third paper submitted.
- The time needed to complete the studies is often too long
- The set of potential external candidates to PhD programs seems to be limited because of the recruitment strategy in place. Continue the current internationalization efforts and make sure that there is an open competition for all open positions in the PhD programs.
- The number of applicants and the admission rate should be higher
- The number of full-time doctoral students should be increased
- There should be more flexibility to allocate the compulsory 60 ETS during the studies. The enterprises may be much more involved in supporting the students if applied topics are more in research focus.
- Attractive courses or alternative methods for training of supervising and teaching skills should be provided
- The number and the visibility of (attractive) research projects should be increased
- The mobility of the academic staff should be increased
- Greater effort should be made towards co-operation with other (foreign) universities
- The amount of the scholarship should be better adapted to real life costs

# 1. Assessment report on SPG of Veterinary Sciences

## 1.1. General Findings and recommendations at the study program group level

### Statistical data of PhD students in Veterinary Medicine and Food Science programme

| Curriculum | Academic year | Admission | Coming from EMÜ | Total number of PhD students as of 31.05 | No of international PhD students as of 31.05 | PhD students employed at EMÜ as of 31.05 | Graduates | Graduates in 4+2 | Dropout cases | Including at their own request |
|---|---|---|---|---|---|---|---|---|---|---|
| Veterinary Medicine and Food Science (VMFS) | 2017/18 | 3* | 2* | 34** | 0** | N/A | 2** | 0** | 1** | 0** |
| | 2016/17 | 4 | 4 | 33 | 1 | 20 | 2 | 0 | 1 | 0 |
| | 2015/16 | 5 | 4 | 31 | 0 | 18 | 2 | 0 | 4 | 0 |
| | 2014/15 | 4 | 4 | 30 | 0 | 19 | 3 | 0 | 1 | 0 |
| | 2013/14 | 8 | 7 | 30 | 0 | 19 | 2 | 1 | 3 | 2 |
| | 2012/13 | 2 | 2 | 25 | 0 | 16 | 1 | 1 | 0 | 0 |

*As of 1.10.2017
**As of 31.12.2017
*Source: Self-Evaluation Report, Table 3 (aggregated data of PhD students)*

**General Findings**

The Committee assessed the PhD program of Veterinary Medicine and Food Science (VMFS) belonging to the study program group if Veterinary Sciences.

EMÜ is the only university in Estonia providing higher education in veterinary medicine at Bachelor's, Master's and Doctoral level.

The Institute of Veterinary Medicine and Animal Sciences (IVMAS), which is one of the five institutes in the EMÜ, is responsible for the Veterinary Medicine and Food Science (VMSF) doctoral program having a relatively high autonomy. Two main research areas, (1) production of safe and healthy foods and (2) animal health, have been identified in the Development plan of the University for 2016-2025. The curriculum of VMFS doctoral program offers four speciality subjects: (1) clinical veterinary medicine and (2) veterinary biomedicine, (3) food hygiene and veterinary public health and (4) food science and food technology.

In the VMSF doctoral programme, the supervisors and the doctoral students seem to be very motivated working closely together. Even though the students are satisfied with the supervision, they are not capable to defend their thesis in 4-6 years. The doctoral students are working outside the university or they are teaching at the university and have therefore less time for doctoral studies. Some actions should be taken to shorten the study time, for example, to set an upper limit for the teaching load and maybe a time limit the for study time. Additionally, more full-time study places are needed.

The curriculum is well structured and due to the individual study plan there is some flexibility for the student together with the supervisor to design the study plan. However, there is only 180 ECTS (3 years) allocated for the research work and writing the thesis including 3 international publications, which may also prolong the doctoral studies. There is one possibility to increase the credits allocated for research to 200 ECTS by decreasing the credits of compulsory studies to 40 ECTS.

One aim of the university is to generate internationally highly recognized research. This is supported by the high requirements of doctoral thesis including 3 international publications and an opponent from abroad. At the moment, all 3 publications have to be published, which takes time and may prolong the study time. One possibility is to ease the requirements so that one publication has to be published, the second accepted and the third submitted.

Additionally, to increase internationality, lecturers from abroad are invited, specialists from abroad are used as co-supervisor and different funding possibilities are available for the students to attend international congresses/symposiums. To be internationally recognized, it is essential to have international doctoral students and post docs and to have joint publications with experts from abroad. However, almost all students in VMFS program are from IVMAS. Joint research projects even research programs with universities abroad could be one solution to get potent doctoral candidates. Greater effort should also be put into research co-operation with highly recognized international universities, which increases the international visibility and may also increase the number of citations.

**Strength**

- Close cooperation between students and supervisors

**Areas of improvements and recommendations**

- The students are not capable to defend their thesis in 4-6 years. The doctoral students are working outside the university or they are teaching at the university and have therefore less time for studies. Some actions should be taken to shorten the study time, for example, to set an upper limit for the teaching load and maybe a time limit the for study time.

- Although there is some flexibility for the student to design the study plan, there is only 180 ECTS (3 years) allocated for the research work and writing the thesis including 3 international publications, which may also prolong the doctoral studies. There is one possibility to increase the credits allocated for research to 200 ECTS by decreasing the credits of compulsory studies to 40 ECTS.
- For defending the thesis there is a high requirement that all 3 publications have to be published, which takes time and may prolong the study time. One possibility is to ease the requirements so that one publication has to be published, the second accepted and the third submitted.
- In order to increase international recognition, increase the number of international doctoral students and post docs, have joint publications with experts from abroad and more research co-operation with highly recognized international universities.

## 1.3. Strengths and areas for improvement of the study program by assessment areas

### 1.3.1. Veterinary Medicine and Food Science

**Study programme**

Standards

- ✓ The launch and development of the study program are based on the Standard of Higher Education and other legislation, national strategies, university development plans, the effectiveness of research and development, various analyses (including labour market and feasibility analyses); striving for the best overall program quality.
- ✓ Doctoral programs contain at least 70% research, development or other creative work by doctoral students, making the results thereof public in international peer-reviewed research journals or in other ways that have international dimensions.
- ✓ Study programs incorporate doctoral student participation in conferences and/or other professional activities, and are counted towards completion of the study programme.
- ✓ Doctoral programs enable doctoral students to acquire leadership and teamwork skills, develop coaching and teaching skills as well as a proficiency in foreign languages at the level needed for successful participation in international working environments.
- ✓ Different components of a doctoral program form a coherent whole supporting the personal development of each doctoral student.
- ✓ Study program development takes into account feedback from doctoral students,

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| supervisors, employers, alumni and other stakeholders. |

Comments

The Institute of Veterinary Medicine and Animal Sciences (IVMAS), which is one of the five institutes of the Estonian University of Life Sciences, is responsible for the curriculum and curriculum development of Veterinary Medicine and Food Science (VMFS) doctoral programme. This program is based on legislations and the Development Plan of EMÜ for 2016-2025. Bio-economy is mentioned in the mission and vision of the University strategy, but it remains unclear how this is implemented in the doctoral program of VMFS.

The doctoral studies of 240 ECTS include 60 ECTS of compulsory courses: (1) basic module of 20 ECTS, (2) specialty module of 35-40 ECTS and (3) optional subjects up to 5 ECTS. The doctoral school is responsible for the basic module (20 ECTS) and IVMAS for the rest. Only 180 ECTS (3-years work) are allocated for the research and writing of three international publications, which is quite little. Maybe some (10-20) credits could be taken from the compulsory courses to increase the thesis part to 200 ECTS.

Every doctoral student is doing an individual study plan together with the supervisor where the compulsory courses (60 ECTS) are allocated and the specific needs of the student are noticed. There are four speciality subjects (18 ECTS each): (1) Clinical Veterinary Medicine and (2) Veterinary Biomedicine included under Veterinary Medicine specialisation and (3) Food Hygiene and Veterinary Public Health and (4) Food Science and Food Technology included under Food Science specialisation. Each student chooses one speciality subject depending on their professional needs.

The vision of the University is to be an internationally recognised research university. To raise the internationality of the doctoral students, scientific presentations abroad have been included in the compulsory part of the studies, the research results have to be published in international scientific journals and an external foreign opponent is typically used.

All doctoral students should have sufficient skills to speak and write in English. The basic module courses organised by the doctoral school are in English, most students present their results in international congresses and all students have to write the scientific papers and defend their thesis in English. Some of the ECTS of the compulsory courses can also be acquired abroad by participating in lessons, meetings, seminars and congresses improving the level of internationalization. All students have a possibility to get support in English from the Language Centre.

Doctoral programs should enable doctoral students to develop leadership, teamwork, coaching and teaching skills. There are two courses (“Practice learning in university teaching” and “Higher education didactics”) in the basic module (totally 5 ECTS), which are obligatory for all students. It remained unclear if any courses in leadership and/or management is organised. Maybe some optional courses could be offered to train these skills.

The feedback of students is collected regularly and seems to work quite well. However, feedback on feedback is mostly missing, and it is suggested that some effort be made towards raising the response rate. The feedback is analysed and used to develop the doctoral program.

The number of students entering the PhD program has been declining during the last years. One of the identified problems is the reduced chance for the students to remain in the academia after their graduations and the need to introduce other disciplines with a more practical approach in the PhD curriculum to make the PhD title more attractive to the enterprises leading to more job opportunities for graduates. However, there appear to be no virtuous path of information from the stakeholders to assure a constant feedback from them.

Strengths

- The individual study plan, which takes the needs of the student into account and increase the flexibility
- The request of three international, peer-reviewed publications as distinct indicator for the high international level of a thesis
- Use of foreign experts as co-supervisor, opponent and reviewer, which also increase the internationalization

Areas of improvement and recommendations

- The doctoral studies are taking too long and greater efforts are needed to shorten the study time. The time allocated for research and writing should be increased. The teaching load should be reduced and perhaps a time limit for doctoral studies could be set.
- 180 ECTS is quite low for 3 international scientific papers and the writing of thesis and could be increased to 200 ECTS by decreasing the compulsory studies to 40 ECTS.
- To implement an official commission and/or a feedback process from the stakeholders to develop the doctoral program with attractive research topics.
- The feedback of the feedback could not be clarified within the interviews and seems to be an area of improvement.
- The change in job request and job security should be taken more in account to adopt running programs by wise estimates of new developments and to let the program become more attractive for MSc graduates.

## Resources

Standards

- ✓ In conducting doctoral study programmes, an adequate number of teaching staff and researchers participate, who hold the appropriate qualifications required to carry out doctoral studies and supervise doctoral theses in a given study programme.
- ✓ Universities shall ensure that sufficient funds are available to conduct doctoral studies, to provide development activities associated with doctoral studies and research, and to support the professional development of teaching staff and researchers.
- ✓ Resources (teaching, learning and research environments; libraries; resources required for teaching, learning and research) support the achievement of objectives set out in study programs as well as the actual teaching, learning and research at the level of doctoral studies. Resource development is sustainable.
- ✓ Trends in the numbers of current learners, admitted learners and graduates (by study programme) in doctoral studies under the study program group during the last five years indicate sustainability.

Comments

All supervisors have been evaluated before granted the right to supervise doctoral thesis and thus they should all be qualified. Furthermore, the supervisors have been ranked by the institutes. Full-paid doctoral positions are allocated yearly through supervisors' competition organised by the Doctoral School using key indicators as number of grants, research projects, scientific papers and doctoral students. This can lead to that some (co-)supervisors, especially young ones, may have huge difficulties to get doctoral students even though they have innovative research topics, which even align with the University strategy.

There is not enough research funding for full-time doctoral students and, therefore, most of the students are part-time researchers working as lecturer or outside the university, which probably is one reason why the study time exceeds even 6 years. The governmental monthly scholarship has recently increased from 422 € to 660 €, which may help the situation a little bit but does not solve the problem.

Short-term mobility of doctoral students is supported through various funding schemes and seems to work quite well: doctoral students have good possibilities to attend international seminars and congresses. However, long-term mobility, which is important for learning new skills, is more difficult to carry out because of missing funding. To get funding for a post-doc period also seems to be very challenging.

Most of the facilities in the IVMAS have been recently renovated. The laboratories and equipment have also been newly significantly updated and modernised. It is very important that enough money is allocated for maintenance and annual

services of the research equipment. The university library provides numerous scientific literature databases, electronic journals and e-books, which are accessible on-line and free for the students. Furthermore, the research environment seems to be very motivating, which was evident during all interviews.

There are at the moment 34 doctoral students enrolled in the VMFS doctoral program but only 2 students graduate yearly showing a very low graduation rate and indicating a very long study time. One reason for the long study time seems to be that the students are working only part-time with the research. Some of the students are working full-time outside the university and some have a too heavy teaching load at the university. The admission should be transparent and the research topics attractive to increase the number of competent applicants also from abroad.

Strengths

- Well-equipped laboratories which have recently been renovated
- The mobility of PhD students is supported through various funding schemes

Areas of improvement and recommendations

- The admission rate should be higher. During the last years, the admission rate has been only around 4 doctoral students. The admission rate could be increased to 6-8. There seems to be enough supervisors available but attractive research topics and funding is needed.
- In order to achieve shorter dissertation periods the bottleneck of long waiting period between submission and publication of papers should be circumvented by demanding one instead of three papers published in advance of a defense. Paper two should be accepted, the third submitted.
- The number of full-time doctoral students should be increased
- The amount of the scholarship should be better adapted to true life costs
- There may be more financial support for doctoral students from enterprises if more applied research topics would be available.

## Teaching, learning, research and/or creative activity

Standards

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| ✓ | Uniform principles, based on best international practices and agreed upon at the university level, shall be followed while implementing doctoral programs and assuring the quality of the doctoral studies (including supervision of doctoral theses). |

- ✓ Doctoral studies support students' personal and social development, including creating an environment which will prepare them to successfully participate in international working environments at research and development institutions, as well as in the business and public sectors.
- ✓ Supervision of doctoral theses; modern methodology used in teaching and research; organisation of studies; and doctoral students' professional research, development and/or other creative activities all support achievement of the objectives and learning outcomes of doctoral studies.
- ✓ Assessment of outcomes of the learning, research and creative work done by doctoral students is relevant, transparent and objective, and supports the development of doctoral students.
- ✓ Doctoral students are asked for feedback regarding supervision on a regular basis and the results of these surveys are taken into account for quality improvement activities.
- ✓ Effectiveness of the doctoral studies is analysed and such analyses serve as a basis for planning quality improvement activities.

Comments

The institute (IVMAS) provides research-based teaching: teachers do research and researchers teach. The mission is to provide high-quality academic education and guarantee high-level research. The VMFS doctoral program is following the uniform principles of the University to assure the high quality of the doctoral studies. Some flexibility is gained by the individual study plan including courses in the speciality subjects taking into account the need of the student. The doctoral studies support the students' development in working at research institutions but not necessarily in the private sector. According to the foreseeable switch to non-academic working places in the future, more applied research topics of these areas are desirable.

The high-quality supervision is guaranteed by supervisors, who have fulfilled the requirements set by the University council and have been yearly evaluated through supervisors' competition. Additionally, the performance of the academic staff is evaluated at least once every five years. However, the academic staff seems to have little time or interest to train the supervising skills. One easy alternative could be to have regular meetings for academic staff where best practices are presented and problems can be solved.

The quality standards for the doctoral students are high requiring at least three peer-reviewed publications in international scientific journals and an external foreign opponent. However, even for a full-time student, three years (180 ECTS), which is allocated for the thesis (research, writing and defense), is a very short time. If doctoral students are expected having published one paper, at least, having the two other papers under revision, would accelerate the process of completing dissertations.

The individual study plan is designed by the doctoral student and the supervisor for the whole studies. The study plan is reviewed and approved by the council of IVMAS. To increase the efficiency of the doctoral studies, the progress of the doctoral studies is assessed yearly by the Evaluation Committee. The doctoral student and the supervisor should be present during the assessment.

Even though the compulsory courses can be quite flexibly scattered in the individual study plan, it is very challenging to pass the compulsory 18 ECTS per year during the first three years. More flexibility is needed for doctoral students to start their research work efficiently during the first year. There also seems to be some problems to pass the courses in time, especially if it is obligatory to attend all the lectures. There should be alternative methods such as written examinations and not only compulsory attendance. It remained unclear how new teaching methods have been adapted in the PhD courses.

Despite of highly motivated students and good supervising, the studies take usually too long time and mostly they are not completed in 4-6 years. The percentage of the students in the VMFS study program who graduate in time is lowest of all doctoral programs, only 20%. Some improvement and actions are needed to solve this problem. The most important reason may be that most of the doctoral students are not full-time students because of the missing funding but there may be other reasons also such as too many compulsory subjects.

Strengths

- Teaching is based on research
- All teachers are assessed
- Doctoral students are involved in research projects
- Good working environment

Areas of improvement and recommendations

- Attractive courses or alternative methods for training the supervising and teaching skills should be provided for teaching staff.
- The topic of courses should more consider the needs of the job market and expected skills and knowledge of young doctorate holders.

## Teaching staff

Standards

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| ✓ | Teaching staff participate in research, development and/or creative activity at the level of and to the extent sufficient to conduct doctoral studies in the curriculum group and to supervise doctoral theses. |
| ✓ | Teaching staff develop their supervisory competences and share best practices |

with one other.

- ✓ Teaching staff collaborate in fields of teaching, research and creative work within the university and also with stakeholders outside the university (public sector organisations, enterprises, other research and development institutions).
- ✓ Teaching staff further their skills at foreign universities or other research institutions, participate in international research and creative projects, and present papers at high-level conferences.
- ✓ Qualified international and visiting teaching staff are involved in conducting doctoral studies, participating in doctoral thesis defence panels and/or reviewing doctoral theses.
- ✓ When assessing the work of teaching staff (including their evaluations), the effectiveness of their teaching as well as of their research, development and creative works is taken into account; including the effectiveness of their student supervision, development of their teaching and supervisory skills, and their international mobility.

Comments

The research-based teaching has been implemented at the University, which means that all teachers should be involved in research. The aim is that all full-time teachers have a PhD degree in the near future. The young researcher has the opportunity to increase the supervising expertise as co-supervisor. The number of international teachers is low; however, all courses in the basic module are in English. The teaching staff is evaluated at least once in every 5 year.

The teaching staff should develop their supervisory and teaching skills; however, it remained unclear if this is truly assessed in the evaluation process of the teachers. The best practices should be shared between the teachers/researchers and for that, regularly organised meetings are a good alternative. There could also be meetings organised at the University level to strengthen the co-operation between the doctoral programs.

Co-operation with the society is very important for the University. Some stakeholders are already actively involved in research projects and they have an opportunity to influence the development of the doctoral programme. However, this process could be improved. The number of enterprises participating in the organisation of courses and maybe also in lecturing could be increased.

Co-operation between the institutes is essential to design attractive interdisciplinary research projects for doctoral students. Greater effort should also be made towards co-operation with other universities.

To increase internationality, foreign research experts have been used as co-supervisors and opponents, and they have also been invited to give lectures. The mobility of the teacher is highly recommended and also supported by different

funding. Teachers and especially co-supervisors have been encouraged to go abroad for different time periods. The interest to go abroad is sometimes very low due to some personal reasons and, therefore, it is important that different types of short-term exchange programs are available. The re-organisation of teaching was often possible enabling participation in different courses, congresses, meetings etc. Using new teaching methods, the time of room lectures could decreased, which leaves more time for the teacher but also for the students.

The teaching staff seems to be very motivated and research orientated. The supervisors competition seems also to work and the feedback from students help the supervisor to develop theirs supervisory skills.

Strengths

- The teachers are very motivated and research orientated
- Selection of supervisors through competitions

Areas of improvement and recommendations

- The number and the visibility of (attractive) research projects should be increased to raise the number of competent national and international applicants
- The mobility of the academic staff should be increased to enhance the competence and internationality of the staff
- More effort should be put into co-operation with other (foreign) Universities to increase the expertise (and internationality) and attractive interdisciplinary research projects. Joint authorships with other (international) experts usually increase the visibility and citations of the scientific papers
- Improve the feedback process on the effectiveness of the teaching and supervising activities

## Doctoral students

Standards

| | |
|---|---|
| ✓ | When admitting students to doctoral study, their suitability for successful completion of their studies is assessed on the basis of transparent criteria. |
| ✓ | Doctoral students plan their studies as well as research and development activities in collaboration with their supervisor(s), setting out specific objectives for each year and taking responsibility for achieving these objectives. |
| ✓ | Evaluation of doctoral students is transparent and impartial. Its purpose is to support development of the doctoral students, provide an opinion regarding the |

| | |
|---|---|
| | effectiveness of their work to date, and assess their capabilities to complete their studies on time and successfully defend their doctoral theses. |
| ✓ | Universities offer doctoral students counselling on completing their studies and planning their further careers. |
| ✓ | Doctoral students' extracurricular teaching, research and/or creative activities or other work-related activities at the university support successful completion of their doctoral studies. |
| ✓ | Doctoral students participate in international mobility programs or take advantage of other opportunities for learning or research at foreign universities and/or research and development institutions[1]. |
| ✓ | Alumni are regularly asked for feedback on the quality of the doctoral study, and employers are asked for feedback on the preparation of the graduates. |

Comments

Admission to doctoral studies is regulated by the Admission Requirements of the University, which are approved by the University Council yearly. The competitions between the applicants in the VMFS is often low especially if the topic is considered unattractive. At the moment, 34 doctoral students are enrolled in the VMFS program and the rate of foreign students is very low (1%). More effort could be put to raise the visibility of the research projects for international students. Only three new candidates have started their doctoral studies last year. At the same time only one defense took place. The study time of most (80%) of the students exceed 6 years, for several students even more than 10 years. One reason may be that they work full-time outside the University, or the workload at the University is too high.

All students are preparing an individual study plan together with the supervisor for the whole study time (4-6 years). In the planning step, the supervisor can be of great help to build up a good and realistic study plan.

The progress of the doctoral studies is evaluated yearly and both the student and the supervisor should be present in the evaluating meeting. The more transparent these discussions and later decisions are, the better the individual development of each student can be improved. It is important that the progress of all students is yearly evaluated. This is a very important process, which can have a positive influence on the study time which should not exceed 4(-6) years. However, this meeting can be especially important for the doctoral students working as lecturer at the University or outside the University who often need longer time to complete the studies but also for those who have some problems with the progress of their studies.

[1] In the context of this document, 'research and development institutions' denote both research institutions and research-intensive companies.

The University offers a multi-level counseling system for doctoral students on completing their studies and planning their future career; however, the effectiveness of the counseling remained unclear.

Many of the doctoral students are working as lecturer or in laboratory or with other tasks during the doctoral studies. These tasks may support the doctoral studies but they may also extend the study time if the workload is too big.

The university offers several funding possibilities for doctoral students to attend scientific congresses/seminars/meeting and all students should be encouraged to attend one scientific event yearly with an oral or a poster presentation.

The doctoral students, which we met in the interview, were very motivated and satisfied with the support they have got from the supervisors. They were also confident with the possibility of complementing the first supervisor with another if some problems occur or if some expertise is needed. They were also satisfied with the curriculum and the requirements.

The feedback from alumni was also positive, although those who did not work at the University would have appreciated to find courses in the doctoral program which meet the needs of labor market.

Strengths

- The doctoral students are highly motivated
- There is a possibility to design an individual study plan
- The performance of doctoral students is monitored annually

Areas of improvement and recommendations

- The number of competent applicants including applicant from abroad should be increased. At the moment, there is no competition between the applicants because the admission process is not transparent and not well advertised and attractive enough.

# 2. Assessment report on SPG of Agriculture, Forestry and Fishery

## 2.1. Introduction

EMÜ is the only university in Estonia providing higher education studies in agricultural sciences in Estonia, doing so at all higher education levels.

Two doctoral programs belong to the SPG of Agriculture, Forestry and Fishery: the PhD program of Agricultural Sciences (AS), and the PhD program of Forestry (FOR).

The AS program is implemented by 3 institutes of EMÜ: the Institute of Agricultural and Environmental Sciences (IAES), the Institute of Veterinary Medicine and Animal Sciences (IVMAS), and the Institute of Economics and Social Sciences (IESS). The Institute of Forestry and Rural Engineering (IFRE) is responsible for the Forestry programme.

### Statistical data of PhD students in Agricultural Sciences and Forestry

| Curriculum | Academic year | Admission | Coming from EMÜ | Total number of PhD students as of 31.05 | No of international PhD students as of 31.05 | PhD students employed at EMÜ as of 31.05 | Graduates | Graduates in 4+2 | Dropout cases | Including at their own request |
|---|---|---|---|---|---|---|---|---|---|---|
| Forestry (F) | 2017/18 | 5* | 4* | 32** | 5** | N/A | 1** | 1** | 3** | 0** |
| | 2016/17 | 6 | 5 | 35 | 8 | 9 | 5 | 2 | 2 | 1 |
| | 2015/16 | 4 | 2 | 37 | 9 | 12 | 2 | 1 | 8 | 2 |
| | 2014/15 | 5 | 3 | 40 | 8 | 16 | 2 | 1 | 0 | 0 |
| | 2013/14 | 4 | 3 | 38 | 7 | 18 | 4 | 2 | 1 | 1 |
| | 2012/13 | 6 | 6 | 37 | 7 | 17 | 2 | 1 | 1 | 0 |
| Agricultural Sciences (AS) | 2017/18 | 10* | 4* | 57** | 9** | N/A | 2** | 0** | 6** | 1** |
| | 2016/17 | 10 | 7 | 56 | 7 | 28 | 6 | 3 | 5 | 1 |
| | 2015/16 | 7 | 5 | 60 | 4 | 28 | 6 | 3 | 7 | 2 |
| | 2014/15 | 9 | 7 | 62 | 5 | 35 | 2 | 0 | 5 | 1 |
| | 2013/14 | 8 | 4 | 60 | 6 | 41 | 6 | 2 | 5 | 1 |
| | 2012/13 | 8 | 5 | 65 | 5 | 42 | 5 | 2 | 3 | 3 |

*As of 1.10.2017
**As of 31.12.2017
*Source: Self-Evaluation Report, Table 3 (aggregated data of PhD students)*

## 2.2. General findings and recommendations at study program group level

**Study programmes**

Strengths

- We were given examples of how innovative (simple and ingenious) approaches were used in the Forestry lab to solve certain problems. As far as we could tell, they were introduced by junior faculty, perhaps even students. If so, this indicates a healthy environment for innovative solutions.
- Research is typically of high quality and there is, according to the students, a sufficient critical mass.

Areas of improvement and recommendations

- The study program is very academic, focusing mostly on needs of the university and writing high level scientific papers (which is necessary to obtain finances for research), but at the same time the study program does not always meet the needs of enterprises which focus more on finding solutions for practical problems. New modules should become part of the doctoral programs irrespective of whether university personnel or external teachers are able to be responsible for them or not. As already mentioned in the SER subjects for strengthening personality skills should become essential part of updated doctoral study programs, e.g. leadership and management issues (project, finance, time, labour, personal).
- Practical issues (suggested by industry) as part of a dissertation could be a constructive collaboration between university and stakeholders if the interests of both sites can be solved in a concerted manner.
- The structure of the Basic module should be reorganized in favour of more job-market orientation (see personality skills). Statistical methods on the research level should more include biometric and other modern statistical issues. Components i.e. Philosophy of Science and Practical Learning of University Teaching should be changed from the mandatory to an elective modus.

## Resources

Strengths

- Many institutes (supervisors) will find possibility to hire the PhD student as part time workers to their research project or as teaching assistants (according to the self-evaluation report in agricultural science 38,3% of students are employed by supervisors and additionally many students are student contractors within the scientific projects)
- Each institute has its own laboratories and mostly they are well equipped, especially the new and modern ones, students and supervisors were satisfied with their laboratories the quality of which provides best conditions for good results; indispensable for high level research papers
- There is cooperation between universities (e.g., with the University of Tartu) for using laboratories. Moreover, some students mentioned that they could use placement opportunities for working in laboratories abroad as well as getting their samples analysed in labs abroad
- The resources for going abroad for courses and conferences seem good. Most people who want to go are able to go.
- The admissions to graduation ratio from the last six years indicate that Forestry is at or above the average of about half of all admitted PhD students graduating. A further sign of sustainability is the higher percentage of foreign students studying Forestry.

Areas of improvement and recommendations

- Although the financial situation of students has been improved by increasing the scholarship for full time student (increase from 422 to 660 €) , there is still an urgent need to find additional work in projects or as a teacher, which are unavoidable factors for the elongation of dissertations
- 4 years are not enough to complete crop science-based theses due to seasonality of field work if results of three seasons have to be covered. Therefore a (preferably) full-time payment of PhD students for 5 to 6 years should better ensure the completion of dissertations in the expected time-span, the publication rate in a shorter period, combined with a higher number of papers per time-unit. In addition the rate of withdrawals should be diminished at the same time due to student-oriented payments.
- Ensure that the PhD-students get some training in how to write a post-doc application (perhaps in conjunction with the 14 ECTS course on international conferences).
- Considering the new orientation towards the requirement of the job market the teaching obligations of doctoral students should be rethought. This would be a substantial contribution to minimize the time-span of

dissertations.

- A potential risk with all the labs is their depreciation and the possibility of maintaining their condition. It is a well-known problem and not really specific to the forestry labs. Its solution must come under the rubric of national infrastructure and an approach to finance such infrastructure at a higher level.

## Teaching, learning, research and/or creative activity

Strengths

- Supervisors' competition is described as positive experience. Thus the quality of supervising can be ensured, including positive influences on finishing PhD theses.
- The progress of PhD students is continuously followed by the supervisors according to the study plan. In addition the annual evaluation of doctoral students ensures the progress of a running thesis. In case of existing problems between supervisor and PhD student the advice and support by the commission can be reorganisation of supervising team or conceptual hints.

Areas of improvement and recommendations

- The area of innovative teaching methods could not be clarified during the discussions. It appears still as field of improvement and important task for a 'training of the trainers' before new teaching methods can be implemented into daily teaching routines.
- There seems to be a slight conflict between fixed continuous theoretical courses and the need to run experiments in laboratories or to accomplish scientific field work which is highly dependent on climatic conditions and has to be accepted as area of higher priority. Could it be helpful to organise courses more in a blocked format, preferably outside the open-range season of crop scientists, in contrast to the existing time schedule?

## Teaching staff

Strengths

- Supervising follows a successful incentive-based mechanisms. We found evidence that the mechanism has improved supervision over the years since it was implemented. The students were also praising the scheme in the interviews.

- There is a programmatic approach to following-up student progress, including an "early warning" system that supports PhD-students well.
- The system of appointing junior, co-supervisors is appreciated as a way of developing competency of young- up and coming- advisors.
- The motivation for being a supervisor is high since the supervision competition process is connected to research financing and career advancement at EMÜ. Teaching seems to be fairly well integrated as a requirement for being awarded the position of supervisor as well.
- The system of review every 5 years for academic staff helps ensure that teaching staff have earned some academic merits through peer review.

Areas of improvement and recommendations

- Both incoming and outgoing staff mobility is low. Encourage staff members for staff mobility.
- Facilitate the requirements for a stay abroad. Instead of finding persons for replacing the missing teacher accept a course structure, i.e. crashed courses in advance or after a stay abroad.
- Make the process of feedback to the students' feedback more transparent.
- The high quality visiting professors could be better leveraged by using them as contacts for students to spend longer periods of time abroad as visiting PhD students. It seems like the desire for students to do extended stays in foreign countries is low.

**Doctoral students**

Strengths

- The students have a very positive view of the structure, content and length of the programme, even though the quality requirements mean that the thesis could take longer than expected. This suggests to us that there is a set of highly motivated students, an important asset.
- Close relationships appear to exist between supervisor and student
- Incentive and control systems (e.g. competition to become supervisors and 3 publication requirements) are widely regarded as innovate and useful by the students.
- A clearly planned timeline, effectively using ISPs, for each student
- Students have a generally high level of satisfaction with their supervision. Those who are parts of larger research groups expressed the importance of the support they receive from their research group. Students feel like feedback on their supervision and coursework works reasonably well.
- The yearly evaluation seminars are appreciated and helpful. Students get to see what other students at EMÜ are working on and they appreciate the

opportunity to practice presenting their research work in English to a large audience. Students see the yearly evaluation as a valuable support if they need help getting their studies back on track. It seems that particularly in forestry, most of the feedback and student evaluation is done informally and often within the research group or between students and supervisors.

- Students are often able to attend courses abroad and occasionally get help from foreign professors on their thesis work.
- The strong focus to motivate doctoral students to spend a study period abroad. The share of 22 PhD-students as outflow out of a cohort of 52 graduates [all three programs] between 2012 and 2017 is noticeable

Areas of improvement and recommendations

- Occasionally a high drop-out rate.
- A proposal from student's side was to create a mentoring system, so that student can have somebody from outside who can give to the student feedback about the personal development and also development of research.
- The Doctoral school curriculum can be improved by making some courses shorter and increasing the length of others. The balance between the "International presentation" course and the statistics course is an example.
- It is to be noted that in the interview sessions (at different levels), there were different opinions on the appropriate share of compulsory courses.

## 2.3. Strengths and areas for improvement of study programs by assessment areas

### 2.3.1. Agricultural Sciences

Among the three doctoral programs most students are inscribed as PhD students of Agricultural Sciences. A similar proportion can be found on the level of employed personnel. Due to that fact the new investments for the renovation of buildings and new lab equipment in the VMFS Unit should consequently be continued for the Units of Agricultural Sciences (and Forestry), in the near future and in the same intensity. The expertises within Agricultural Sciences (and Forestry) are very much based on production-oriented chairs with natural or engineer science background; research and teaching topics with a corresponding focus. Continuous development and adaptation of the new concept of EMÜ ('Bioeconomy') will have to keep these facts in mind when thematic changes have to be realised by personnel restructuring.

Strengths

- EMÜ has provided convincing indicators of raised quality in research and academic teaching over the last decade. Investments for buildings and equipment are distinct evidence for that positive development. The same is true for the reorganization of requirements for lecturing and assessing courses and research projects.

Areas of improvement and recommendations

- The working environment (buildings and equipment) of Agricultural Sciences and Forestry should be renewed as demonstrated at the VMFS Unit.
- Doctoral studies should be more opened for international students by better announcement and more suitable application systems internally for a PhD position, externally for temporarily residency and labour permission.
- The academic background of doctoral studies should be more opened towards the needs and requests of non-academia labour conditions which are dominantly based on personal and managerial skills.

## Study programme

Standards

- ✓ The launch and development of the study program are based on the Standard of Higher Education and other legislation, national strategies, university development plans, the effectiveness of research and development, various analyses (including labour market and feasibility analyses); striving for the best overall program quality.
- ✓ Doctoral programs contain at least 70% research, development or other creative work by doctoral students, making the results thereof public in international peer-reviewed research journals or in other ways that have international dimensions.
- ✓ Study programs incorporate doctoral student participation in conferences and/or other professional activities, and are counted towards completion of the study programme.
- ✓ Doctoral programs enable doctoral students to acquire leadership and teamwork skills, develop coaching and teaching skills as well as a proficiency in foreign languages at the level needed for successful participation in international working environments.
- ✓ Different components of a doctoral program form a coherent whole supporting the personal development of each doctoral student.
- ✓ Study program development takes into account feedback from doctoral students, supervisors, employers, alumni and other stakeholders.

Comments

The new vision of EMÜ clearly focuses on bio-economic issues, which appears as a serious shift from natural science based institution to a natural and social science balanced academic entity. From the understanding of the panel, this can only be achieved in a long-term process, because the economic field as seen at staff positions within the doctoral programs seems to be marginal compared to all the other thematic fields within the three programs (Veterinary Medicine and Food Science; Forestry; Agricultural Sciences). From the agronomic view point, the missing fields, e.g. Plant nutrition and Plant breeding, seem to be fields of further future developments in order to keep all relevant thematic areas of crop sciences.

Till now the main focus (and main attraction) on recruiting young doctorate holders obviously was the filling of empty positions of the academia. This will be changed in the near future. Therefore new issues have to be implemented into the doctoral study programs (into the MA programmes, as well) in order to meet the requirements of the job market for young professionals with the option to leading positions. Example could be leadership, personal management, conflict management, project management, etc.

Four years are not enough to complete crop science-based theses due to

seasonality of field work if results of three seasons have to be covered.

The structure of the Basic module should be reorganized in favour of more job-market orientation (developing personality skills). Statistical methods on the research level should include more biometric and other modern statistical issues whereas a basic understanding of statistical evaluation should be essential part of the education at the master's level. Components, e.g., "Philosophy of Science" and "Practice Learning in University Teaching" should be changed from the mandatory to electives. Thus they would not be completely eliminated and could be chosen by those with a clear academic career in mind, but could be replaced by those with distinct intentions of a non-academia profession.

Strengths

- Reorganizing of curricula is going on, with the goal of better adaption to the actual life and future working conditions
- Most students and supervisors were very pleased with the study program, they found it useful and good for personal development
- It is positive that there are courses in English

Areas of improvement and recommendations

- The study program is very academic, focusing mostly on needs of the university and writing high level scientific papers (which is necessary to obtain finances for research), but at the same time the study program does not always meet the needs of enterprises which focus more on finding solutions for practical problems. New modules should become part of the doctoral programs irrespective of whether university personnel or external teachers are able to be responsible for them or not. As already mentioned in the SER subjects for strengthening personality skills should become essential part of updated doctoral study programs, e.g. leadership and management issues (project, finance, zime, labour, personal).
- Practical issues (suggested by industry) as part of a dissertation could be a constructive collaboration between university and stakeholders if the interests of both sides can be solved in a concerted manner.
- The structure of the Basic module should be reorganized in favour of more job-market orientation (developing personality skills). Statistical methods on the research level should more include biometric and other modern statistical issues. Components such as "Philosophy of Science" and "Practice Learning in University Teaching" should be changed from mandatory to electives.

## Resources

Standards

- ✓ In conducting doctoral study programmes, an adequate number of teaching staff and researchers participate, who hold the appropriate qualifications required to carry out doctoral studies and supervise doctoral theses in a given study programme.
- ✓ Universities shall ensure that sufficient funds are available to conduct doctoral studies, to provide development activities associated with doctoral studies and research, and to support the professional development of teaching staff and researchers.
- ✓ Resources (teaching, learning and research environments; libraries; resources required for teaching, learning and research) support the achievement of objectives set out in study programs as well as the actual teaching, learning and research at the level of doctoral studies. Resource development is sustainable.
- ✓ Trends in the numbers of current learners, admitted learners and graduates (by study programme) in doctoral studies under the study program group during the last five years indicate sustainability.

Comments

Even though the governmental stipends recently were increased by approximately 60%, in many discussions the urgent need for additional income sources was pointed out. There are various operational fields for filling the financial gap, inside and outside the university, in any case this is a serious retardation of dissertation projects and an unavoidable loss of actuality of research topics due to the long waiting period before scientific findings could be published. The panel rates such circumstances as a negative trend for the institution, the elaborated topics, and, even more relevant and tenuous, for the young researchers. This fact is identified as one of the main reasons for the elongation of dissertations. 4 years are not enough to complete crop science-based theses due to seasonality of field work if results of three seasons have to be covered. Therefore a (preferably) full-time payment of PhD students for 5 to 6 years should better ensure the completion of dissertations in the expected time-span, an elevated publication rate in a shorter period, combined with a higher number of papers per time-unit. In addition the rate of withdrawals should be diminished at the same time due to more realistic payments which are closer to real life conditions.

Although the admission figures for the doctoral study of Agricultural Sciences 'recovered' for the last two academic years the numbers of the total PhD students are still on a level under 60. Reasons for that might be very divergent. Are these the diminishing options for academia working places? Is it the diminishing monetary surplus for doctorate holders in business? Is it the fact that not all agricultural thematic fields are represented in the group of professors and researchers at EMÜ? Is it the degree of under-payment for substantial

contribution of young scientists for the academic profile of their university? It will be a challenging task to identify the relevant shares of these parameters and to answer with appropriate concepts by re-structuring study programs, updating scientific profiles and working positions and by creating more attractive working conditions for the PhD students.

The campus of EMÜ provides a very positive and inspiring ambient for all persons working and studying in that environment. Laboratories which could be visited gave a good insight view of working facilities and environment. In places which are still waiting for a similar renovation as presented at the Veterinary Medicine and Food Science Unit the exhibited tools were quite convincing and presented good examples that scientific data can also be achieved by high personal creativity and practical skills, even under slightly out-dated technical standards.

The access to modern library services enables EMÜ to provide adequate conditions for scientific teaching and research.

Strengths

- Competition of supervisors should ensure that the best supervisors will be selected, and requirement to show the presence of finances during whole PhD study period will ensure that shortage of money is not prohibiting the PhD studies
- Many institutes (supervisors) will find possibility to hire the PhD student as part time workers to their research project or as teaching assistants (according to the self-evaluation report in agricultural science 38,3% of students are employed by supervisors and additionally many students are student contractors within the scientific projects)
- Each institute has its own laboratories and mostly they are well equipped, especially the new and modern ones, students and supervisors were satisfied with their laboratories the quality of which provides best conditions for good results; indispensable for high level research papers
- There is cooperation between universities (e.g., with the University of Tartu) for using laboratories. Moreover, some students mentioned that they could use placement opportunities for working in laboratories abroad as well as getting their samples analysed in labs abroad

Areas of improvement and recommendations

- Although the financial situation of students has been improved by increasing the scholarship for full time student (increase from 422 to 660 €) , there is still an urgent need to find additional work in projects or as a teacher, which are unavoidable factors for the elongation of dissertations
- 4 years are not enough to complete crop science-based theses due to seasonality of field work if results of three seasons have to be covered.

Therefore a (preferably) full-time payment of PhD students for 5 to 6 years should better ensure the completion of dissertations in the expected time-span, the publication rate in a shorter period, combined with a higher number of papers per time-unit. In addition the rate of withdrawals should be diminished at the same time due to student-oriented payments.

- Considering the new orientation towards the requirement of the job market the teaching obligations of doctoral students should be rethought. This would be a substantial contribution to minimize the time-span of dissertations.

## Teaching, learning, research and/or creative activity

Standards

- ✓ Uniform principles, based on best international practices and agreed upon at the university level, shall be followed while implementing doctoral programs and assuring the quality of the doctoral studies (including supervision of doctoral theses).
- ✓ Doctoral studies support students' personal and social development, including creating an environment which will prepare them to successfully participate in international working environments at research and development institutions, as well as in the business and public sectors.
- ✓ Supervision of doctoral theses; modern methodology used in teaching and research; organisation of studies; and doctoral students' professional research, development and/or other creative activities all support achievement of the objectives and learning outcomes of doctoral studies.
- ✓ Assessment of outcomes of the learning, research and creative work done by doctoral students is relevant, transparent and objective, and supports the development of doctoral students.
- ✓ Doctoral students are asked for feedback regarding supervision on a regular basis and the results of these surveys are taken into account for quality improvement activities.
- ✓ Effectiveness of the doctoral studies is analysed and such analyses serve as a basis for planning quality improvement activities.

Comments

It is sensible that all academic teachers which are qualified for a supervising task are interested to be awarded with doctoral scholarships for the promotion of their own scientific career and profile. If that would be the only source to work with, it would be a dangerous indication for the researcher. The figures of external project funds clearly show thematic fields of public awareness and the ability of experienced persons to profit by writing the right proposals. With regard to the

big group of AS supervisors the relatively small number of successful applicants exposes one field of improvement for the near future.

The doctoral school of Agricultural Sciences is obviously dominated by a big group of experts in the fields of Entomology (6 persons) and Field Crop Science (8 persons). Can such a system be maintained in times of decreasing governmental funding for the Higher Education? In the long-run concentrations of 6 entomologists or 8 field crop experts should be given up in favor of the establishment of essential, currently missing fields i.e. Plant nutrition and Plant breeding.

Research design and study plan are mostly developed in close collaboration between doctoral student and supervisor. With concern to the suitable program for a novice PhD student this support seems to be appropriate. With concern to the research design a higher level of independence (ergo: lower level of guidance) would be desirable for a young researcher at a stage of increasing self-responsibility. It is the role and the experience of a good supervisor to recognize the intellectual potential of a doctoral student and to find the suitable way of communication.

The competition for supervisors has been found as valuable instrument to strengthen the quality of academic education and the level of doctorate outcomes. According to the discussions all actors, supervisors and supervisees, are confident with it.

The same is true for the annual assessments of PhD students' progress which was acknowledge by most of the interviewed persons.

All in all the contact between student and supervisors seem to be quite intensive, sometimes even by using Saturdays and Sundays for personal meetings and exchange of information. That is a positive indication for the commitment of supervising persons.

Strengths

- Supervisors' competition is described as positive experience. Thus the quality of supervising can be ensured, including positive influences on finishing PhD theses.
- New unexperienced supervisors have good opportunity to be integrated as co-supervisor, also co-supervisors from abroad are very welcome
- There are special courses for supervisors to improve supervising skills and there was a positive feedback from those participating in such courses.
- The progress of PhD students is continuously followed by the supervisors according to the study plan. In addition the annual evaluation of doctoral students ensures the progress of a running thesis. In case of existing problems between supervisor and PhD student the advice and support by the commission can be reorganisation of supervising team or conceptual hints.

- Existing co-operations between universities (e.g. University of Tartu) widen the access to different lab tools which are not part the facilities of EMÜ.
- The combination of a study abroad and the analyses of own research samples at the same place creates ideal circumstances as pointed by some students' experiences.

Areas of improvement and recommendations

- Some supervisors are very much occupied with teaching and other duties, so they have to find time to meet their students in weekends. Instead of frustrating date findings for the progress of manuscripts or common exchange of information and recommendations modern tools e.g. web-based writing software should be used for co-writing of papers (and other information exchange).
- It was mentioned many times by several stakeholder groups that post-doc studies, preferably abroad, are suggested as next step for an academic career. There is a very strong competition for these positions, quite often with negative results for Estonian applicants. In addition the waves are normally too small to cover all expenses if a family with children would intend to move to the other place. Next obstacle, in specific for young mothers, the organisation of an academic career plus the needs and demands of a family around.
- The area of innovative teaching methods could not be clarified during the discussions. It appears still as field of improvement and important task for a 'training of the trainers' before new teaching methods can be implemented into daily teaching routines.
- There seems to be a slight conflict between fixed continuous theoretical courses and the need to run experiments in laboratories or to accomplish scientific field work which is highly dependent on climatic conditions and has to be accepted as area of higher priority. Could it be helpful to organise courses more in a blocked format, preferably outside the open-range season of crop scientists, in contrast to the existing time schedule?
- Another improvement could be the agreement for more flexibility with regard to examinations of obligatory courses. That would help to minimize the described conflict between research obligations and course obligations.

## Teaching staff

Standards

| | |
|---|---|
| ✓ | Teaching staff participate in research, development and/or creative activity at the level of and to the extent sufficient to conduct doctoral studies in the curriculum |

group and to supervise doctoral theses.

- ✓ Teaching staff develop their supervisory competences and share best practices with one other.
- ✓ Teaching staff collaborate in fields of teaching, research and creative work within the university and also with stakeholders outside the university (public sector organisations, enterprises, other research and development institutions).
- ✓ Teaching staff further their skills at foreign universities or other research institutions, participate in international research and creative projects, and present papers at high-level conferences.
- ✓ Qualified international and visiting teaching staff are involved in conducting doctoral studies, participating in doctoral thesis defence panels and/or reviewing doctoral theses.
- ✓ When assessing the work of teaching staff (including their evaluations), the effectiveness of their teaching as well as of their research, development and creative works is taken into account; including the effectiveness of their student supervision, development of their teaching and supervisory skills, and their international mobility.

Comments

Supervisors are highly motivated actors of the existing system. They are confident for having found the right mixture between promotion of and demand towards doctoral students.

Teaching staff members partly reported on very high workload due to numerous administrative, teaching and researching tasks. Nonetheless the regular contact with their doctoral students is assured either by electronic tools or physical meetings during week-ends. There is a high commitment of supervisors for the progress and final success of their supervisees.

The internal qualification of supervisors, either by building up tandems of young researchers with experienced colleagues or by providing special courses for the new matter, can be highlighted as a convincing approach of EMÜ for increasing the quality of education in academic research and teaching.

The need for external opponents of doctoral defenses also implies the possibilities for lectures by external authorities; sometimes the integration of external, international colleagues as co-supervisors is arranged.

Some teachers mentioned that they would like to take PhD students but there are not enough finances and projects; as pointed out before the convincing writing of attractive research proposals seems to be an area of improvement.

Teachers are encouraged to take a leave for a study abroad in order to intensify personal connections, to specialize in new methods and technologies, to improve teaching and language skills. Even available funds for such stays abroad are seldom used due (1) to high workloads of the teaching staff, (2) to the necessity

to find capable persons as replacement for the teaching obligations, (3) to private matters in specific in young families with small children.

Strengths

- Internal qualifications for young academic teachers and supervisors
- Available funds for staff mobility
- Strong commitment of supervisors for their supervisees

Areas of improvement and recommendations

- Some teachers mentioned that they would like to take PhD students but there is not enough finances and projects. (a) The share of successful research proposals has to be augmented, (b) Topics of dissertations should be part of research projects funded with external money. That assures the financial needs of doctoral student.
- Encourage staff members for staff mobility.
- Facilitate the requirements for a stay abroad. Instead of finding persons for replacing the missing teacher accept a course structure, i.e. crashed courses in advance or after a stay abroad.
- Make the process of feedback to the students' feedback more transparent.

## Doctoral students

Standards

- ✓ When admitting students to doctoral study, their suitability for successful completion of their studies is assessed on the basis of transparent criteria.
- ✓ Doctoral students plan their studies as well as research and development activities in collaboration with their supervisor(s), setting out specific objectives for each year and taking responsibility for achieving these objectives.
- ✓ Evaluation of doctoral students is transparent and impartial. Its purpose is to support development of the doctoral students, provide an opinion regarding the effectiveness of their work to date, and assess their capabilities to complete their studies on time and successfully defend their doctoral theses.
- ✓ Universities offer doctoral students counselling on completing their studies and planning their further careers.
- ✓ Doctoral students' extracurricular teaching, research and/or creative activities or other work-related activities at the university support successful completion of their doctoral studies.
- ✓ Doctoral students participate in international mobility programs or take advantage of other opportunities for learning or research at foreign universities and/or

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| | research and development institutions[2]. |
| ✓ | Alumni are regularly asked for feedback on the quality of the doctoral study, and employers are asked for feedback on the preparation of the graduates. |

Comments

Doctoral students are highly motivated and confident with the existing system of teaching, assessing, supervising, etc.

Doctoral students will get the work experience by conducting lectures, seminars and laboratory works and often they are included in different projects.

PhD students have good opportunities to participate in scientific conferences and present their research findings as poster or oral presentations both in Estonia and abroad.

PhD students are encouraged to participate in different international courses to improve their language and communication skills and to start networking with student colleagues and others.

All in all students expressed their positive experiences with the guidance of their supervisors. Only in case of their multiple occupations students and supervisors do meet during week-end due to missing time during the working days. From the positive viewpoint this is a clear commitment for the subject, for the persons involved, and for the goals of the institution to meet requirements of expected academic visibility. Seen from the other viewpoint: should not week-ends serve for recreation and neglected obligations during the week? At least modern IT technology could help to diminish these extra dates to a minimum without loosening regular contact to each other.

Strengths

- Most of students were very positive about supervising (describing the relationships as almost friendship with the supervisor
- The individual study program is worked out between student and supervisor; as pointed out quite often a substantial benefit for students' personal development.
- The positive things mentioned about the study were:
    - ❖ not so many subjects to pass
    - ❖ independent in your work
    - ❖ courses in English language
    - ❖ good professionals

[2] In the context of this document, 'research and development institutions' denote both research institutions and research-intensive companies.

- There are finances available for visits of the conferences abroad like DORA program, Kristjan Jaak scholarship, etc.
- The strong focus to motivate doctoral students to spend a study period abroad. The share of 22 PhD-students as outflow out of a cohort of 52 graduates [all three programs] between 2012 and 2017 is noticeable

Areas of improvement and recommendations

- The exchange of local information inside the university is mostly in Estonian – not easy to understand for international students (but it can encourage to learn Estonian for students who are interested)
- Some students mentioned that supervisors are sometimes very occupied and therefore there is not enough time for discussions and sometimes need to wait for comments about paper prepared by student. Quick replies, at least in a digital form, could be very helpful.
- The system to employ student contractors in research projects which are different to their own research topics is positive in terms of additional income sources for students, highly questionable in terms of expected dissertations which are finished in a time-span of 4 to 6 years. It could even cause elongation of dissertations without real thematic reasons. Therefore the system of obligatory additional income sources should be reconsidered and, if possible, re-organised.
- A proposal from student's side was to create a mentoring system, so that student can have somebody from outside who can give to the student feedback about the personal development and also development of research.

### 2.3.2. Forestry

There is wide agreement, as codified e.g. in the bioeconomy strategy adopted by the EMÜ, that forests can provide an essential input into a sustainable economy. It is also widely agreed that forests provide a whole spectrum of goods and services, ranging from forest biomass to non-wood forest products, tourism recreation and more. Whether or not forest education in the EU is suitably aligned to the changing role of forestry is a matter of current intense discussion. The EMÜ is the only institution to produce forest specialists in Estonia. As it stands now, the objective of advanced forestry education at the EMÜ is *"… to train competent, internationally recognized researchers, teachers, and top specialists in forestry and the related fields. The graduates of the PhD programme of Forestry are competent to work in universities, research and development institutes, governmental authorities and the private sector."* Implementing the bioeconomy strategy effectively will support this objective in a very useful way.

Currently, the forestry programme is heavily bent towards natural science. At a meeting with the Rector and the Vice-Rector of studies, it was suggested that the PhD-program is "too theoretical'' overall, suggesting that the PhD education is mostly directed towards the academic market. This sentiment is, to some extent, echoed in the report regarding forestry *"All doctorate holders cannot be employed by the academia, therefore, an increasing need for doctoral studies geared towards entrepreneurship can be detected".* The idea that the current PhD was not ideally harmonized with the private market demands was echoed at several interviews (e.g. the education was too narrow to fit the needs of small companies).

It should be noted that the leadership indicated in the interview that social science will be given a more important role in the future. Thus, there are several reasons why EMÜ should consider (and is apparently considering) the current balance between natural and social sciences. The bioeconomy strategy and the attractiveness of graduates over a broad spectrum of employers are strong motives to consider changing the current balance. Fortuitously, given the key role the UN, the EU, EMÜ itself and a whole suite of key players have assigned to forest and forestry (under the bioeconomy umbrella), there is a window opportunity for the forestry program. For example, the Forest Industry Master's program has recently appointed a new head of program and the previously announced changes in 2016 are in active process.

We recommend that the university considers different ways of playing up the importance of social science in the field of forestry. The mechanisms for doing this in the short-run are most naturally via the Doctoral School and sustained co-operation nationally and internationally. Over the longer run, decisions will have to be taken regarding Chairs and so on and so forth. This involves several difficult choices and the facing of inevitable trade-offs, but if the "bioeconomy'' strategy is to be as effective as possible, there are few alternatives to an introduction of relatively more social science in the curriculum. The idea of gearing a certain part of the program towards entrepreneurship is very useful and should be supported.

While our report focuses on the PhD-education, it is imperative that the analysis of the best way forward is made with the whole curricula in mind. In other words, changes of the Master's program should be made in conjunction with plans to improve the other two curricula. A forward-looking analysis should be carried out with an eye to an international audience, not only because forest and forestry will play key roles in several significant international policy areas, climate change being one of them, but also because the "student market'' is increasingly being globalized. We have every reason to believe that the Forestry program that currently is being shaped at EMÜ could be competitive internationally and attract a lot of attention. The report itself does not exude much optimism regarding the attractiveness of the forestry PhD at the international level, but a high-ranked university will always be attractive if it can offer a useful option for foreign students. There are many master programs of forestry around the globe and it will be useful to consider where EMÜ has its comparative advantages and build on those for the future.

An interesting, if imperfect, indicator of the success of the current structure is how the market awards the PhD. According to the stakeholders in the interview session there is one example of the state forestry agency giving a 10% automatic raise if you get a PhD. For other cases, it was not clear whether or not there exists a bonus. From the report and the interviews, our impression is that the PhD in forestry may be less rewarded by the market than expected. Over the long-run this will have implications for the program and its potential to recruit excellent students.

**Strengths**

- World-class facilities, such as labs and field stations
- Top-notch research in several areas
- Good working relationships between PhD-students and supervisors
- A unique attention to quality of thesis. The high number of required publications in scientific journals for thesis defense should make graduates competitive in the academic job market.
- Dedicated and enthusiastic teachers
- Significant national and international project participation (According to ETIS, in 2012-2017, the IFRE academics in forestry participated in 155 projects, funded from international and national funds)
- Incentive-based (ECTS crediting) of international conference student participation. This requirement stimulates student communication of their research.
- Students taking supplemental courses at the University of Tartu and foreign universities also supports a good flow of students going abroad and establishing contacts that can be important for their future careers and EMÜ.
- A clearly articulated set of requirements that the student need to fulfill together with a comprehensive approach to student evaluation via yearly follow-ups of the ISP.
- Multi-level counselling system to ensure the success of doctoral studies.

**Areas of improvement and recommendations**

The SER identifies several issues regarding forestry PhD, for example; *high dissatisfaction rate among the doctoral students of forestry (p.41); project-based funding; the doctoral degree is not highly valued in society, so low interest; All doctorate holders cannot be employed by the academia; reduced state funding; low graduation rate; low competition for PhD-slots; unattractive program for foreigners and high drop-out rate.*

Of these, we were unable to document a high dissatisfaction rate among the students at the interview, rather the contrary. The students appreciated the high

quality of the university and also mentioned the possibilities of going abroad. If we look at the issue in the other direction, the report mentions that the program is not necessarily ''*attractive to foreign students"* (p.38), at the same time the report says that the number of foreign students is ''enough'' (p.39). Finally, that all PhDs cannot be hired by the university is not a weakness and should, at any rate, be compared to the overall objectives of the PhD-education.

A number of initiatives have been introduced to combat some of the issues identified, *e.g. criteria for the supervision were changed, competition for supervision position was introduced, departments get a bonus after their supervisee's successful graduation, the number of Defence Boards was reduced and the Defence Boards are more speciality focused.* These are mostly excellent changes (see our recommendation about the openness of the bonus and where the money goes).

We did not have sufficient information to exhaustively analyze degree-goals, learning-goals and exam-goals. One important question we did look at corresponds to the question: Are there sufficient courses corresponding to goals? The report observes (p.38)*: "There are no limitations regarding the previous studies of the candidates, as science today is interdisciplinary. If there is a lack of basic knowledge in the narrow field of research, the individual study plan enables the student to compile the plan according to his/her special needs and take courses from the University or go to the courses in other universities."* Our interpretation is that the university considers that there are enough courses; the flexibility of the solution means that to analyse the question requires very detailed information. It does seem that the courses are individualized after completion of the compulsory ones, which makes it very hard to assess the comprehensiveness of the curricula as such. Does it contain sufficient courses in methodology etc in the social sciences? Does it give the student a broad and advanced level of knowledge in the relevant field? The flexibility does make this possible, although it seems to mean that the courses are modelled after the particular project the student is working on.

The panel was given sufficient evidence to conclude that there are procedures to secure quality in all aspects of the educational process. We were also convinced that the students are closely included in the whole research process.

## General recommendations

1. Consider if the extent of social science in the existing program matches the bioeconomy strategy adopted by the university. Explore the possibility of using the Doctoral school and national/international co-operation to increase the role of social science
2. Given the tightly linked programmes, changes must be made in a holistic manner. For example, when developing 460 and 461 in the master programme, presumably with an eye towards the bioeconomy strategy, eventual changes should be carried out with an eye towards how they fit forestry education at all levels.

3. Analyze the comparative advantages of the advanced forestry program and how it can be made more open to international competition.
4. With the high quantity of publications from many graduated PhD holders and the international connections students have through their research projects and international courses, it seems like there is possibility to better convert your existing possibilities into more successful international post doc positions and other entry-level academic positions for your graduates.
5. Promote intellectual flow at all levels, both in- and outflow, as indicated in the report (*"Encouraging postdoctoral studies and research.").* Both inflow and outflow is important. Action plan could make this more explicit. One approach would be for a suitable sponsoring body to offer post-doc grants that are exclusive to international post-docs. The university could impose this constraint itself for a certain percentage of the jobs offered.

**Specific recommendations**

1. PhD positions should be opened to foreign competition to a larger extent than today. Positions should be announced globally (e.g. via dedicated sites, ResearchGate etc).
2. The process of recruiting a student should be subject to quality control and be approved of by a suitable body that would include the comprehensiveness of the announcement etc.
3. A pre-seminar , in which an internal opponent examines the thesis could be considered, in so far as this is not taken care of by the existing courses.
4. As mentioned in the general recommendations, it is advisable to be more transparent about where the PhD student bonuses goes. It seems like bonus funds dispersed at beginning of a student's studies goes to the chair but then the chair decides where it should go. The money at the end may go directly to an individual not to the research budget. Also, it is also not clear to the committee how justified it is to give such payment to the principal supervisor. Is the financial bonus really addressing an important reason why students do not defend their thesis? How effective is this 3,000 € incentive? Given that lack of salary is a primary reason for students not completing their studies, this final bonus seems like it may be better spent elsewhere (i.e. on the students themselves).

## Study programme

Standards

The launch and development of the study program are based on the Standard of Higher Education and other legislation, national strategies, university development plans, the effectiveness of research and development, various analyses (including labour market and

feasibility analyses); striving for the best overall program quality.

- ✓ Doctoral programs contain at least 70% research, development or other creative work by doctoral students, making the results thereof public in international peer-reviewed research journals or in other ways that have international dimensions.
- ✓ Study programs incorporate doctoral student participation in conferences and/or other professional activities, and are counted towards completion of the study programme.
- ✓ Doctoral programs enable doctoral students to acquire leadership and teamwork skills, develop coaching and teaching skills as well as a proficiency in foreign languages at the level needed for successful participation in international working environments.
- ✓ Different components of a doctoral program form a coherent whole supporting the personal development of each doctoral student.
- ✓ Study program development takes into account feedback from doctoral students, supervisors, employers, alumni and other stakeholders.

Comments

Training in forestry before the PhD-program at EMÜ is composed of a three-year Bachelor's degree (Forestry followed by a choice of two two-year Master's degree in accord with European norms; Forest Management (460) and Forest Industry (461). There are plans to redesign the curriculum of 460; our understanding is that also 461 is being assessed for the future. Given that (i) PhD-students are, in many cases, recruited from EMÜ (ii) the competitive supervisor selection process and (iii) the preponderance of natural science at the DMU, not the least in forestry research, as the current system would seem to give a tilt towards students with an interest in natural sciences. Re-designing the curriculum of 460/461 could be carried out with the overarching university strategy in mind.

The panel saw evidence that the general structure and content of study program and modules correspond to the Estonian Standard of Higher Education and to valid institutional internal regulations as well as to the Statutes of Curriculum and rules of Study of the EMÜ. The above standards applicable to the domain of are all met. Innovative teaching methods are sometimes being used, a mentioned in the interview session.

There are some hard-to-assess areas such as how the program supports "proficiency in foreign languages"; we guess that the English language is catered for. Furthermore, the skills of leadership, teamwork, and coaching are difficult to evaluate at the PhD level although should be a part of further student success as post docs and early career researchers.

The individual study plan (ISP) of every student is used effectively; most importantly it is administered with flexibility (according to the student interview). Thus, over the student's time in the program, the ISP is tailored to the precise

needs of each student. As far as we could make out from our interviews with various stakeholders in the PhD-process, feedback is given an used to improve the final product. The most important feedback is, naturally, from the supervisor and we have not had enough time to scrutinize other stakeholders input. Participation in international conferences is encouraged.

Processes for curriculum development and quality assurance are in place, and take into account feedback from the university and key stakeholders of the society.

The teaching load was not considered to be a main problem; rather the limiting factor is research money. At least that was the impression given in the interview. It can be considered to be strength, in that in competing universities teachers often complain about the teaching load.

Strengths

- We were given examples of how innovative (simple and ingenious) approaches were used in the Forestry lab to solve certain problems. As far as we could tell, they were introduced by junior faculty, perhaps even students. If so, this indicates a healthy environment for innovative solutions.
- Research is typically of high quality and there is, according to the students, a sufficient critical mass.

Areas of improvement and recommendations

- Significant efforts have been made recently to increase student financing (as well as increase the quality of supervision and student chances of successful thesis defense). Many students are, however, still working on non-research, non-academic subjects due to funding needs. It is clear this non-academic work may significantly distract from the completion of studies. Efforts can be made to officially document total student workload. This ISP may be an appropriate place to keep track of total student workload. At the very least, these figures will give a better idea of when students drop out of the program and why. At best, they can be used to advocate for state funding for PhD studies from year 4 to year 6.
- The most important issues have been covered above and we return to the key issues here, but explain in more detail our considerations. As noted above, the SER mentions under the headline of 'areas of improvement' that "*All doctorate holders cannot be employed by the academia, therefore, an increasing need for doctoral studies geared towards entrepreneurship and industry can be detected*". It is unclear to us if this sentiment is a signal that the academic staff considers the main purpose of the forestry PhD to be producing researchers? The objectives makes clear that the forestry PhD should prepare the student for top level jobs in many different sectors of society, not only in academia. If the sentiment is

a signal that more social science is needed, then this is consistent with our recommendations Alumni and industry reps did indeed mention that the education was "a little too theoretical". To substantiate the idea of introducing more social science, it does seem that gearing the program towards ''bioeconomy'' might be able to alleviate some of the weaknesses identified in the SER as regards the theory/applied mix. With a more substantive share of social science in the program, there is some likelihood that the studies become slightly less ''theoretical''.

- All course lists should be subject to scrutiny in relation to the key strategic items of "Bio-economy". For many existing courses in the Doctoral program this point is moot, yet some simple measures such as using appropriate examples might be useful in the short run.
- To be able to develop the Bio-economy concept further, teaching resources to e.g. Forest Industry (master's program 461 in 2016), or its current equivalent, should be available, given the fact that most PhD-students are EMÜ-students.

## Resources

Standards

- ✓ In conducting doctoral study programmes, an adequate number of teaching staff and researchers participate, who hold the appropriate qualifications required to carry out doctoral studies and supervise doctoral theses in a given study programme.
- ✓ Universities shall ensure that sufficient funds are available to conduct doctoral studies, to provide development activities associated with doctoral studies and research, and to support the professional development of teaching staff and researchers.
- ✓ Resources (teaching, learning and research environments; libraries; resources required for teaching, learning and research) support the achievement of objectives set out in study programs as well as the actual teaching, learning and research at the level of doctoral studies. Resource development is sustainable.
- ✓ Trends in the numbers of current learners, admitted learners and graduates (by study programme) in doctoral studies under the study program group during the last five years indicate sustainability.

Comments

The site visit, the report and other evidence collected by the panel shows very convincingly that the resources are excellent in international comparison. While the panel did not visit the Järvselja research station, we consider it an asset of importance also for the PhD program.

The system of review every 5 years for academic staff helps ensure that teaching staff have earned some academic merits through peer review. The system of supervisor competition and using young researchers as co-supervisors helps provide a new generation of supervisors.

Forestry and most other curricula depend on outside competencies for coursework and subject matter expertise. This is a merit of course, but the way this point is written implies that these competencies should all be provided "in-house" at EMU. Perhaps re-wording this standard would be beneficial.

Strengths

- There are necessary resources available for achieving the objectives set out by the forestry program, with regard equipment, infrastructure, supervisors and so on and so forth.
- Some of the resources are of exceptional quality even by international standards.
- Students especially mentioned in the case of forestry that the supervising situation was very satisfactory (by contrast the SER reports that this is not the case).
- There seems to be ample opportunities for students to engage with the international community of researchers. At the same time, we found that it was not easy to obtain a post-doc position abroad.
- The resources for going abroad for courses and conferences seem good. Most people who want to go are able to go.
- The admissions to graduation ratio from the last six years indicate that Forestry is at or above the average of about half of all admitted PhD students graduating. A further sign of sustainability is the higher percentage of foreign students studying Forestry.

Areas of improvement and recommendations

- Students mentioned that the money they receive per month is insufficient. This problem is generic to all areas. It does mean that students have an incentive to seek ways to enhance their monthly income, by e.g. teaching. This could be one factor that determines the duration of a PhD. This is a very common and generic trade-off, especially since the PhD-education is an investment in human capital. The return should come later, but as we have seen, the market does not necessarily reward a PhD to any significant extent. Still, the recommendation must be to find ways to change this situation, because it also increases the international attractiveness of the PhD-positions.
- A potential risk with all the labs is their depreciation and the possibility of maintaining their condition. It is a well-known problem and not really

specific to the forestry labs. Its solution must come under the rubric of national infrastructure and an approach to finance such infrastructure at a higher level.

- Ensure that the PhD-students get some training in how to write a post-doc application (perhaps in conjunction with the 14 ECTS course on international conferences).

## Teaching, learning, research and/or creative activity

Standards

- ✓ Uniform principles, based on best international practices and agreed upon at the university level, shall be followed while implementing doctoral programs and assuring the quality of the doctoral studies (including supervision of doctoral theses).
- ✓ Doctoral studies support students' personal and social development, including creating an environment which will prepare them to successfully participate in international working environments at research and development institutions, as well as in the business and public sectors.
- ✓ Supervision of doctoral theses; modern methodology used in teaching and research; organisation of studies; and doctoral students' professional research, development and/or other creative activities all support achievement of the objectives and learning outcomes of doctoral studies.
- ✓ Assessment of outcomes of the learning, research and creative work done by doctoral students is relevant, transparent and objective, and supports the development of doctoral students.
- ✓ Doctoral students are asked for feedback regarding supervision on a regular basis and the results of these surveys are taken into account for quality improvement activities.
- ✓ Effectiveness of the doctoral studies is analysed and such analyses serve as a basis for planning quality improvement activities.

Comments

The above standards applicable to the domain of ''Teaching and Learning' are in many cases met and in some cases exceeded. Student learning is, for the most part, well managed. There is continual ongoing reflection on teaching and learning in meetings. The panel found a sustained effort is being directed towards continued development of the programmes. There is a connection between theoretical and practical learning, as was presented to us in a very interesting laboratory visit. Assessment procedures are generally acceptable, but there are rooms for improvement. Student feedback regarding supervision is often done informally, but there is at least an annual survey on supervision that students thought worked sufficiently.

Strengths

- Committed, enthusiastic enterprising teachers/supervisors and students with confidence-inspiring cooperation
- Supervision supported by very high quality research in many areas
- Innovative procedure to select supervisors that has been rather succesful
- The system of review every 5 years for academic staff helps ensure that teaching staff have earned some academic merits through peer review. The system of supervisor competition and using young researchers as co-supervisors helps provide a new generation of supervisors. HOWEVER, forestry and most other curricula depend on outside competencies for coursework and subject matter expertise. This is a merit of course, but the way this point is written implies that these competencies should all be provided "in-house" at EMÜ. Perhaps re-wording this standard would be beneficial.
- The long-term relationship between student and supervisor that often begins when students are undergraduates or doing their Masters studies encourages supervisors to invest in their students. In forestry in particular there seems to be a high level of satisfaction among students coming from EMÜ with their supervisors despite problems pointed out to the contrary in the SER.
- Courses were overall appreciated by students. We expected there to be more requests among program developers, supervisors, and students to decrease the number of required credits, but everyone seemed satisfied.

Areas of improvement and recommendations

- It would be good to increase flexibility in course schedule so that students can be gone from University for foreign courses, but more foreign RESEARCH opportunities. Many required courses appear to be given over the course of several months. Increased flexibility will, among other things, allow students to be abroad on longer research and education visits for the first 1-3 years.
- Supervising follows successful incentive-based mechanisms. We found evidence that the mechanism has improved supervision over the years since it was implemented. The students were also praising the scheme in the interviews.
- There is a programmatic approach to following-up student progress, including an "early warning" system that supports PhD-students well.
- The panel was given examples of how the Doctoral school co-operated nationally.

## Teaching staff

Standards

- ✓ Teaching staff participate in research, development and/or creative activity at the level of and to the extent sufficient to conduct doctoral studies in the curriculum group and to supervise doctoral theses.
- ✓ Teaching staff develop their supervisory competences and share best practices with one other.
- ✓ Teaching staff collaborate in fields of teaching, research and creative work within the university and also with stakeholders outside the university (public sector organisations, enterprises, other research and development institutions).
- ✓ Teaching staff further their skills at foreign universities or other research institutions, participate in international research and creative projects, and present papers at high-level conferences.
- ✓ Qualified international and visiting teaching staff are involved in conducting doctoral studies, participating in doctoral thesis defence panels and/or reviewing doctoral theses.
- ✓ When assessing the work of teaching staff (including their evaluations), the effectiveness of their teaching as well as of their research, development and creative works is taken into account; including the effectiveness of their student supervision, development of their teaching and supervisory skills, and their international mobility.

Comments

The material under scrutiny together with the site visit indicated to the panel that the standards are all met. It is notable that the teaching allocation was not considered to be a major constraint for research; rather the lack of funds was a more significant problem. In general, we heard about aspects of innovation in education that went well. Many teachers and students were happy with the state of methods for education. We did not, however, hear much from those who saw areas for improvement in teaching innovation and technology.

Strengths

- Research work and teaching is balanced, scientific work is valued.
- International cooperation is encouraged. There are international courses for teachers that are sometimes used, as explained in the interview. Teaching staff felt they were able to go to other universities or abroad for teaching development courses and had reasonable funding to do so.
- There is an increasing international co-operation in thesis committees.
- The system of appointing junior, co-supervisors is appreciated as a way of developing competency of young- up and coming- advisors.

- External stakeholders often invited to speak and be part of education from bachelors to PhD. Some PhD students have topics from industry or government. Research seems tightly connected to social needs.
- The motivation for being a supervisor is high since the supervision competition process is connected to research financing and career advancement at EMÜ. Teaching seems to be fairly well integrated as a requirement for being awarded the position of supervisor as well.
- The system of review every 5 years for academic staff helps ensure that teaching staff have earned some academic merits through peer review.

Areas of improvement and recommendations

- Both incoming and outgoing staff mobility is low.
- The ISP and the way the coursework is distributed make it difficult to evaluate the courses, because curricula seem to be tailor-made. As far as the panel could tell, the course work seemed adequate.
- The high quality visiting professors could be better leveraged by using them as contacts for students to spend longer periods of time abroad as visiting PhD students. It seems like the desire for students to do extended stays in foreign countries is low.

## Doctoral students

Standards

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| ✓ | When admitting students to doctoral study, their suitability for successful completion of their studies is assessed on the basis of transparent criteria. |
| ✓ | Doctoral students plan their studies as well as research and development activities in collaboration with their supervisor(s), setting out specific objectives for each year and taking responsibility for achieving these objectives. |
| ✓ | Evaluation of doctoral students is transparent and impartial. Its purpose is to support development of the doctoral students, provide an opinion regarding the effectiveness of their work to date, and assess their capabilities to complete their studies on time and successfully defend their doctoral theses. |
| ✓ | Universities offer doctoral students counselling on completing their studies and planning their further careers. |
| ✓ | Doctoral students' extracurricular teaching, research and/or creative activities or other work-related activities at the university support successful completion of |

their doctoral studies.

- ✓ Doctoral students participate in international mobility programs or take advantage of other opportunities for learning or research at foreign universities and/or research and development institutions[3].
- ✓ Alumni are regularly asked for feedback on the quality of the doctoral study, and employers are asked for feedback on the preparation of the graduates.

Comments

There seem to be opportunities for opening up the procedure of intake to a wider set of potential students. Currently, it would seem as though a promising student is identified at the EMÜ, which reduces the risk of misallocation of resources substantially.

Supervisor and students appear to work very closely; the student is given ample feedback (according to the interview with the students. But notice again the conflicting message in the SER). We saw students who are most often physically working at the university during the week. There may be other students with different perceptions who are working mostly outside EMÜ who may have difficulties we did not hear about. Evaluation of student progress is transparent and supportive.

We have taken notice of the, sometimes, high drop-out rate.

Alumni and external stakeholders are highly involved in the Forestry education program from the bachelor level to PhD. As self-described by alumni from Forestry, the community of forestry in Estonia is small and everyone knows everyone else. This is an advantage because practical issues in forestry can be researched by EMÜ and well integrated into education at all levels, but this closed community of forestry may have some disadvantages as well. The Forestry program may benefit from thinking about what kinds of disadvantages may arise from the small size and closed nature of forestry at EMÜ and in Estonia in general**.**

Although this is not under the control of EMÜ, the state stipend for PhD students should be higher. No student can live off the stipend alone and all must be employed by either research project money or through University teaching. It would be beneficial for the stipend amount to be indexed so that it increases at least at the rate of inflation. Additionally, the stipend ends after 4 years with no way to extend the stipend time. The stipend should last at least 5 years. EMÜ knows this and has been pushing the government to increase funding for PhD students. Research groups and supervisors in Forestry make a strong effort to find funding sources for students to supplement their government stipend and extend their ability to continue as full time students in years 5 and 6.

[3] In the context of this document, 'research and development institutions' denote both research institutions and research-intensive companies.

While there is counselling available to students for completing their studies and planning future careers, we did not hear from the students how they used this resource or how much they valued it.

Strengths

- The students have a very positive view of the structure, content and length of the program, even though the quality requirements means that the thesis could take longer than expected. This suggests to us that there is a set of highly motivated students, an important asset.
- Close relationships appear to exist between supervisor and student
- Incentive and control systems (e.g. competition to become supervisors and 3 publication requirements) are widely regarded as innovate and useful by the students.
- A clearly planned timeline, effectively using ISPs, for each student
- Students have a generally high level of satisfaction with their supervision. Those who are parts of larger research groups expressed the importance of the support they receive from their research group. Students feel like feedback on their supervision and coursework works reasonably well.
- The yearly evaluation seminars are appreciated and helpful. Students get to see what other students at EMÜ are working on and they appreciate the opportunity to practice presenting their research work in English to a large audience. Students see the yearly evaluation as a valuable support if they need help getting their studies back on track. It seems that particularly in forestry, most of the feedback and student evaluation is done informally and often within the research group or between students and supervisors.
- Students are often able to attend courses abroad and occasionally get help from foreign professors on their thesis work.
- Alumni and employers are often highly involved in research, including PhD student research. This close connection to external stakeholders and national needs is a clear strength of all curricula, forestry included. With an already close relationship, there may not be need to further deepen the connection with alumni and external stakeholders in the forestry curricula.

Areas of improvement and recommendations

- Occasionally a high drop-out rate.
- Consider the teaching/learning ratio for the PhD-students, in some cases, students seemed to do a lot of teaching
- Are students reaching out to the international community to a sufficient degree? There is conflicting evidence on this point. In the interviews the students explained that there were ample opportunities of going abroad, at the same time it was difficult to obtain a post-doc in another country. Students could be better encouraged to see their existing international

connections via coursework or foreign co-authors/ supervisors as networking links to increase their competition for post-doctoral positions.

- The Doctoral school curriculum can be improved by making some courses shorter and increasing the length of others. The balance between the "International presentation" course and the statistics course is an example.
- It is to be noted that in the interview sessions (at different levels), there were different opinions on the appropriate share of compulsory courses.
- Students see the application process for supervisorship as beneficial, but the time it takes to apply to be a supervisor means students have to know very early already what kind of project they would like to do for their PhD work. Students said it would be beneficial to increase the flexibility of supervisor approval so that students can come with their own research ideas in for approval for PhD topics.