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RESEARCH ACTIVITIES IN THE FIRST TWO CYCLES OF EUROPEAN BIOSYSTEMS ENGINEERING UNIVERSITY STUDIES – SITUATION IN THE NETHERLANDS

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Abstract

Wageningen University has implemented the bachelor – master model by 2003. The biosystems related programmes of Wageningen University are the BSc Agrotechnology and the MSc Agricultural and Bioresource Engineering. The bachelor programme has a size of 180 credits and the master programme a size of 120 credits.

Both 1st and 2nd cycle programmes have a strong focus on research. A thesis is part of both programmes; the size is 12 credits for the bachelor thesis (to be increased to 24 by 2010) and 36 for the master thesis. An important difference between the bachelor and the master thesis is the level of independence. The bachelor thesis work is more structured than the master thesis work. Most of the thesis work is related to ongoing research projects.

In the bachelor programme there are several courses that confront students with research and in which they learn research and academic skills. In this way the students gradually learn what research is and how to do it. In the master programme there are only a few courses related to the research skills; the students that start with the master are supposed to possess these skills.

The BSc degree is not considered as an end point but is a pivot point for choosing a master. Therefore there are no research positions for persons having only BSc degree. Research positions in industry require at least a MSc degree but the trend is that more and more a PhD is required. Senior research positions within the research organizations require in most cases a PhD and within the university it is a basic requirement.

1. News on the Bologna process

Wageningen University is the only university offering Biosystems Engineering related study programmes on university level. Wageningen University converted all undivided study programmes with a duration of four or five years to the bachelor – master model by 2003. All bachelor programmes have a duration of three years and the master programmes have a duration of two years. A few years later

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Wageningen University implemented the European Credit Transfer System and obtained a few year ago the ECTS Label from the EU.

Until now there was a smooth transition between the BSc programmes and the MSc programmes. This means that students can do courses related to the MSc programme while they are still in the BSc programme. This will change by 2012 since the Ministry of Education introduced the 'harde knip', a clear separation between the BSc and the MSc programme. In practice this will mean that students can only start with the MSc programme if they have obtained their BSc diploma.

Within Wageningen University and also other universities in the Netherlands there is a clear separation between the 1st and 2nd cycle one side and the 3rd cycle on the other side. The 1st and 2nd cycle are managed by the educational institute of the university and the 3rd cycle is managed by the graduate schools. Within the 1st and 2nd cycle there are specific programmes, including a BSc and MSc related to biosystems engineering (Agrotechnology and Agricultural and Bioresource Engineering respectively). There are discussions going on to change the names of both the bachelor and the master programme to biosystems engineering. There is no direct link between the 1st and 2nd cycle and the 3rd cycle whilst there is a strong link between the 1st and the 2nd cycle.

2. Research related activities in the 1st cycle

The bachelor and the master programmes of Wageningen University are all research oriented; Wageningen University does not offer professional bachelors or master programmes. This means also that students are already taught in research related skills in the bachelor programme. The conclusion of the bachelor programme is a thesis of 12 credits; this size will be increased to 24 credits by 2010. This bachelor thesis is an individual thesis by which the student has to show that it masters the competences of the bachelor programme. The main difference between the bachelor and the master thesis is the level of independency.

In several courses during the bachelor programme the students are trained in different types of research related skills. In the first year they start with a course on information literacy in which they learn how to retrieve information from all kind of sources, as internet, magazines, reports, professional journals and scientific journals. More towards the end of the first year they get a special course dedicated to the problem definition. In this course the students are confronted with different research projects, usually of PhD students. The students are trained to come up with a clear description of the problem, i.e. a description of what the problem is and in which direction a solution should be found. They also have to formulate a clear problem description, the objective of the study and they have to come up with some good research questions.

This training is continued in the second year where there a special course on research. In this course there is a more advanced module on information literacy and there is module on scientific writing. The students have also to work in small groups on a project of their own. They can choose as group a problem from a list and they have to work out this problem, as if it were a research project. They have make a clear problem definition, formulate the objective, and derive the research



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questions. Consequently they have to work on the research question by reading literature, making analysis, having discussions, etc. and finally they have to come up with a good discussion and conclusions. This all has to be written down in a report that is reviewed by staff members.

In the third year the students have to do their bachelor thesis, which is also a proof of the bachelor programme competences. Therefore they are only allowed to start with their bachelor thesis after they have completed most of the compulsory part of the bachelor programme. In most cases the topic of the bachelor thesis is related to an ongoing research project within the department, most times projects of PhD students. In this way students are already confronted in an early stage with real scientific research work. In the bachelor thesis the students have to start with making a brief project proposal in which they have to describe the problem, the objective and the research questions. They have also to do some literature research to get a good idea of the state-of-the-art. Part of the proposal is also a description of the approach, in which they have to elaborate on how they will answer the different research questions. The students are supervised by a staff member, with whom they have a regular meeting in which the progress and the different intermediate products are discussed. At the end the student has to give a presentation on his work and the thesis project is concluded with a final discussion with the examiner (the chair of the group or a senior staff member) and the supervisor.

The 1st cycle of the university is not considered as an end point but is seen as a pivot point from which the student can choose a master. Therefore it is not likely that 1st cycle graduates will get a research position. In the Netherlands there is a clear trend that a 3rd cycle degree is required for research positions within the universities and the different research organizations, public, private or within large companies as for example Philips, Unilever or Shell.

3. Research related activities in the 2nd cycle

The second cycle programme in agricultural and bioengineering at Wageningen University is, as all other master programmes at Wageningen University, research oriented. The thesis is one of the most important parts of the second cycle programme. All students have to do a thesis of 36 credits. Within the programme the students can choose from the following main subjects: farm technology, systems and control, information technology, environmental technology, and (agro)logistics. In addition they have to do two courses of six credits each that are related to the thesis they have chosen. These courses are in depth courses and should the students give a good content related preparation to the thesis work they are going to do.

Most of the subjects of the thesis are related to ongoing research projects within the departments of the university or the contract research institutions that are part of Wageningen University and Research centre. Thesis projects can also be done in cooperation with a company. The students choose themselves the main subject and within this main subject they choose a specific subject in consultation with the



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chair of the group or a senior staff member. In any case, one of the supervisors is from the university.

Most of the courses that support the research work are scheduled in the bachelor programme and the students that start with the master programme are supposed to have these skills. In the master programme there is a limited number of modules they can attend to improve their research skills, as for example scientific writing. Students that lack these skills can also attend some modules to catch up but these credits are usually not part of the 120 credits of the master programme.

An important difference between the thesis work in the 1st and the 2nd cycle programme is the level of independence. The thesis work in the bachelor programme is somewhat more structured and the students get relatively more supervision than in the master programme. The students can write the bachelor thesis in the Dutch language; the master thesis has to be written in English with some exceptions. For the master thesis the students start with writing an extensive project proposal and about one month after the start they have to present their project proposal.

The assessment of the thesis work consists of a presentation of the research work at the end and a discussion with the examiner (usually the chair of the group) and the supervisors. There is always one person involved in the assessment who was not involved in the execution of the thesis work.

Part of the second cycle programme is an academic internship of 24 credits. Important aspect of it is that students have to work on a research project in a company or research organization outside Wageningen University.

Graduates of the second cycle can get research positions, including PhD positions. Research positions in the university require a PhD degree; for research positions in the research organizations this is not always the case, although as stated before, more and more positions require a PhD. In the private sector this is less the case and the smaller companies or organization have also several positions for graduates with only a second cycle degree.

4. Rare knowledge

Not applicable.