

# **The Degree Reform in the Department of Surveying, Helsinki University of Technology**

**Arvo VITIKAINEN, Finland**

**Key words:** Bologna process, degree reform, education, Helsinki University of Technology

Helsinki University of Technology will change over to a new, two-phase degree structure, together with other Finnish universities, on the 1<sup>st</sup> of August, 2005. In practice this means a transform from the single-stage degree of the Master of Science in Technology to a two-stage university degree consisting of a lower and a higher degree. The aim is a high quality degree structure corresponding to 180+120 ECTS points, which are recognised in other high standard European universities of technology and science. Another significant reform in the new degree structure will be the compilation of the courses into modules, which will form the larger elements of the degree: general scientific studies, general studies of the programme, subject studies, and the majors and the minors for the Bachelor's and Master's Degrees.

The degree reform is related to the commitment of Finland and some 40 other European countries to the so-called Bologna process. The goal of the process is to clarify and harmonise the degree structures in European universities and create an internationally competitive academic education area in Europe by the year of 2010. The goal is achieved by standardising the degree structures, by adopting a uniform sizing system for the studies, by encouraging the mobility of the students, researchers and other university personnel, by enhancing the European co-operation related to the grading of studies, and by diversifying international co-operation and networking between various universities.

The paper deals with the goals, contents, and practical implementation of the degree reform in the Department of Surveying. The reform and the experiences obtained may serve as an example to the reforms implemented elsewhere in the field of surveying education.

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## **1. INTRODUCTION**

Helsinki University of Technology will change over to a new, two-phase degree structure, together with other Finnish universities, on the 1<sup>st</sup> of August, 2005. Students who begin their studies after this date shall first complete a Bachelor of Science degree, and only after that the Master of Science in Technology, Architecture or Landscape Architecture. Those who begin their studies before the reform can continue to study in the current system until the 31<sup>st</sup> of July, 2010. Students are also allowed to change over to the new system if they wish to do so.

The change in the degree structure is connected to the “Bologna Process”, in which Finland and some 40 other European countries participate in order to create an internationally competitive European area of higher education by the year of 2010 and enhance the attraction of the European academic education compared to other continents. The aim is to increase student mobility and employment opportunities as well as to improve the transparency and comparability of degrees. The goal will be achieved by standardising the university degree structures, adopting a conformable system for the scope of studies, encouraging the mobility of the students, teachers, researchers and other university personnel, increasing European co-operation related to the grading of the studies, and diversifying international co-operation and networking between various universities.

Standardisation of the degree structure means that the European university degrees will primarily be two-stage degrees. The first-stage degree will be a three- or four-year Bachelor’s Degree. The second stage will be a one- or two-year Master’s Degree. In the field of technology in Finland this means a change from the one-stage degree of Master of Science in Technology, Architecture, or Landscape Architecture, into a two-stage degree structure consisting of a lower and a higher academic degree. Three years of studies will lead to the degree of Bachelor of Science in Technology and the following two years of studies will lead to the degree of Master of Science in Technology, Architecture, or Landscape Architecture. The idea of the Bologna Process is also that after the basic stage of three years the students may, if they wish, more flexibly change between degree programmes or even into another branch.

The new degree structure will adopt the European Credit Transfer System (ECTS). In this system the annual amount of work for a student will be 1600 working hours, i.e. 60 points (one point corresponds to 26 2/3 student working hours). Measured by the study points the goal of the reform (3 + 2 years) in the Helsinki University of Technology will be a degree structure of 300 ECTS points (180 + 120 ECTS points).

## 2. THE BASIC MODEL FOR THE MASTER'S DEGREE

Presumably the greatest change in the degree structure introduced in the autumn of 2005 will be the composition of courses into modules, which will form the larger components of the degree: the basic studies (i.e. the general scientific studies and general studies of the programme), the subject studies, the major, and the minor. Figure 1 shows a basic model for a Master's Degree, where the student has taken the same major (A) for both the Bachelor's and the Master's Degree. The minor (B) also stays the same for both of the degrees. As previously, the student may, however, choose his/her minor (i.e. the minor modules B) from another department. Compared to the old degree structure other new elements are the Bachelor's Thesis and the related seminar, the methodological studies and the special module C for the Master's Degree, the contents of which depend on the department in question. The special module may be used, e.g. for advanced major studies and/or enhancing the ability for applying scientific knowledge and post-graduate studies.

Free-choice studies (20 cr)	Methodological studies (20 cr)	Master's Thesis (30 cr)	} Master's Degree
Subject Studies, specialization module A3 (20 cr)	Subject Studies, advanced module B2 (20 cr)	Special module C (20 cr)	
Subject Studies, advanced module A2 (20 cr)	Subject Studies, basic module B1 (20 cr)	Bachelor's Thesis and seminar (10 cr)	} Bachelor's Degree
		Free-choice studies (10 cr)	
General scientific studies (80 cr)		Subject studies, basic module A1 (20 cr)	
		General studies of the programme (20 cr)	

**Figure 1:** The Basic model for the Master's Degree in the Helsinki University of Technology.

According to the present proposal the Bachelor's Degree in the Helsinki University of Technology consists of general scientific studies of 80 ECTS points common to all, general studies of the programme (20 points), three Subject Studies Modules (a' 20 points), free-choice studies (10 points) and the Bachelor's Thesis (10 points). It is noteworthy that the purpose of the Bachelor's Degree is not to provide competence for working life but

preparedness for education leading to a higher academic degree, continuous learning and application of the acquired knowledge in working life.

The higher degree would consist of free-choice studies worth 20 points, 10 points of scientific studies, three Subject Studies Modules (a' 20 points) and the Master's Thesis (30 points). The Subject Modules are of three stages, so the Bachelor's Degree would include one two-stage module and the Master's Degree at least one three-stage module.

### **3. THE NEW DEGREE STRUCTURE IN THE DEPARTMENT OF SURVEYING**

The Department of Surveying concluded a Degree Programme Reform in the spring of 2000, by which two Degree Programmes were established:

- Real Estate Economics, which is divided into two options: a) Land Management and Real Estate Law and b) Real Estate and Facilities Management.
- Geomatics, which is divided into two options: a) Geoinformatics and b) Surveying and Mapping Technology.

The initiative with the current degree structure reform in the Department of Surveying is that both of the Degree Programmes will transform into clearly organised and functioning system of degrees in accordance with the new degree structure.

#### **3.1 The Degree of Bachelor of Science**

The degree of Bachelor of Science in Technology (180 points) at the Department of Surveying thus presumes that the student normally takes the general scientific studies, general studies, Basic Module (A1) and two Subject Modules (B1/A2) and the Bachelor's Thesis. The Bachelor's Degree shall also include free-choice studies worth at least 10 points (see Figure 1).

General scientific studies (80 points) include mathematics, information technology, courses offering general preparedness for surveying studies, languages and training in both of the Programmes. In the Degree Programme of Geomatics the module also includes physics, but in the Degree Programme of Real Estate Economics physics will be substituted for basic courses on Geoinformatics, Geodesy and Photogrammetry. In addition, basic studies in the Degree Programme of Real Estate Economics will also include the basics of Urban and Environmental Planning and Design.

General studies of the programme (20 points) in Geomatics include, e.g., the basics of Remote Sensing, Photography, Photogrammetry, Geodesy and Geoinformatics and courses of Real Estate Economics worth 10 points. The module of Real Estate Economics will include basic courses on Land Management, Economics and Real Estate Law, Real Estate Valuation and Real Estate Management.

Subject Studies, Basic Module A1 (20 points) in the Degree Programme of Geomatics further includes studies on Remote Sensing, Photography, Photogrammetry, Geodesy and Geoinformatics, Geographic Data Management and GIS Software Engineering, and Theories and Techniques in Geoinformatics. The Basic Module of Real Estate Economics includes, e.g., Science of Real Estate Economics and Calculation Methods of Real Estate Economics, and Planning and Building Law.

There are two Subject Modules B1/A2 (20 points) in both of the Degree Programmes. The Subject Modules of a) Geodesy and Photogrammetry, and b) Geomatics in Geomatics, and the Subject Modules of a) Land Management and Real Estate Law, and b) Real Estate and Facilities Management in Real Estate Economics.

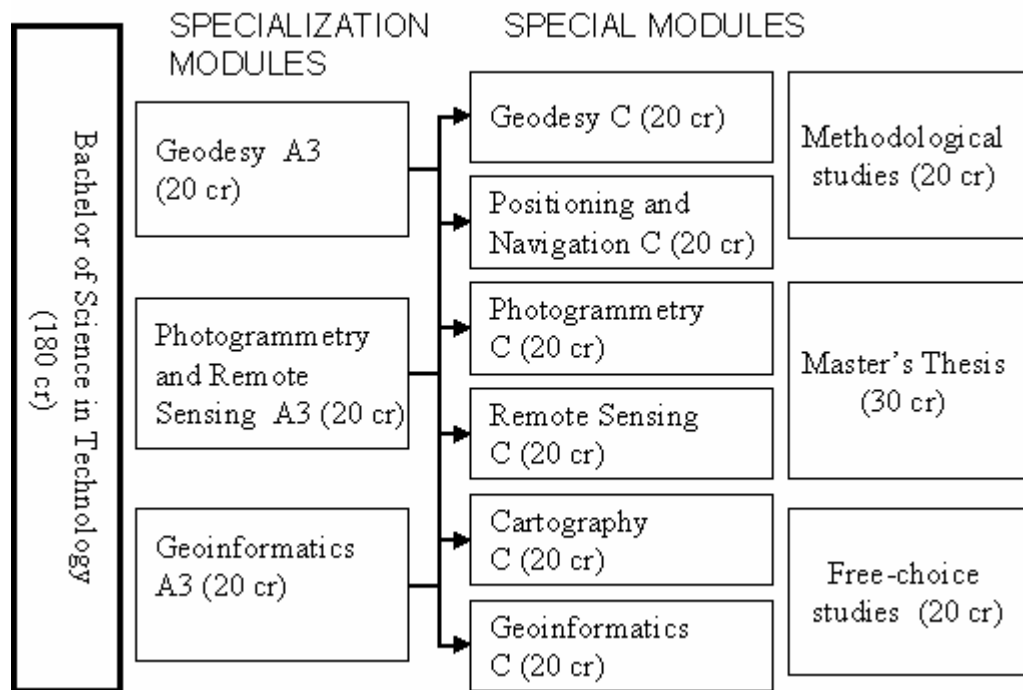
The students may also freely choose a Basic Module (B1) outside his/her Degree Programme instead of one of the Subject Modules. For students of Geomatics it may be, for example, Real Estate Economics, Information Technology or Imaging Technology, and for the students of Real Estate Economics it might be Surveying and Mapping Technology, Structural Engineering and Building Technology, Building Physics or Urban Planning and Design.

### **3.2 The Degree of Master of Science**

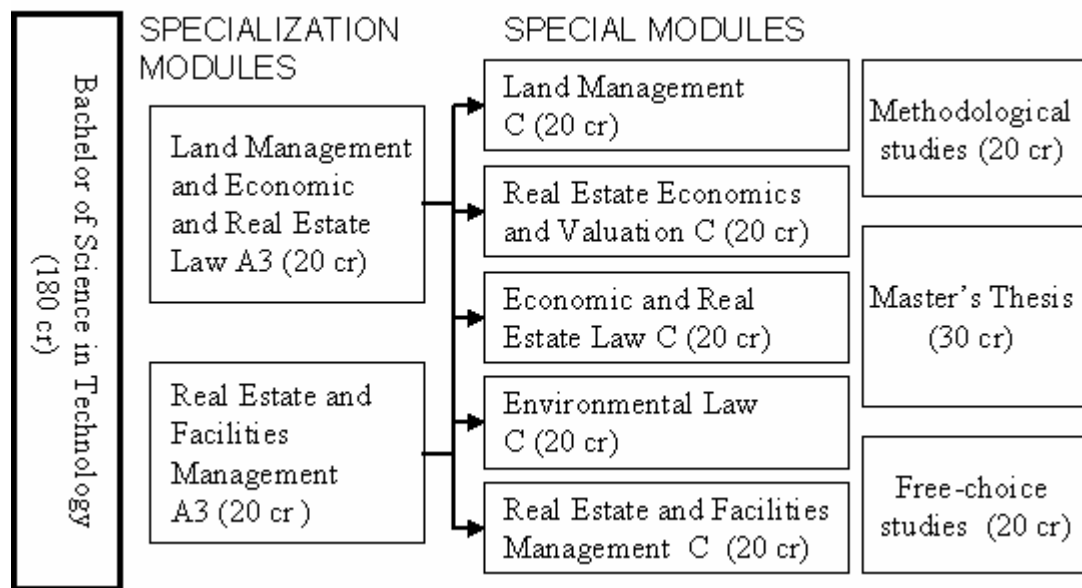
The degree of Master of Science in Technology at the Department of Surveying presumes that the student normally takes, in addition to the Bachelor's Degree, at least one Specialization Module (A3) and two Special Modules (C), free-choice studies worth 20 points, methodological studies (10 points) and the Master's Thesis (see Figures 2 and 3).

There are three Specialization Modules A3 (20 points) for the Master's Degree in Geomatics: 1) Geodesy, 2) Photogrammetry and Remote Sensing, and 3) Geoinformatics. For the Master's Degree in Real Estate Economics there are two Specialization Modules: 1) Land Management and Real Estate Law, and 2) Real Estate and Facilities Management. If the student has chosen the Basic Module B1 at the Bachelor stage, he/she may choose the Advanced Module B2 at this stage for his/her subject studies.

Special Modules C (20 points) are at the Department of Surveying meant for advanced studies after the Modules A3. Special Modules in Geomatics are 1) Geodesy, 2) Positioning and Navigation, 3) Photogrammetry, 4) Remote Sensing, 5) Cartography and 6) Geoinformatics. The Special Modules for Real Estate Economics are 1) Land Management, 2) Real Estate Economics and Valuation 3) Economic and Real Estate Law, 4) Environmental Law and 5) Real Estate and Facilities Management.



**Figure 2:** The Master's Degree in the Degree Programme of Geomatics at the Department of Surveying.



**Figure 3:** The Master's Degree in the Degree Programme of Real Estate Economics at the Department of Surveying.

#### **4. ENTRY REQUIREMENTS AND PREREQUISITES**

One of the goals of the degree structure reform is to add student mobility. This means that the University will encourage selection of new interesting subject combinations and facilitate interaction within the Helsinki University of Technology and between other universities. Consistent degree structures in Europe will remove obstacles to free labour movement between different countries and therefore the students are also encouraged to take a part of their studies (e.g. ½ to 1 years) at foreign universities.

Secondary school graduates coming to the university will be selected to the Bachelor Programmes and they are simultaneously granted the right to study in the corresponding Master Programmes for Master of Science in Technology or Architecture. Students for the Master Programmes may also be selected among those graduated from other universities or polytechnics. The departments, however, have the right to set prerequisites for the entry of such students. The students may have to take some bridging studies in order to guarantee their adequate preparedness for the Master Programme. The extent of supplementary studies may be 60 study points at the maximum. If a department considers that a Bachelor's Degree or a degree taken in a Polytechnic is not adequate even after the supplementary studies, the student shall take the normal entrance examination.

#### **5. REFORM OF THE TERM DIVISION**

Together with the degree structure reform also the term division will be renewed starting next academic year. There will be four terms (4 x 6 weeks). Each term will conclude with an examination season. In addition to these there will two general examination seasons, one in the autumn before the commencement of the first term and another in the beginning of the calendar year before the commencement of the third term.

The new degree structures for the Department of Surveying are partly still preliminary, but the basic structure has been approved with one consent within the Department and the working teams within the university, as well as among the interest groups of the surveying branch. Due to practical reasons the reform must be ratified rather quickly, as it is the objective that the entrance examination of the spring 2005 will select students to the new Degree Programmes.

#### **REFERENCES**

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## BIOGRAPHICAL NOTES

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1985: Head of Land Consolidation Office, Ylivieska Land Consolidation Office  
1989: Surveying Manager and Senior Engineer, Lapland Land Survey Office, Rovaniemi  
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