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Self-Assessment Report for International Accreditation – Bachelor's and Master's degree programmes in Information Technology

Editors: Jari Porras, Uolevi Nikula, Lasse Lensu, Annikka Nurkka

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ASIIN Accreditation Report
Self-Assessment

Degree Programmes
Bachelor of Science in Information Technology
Master of Science in Information Technology

offered by
Lappeenranta University of Technology

Version:	1.1	April 23, 2012	Jari Porras

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FORMAL INFORMATION

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Name of degree programme (Finnish)	Tietotekniikan koulutusohjelma – Tekniikan kandidaatti
Name of degree programme (English)	Bachelor of Science (Technology) in Information Technology
Language of instruction	Finnish (88%), English (12%)
Contact Person	Head of Department of Information Technology (LUT IT), Prof. Jari Porras
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Master's Programme:

Name of degree programme (Finnish)	Tietotekniikan koulutusohjelma – Diplomi-insinööri
Name of degree programme (English)	Master of Science (Technology) in Information Technology
Language of instruction	English (92.5%), Finnish (7.5%)
Contact Person	Head of Department of Information Technology (LUT IT), Prof. Jari Porras
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Telephone number	+358 400 555 427
Fax	+358 5 621 2899
Web address	www.it.lut.fi

1. FORMAL SPECIFICATIONS

1.1 Name of the programme

Tietotekniikan koulutusohjelma, tekniikan kandidaatin tutkinto
Tietotekniikan koulutusohjelma, diplomi-insinöörin tutkinto

Bachelor's degree programme in Information Technology
Master's degree programme in Information Technology

1.2 Type of the programme

Both the Bachelor's degree programme and the Master's degree programme are more research-oriented full time programmes. The Master's degree is consecutive to the Bachelor's degree.

The Bachelor's degree programme is aimed at Finnish students, and teaching is mainly (88 %) given in the Finnish language. However, some modules taught in English can be included in the studies.

The Master's degree programme is mainly (92,5 %) given in English and the modules included are common both for Finnish students continuing from Bachelor's programme and international students accepted directly into International programme of the LUT IT.

Obligatory studies in foreign languages are included in both degree programmes. The Bachelor's degree programme may include language studies maximum of 15 ECTS credits and the Master's degree programme 10 ECTS credits respectively.

Studying abroad is not obligatory, but the university encourages students to do so. LUT takes part in a number of international student exchange programmes (such as Erasmus and Nordtek), and has many bilateral student exchange agreements. Studies in foreign universities can be included in the student's degree in LUT, if they are suitable to substitute or extend studies in the LUT degree programme. It is recommended that students present a study plan before starting studies abroad, if they intend to apply for the recognition and inclusion of the studies abroad.

Information Technology programme has teachers and researchers from foreign universities and industry, which makes it possible to widen both the educational, cultural, and business perspectives of the education.

1.3 Final degree

The degrees awarded are Bachelor of Science (Technology) in Information Technology and Master of Science (Technology) in Information Technology.

The degrees and the Finnish universities that can award these degrees are defined in the Universities Act (558/2009) (enclosure 1) and in the Government Decree on University Degrees (794/2004) (enclosure 2).

A degree programme has two cycles: the lower (Bachelor) and the higher (Master) university degrees. LUT IT also offers separate Master's programmes, which are not included in the accreditation.

1.4 Standard period of study and credit points gained

The extent of studies required for a lower university degree (Bachelor's degree) is 180 ECTS credits and for the higher university degree (Master's degree) 120 ECTS credits. The university must arrange the education in such a manner that the students are able to complete the lower degree in three years, and the higher degree in two years of full-time study (Government Decree on University Degrees 794/2004, enclosure 2).

The extent of studies is measured by the European Credit Transfer and Accumulation System (ECTS) credit units. Courses are quantified according to the work load required. The average

input of 1600 working hours needed for the studies of one academic year corresponds to 60 credits (The Government Decree on University Degrees 794/2004, enclosure 2).

The academic year is divided into two semesters. The autumn semester (divided into periods 1 and 2) and spring semester (divided into periods 3 and 4) each include two standard periods lasting seven weeks and at least one additional examination week. The students can enrol in the first period of either semester.

Courses can last from one to four periods. However, the university also offers courses in intensive format. In those cases, the length of the courses varies depending on the course. All of the course details are given in the course descriptions available in the study guide (enclosure 3) for the LUT IT courses while the course descriptions from other departs are listed in enclosure 7. The study guide presents how courses are divided between the study years. The scheduling of courses is planned accordingly. The programmes described here are planned for full-time studies.

1.5 Expected intake for the programme

The expected intake for the academic year 2012-2013 is 35 enrolments for consecutive programmes (Bachelor's + Master's degrees, see section 1.2) and 35 enrolments for non-consecutive Master's programmes, which are not included in the accreditation process.

1.6 Degree programme history and the start date within the academic year

The consecutive degree programmes in Information Technology have been offered at LUT since 1985. The programmes (Bachelor's + Master's degrees), which are included in this accreditation process, have been offered for six years so far (since year 2005 due to implementation of the Bologna Process in the Finnish universities). The academic year of the university starts on August 1st and ends on July 31st.

1.7 Amount and type of fees/charges

According to the Universities Act education leading to a university degree and entrance examinations relating to student admission shall be free of charge for Finnish students. The admission is free also for citizens of countries within the EU/EEA as well as Switzerland.

However, to have the right to study, students must pay the student union membership fee. For the academic year 2011-2012 the fee was 103 Euros. This membership entitles students to have lunch at a reduced price in all the student canteens in Finland and free medical treatment from the National Student Health Service in all the universities in Finland.

In 2011-2012 three of LUT's nine master's programmes introduced tuition fees. In general, individuals who are citizens of countries outside of the European Union (EU), European Economic Area (EEA) and Switzerland are required to pay tuition fees in following degree programmes: Master's Degree Programme in Mechanical Engineering, Master's Degree Programme (CBU) in Business and Administration in International Technology and Innovation Management, MITIM and Master's Degree Programme in Strategic Finance (MSF). 2012-2013 tuition fees will be introduced to all other programmes.

2. DEGREE PROGRAMMES: CONTENT, CONCEPT AND IMPLEMENTATION

2.1 Aims of the programme of studies

The Degree Programmes in Information Technology provide for the students the necessary theoretical and practical knowledge, skills and capabilities required by the IT industry and academic research institutions. A person who graduates from the Bachelor's or Master's Degree Programme is capable of continuing his/her studies in the field of IT. The Degree Programmes combine up-to-date research knowledge and the fundamentals of computer science and provides this information to the students with modern and efficient teaching methods. LUT quality bonus of the education has been granted for the Degree Programmes since year 2007 (see Section 6.1.1).

The education in LUT IT is international, multidisciplinary and multicultural. LUT IT together with the Department of Industrial Management form the Faculty of Technology Management, but the students can also take courses offered by the other departments in the university. LUT IT offers also many international Master's programmes and opportunities for student exchange as well as a specialized Master's programme designed to be completed concurrently with a full-time job. This self-assessment report focuses on the Bachelor's and Master's programmes offered for full time students.

The Degree Programme in Information Technology educates Bachelors and Masters of Science for the needs of industry, research institutions, businesses, and public administration within the field of Information Technology. The Bachelor's Degree Programme in Information Technology has one common major topic "Computer Science and Communications Software" whereas Master's Degree Programme in Information Technology is divided into three major topics; "Communications Software", "Intelligent Computing" and "Software Engineering". Post-graduate studies are possible in each of the major topics. The general objective of the Degree Programme is to educate experts who can efficiently work in teams and to provide them a solid ground for the independent continuation of learning in the ever-changing field of computer science.

2.2 Learning outcomes of the programmes

The learning outcomes of the programmes for the Bachelor's and Master's degrees in Information Technology are introduced in the following and in the study guide (enclosure 3 and 7). The study guide is accessible on the LUT web site to all students, staff members and all other interested parties.

The relationship between the learning outcomes according to ASIIN's subject-specific criteria and the objectives of the degree programme (Bachelor's and Master's levels separately) according to the module handbook and ACM/IEEE Computer Science Curriculum are evaluated in enclosure 5. The motivation for using the ACM/IEEE Computer Science Curriculum is twofold: first, it has been accepted and used widely in computer science programmes and second, it presents a detailed model of the core of computer science education.

Bachelor's Degree Programme

All the students in the Bachelor's degree programme in Information technology have the same major, *computer science and communications software*. The students graduating from

the study programme have the following learning outcomes and also the superordinate educational objectives of the BSc graduates:

The graduates with the Bachelor's degree

- **BSc1**: understand the basic principles of scientific thinking and working
- **BSc2**: have basic skills in mathematics and natural sciences
- **BSc3**: have basic skills in computer science and programming
- **BSc4**: can solve problems with self made computer programs
- **BSc5**: can describe and solve problems using software engineering techniques and methods
- **BSc6**: can solve data communication problems using various communication networks and different communication patterns
- **BSc7**: know the basics of the principles of intelligent computing
- **BSc8**: are capable of independent study and are ready for life-long learning.

(**BSc9**) The graduates can participate in software projects using the acquired knowledge and technical skills applying them in different application domains taking into account technical, social, and economical constraints. (**BSc10**) The graduates can communicate both verbally and in writing and can work as a part of a project team using both the domestic languages as well as English.

Master's Degree Programme

The graduates from the master's degree program in Information Technology have a solid foundation in information technology and expertise in the specialities of the major. The graduates are able to work in various roles as members of a group both in domestic and international environments. The learning outcomes and also the superordinate education objectives in the Master's degree programme are the following:

The graduates with the Master's degree

- **MSc1**: are able to take advantage of the disciplines of scientific consideration and reasoning and are able to exploit scientific approaches and methods
- **MSc2**: master thoroughly the specialities of the selected major
- **MSc3**: are able to act as experts and developers in their fields of speciality during the working life
- **MSc4**: understand the foundations of the minor subject selected
- **MSc5**: possess good communications skills and proficiency in at least one foreign language
- **MSc6**: possess good skills in presenting, in knowledge and capabilities in cultural and multinational aspects, team work, project work, and in leadership and management
- **MSc7**: are ready for doctoral studies and life-long learning in working life.

(**MSc8**) The Masters graduated from the programme are able to participate in software projects in the role of an expert or as a leader and they are able to apply their knowledge and capabilities to the challenges in development projects. (**MSc9**) The graduates are able to apply scientific knowledge and methods in practice, they are able to communicate both orally and in writing and they are able to participate in a project group in a multi-cultural environment. The education is mainly given in English language and as such, the graduates can communicate both orally and in writing using English language. Furthermore, each major

has the following learning outcomes completing the learning outcomes (and superordinate objectives) listed for the full program:

Graduates from Communications Software (**CS**)

- know the structures and operations of various networks and aspects affecting their operation, such as wireless nature, mobility and security
- know the use of services and applications as a part of distributed environment
- know the various communication models and protocols and the ways to use them
- are able to read and produce specifications
- are able to design, model and implement network-enabled services and applications for the distributed environment.

Graduates from Intelligent Computing (**IC**)

- are able to analyze and find solutions for challenging problems in information processing through transforming them into algorithmic form
- are able to apply mathematical methods in algorithms
- are able to apply intelligent and learning approaches of information processing to solve problems in information technology
- are able to use and rationally select solutions and methods in computer vision, computer graphics, compiler construction, machine learning and artificial intelligence.

Graduates from Software Engineering (**SE**)

- can explain the role of software and information systems in the modern society and business
- can apply modern design techniques and methods in daily software engineering
- can participate in software projects as an expert in their specialisation area or as a project manager
- can recognise problems in software development and improve processes in technical, project management, and organisational areas
- can describe the company activities as processes, specify the documents produced in different phases of the development, and adopt suitable measurements to support systematic production.

2.3 Learning outcomes of the modules

Description of the objectives of individual university modules is presented in the module handbook, i.e. study guide (enclosure 3 and 7).

The curriculum matrices (enclosure 5a, 5b and 5c) show the linkage between the superordinate objectives and the courses of the Degree Programme in Information Technology. The Bachelor's degree and the Master's degree have been described and discussed separately. The presented matrices also displays the level of know-how (knowledge, skills and competences) each course provides for the student. Enclosure 5c describes in detail how the module analysis has been done and how ASIIN's subject-specific criteria are evaluated against the objectives of LUT IT degree programmes.

The curriculum is designed to cater for the professional needs of Bachelor's and Master's level graduates. In Finland, the Bachelor's degree of research universities is primarily considered as a gateway to Master's degree studies, introducing the student to scientific

thinking and methods. The courses arranged by LUT IT for the Bachelor's degree have emphasis on the following ASIIN categories (see enclosure 5c):

- Formal, Algorithmic and Mathematical competences in 45% of courses
- Analysing, Designing and Realising competences in 72% of courses
- Technological competences in 63% of courses
- Cross subject competencies in 70% of courses
- Methodological competencies in 37% of courses
- Project management competencies in 70% of courses
- Social and Individual competencies in 71% of courses

The courses arranged by LUT IT for the Master's degree have emphasis on the following ASIIN categories (see enclosure 5c):

- Formal, Algorithmic and Mathematical competences in 15% of courses
- Analysing, Designing and Realising competences in 48% of courses
- Technological competences in 59% of courses
- Cross subject competencies in 24% of courses
- Methodological competencies in 40% of courses
- Project management competencies in 74% of courses
- Social and Individual competencies in 65% of courses

The content, learning outcomes and workloads of individual modules are presented in the study guide (enclosure 3 and 7). In addition to the learning outcomes, the study guide provides the students with information about the year and period of study, responsible teacher(s), course content, modes of study, evaluation, study materials and prerequisites for the course. This information and the learning outcomes are also introduced to students during the first lecture/meeting of each module.

2.4 Job market perspectives and practical relevance

2.4.1. Nature of the ICT field

Despite the turbulent nature of the economy related to Information and Communications Technologies (ICT), the role and relevance of computing technology is unquestioned in practically all fields of science and technology. These technologies provide the means to efficiently gather and process information in a way unprecedented 30 years ago and communicate it globally without delay. As such, ICT have revolutionized the ways of handling information and its usage for laying the foundation for the information society.

2.4.2. Industry expectations and demand

Nationally the Bachelor's degree of the research universities is considered as an intermediate step in the progress towards a Master's degree. Naturally, there exists work tasks in the industry for which the skills obtained during the Bachelor's studies are sufficient, but the two-stage degree programmes are relatively new in engineering in Finland and the industry traditionally expects fully trained Master's of Science capable of independent engineering work. This is also affected by the fact that there are 25 universities of applied sciences. The graduates from these institutions should be able to readily start working in the industry, but such background is not directly suitable to start the Master's studies in a research oriented university.

LUT gathers feedback from both the graduated students and industry. The recent survey focusing on graduated students (enclosure 6) reveals that the following skills are important in the IT field: a) problem solving, b) information acquisition, c) analytic and systematic thinking, d) communication in English, and e) team work and social skills. In the same survey, the graduated students state

that they have received good skills for a) information acquisition, b) information and communication technology, c) theoretical knowledge in the field of study, d) problem solving, and e) analytic and systematic thinking. The survey for the thesis workers' employers (enclosure 27) reveals that the thesis workers a) have had the ability to learn new things, b) have shown skills for independent working, and c) would fit nicely to the company if evaluated by the skills.

2.4.3. Collaboration with industry

The collaboration with the ICT industry is implemented in the form of co-operatively organized intensive courses and seminars as well as jointly funded and implemented research projects.

The courses and seminars give insight to the students about the work tasks and related problems as well as the state-of-the-art tools used in the industry. Various courses in the IT curricula use guest lecturers from the industry to give insight to the current problems and solutions. The amount of guest lectures varies annually and to establish longer term collaboration with industry, LUT IT has started an industry board for the development of the curricula. Industry board, consisting of 5 industry representatives and department representatives, aims to look at the industry needs and ways to answer to them within curricula. Industry representatives represent both local and national level, small and large companies as well as government perspectives.

From the viewpoint of research, the true synergy benefit arises from co-financed research projects. Most of the funding is granted by the Finnish Funding Agency for Technology and Innovation (Tekes; application-oriented research), European Union Framework Programs (international co-operative research), European Regional Development Fund (national collaboration with industry), and Academy of Finland (basic research). The rest of the funding comes from the participating companies and universities.

2.4.4. Work internships

The compulsory internship period in the Degree Programme in Information Technology is divided into a work environment internship that acquaints students with their potential future work environments (B.Sc. degree), and a professional internship that develops the students' professional skills (M.Sc. degree).

The work environment internship aims to provide students with an experience of what paid work is like. After the work environment internship, the student will be able to define and explain what is involved in working for an employer and what the basic rules of the world of work are from the employee's perspective, and further, evaluate how to act in a working community. The objective is for the student to learn to interact as an employee in a working community.

The aim of the professional internship is for students to obtain a basic knowledge of the work, work environment and working community in their own field. After the professional internship, students will be able to apply and deepen their knowledge and practical skills acquired during the studies to work in their own field. Students obtain practical experience and knowledge of the professional duties, production equipment and software in their field.

In practice, the student obtains a summer job from a company, works as paid employee, requests a work certificate and applies for the approval of the work as an internship. To this end, the student fills out an application form and encloses the required work certificates and an internship report including a job description and the student's own view of the content and importance of the internship. The application form, work certificates and internship report are submitted to the internship coordinator.

The degree of Bachelor of Science (Technology) includes a compulsory internship (see enclosure 3) of 2 ECTS credits. All full-time employment relationships of at least four weeks are approved as compulsory internships in the Bachelor's degree. The requirements and workload for the internship have been developed during the current academic year: the new course descriptions are presented in enclosure 24.

The degree of Master of Science (Technology) includes a compulsory internship of 2 ECTS credits and an elective one worth a maximum of 8 ECTS credits (enclosure 3). All full-time employment relationships of at least four weeks and related to the student's field are approved as compulsory internships in the Master's degree. The requirements and workload for the internship have been developed during current academic year. The new course descriptions are shown in enclosure 24.

2.4.5. Competence profile of graduates

LUT IT has defined both general and specific learning outcomes for both Bachelor's and Master's degree. The specific learning outcomes were defined in Section 2.2, and the general ones are the following.

Graduates of the Bachelor's programme and their competence is defined as follows:

> The graduates can participate in software projects using the acquired knowledge and technical skills applying them in different application domains taking into account technical, social, and economical constraints. The graduates can communicate both verbally and in writing and can work as a part of a project team using both the domestic languages as well as English.

Graduates of the Master's programme and their competence is defined as follows:

> The graduates are able to participate in software projects in the role of an expert or as a leader and they are able to apply their knowledge and capabilities to the challenges in development projects. The graduates are able to apply scientific knowledge and methods in practice, they are able to communicate both orally and in writing and they are able to participate in a project group in a multi-cultural environment. The graduates can communicate both orally and in writing using the English language.

In both the programmes special attention is given to both technical and social competencies. In addition to these general learning objectives each major topic has their own objectives presented in the IT curricula (enclosure 3). The competencies of the graduates are further analysed in enclosure 5. The analysis is performed against ASIIN criteria as well as the ACM/IEEE Computer Science curricula.

2.4.6. Placement of graduates on the labour market

The curriculum of the Bachelor's degree programme includes mostly fundamental studies in mathematics, natural sciences, and engineering. The primary objective of this degree is to enable efficient studies in the M.Sc. degree program.

Graduate surveys immediately and five years after graduation (enclosures 22 and 6 respectively) are used to collect relevant information on the professional qualification of the graduates. Based on the results and statistical analysis most of the B.Sc. graduates have continued their studies in the M.Sc. degree programs. For example, the following observations can be made from the Master's graduate survey five years after graduation (enclosure 6):

- In 2005, 67% of the graduates were already employed when they graduated, only 14% were unemployed.
- In 2010, 100% of the graduates were employed.
- 76% were employed by the private sector or a state-owned company, 14% by a university, and 5% founded a private business.
- For 66%, the graduate's first job was in design, development or administration, for 14% it was in research, and for 10% in education or teaching.
- From 2005 to 2010, the proportion of leadership and managerial duties increased significantly (from 5% to 24%).
- For 48%, the first job's requirement level corresponded well to the education, for 33% the requirement level was partly lower than the education level. In 2010 81% of graduates had corresponding or higher position than academic education.
- 96% of graduates were able to use the skills learned in university in their first job.
- 83% were satisfied (somewhat to extremely) with the university degree.
- The most important work life skills which were not fully developed during the studies are i) negotiation skills, ii) teamwork skills and social skills, and iii) managerial skills. The future development efforts will focus on these areas since they have the widest gap between the importance and the development of the skill (enclosure 6).

The graduates are employed by a wide range of organisations. The most important employers have traditionally been large IT companies like Nokia and Digia but in general include large and small enterprises and consultancies.

The major subject of the studies reflecting the student's interests and qualifications affects the student's first job, but the Master's thesis project and related collaboration with the industry can be considered to be the most important factor. To develop this collaboration, LUT has gathered feedback from Master's thesis employers since 2010 (enclosure 27). From the viewpoint of the students, career prospects are typically discussed during the Master's thesis project, and the students can also use LUT Career Services.

The Degree Programmes in Information Technology have also contributed to the birth of new companies. For example, Oy LabVision Technologies Ltd was started during the collaborative research project PapVision (2003-2006). This spin-off company commercialises the scientific results of machine vision and image analysis projects, and works in close co-operation with LUT IT.

2.5 Admissions and entry requirements

According to the Finnish University Law (2009/558) the board of the university decides the number of new students to be selected each year. The Rector decides annually on the selection process and the basis of the selection criteria of the prospective students after hearing the opinion of the faculties. In practice, the student selection into Bachelor's degree of the Finnish matriculation examination graduates is mainly organized by a joint universities application system, DIA (joint-application to Studies of Bachelor and Master of Science in Technology). This joint application system is shared by seven technological universities/faculties in Finland and it is coordinated by a joint application committee. This process enables an applicant to apply to five degree programmes in an order of preference in one or in several universities of technology by using the same

application form and examinations. The application system enables prospective students to apply for several degree programmes at the same time, but the applicant can accept only one study place in one degree programme in a given academic year.

2.5.1. Entry requirements

Bachelor‘s programme

The Finnish University Law (2009/558, 37§) rules the entry requirements for the Bachelor’s degree.

Prospective students applying in Bachelor’s degree are:

- Applicants who have completed the Finnish matriculation examination, or who have completed the Finnish matriculation examination and received a blue certificate.
- Applicants who have completed the EB, IB or Reifeprüfung degree.
- Applicants who will complete the EB, IB or Reifeprüfung degree either in Finland or abroad during the application year. These applicants must include their degree certificate or a certificate of participation in the respective examination from their school with their application form.
- Applicants who are not upper secondary school graduates but who have completed a polytechnic higher vocational degree, vocational polytechnic degree or at least a three-year vocational degree.
- Applicants from other Nordic countries who are eligible for application.
- Applicants who have not completed upper secondary education in Finland are eligible to apply for Bachelor degree courses if they are eligible for studies at a university in their own country.

DIA-applicants have three different quotas where they can be selected in: 1. Success in matriculation examinations, 2. success in matriculation examinations and in the entrance examinations and 3. success in entrance examinations. To be selected by success in matriculation examination the prospective student must have at least grade C in physics or chemistry and must have passed advanced course in mathematics or he/she must have at least M in advanced course in mathematics. Six best grades in matriculation examinations are graded as points which count in the selection process. 40 % of the applicants accepted into a degree programme can be selected because of their success in the matriculation examination. DIA organizes also this selection. The results are communicated to the applicants before the entrance examinations and students accepted based on their success in the matriculation examination are not allowed to participate in the entrance examinations. 70 % of the remaining study places are selected based on the success in the matriculation examinations and entrance examinations. In this case, success in six examinations in the matriculation examinations counts and the points received in the entrance examinations.

The entrance examinations are organized by the joint application procedure. The entrance examination is based on the Finnish upper secondary school curriculum in mathematics, physics and chemistry. There are three separate examinations. LUT IT requires the applicants to take the mathematics exam, and an exam in physics or chemistry. If the applicant is willing to take all three, the best results of the exams count. Prospective students must pass the entrance examination to be selected even if there are fewer applicants than places attained. This guarantees a minimum knowledge level in science for all the selected students.

Other applicants who have performed their matriculation examinations abroad, have a separate application system, but they take part in the same entrance examinations as the DIA-applicants.

Information about the applicants is available according to law of student selection register (1058/1998). Prospective students are able to apply online at www.yliopistohaku.fi. A prospective student can appeal against a negative result of student selection within 14 days of the decision.

Master's programme

All students accepted in the Bachelor's programme are also accepted in the Master's degree programme.

There are also several separate variants of entrance directly to the separate Master's degree programmes, but these are not included in this accreditation process. Applicants should have a BEng/ B.Sc. degree in the relevant field of study or in a closely related field. In addition, applicants with a Bachelor's degree from Universities of Applied Science in a related field from a Finnish Universities of Applied Science (Polytechnics) are eligible to apply. The degree must be completed by the end of the application period. The programme applied for makes the final decision whether the applicant's previous degree is suitable.

Applicants with a former university degree are selected based on their success in the previous studies and the relevance of their degree.

Prospective students applying for and selected in a Master's degree programme are going to prepare their personal study plan with the help of academic advisors. This personal study plan also defines the needed complementary studies for the student to be ready to take part in the master's level studies.

The prospective student can appeal against a negative result of student selection within 14 days of the decision.

2.5.2. Transfers from/to the conventional system of qualification

Students at LUT can at any given point of time have at the most one study place for technology.

Students can request for a change of degree programme. Until now the degree programme into which the applicant wishes to change, has required the applicant to have been successful enough in the DIA-selection to be selected to the particular degree programme. From now on, the faculty is able to decide if the student can change the major within the faculty. Otherwise, the student can take part in the entrance examination again or request the change after completing the Bachelor's degree.

In general, a student can request for a change of degree programme after completing the Bachelor's degree. If there are more requests than the degree programmes applied to is willing to take, quantitative and qualitative success in studies and work experience can be used as criteria for selection. If the student has not completed a Bachelor's degree the criteria for change is his/her success in the previous application process. Previously completed courses can be replaced in the personal study plan which eliminates loss of time. A student wishing to change universities should have completed the Bachelor's degree and can then apply directly to a Master's degree programme.

Recognition and Assessment of prior learning is in use. If a student performs studies in another university or educational institute in Finland or abroad, he/she must request the Head of Degree Programme to credit the studies performed elsewhere. A student can receive credit and replace study modules also by knowledge gained otherwise. Sufficient knowledge can be shown by taking

an oral or written examination. Portfolios are also used as a measure to validate previously gained knowledge. Still, at least 90 ECTS of the Bachelor's degree (including Bachelor's Thesis) and 70 ECTS of the Master's degree, including at least 45 ECTS of major, including Master's Thesis, have to be passed at LUT.

2.6 Curriculum content

Enclosure 3, the study guide, presents the LUT IT curricula in detail and the course desciriptions for the individual courses offered by other departments are summarized in enclosure 7. First, an overview of the curricular content of the Bachelor's and Master's programmes is presented.

2.6.1. Bachelor's degree programme

The extent of the studies required for the Degree of Bachelor of Science is 180 ECTS credits. The structure of the Bachelor's degree is described in the University Regulations on Education and the Completion of Studies, Section 31 (enclosure 4). Studies in other domestic and foreign universities can be accepted as part of the LUT degree based on a separate application to the Head of the Degree Programme. The students are also advised to follow the courses offered by the Open University.

The Bachelor's degree in Information Technology comprises the following studies (enclosure 3).

- General studies min. 103 ECTS cr
- Major subject min. 46 ECTS cr
- Minor subject min. 20 ECTS cr
- Elective studies min. 11 ECTS cr

2.6.2. Master's degree programme

The extent of the studies required for the Degree of Master of Science is 120 ECTS credits. The structure of the Master's degree is described in the University Regulations on Education and the Completion of Studies, Section 31 (enclosure 4). Studies in other domestic and foreign universities can be accepted as part of the LUT degree based on a separate application to the Head of the Degree Programme. The students are also advised to follow the courses offered by the Open University.

The Master's degree in Information Technology comprises the following studies (enclosure 3).

- General studies min. 18 ECTS cr
- Major subject min. 72 ECTS cr
- Minor subject min. 20 ECTS cr
- Elective studies min. 10 ECTS cr

2.6.3. Personal study plan

The personal study plan allows students to plan their studies. All students prepare a study plan for both their B.Sc. and M.Sc. studies (see enclosures 17 and 18). In the Degree Programme of Information Technology, the study plan is prepared in the autumn semester of the first year of studies in the course Introduction to Studies in Information Technology. Students who start their studies directly at the Master's level prepare their study plan at the beginning of their studies. Students update their study plan at different stages of their studies. The official checkpoints for the personal study plan are in the beginning of the studies, at the graduation of Bachelor's degree and at the graduation of the Master's degree. The check is also made when the students choose the major for the Master's degree. The official check is made by the member of Study affairs services and it's validated by the Head of the Degree Programme.

3. DEGREE PROGRAMME: STRUCTURES, METHODS AND IMPLEMENTATION

The structure of the consecutive B.Sc. and M.Sc. degree programmes in Information Technology is constructed to meet the learning outcomes defined for the programmes in the educational frameworks of both the national and LUT regulations.

3.1 Structure and modularity

National regulations require 180 ECTS credits for the Degree of Bachelor of Science, and the education has to be arranged in such a way that it is possible to attain the degree in three full academic years. The Bachelor's degree comprises the following classes of studies based on the University Regulations on Education and the Completion of Studies (enclosure 4):

1. General studies min. 70 ECTS
2. Major subject min. 40 ECTS
3. Minor subject min. 20 ECTS
4. Elective studies min. 10 ECTS

Foreign language and communication studies are included in General studies. The Bachelor Thesis including a seminar (10 ECTS) is included in the Major subject. The Degree programme of Information Technology fulfils these general requirements (cf. Section 2.6.1).

National regulations require 120 ECTS credits for the Degree of Master of Science, and the education has to be arranged in such a way that it is possible to attain the degree in two full academic years. The Master's degree comprises the following classes of studies based on the University Regulations on Education and the Completion of Studies (enclosure 4):

1. General studies min. 5 ECTS
2. Major subject min. 60 ECTS
3. Minor subject min. 20 ECTS
4. Elective studies min. 10 ECTS

Foreign language and communication studies are included in General studies. Master Thesis including a seminar (30 ECTS) is included in the Major subject. The Degree programme of Information Technology fulfils the general requirements (cf. Section 2.6.2).

3.1.1. Bachelor's Degree Programme in Information Technology

The Bachelor's degree programme takes three years, entails 180 ECTS credits, and leads to the degree of Bachelor of Science in Technology. All the students in the Bachelor's degree programme in Information technology have the same major, *computer science and communications software*.

The study programme for the Bachelor of Science builds on the following progression of the studies. The elective studies are not fixed at any given year but the students are expected to take them evenly during the whole study period, and the minor studies are taken from the study units offered by other degree programmes at LUT.

Year 1 (BSc 1): General studies
Year 2 (BSc 2): General studies, major and minor studies
Year 3 (BSc 3): Studies on major and minor subjects, thesis

General studies on IT 103 ECTS cr	Computer science and communications software studies 46 ECTS cr
	Minor studies 20 ECTS cr
	Elective studies 11 ECTS cr

3.1.2. Master's Degree Programme in Information Technology

The Master's degree programme takes two years, entails 120 ECTS credits, and leads to the degree of Master of Science in Technology with the following schedule:

Year 1 (MSc 1): General studies, studies in the selected major subject, some studies in the selected minor subject, elective studies

Year 2 (MSc 2): Studies in the selected major subject and minor subject, elective studies, thesis

<table>
<tr><td rowspan="2">General Studies
18 ECTS cr</td><td rowspan="2">Major Subject 72 ECTS cr</td><td>Minor Subject 20 ECTS cr</td></tr>
<tr><td>Elective Studies 10 ECTS cr</td></tr>
</table>

Students in Master's Degree Programme in Information Technology select one of the following major subjects after they have completed at least 100 ECTS credits in their Bachelor degree (in the spring of the second study year) or in the beginning of the Master's studies:

- Communications software
- Intelligent computing
- Software engineering

The minor subject of Master's degree can also be selected among the other minor subjects of any other degree programmes of LUT. The full structure of the degree programmes including the modules to be studied in different subject groups are shown in the study guide (Module Handbook, enclosure 3).

As a result of implementation of the Bologna Process in Finnish universities, the present degree structures have been effective since 2005. The transition period to the new curricula has had an effect on various statistical data, which has to be taken into account in their interpretation.

3.2 Workload and credit points

The academic year is divided into two semesters. The autumn semester and spring semester each include two periods (1, 2, 3, 4) of instruction lasting seven weeks each. Three examination periods of ca. 1 week each are arranged, one just before the semester, one just after the semester and one between the teaching periods. Examinations are also arranged during the teaching periods. The modules can last from one to four periods. However, the university also offers some modules as intensive modules. In those cases the length of the modules varies. Most modules are offered every year, but a few are taught every second year. Module details are given in the module descriptions available in the study guide (enclosure 3 and 7).

The basic unit of the studies is ECTS (European Credit Transfer and accumulation System) credit. A module is scored by the workload required to pass it. 1600 hours on average, corresponding to 60 ECTS credits, are required to complete the studies of one academic year. The average workload per semester is ca. 800 hours, including face-to-face teaching, individual studying and preparation for and taking examinations. One ECTS equals to 26 hours of work. Establishing a total workload with enough time for independent study as well, is part of operative curriculum design. The LUT course feedback system (Webropol) is used to gather information for workload planning. Students' individual workloads per semester might vary depending on the workload of voluntary course modules, which they have selected. The following tables, Table 1 through Table 4, represent the guiding credit summaries for Bachelor's and Master's degrees. Bachelor's programme is easier to present as all students study the same courses whereas Master's programme is divided into three majors. Examples of study plans in enclosures 17 and 18 show how the workload is divided during each semester.

Table 1. Work load distribution over the studies for the Bachelor's degree. Yellow colour indicates optional completion times.

Bachelor's Degree 2011-12

	Year 1				Year 2				Year 3			
Module	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
BM20A0100	3											
BM20A0300	5											
BM20A0500			3									
BM20A0700			2									
BM20A0900				3								
BM20A1401					3							
BM20A1501							3					
BM30A0210	5											
BM30A0220		2										
BM30A0230			5									
BM30A0240				2								
CT10A0100	2											
CT50A2000	5											
CT50A2100			5									
CT60A0200	5											
CT60A0210			5									
CT30A2002					7							
CT50A2310						5						
CT50A2602					5							
CT60A2410					5							
CT60A4001							5					
CT60A4301							5					
FV11A4400							4					
FV13A1200			2									
FV18A2800					3							
FV18A4001											2	
CT10A0400	Summers											
CT30A2800							7					
CT30A3101									7			
CT30A3700											7	
CT50A3000									5			
CT50A4000							5				5	
CT60A4101									5			
CT10A4000									10			
	Total credits over periods				Total credits over periods				Total credits over periods			
General and major	**54 ECTS**				**52 or 57 ECTS**				**41 or 36 ECTS**			
Minor	**0 ECTS**				**10 ECTS**				**10 ECTS**			
Electives	**0-11 ECTS**				**0-11 ECTS**				**0-11 ECTS**			

Table 2. Work load distribution over the studies for Communications software major in the Master's degree. Yellow colour indicates optional completion times.

Master's Programme, Communications Software								
	Year 1				Year 2			
Module	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
CT10A9500	3							
CT30A9002			4					
CT60A4400	5							
FV11A8400			4					
CT10A0500	**Summers**							
CT30A5001	7							
CT30A6000	8							
CT30A8301			7					
CT30A9600					4			
CT10A6000					30			
General and obligatory major	**34 or 38 ECTS**				**34or 30 ECTS**			
CT10A9100								Int. 1-3
CT10A9700								Int. 2
CT30A7500					Book 5			
CT30A8902							5	
CT30A9002			3					
CT30A9300					Int. 4			
CT30A9400					Book 5			
CT60A7201			7					
CT60A7302					7			
CT60A7400	7							
CT60A7500	5							
BL40A1000					5			
BL40A1100	4							
Minor	**0-20 ECTS**				**0-20 ECTS**			
Electives	**0-10 ECTS**				**0-10 ECTS**			

Table 3. Work load distribution over the studies for the Intelligent Computing major in the Master's degree. Yellow colour indicates optional completion times.

Master's Programme, Intelligent Computing								
	Year 1				Year 2			
Module	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
CT10A9500	3							
CT50A6500			4					
CT60A4400	5							
FV11A8400			4					
CT10A0500	Summers							
CT50A5700		5						
CT50A6000			7					
CT50A6100	7				7			
CT50A6400			7					
CT10A6000					30			
General and obligatory major	**35 or 42 ECTS**				**37 or 30 ECTS**			
CT10A9100								Int. 1-3
CT10A9601	1 - 5							
CT30A7500					Book 5			
CT50A6200	7				7			
BK70A0000			6					
BL40A0700			5				5	
BL40A1000					5			
BL40A1100	4							
BM20A1900		3				3		
BM20A2800				4				4
BM20A2901				5				5
BM20A4201		4-6				4-6		
BM30A0500		6						
Minor	**0-20 ECTS**				**0-20 ECTS**			
Electives	**0-10 ECTS**				**0-10 ECTS**			

Table 4. Work load distribution over the studies for the Software Engineering major in the Master's degree. Yellow colour indicates optional completion times.

Master's Programme, Software Engineering

	Year 1				Year 2			
Opintojakso	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
CT10A9500	3							
CT60A7100			4					
CT60A4400	5							
FV11A8400			4					
CT10A0500	Summers							
CT60A7201			7					
CT60A7302					7			
CT60A7400	7							
CT60A7500	5							
CT10A6000					30			
General and obligatory major	**31 ECTS**				**37 ECTS**			
CT10A9100								Int. 1-3
CT10A9601	1 - 5							
CT30A5001	7							
CT30A6000	8							
CT30A7500					Book 5			
CT30A8301			7					
CT30A8902							5	
CT30A9300					Int. 4			
CT50A5700		5						
CT50A6000			7					
CT50A6400			7					
BL40A1000					5			
BL40A1100	4							
	0-20 ECTS				**0-20 ECTS**			
	0-10 ECTS				**0-10 ECTS**			

The Bachelor's thesis and seminar amount to 10 ECTS credits and the Master's thesis to 30 ECTS credits. The foreign language studies of the Bachelor degree can be at most 15 ECTS cr. The foreign language studies in the Master degree can be at most 10 ECTS cr. A more detailed description of the credit point system and inclusion of studies in other institutions are presented in the University Regulations on Education and the Completion of Studies (enclosure 4).

3.3 Educational methods

Both the Bachelor's and Master's degree programmes are full-time, on-campus programmes. The teaching methods consist of lectures, classroom and laboratory exercises, supervised assignments (individual or team work), homeworks, projects, seminars and discussions. In some courses such as code camp cooperative learning/teaching approach is used. Book based courses are offered to deepen the knowledge in some areas.

The choice of teaching methods is influenced by the learning outcomes, content and quality requirements for instruction, the time and financial resources spent on instruction, the teacher's preference and the number of students in the course. As a result of the active pedagogical

development of instruction, LUT IT has strongly emphasized a student-oriented approach instead of a teacher-oriented one. The sole use of lectures and literature examinations in instruction has decreased, and pair, group and project work is increasing.

The class sizes are large in approximately 20% of courses (up to 200 students), and small in 45% of courses (20–40 students). Large courses are mainly included in the Bachelor's degree and, in general, provided for the other programmes of the university. In small and medium-sized groups, which are mainly included in the Master's degree, interactive and collaborative learning and learning by doing play an essential role. Small and medium-sized course groups apply teaching methods that promote skills and knowledge needed in real-life situations in the world of work. This is achieved through assignments that require practical problem solving, decision making and development of activities, through extensive and realistic material, and high-pace interactive teamwork. At the moment two courses are offered as book-based self-study courses.

Pedagogical advice to teachers is given in the "LUT Teacher's Quality Manual" (enclosure 8).

3.4 Support and advice

3.4.1 Academic guidance methods for students

The university offers academic guidance to students which together cover the entire span of studies and supports effective study and learning, allowing student to complete their studies following an appropriate study plan that they have prepared themselves to graduate within the desired time. The roles and duties of study guidance personnel and units are listed in Table 5.

Table 5. The roles and duties of study guidance personnel.

Peer tutor	Introduces new students to the university, studies and the student community, and helps them with practical arrangements at the start of studies. A peer tutor introduces new students to the university facilities, study guidance staff and other students. A peer tutor makes sure that students know the most important practices related to studies: registration for courses, attending lectures, taking examinations, preparing a course schedule, and social aspects.
Tutoring coordinator	Coordinates and develops the university's peer tutoring together with faculties, Student Services and the student union.
Student adviser	Student advisers are LUT students who work part-time while they study. They provide information and guidance in studies, see to the choice of tutors and arrange their training together with study coordinator, and take part in arranging briefings for students.
Study counselling psychologist	Psychologist counsels students in problems related to studies and learning, provides expertise in issues involving learning and guidance, and support other study guidance personnel.
Study coordinator	The study coordinator normally coordinates study guidance for students. The duties include study and degree guidance for students, from applicants to postgraduate students. The study coordinator helps students in preparing their personal study plan (including the recognition of prior learning and studies outside LUT, e.g. through the flexible right to study) and provides guidance in administrative issues related to graduation.

Head of degree programme	The head of a degree programme is in charge of evaluating and developing study guidance.
Head of study affairs	Head of study affairs is responsible for organizing study guidance in the faculty. He/she Is responsible for administration of studies and partly also for study guidance related to administrative affairs of post-graduate students.
Study secretary	Study secretaries provide guidance in studies and information in the practical matters such as with the graduation processes. Study secretaries check personal study plans together with study coordinator and student adviser. They make also the degree certificates.
Student affairs office	Student affairs office provides help and information for all LUT students in matters such as registration for academic year, signing up for the courses and exams, registrations of course results, and student allowance matters.
Teacher tutor	A teacher-tutor helps students prepare their personal study plans and follow its progress. Teacher-tutors provide guidance in the selection of major and minor subjects from the viewpoint of career guidance. They belong to the study guidance personnel appointed for a department or degree programme. Students may turn to them with any issues involving studies.
Teachers	Teachers are responsible for study guidance related to the completion of the courses/modules they are responsible for.
Introductory course	Introductory course is arranged to help students get started with their academic studies. Introductory course also guide in preparing the personal study plan.
Professors	Professors provide guidance in the selection of a research topic, and in preparing final theses for undergraduate and postgraduate studies.
International services	International services offers general study guidance to international students at the university and coordinates the activity of international tutors. International services also assists Finnish students in matters related to studies abroad.
Career services	Career services guide students in career planning and searching for employment.
Language centre	The Language centre offers study guidance related to language, communication and culture studies.
Library	Library personnel provide guidance in information retrieval and instruction in information literacy.
Origo helpdesk	Support services for the use of information and communication technology in studies.

At the beginning of their studies, students prepare a personal study plan (HOPS). The study plan is made for the entire duration of the studies, i.e. until the M.Sc. degree is completed. An independent study plan is a tool that helps students to plan their studies. Its purpose is to help students to see their studies as a whole from the very beginning, and to support students in choosing courses and minor subjects that best suit them. The aim is also to avoid delaying graduation unnecessarily and also to awaken students to realize their own responsibility for their studies, and motivates them to make a commitment to their studies.

During teaching periods teaching takes place from 8 am to 8 pm from Monday to Friday including examinations. Office time at the university is from 8 am to 4 pm. Teachers are responsible for the courses they teach, including supervision of the contents of their own courses. Teachers are available at the university mainly during the office hours, but students may have guidance and individual supervision also out of these hours by agreeing a special appointment with the teacher.

General supervision of studies at the university and about the degree programme is given by the Head of Study Affairs of the faculty and by the study coordinator of the degree programme. In addition, study counselling is provided by the student adviser of the degree programme. The student adviser works part-time and helps students with practical study-related matters. In addition, there are tutors at two levels: student tutors, who help first year students with practical matters and teacher tutors who help students with their personal study plans.

3.4.2 Specialized support and advice for finishing Bachelor's and Master's thesis

The most recent update of the thesis instructions were approved by the vice-rector on June 2011 and they entered into force 1 August 2011. The instructions are available on the Internet. The main aspects are as follows.

At LUT, most Master's theses in engineering are prepared on topics given by companies or other sponsors, in which case the student must discuss the topic with the sponsor as well as with the professor (or docent) who is acting as the supervisor and examiner. Together with the professor, the student ensures that the subject meets the scientific requirements set for academic theses. Students must, from the very start, discuss at least the following issues with the employer's representative:

- the contact information of the contact persons in the sponsoring organisation as well as that of the supervisor at employer
- the aim of the theses from the perspective of the sponsor/employer
- the schedule (the nominal scope of a Master's thesis in engineering is 30 ECTS credits)
- the instructions laid down by LUT which students must follow when working on their Master's theses (www.lut.fi/opinto/ohjeita/)
- adapting the sponsor's/employer's aims to the requirements for a Master's thesis
- possible partners (individuals and organisations) and the main principles to be followed in cooperation
- the publicity of the thesis
- immaterial rights (intellectual property rights)
- the terms and rules for financing

In addition to the above, it is necessary to discuss the issues related to the confidentiality and protection of invention concepts made by the student themselves. Master's theses are normally public after being accepted.

The full instructions are presented in enclosure 11. The evaluation form of Master's thesis is presented in enclosure 10.

3.4.3 Academic Guidance Methods for Prospective Students

The University has contacts with study advisors and teaching staff at Finnish high schools and polytechnics to ensure that their counselling staffs have up-to-date information about the study possibilities at LUT. Printed material is posted to these educational institutions each autumn. The teachers and study advisors are given an opportunity to bring groups of students to LUT and visit the physical premises (laboratories, library, etc.) and have a guided tour at the LUT campus. Annually in November, all high schools in the surrounding regions (abt. 200 km range) are invited to an open house event where the programme and information provided is tailored for high school seniors.

LUT's own degree students systematically visit high schools and garrisons where young Finns do their compulsory military service. The motivation for these visits is to provide information on the study possibilities and student life. LUT students give more than one hundred of these presentations each academic year. LUT also takes part in the most important national fairs targeted at young people seeking higher education opportunities.

LUT IT provides a basic programming course to local high schools as cooperation activity.

4. EXAMINATIONS: SYSTEM, CONCEPT AND ORGANISATION

4.1 Assessment through examinations

An examination is the primary instrument for assessing the achievement of the planned learning outcomes. In addition, marked exercises and coursework, seminar reports and presentations, and documented case-studies and home works may also be taken into account when giving the final grade. The assessment methods used in a particular course are decided by the teacher responsible for the course and they are presented in the study guide (enclosure 3 and 7). The form of examination is laid down in the course description for each course. It is ensured that at the commencement of the teaching term, students are informed of examinations and pre-examination requirements, which must be in line with the course objectives. The appropriateness of the assessment methods is related to the modes of study, which are also presented in the study guide. For a specific reason, the responsible teacher has the right to use an alternative mode and date of completion for an individual case. In any case, the assessment criteria and methods are chosen to support the learning outcomes of the course.

Commonly, the examinations are implemented as written ones. The use of oral and other types of examinations, such as reports, demonstrations, or learning portfolios increases all the time. Some examples of various evaluation types from study guide include:

- CT30A7500 Parallel computing, Exam 100%
- CT30A8301 Wireless Service Engineering, Exam 50% and practical assignment 50%
- CT30A3200 Webbed applications, Continuous evaluation 50% and practical work 50%
- CT10A9601 Research methods, laboratory project, Report and presentation 100%

Oral examinations are used, for example, when a student applies for compensating the completion of a course based on earlier studies in another institution. Some guidelines for using alternative examination types are available in the Teacher's Quality Manual (enclosure 8).

4.2 Evaluation criteria

Teachers responsible for the modules prepare and mark the examinations as determined by the head of the degree programme. Typically, the examinations include tasks related to writing short essays, problem-solving questions, and calculation problems. The standard duration of a written examination is 3 hours. For more information, see the University Regulations on Education and the Completion of Studies, (enclosure 4).

Courses are evaluated either on the scale excellent (5), very good (4), good (3), very satisfactory (2), satisfactory (1) and failed (0), or pass – fail.

Teachers forward the grades to the Student Affairs Office and inform the students and post them online within one month after all course deliverables are completed. Teachers keep the examination scripts and other equivalent material, and participant lists of the examinations for at least six months after the grades have been published. Grades for the courses are entered into the student register by the Student Affairs Office.

Students who are dissatisfied with the assessment may request a correction to the assessment orally or in writing from the teacher who made the assessment or the person who made the recognition decision. Pursuant to the Universities Act (558/2009), section 44 (enclosure 1) the students have the right to obtain information about the application of assessment criteria to their

study attainments. They shall be given the opportunity to see the assessed study attainment. After the assessment, students have the right to receive a duplicate of the paper assessed.

Four examination dates are set for each course. Students may take part in two of them. All teachers prepare and grade examinations in the subjects under their responsibility as determined by the head of the degree programme. For more information see University regulations on education and the completion of studies (enclosure 4).

4.3 Students' rights and responsibilities

Examinations for each course are organized four times. However, students may take part in two of them. If a student fails to attend an exam he/she has signed up for and has failed to cancel his/her participation in the exam within the due period, the exam is considered having been taken.

The examination dates and times for each department and changes thereto can be found on the university Web site. Therefore, the exam schedule is always up-to-date.

Students who have enrolled as attending or students who have enrolled as non-attending due to, for example, student exchange have the right to take part in examinations. The aim is to provide students who have been absent due to illness, military service, maternity or parental leave, or studies abroad the same rights upon their return as they had when they left. The rights shall remain in force until the end of the following semester (enclosure 4).

Students register for examinations and intermediate examinations during the academic year through electronic system, WebOodi. If needed, students may register by telephone or in person at the customer service desk in the Student Affairs Office or by e-mail to opinto@lut.fi. Registration starts four weeks before the examination date and ends one week before the examination. (Regulations for teaching and studies, section 70.) For example, if the examination is on a Monday, students must register on the previous Monday, at the latest. Students who have registered for an examination but are unable to take it must cancel their registration through WebOodi. Registrations are to be cancelled two working days before the examination. Late registrations are accepted until the day before the examination. Students who register late must do so in person at the customer service desk at the Student Affairs Office during opening hours (Mon-Thu 12-15 and Fri 12-14). A fee of € 5, paid in cash to the Student Affairs Office, is charged for late registration. The Student Affairs Office adds the student to the participant list delivered to the examination hall. Signing up after the deadline is possible only for exams for which other students have signed up for by the deadline. If no one has signed up for the exam within the due period, the exam will not be organized and therefore signing up after the deadline is impossible. If the student cannot register in person the day before the examination, he or she may go to the examination hall and write down the required information and invoicing address on the invigilators' participant list. In such cases, the Student Affairs Office charges € 20 for late registration and sends the student an invoice after the examination. The student's grade will be registered in the student's records after the payment is made. The invigilators do not accept payments. Teachers have no obligation to arrange an examination for a student who has not registered for it in advance.

4.4 Additional exam retake

According to LUT's regulations on education and the completion of studies (enclosure 4) students may take the final examination for a course twice. If a student does not pass the examination after taking it twice, he or she may apply for an additional retake. A retake must be applied for in advance of the exam date in University's exam schedule.

In order to be granted permission to take the examination again, the student must improve his or her knowledge of the topic area by completing additional assignments or other tasks assigned by the teacher. The assignment may be a discussion with the teacher during the teacher's office hour, answering questions from a previous examination, taking part in an examination feedback session, or any other task considered suitable for the purpose by the teacher. The aim is that the teacher and student together discuss why the student has not been able to complete the course successfully, and to determine how the student's knowledge of the topic area could be improved.

4.5 Practical arrangements of examinations

The operative curriculum forms the framework for arranging the examinations. The examination and teaching periods are announced annually in the university part of the study guide as well as in the university web-pages. For the academic year 2011-2012, the exam periods are as follows:

Week 34	22 - 27 Aug. 2011
Week 42	17 - 21 Oct. 2011
Week 50	12 - 16 Dec. 2011
Week 1	2 - 5 Jan. 2012
Week 9	27 Feb. - 2 Mar. 2012
Weeks 14	3 - 5 Apr. 2012
Week 18	2 - 4 May 2012
Week 19	7 - 11 May 2012

Examinations during the teaching periods are arranged according to the examination schedule on Mondays, Tuesdays, Wednesdays and Thursdays from 16:15 to 19:15 (five-hour exams from 15:15 to 20:15). On exam weeks in August, October, December, January, March and May, exams are arranged from Monday to Friday: 8:30-11:30, 12:00-16:00 (only Language Centre exams) and 16:15-19:15 (five-hour examinations 15:15-20:15). On 3 - 5 April 2012, exams will be arranged 8:30-11:30 and 16:15-20:15 (five-hour exams 15:15-20:15). No lectures are given during exam weeks. In addition, examinations may be arranged on the Saturdays November 12th 2011 and March 24th 2012 according to demand.

The exam and course schedules will be available on the university web site. The lists of exams for specific courses are available on university's web-pages (an example is in enclosure 9. Students can use the WebOodi-application to register for the exam. More information about the practical arrangements of exams is available at www.lut.fi/en/lut/studies/tools/exams.

The schedule for the examinations is planned by the university's Student Affairs Office, and accepted by the vice rector responsible for teaching. The accepted schedule is communicated to the students and teachers before each academic year begins. Examinations are coordinated so that students have sufficient time to prepare for them. The examination organization guarantees examinations that accompany study and avoids causing extensions to the period of study.

4.6 Examinations connected with final theses

Bachelor's thesis and seminar (10 ECTS cr)

The Bachelor's degree includes a Bachelor's thesis, which is an assignment related to a module in the student's major studies. The thesis documents independent work of the student, and its topic and content is discussed with the supervisor before starting the work. The actual work can be either empirical research or review of literature. The Bachelor's thesis and related seminar provide

a proper foundation for continuing the studies at the Master's level. Together, the thesis and seminar are worth 10 ECTS credits.

The student prepares a presentation of his/her work before the seminar and presents the Bachelor's thesis (objectives, methods, results, and summary) in the seminar. In addition, the student answers to questions from the audience.

Bachelor's theses are graded on the numerical scale (0-5, see section 4.2). LUT Information Technology has developed a suggestive evaluation matrix for the thesis assessment which is openly available to both the teachers and students. Since Bachelor's degrees are done in Finnish, this matrix is also done in Finnish.

Maturity test (Bachelor's thesis)

Students must prepare a written maturity test to demonstrate their native language skills and how well they know the topic of their thesis. The maturity test is supervised in the Origo exam aquarium and students are not allowed to use reference material. The test must be taken five to six weeks before graduation. The maturity test is evaluated by the supervisor of the Bachelor's thesis and a language reviser approved by the university.

Master's thesis and seminar (30 ECTS cr)

The Master's thesis is the final project of the Master's degree studies. It demonstrates the student's knowledge of a scientifically or socially important topic. The thesis is a research assignment in the student's major subject organized in the form of a course. It requires approximately six months of work and involves a seminar. The student must demonstrate the ability to carry out the project independently and following a plan. The supervisor and first examiner of the Master's thesis is the professor (or docent) specialized in the field. The supervision of final thesis carried out in industry is subject to strict regulations ensuring its meaningful incorporation within the curriculum.

In the thesis seminar, students learn about the theses of others and present their own thesis. The student prepares a presentation of his/her work before the seminar and presents the Master's thesis (objectives, methods, results, and summary) in the seminar. In addition, the student answers to questions from the audience, which consists of teaching personnel and students preparing their Bachelor's or Master's theses.

Master's theses are graded only on the numerical scale (0-5, see Section 4.2). LUT Information Technology has developed a suggestive evaluation matrix that can be used for the assessment of Master's thesis.

Maturity test (Master's thesis)

If the student has demonstrated his or her language skills in connection with the lower university degree, the language of the maturity test will not be evaluated, only the contents. The student completes the maturity test by presenting a summary of his or her thesis in the Master's thesis seminar. The supervising professor or a person acquainted with the field and appointed by the professor evaluates the presentation. The student's knowledge of the topic of the thesis is verified with a maturity test. The test must be taken at least five to six weeks before graduation. To evaluate Bachelor's and Master theses also formal evaluation forms are utilized (the example of the evaluation form for Master's thesis is presented in enclosure 10).

4.7 Further instructions

A more detailed description of the rules regarding the examinations, enrolment, assessment, and sanctions for unethical conduct are given in the Examination Regulations (enclosure 25) and in the

University Regulations on Education and the Completion of Studies (enclosure 4). Compensation guidelines for disabled students are given in the LUT Teacher's Quality Manual (enclosure 8).

5. RESOURCES

5.1 Staff involved

A composition of teaching and research personnel in LUT is based on new four step system: Doctoral student, Post-doctoral researcher, Associate professor and Professor. The number of staff involved in teaching in the degree programmes of LUT IT is presented in Table 6.

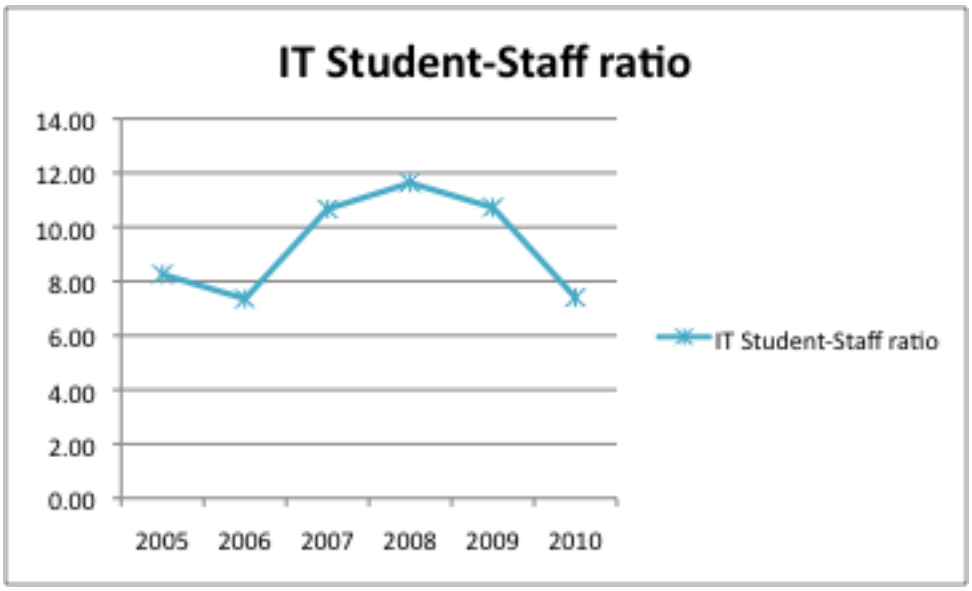
Table 6. The LUT IT teaching staff.

Summary of Staff contribution to the Degree Programme		
Position type	Permanent or equivalent positions	Total number of employees
Professorships	4	6
Associate Professors	4	8
Post-doctoral researchers	0	2
Other academic staff (assistants and doctoral students)	0	18
TOTAL ACADEMIC STAFF	8	34

Staff Handbook, which is prepared according to ASIIN's criteria, shows the educational level of the teaching staff and their scientific contribution (enclosure 14).

The development of the number of students related to the amount of teaching and research staff is presented in Figure 1. The student/staff-ratio has varied quite considerably during the years 2005-2010 for many reasons. For example, in 2007 a new degree program for Technomathematics and Technical Physics was established in the Faculty of Technology, and the LUT IT department staff teaching mathematics moved to it.

Figure 1. The LUT IT student-staff ratio.



5.2 Staff development

Lappeenranta University of Technology aims to create a good working environment for its staff, and to support their professional development and well-being at work. Functions related to human resources administration are presented in operations manuals of support services (in Finnish).

The university has a human resources committee, which is responsible for, among others, personnel training. Through this committee, the university personnel has a representation in decision-making concerning the development of the working environment and conditions. The chair of the human resources committee is the vice-rector in charge of education. The names of other members and committee memoranda are available on the University intranet.

The university supports its staff members in maintaining and developing their professional expertise and in career planning. The human resources committee annually revises its measures for professional development and maintaining professional expertise, which e.g. determine the focus areas of personnel training at the university. Measures for professional development and training are presented on the university intranet, in the memorandum of the human resources committee.

University also regularly organises training in university pedagogy, which aims to strengthen the practical teaching competences of the teaching personnel. University pedagogy is a multidisciplinary field that deals with learning, studying, teaching and assessment in the Higher Education context. The workload of the university pedagogy course is 25 ECTS credits in total, and it consists of five modules. The aim of the course is to provide university teachers the basic principles of learning and teaching in Higher Education institution, curriculum planning and assessment of learning and teaching. After taking the course, the teacher is expected to be able to evaluate and develop his/her own teaching and assessment methods. The teachers of the LUT IT are free to participate in any pedagogic courses available in Finland. Professors are also obliged to participate in management training organized by the University.

The costs of staff training organised by the university are covered by general personnel training appropriations. Moreover, each unit offers its staff members the possibility to take part in staff training outside the university in order to support their professional development and expertise. Personnel training is part of each staff member's duties, and therefore, training is usually arranged during working hours. The university supports the professional development of its personnel by allowing them to take two lessons (2 x 45 minutes) per week for independent study if the employee's supervisor and head of the unit consider that the studies serve the purposes of the working community.

University staff members have annual performance and development discussions with their immediate supervisor. The parties of the discussion examine results obtained, set goals for the near future also concerning the professional development and personnel training needed. Instructions for performance and development discussions are available on the university intranet.

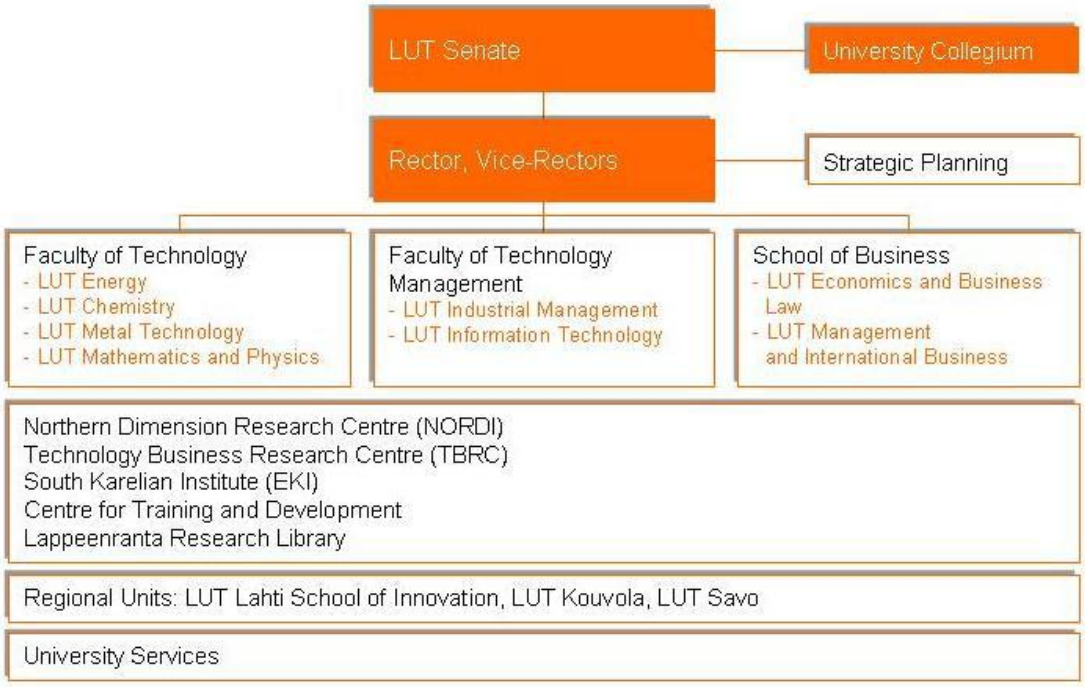
LUT's research and innovation services help and support LUT's research staff in questions dealing with research funding, administration and practical arrangements of contracts. The main task of the persons working in the unit of research and innovation services is to make it easier to transfer the results of scientific research to be utilized in the society and help to establish new enterprises and business. This unit also supports the researches in the matters of patents and novelty criteria of inventions.

5.3 Institutional environment, financial and physical resources

5.3.1. Institutional environment

University education is governed by the Universities Act (558/2009), the Government Decree on University Degrees (794/2004) and Regulations of Lappeenranta University of Technology 9/2009 (enclosures 1, 2, and 25). The roles and responsibilities of the management of education are defined in the Regulations of Lappeenranta University of Technology (enclosure 4). The educational goals are agreed upon annually in the negotiations between the University and the Ministry of Education and Culture. The achievement of goals affects the financing granted to the University by the Ministry. The financing decisions are made on annual basis. The aim of the university regulations (enclosure 25) is to lay the groundwork for academically and financially productive management and high-level administration at the university. These regulations describe the objective, mission, organization and administration of LUT. The organization of LUT is also presented in LUT Quality Manual (enclosure 12) and it is illustrated in general in Figure 2.

Figure 2. The organization of LUT.



The University Senate decides the strategic long-term goals of the university teaching and education, the total number of new entrants and the degree programmes provided by the University. The strategic long-term goals are presented in LUT's Strategy 2013 (enclosure 13).

The Rector decides the entry requirements and the total number of new entrants to each faculty. In addition, the Rector also makes the decision on the approval of new entrants to the degree programmes. The Rector also appoints, when necessary, the board of examiners to consider the remedial requests concerning the study attainments. The University applies the The University Regulations on Education and Completion of studies (enclosure 4) approved by the Rector. The regulations define the basic ways of action concerning the teaching and studying at the University, and the degree programmes provided by the University. The guidelines are published on the University's web-pages.

The University has a Vice Rector responsible for education. In addition, each department has an appointed director for education. The Vice Rector organizes a meeting with the heads of the

degree programmes once in every two months to discuss the leading, evaluating and developing principles of the degree programmes. The memos of the meetings are published in the University intranet. The Vice Rector also leads the University's supervisory and development group for teaching appointed by the Rector. The goal of the group is to promote the internal cooperation within the University in developing the teaching practises.

The student representation in the University's administrative bodies is determined by the Universities Act and the Regulations of Lappeenranta University of Technology. In accordance to the statutory representation in the administrative bodies, the students also have a representation in the University's supervisory and development group for teaching. In addition, the students participate in the development of teaching through the course evaluation carried out annually in each University study course, and through the teaching feedback enquiry organized by the Students' Union.

5.3.2. Committees responsible for teaching in the degree programmes

The university has three faculties: the Faculty of Technology, the Faculty of Technology Management, and the School of Business. LUT IT belongs to the Faculty of Technology Management and, as such, degree programmes are realized in this Faculty. The development and assessment of teaching in the Faculty of Technology Management is monitored at various levels; starting from the Faculty level and going all the way down to a single course and teacher.

The Faculty Council is responsible for supervising the quality of teaching. It also makes decisions concerning to study plans and degree requirements. In addition, the Council makes proposals to the Rector concerning the entry requirements and the number of new students to be accepted on each programme.

The quantitative and qualitative goals of the Faculty are agreed on a yearly basis in the negotiations between the Faculty and the University. The University takes into account the results of the Faculty's operation in previous years and the Faculty's development needs when allocating the money received from the Ministry of Education and Culture.

The Faculty is responsible for the equipment needed for teaching and research. The Dean of the Faculty is responsible for the resources needed for teaching. The Dean also appoints the Heads of the Faculty's degree programmes. In addition, the Dean accepts the Master's theses of the graduate students.

The head of the degree programmes is responsible for producing, evaluating and developing the degree programmes. He approves the topics of the theses of graduate students. Each degree programme of the Faculty also has an advisory group of education to help the Head of the Degree Programme.

The contents of the Major Subjects of the degree programmes are decided by the professors responsible for carrying out the research in the corresponding field of science. The major subjects are congruent with the focus areas of the research. The professors are also responsible for organizing teaching in their own remits. In addition, the professors make the propositions to the head of the degree programmes regarding the topics of the theses of their own students.

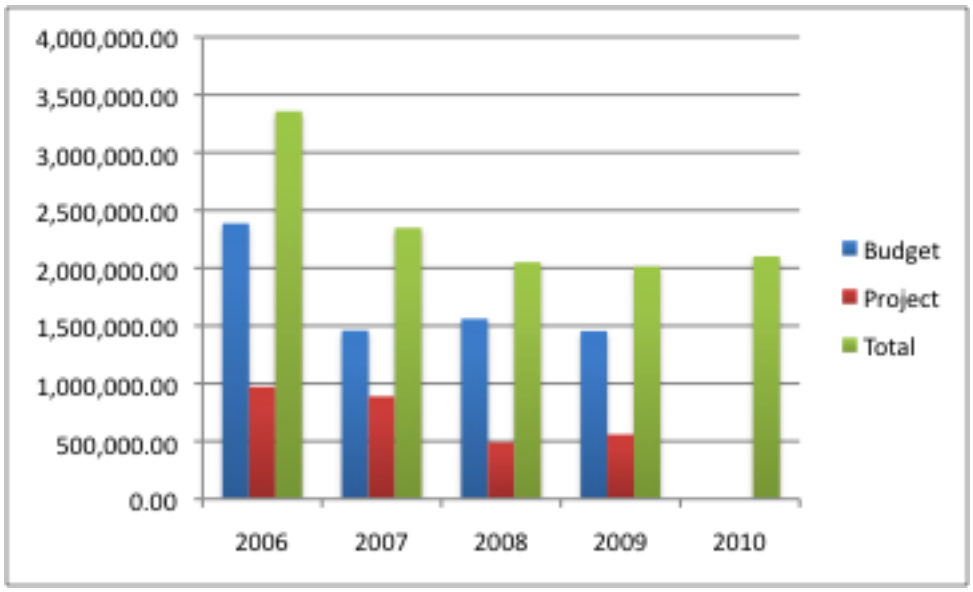
The Degree Programme of Information Technology has also an Industry Board, consisting of representatives of teachers, students and industry. The purpose of the board is to develop the content, quality, and industry relevance of the education. The industrial representatives play an important role to guarantee that the contents of the programmes meet the changing requirements of professional life. The board meets twice a year.

Teachers in charge of the study courses are responsible for executing, evaluating and developing their own teaching. The University has published a handbook called LUT Teacher's Quality Manual to support teaching (enclosure 8). The handbook contains information about the planning and implementation of study courses. It also gives instructions for defining the learning outcomes of the study courses, and for evaluating whether the learning outcomes have been achieved. In addition, the handbook provides the teachers with tools to measure of workloads of courses. The handbook is published as a printed version and in an electronic form on the University's intranet and on the Internet.

5.3.3. Financing of the programmes

LUT Information Technology financing of personnel is presented in Figure 3 for the period of years 2006 to 2010. On average the personnel funding 75% is covered by the University budget and the rest 25% by the research projects carried out by the unit (external funding). The budget funding includes costs related to teaching, teaching materials and maintenance of teaching equipments. Budget funding has decreased from the best years (beginning of 2000), but has settled around 1,5 M€.

Figure 3. LUT IT financing.



5.3.4. Cooperation within the university

The modules in the field of mathematics, physics and languages are produced by other departments and units of the university. The degree programmes of Information Technology include several modules from the other departments of LUT and students are highly encouraged to take a minor subject from some other department. The student may also include any modules taught at LUT into his/her elective studies. Table 7 shows how LUT IT students study courses from different departments.

Table 7. The courses taken from other departments by LUT IT students.

Producing department	Year	ECTS of students from LUT IT
LUT Energy	2006	934
	2007	273
	2008	178
	2009	180
	2010	119
LUT Chemistry	2006	8
	2007	33
	2008	
	2009	10
	2010	
LUT Metal	2006	72
	2007	57
	2008	75
	2009	56
	2010	18
Maths and Physics	2007	1,729
	2008	1,199
	2009	1,253
	2010	972
LUT IT	2006	10,825
	2007	7,980
	2008	7,315
	2009	7,138
	2010	4,966
Industrial mgmt	2006	1,775
	2007	1,496
	2008	1,179
	2009	1,152
	2010	783
Business administration	2006	1,510
	2007	1,146
	2008	849
	2009	840
	2010	903
Language center	2006	873
	2007	907
	2008	630
	2009	743
	2010	646
Total used	**2006**	**15,997**
	2007	**13,622**
	2008	**11,425**
	2009	**11,091**
	2010	**8,407**

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LUT IT also produces courses that are used by other programmes either as a part of their major or as a minor subject. Table 8 illustrates how other departments utilize courses produced by LUT IT. The curricula change in 2005 and creation of faculties in 2007 has decreased the usage of IT courses.

Table 8. The utilization of LUT IT courses by the students of other study programmes.

Producing department	Year	Total produced	ECTS of students from							
			LUT Energy	LUT Chemistry	LUT Metal	Electrical Engineering	Maths Physics	LUT IT	Indutrial mgmt	Business administratio
LUT IT	2006	20,940	1,238	841	1,390	1,552		10,825	4,438	65
	2007	11,964	147	51	256	739		7,980	2,238	55
	2008	10,153	160	21	74	441	90	7,315	1,608	44
	2009	10,151	98	17	103	491	45	7,138	1,746	51
	2010	8,168	101	23	85	396	35	4,966	1,831	73

5.3.5. External cooperation with institutions of higher education / other institutions

LUT IT has external co-operation related to teaching with other institutions at various levels: student exchange, teacher exchange and international co-operation in curricula development. In addition, LUT IT has several post-graduate level double degree agreements with foreign universities.

Student exchange

International student exchange and intake of degree students from foreign countries are strongly encouraged at LUT.

Student exchange is arranged by LUT International Services, which supports the university's internationalization by developing and maintaining cooperation relationships and agreements with international universities and networks. International Services is in charge of organizing student exchange programmes and coordinating EU's education programmes within the university. The office of International Services advises international students who apply for admission to M.Sc. Degree programmes taught in English. International Services also provides advising and assistance for outgoing and incoming students with practical arrangements, offers an orientation programme, runs tutoring system for international students and helps with accommodation arrangements.

LUT has an extensive partner network all around the world. The network of over 150 higher education and research institutions forms an excellent basis for collaboration and mobility of students, teachers and researchers, as well as joint education and research projects.

Student mobility is facilitated by several study abroad programmes: the Erasmus exchange programme in Europe, Nordplus exchange within the Nordic countries and bilateral agreements with several partner universities overseas. LUT is or has been a partner in Erasmus actions, Leonardo projects, and as well in several other European projects such as Asia-Link, Tempus projects, COST actions, Networks of Excellence and research projects funded from the EU's Fifth, Sixth and Seventh Framework programmes in different sectors. LUT is also a member of the Cross-Border University project, a Finnish-Russian consortium of nine universities developing joint master's degree programmes. In addition, LUT has several double-degree agreements with Russian partner universities. LUT is also a member of ISEP network, the International Student Exchange Programme.

Table 9 below shows the number of incoming and outgoing student exchanges in LUT IT.

Table 9. The LUT IT exchange students.

Student exchange	Incoming	Outgoing	TOTAL
2010	15	2	**17**
2009	15	2	**17**
2008	21	1	**22**
2007	19	2	**21**

Teacher exchange

LUT teachers can undertake short-term, 1-2 weeks, teaching assignments abroad within the framework of the Erasmus programme or within bilateral co-operation agreements. There are also possibilities for research exchange for teachers when the main focus during exchange period is research but the exchange also consist of some teaching lectures. Several visiting lecturers from foreign universities come to LUT IT every year to give lectures.

International curricula development

LUT IT has been active in various international programs. LUT IT started the first international Master's program (IMPIT) in LUT in 1999-2000. Since the first programme LUT IT has been actively starting cross-border university between Finnish and Russian universities, developing double degree model with the Russian Universities, and participating in international education networks in Erasmus program (PERCCOM in Erasmus Mundus, DEC and TRICE in Socrates). These international programs are not considered in this accreditation process.

5.3.6. Library

Lappeenranta Academic Library collections consist of c. 150.000 printed monographs, 68.000 printed journals, 65.000 electronic books, and 22.300 e-journals. The number of printed maps is 41, documents in microfiche form c. 1.100, and audio recordings 550. The annual procurement of printed monographs is c. 7.000 and the number of subscribed printed journals is 900 volumes per year. The Library provides its customers with library and information services both on-site and online. Information literacy education for the entire University is also arranged and given by the Library personnel. Electronic material is available remotely for LUT staff and students only. The Librarians act as experts in publishing LUT series. Within LUT, the Library is one of the Independent Institutes.

There are c. 400.000 yearly visits to the Library. The Library is open to LUT staff, students, and general public during terms on workdays: Mon-Thu 8:30-18:00 and Fri 8:30-15:30. In summer and during the holiday season the Library closes at 15:30 on each workday. There are no restrictions to the number of loans. The customers access the Library catalog Wilma 600.000 times per year. The Wilma database includes information about both printed and electronic books as well as the storage information of printed journals. Electronic books can be accessed via a link the Library catalog. There are over 20 database vendors with more than 182 databases available for the Library customers. Most database hosts allow IP access to their information sources. Students and staff have also remote access to e-journals and electronic books.

The number of Library staff is 21, nine of whom have Master's degrees in science or arts. Ten staff members have professional library qualifications which equal to Bachelor's degrees. One of the staff members is an IT specialist. The number of seats for reading in the Library is 170. There are 100 computer workstations available for the customers. The Library also offers six workshop rooms with a total of 44 seats for group work.

5.3.7. Other premises

At LUT there are 34 lecture rooms for teaching, 9 language laboratories and 14 computer classrooms. LUT Library has about 100 seats for students' individual learning purposes, several rooms for teamwork and two computer classrooms. The reading hall is open 24 hours.

5.3.8. IT provision and computer facilities

University offers the personnel Windows computers of a known brand for normal use, or a similar computer with more memory and enhanced display adapter for those who use scientific computing software. The screens are LCD screens. Both color and b/w printers and scanners are available to the personnel.

Students can use the computers which are in common use in the library area (Origo) or in the classrooms. Those are Windows computers of a known brand. Also printers and scanners are available for students.There is very little need for supervision and most of it is done with centralized electronic means such as browsing installed software. However, the student helpdesk Origo is located on the library area and the supporting team also supervises the students. Part of the supporting staff is students. They have direct access to the support team in the university information services and technology (IS&T). The IS&T staff qualify as B.Sc. or M.Sc. in their field.

Every student has access to every computer. There are 84 computers located in the library area, and they are available during the library opening hours. 325 computers located in classrooms are available when there are no lessons. There are 14 computing classrooms, 3 of which are equipped for scientific computing use and have 63 high-performance computers in total. One classroom has Linux setup. In addition there are 9 workshop rooms which have one or two computers each. On passageways there are some computers that can be used only for web browsing. These are typically used for email checking. Centralized services, such as learning environments can be accessed also outside of the campus. The university offers Eduroam WLAN services to enable use of students' own computers at the campus.

Students search and use publications that are available in the library or on the databases (www.lut.fi/en/library). They write reports, essays and theses. They enroll in the modules they are going to take (https://weboodi.lut.fi/oodi --> in English), they get the course information, learning material and assignments of the modules they have enrolled in (noppa.lut.fi --> in English) and they participate in the web-based modules on the University Moodle learning space. They use software specific to studies to solve problems and tasks that belong to their studies. Also email and Internet browsing belong to their daily tasks.

6. QUALITY MANAGEMENT: FURTHER DEVELOPMENT OF DEGREE PROGRAMMES

6.1 Quality assurance and further development

The key aim in the quality management and development at Lappeenranta University of Technology is to incorporate quality management into the normal activity of the university, with the underlying idea of continuous improvement. The university's quality management system covers the entire range of education provided by the university (undergraduate education, postgraduate education, continuing education and Open University education), research, societal and regional interaction, and support services.

The university's quality management system is described in LUT Quality Manual (enclosure 12) and operations manuals of support services. The university's quality management documents and other related material is available on the LUT intranet and Internet.

LUT Quality Manual depicts the university's quality policies and goals, key resources, the university's management practices, the university's key processes and their quality management, and practices related to the assessment, measurement and development of activities. LUT Quality Manual lays a foundation for describing the entire quality management system of the university and gives both internal and external stakeholders a comprehensive picture of the quality management of the university's different activities. The LUT Quality Manual depicts these activities and practices that apply to and obligate the entire university community.

The university has set quality targets, which have been derived from the university strategy. The following quality targets apply to education:

1. Competitiveness and internationality: LUT will be known for the best Finnish university education in technology and business, and will be a sought-after partner in cooperation at an international level.
2. High quality of degrees: International academic expertise as a result of education, which consists of a) specialist skills in one's own field and b) transferable skills.
3. Satisfaction with studies at LUT: the students of the university and employers of graduates are satisfied with the content and implementation of the education; the teaching staff is satisfied with the tools, facilities and support for educational purposes.
4. The possibilities for lifelong learning are numerous and flexible, and the training meets the needs of target groups.

The university has also published LUT Teacher's Quality Manual in order to guide teachers to good teaching (enclosure 8).

In its meeting of March 5th 2009, the Finnish Higher Education Evaluation Committee decided, based on the presentation and report of the audit group, that the quality assurance system of the Lappeenranta University of Technology meets the criteria set for the quality assurance system as a whole and for quality assurance of its basic tasks. The audit is valid for six years (enclosure 20).

6.2 Further development of the degree programmes

One of the vice-rectors is in charge of education at the university. He/she manages the educational affairs and development of education of the university in cooperation with the heads of degree programmes and steering and development committee for teaching. The vice-rector and the Heads of degree programmes have regular meetings, where they evaluate and discuss about procedures concerning education and needs for development. The steering and development committee for

teaching, in an advisory capacity, aids the vice-rector in decision-making. The committee, headed by the vice-rector, coordinates and promotes the development of LUT education, and prepares the application procedure for the quality bonus for teaching and prepares the allocation decision for the rector.

In each department there is an advisory steering committee for the degree programmes. It supports the head of the degree programme in producing, assessing and developing the degree programmes. In addition to the general advisory board, LUT IT has an industry board for the discussion of industry needs and visions for the future.

LUT IT works actively to develop the curricula to meet the high standards and to provide properly educated graduates mainly for the industry. As a result of this development work LUT IT has been granted with the LUT education quality bonus since the establishment of this procedure in 2007. LUT IT has also received grants from industry for the education development in the last few years.

The focus areas in terms of developing the quality of education at LUT and LUT IT level are the following:

- LUT: development projects for teaching
- LUT: internal quality bonus for education
- LUT: a salary system with incentives for high-standard education and its development
- LUT: pedagogical and other continuing education for the teaching staff
- LUT: support services for education
- LUT: system for the recognition of teaching qualifications
- LUT: recognition of good teachers by LUT student union
- LUT IT: Advisory board of the degree programme
- LUT IT: Industry board utilization
- LUT IT: Project based learning
- LUT IT: Pedagogic research and publications

LUT is actively involved in a number of different national and international development projects for teaching. The vice-rector in charge of education decides on development projects, which LUT engages in and starts to promote.

The university grants quality bonuses for the development of education for a year at a time. The quality bonus is a reward for development measures taken and an incentive for the further development of education and teaching. The steering and development group for education makes the preparations for the application procedure and the decision to grant a quality bonus, and the rector appoints the recipients of the bonus. LUT IT has been and is involved in several education development projects, since the start of this system. The development work has included for example strengthening the project skills in 2012, realization of industry board in 2011, development of curricula in 2010, etc.

The salary system provides an incentive for teachers to develop their teaching and pedagogical skills. The job classification of the teaching staff is based on scientific qualifications and their development, the development of teaching skills and the variety of teaching duties, and responsibility for one’s field of science and its development.

The university annually offers its teaching staff a study module in university pedagogy worth 25 ECTS credits (see Section 5.2). The teaching staff is also offered other training that supports their teaching and its development, such as training in the use of information and communication technology in instruction. The training is coordinated by Personnel Services.

The support services for education allow teachers to focus on actual teaching and study guidance. The support services provide administrative services related to instruction, as well as technological support e.g. in setting up web-based instruction and educational technology. The responsibility for these support services is shared by Student Services and Information Services and Technology, which operate within the context of University Services, and by faculty support services.

The recognition of teaching qualifications and the adoption of teaching portfolios in the appointment of teaching personnel supports the development of teaching. For teaching positions, the university recruits professionals with not only strong scientific expertise in the field in question, but with pedagogical skills, as well. To this end, applicants for teaching positions must also submit a teaching portfolio or another report on their teaching qualifications. In addition, the appointment of teaching personnel requires a trial lecture from the applicant.

Every spring, the Student's Union of LUT nominates the lecturer of the year and the course module of the year. LUT IT has had two lecturers of the year (Prof. Porras in 2000 and Assoc. Prof. Ikonen in 2009) since the start of this recognition in 2000. Assoc Prof. Ikonen received also the national recognition for good teaching in 2010. The nomination of the Course of the Year 2008 was given to the course CT60A0200 Fundamentals of Programming, which belongs to the Bachelor's Degree Programme in Information Technology.

The most recent education development in LUT IT in related to the industry needs and how the degree programmes can answer to these needs. In 2011 Industry board was established for the direct dialogue between LUT IT and industry. In 2012 the emphasis is on developing project skills in cooperation with industry. The development actions are documented and the results are published in suitable scientific forums. Two of the Doctoral graduates have emphasized education development and ICT solutions in their dissertations. A list of publications focusing on education development activities is presented in enclosure 29.

6.3 Instruments, methods and data

6.3.1. Evaluation during the degree programmes

During their studies students fill out several questionnaires by which they can give feedback and tell their opinions concerning the studies and conditions in the university. At the beginning of the studies the freshmen are asked to fill out a questionnaire concerning the progress of studies and the tutoring of freshmen. A feedback questionnaire to students and peer tutors helps to evaluate whether the start of studies and initial study guidance have been successful. The feedback survey is carried out annually by the Student Affairs Office. The feedback is discussed with the peer tutors and personnel in charge of study guidance. The feedback combined with practical experiences will be used to develop study guidance for new students and tutor training.

The Student Union also compiles student feedback regularly every other year. This questionnaire mainly concentrates on the well-being of the students, and it often points out some needs for development in education. The results of the questionnaire are communicated to the university personnel.

A study plan is an important tool to evaluate the progress of studies of an individual student. All LUT students prepare a personal study plan (HOPS) at the beginning of their studies. All personal study plans are evaluated and confirmed in accordance with faculty or department procedures.

The progress of studies and the accumulation of credits are monitored by the Student Affairs Office. The results are reported to the degree programmes, and the follow-up reports are available

on the LUT intranet. The accumulation of credits is also examined annually to confirm students' eligibility for student financial aid from the Social Insurance Institution of Finland (KELA).

The accumulation of ECTS credits is controlled individually for each module. Credit accumulation is a key method of performance assessment. Statistics on ECTS credits accumulated are compiled annually for each faculty, and the number of completed credits is one of the criteria for resource allocation to departments.

Student feedback for modules is collected for all of the university's modules in accordance with a university-wide procedure. Teachers together with the feedback system administrators are responsible for collecting student feedback. The electronic feedback questionnaire applies the same basic assessment criteria to all modules. The objects of assessment include the expediency of the module and a general impression of the module.

The following questions deal with the fulfilment of these criteria in LUT level (common to all courses):

1. The working methods applied were appropriate for the purposes of the course and they supported my learning during the course. Answers on a scale of 1-5 (1 = I disagree completely, 5 = I agree completely).
2. Overall evaluation of the course. Answers on a scale of 1-5 (1 = worst and 5 = best).
3. Open feedback on the course.

LUT IT has defined other mandatory questions to be included into the questionnaire. These include (see enclosure 28a):

4. If the requirements and contents of a course remain at the current level, how do you see the amount of credits of the course? (1 = clearly too low, 3 = suitable, 5 = clearly too high)
5. Consider your own work in this course. How do you see your own work compared to the workload estimation of the course? This is for various teaching modes separately e.g. lectures, exercises, etc. (1 = clearly less, 3 = same amount, 5 = clearly more)
6. Assume that the number of credits will remain in current level. How do you see the importance/value of the following parts? This is for various teaching modes separately e.g. lectures, exercises, etc. (1 = reduce considerably, 3 = stay at this level, 5 = increase considerably)
7. Calculate the time required for all work done in this course and compare that to the workload estimation. How much did you work altogether? (1 = less tan 50%, 3 = 75-100%, 5 = more than 25%)

The feedback system also allows teachers to add questions to the questionnaire (see enclosure 28b), thus collecting feedback for their own purposes. This, combined with the open feedback field in all of the questionnaires, supports the teachers' own professional development. Students are motivated to give feedback by preparing course-specific questions in addition to the general ones and by sending students a response to the feedback. The feedback for each course is recapitulated by the system administrator every semester with a general reporting form. The reports are forwarded to the head of degree programmes and to the quality manager, who then submits the reports to the vice-rector in charge of education before the performance and development discussions between the university management and faculties. The units' performance target negotiations deal with student feedback, and if the average assessment for a

course is very low (e.g. 2.5 or lower), the vice-rector in charge of education discusses the topic with the head of the degree programme.

6.3.2. Evaluation of the success of the degree programmes

The university management, faculty management, the head of department and the head of degree programmes shall ensure that the education provided by the university is efficient and of a high standard. Success of the degree programme is evaluated in many ways, which are described in the following. Alumni activities and employment of graduates are evaluated systematically.

Competence of graduates

Skills and knowledge accumulated by students during the entire education process are demonstrated in a final thesis, which is prepared by all Bachelor's and Master's level students. Skills in the student's native language are demonstrated in a maturity test at the end of the Bachelor's degree studies.

Quantitative results of a degree programme

Information on the number of graduates, the time in which their degree was completed and their employment is compiled into statistics by the LUT Student Services. The cost-efficiency of the education is also evaluated annually when the final accounts are drawn up. The frequency of student mobility is monitored annually by International Services. Student exchange statistics are compiled on the university intranet and published in the university's final accounts documents.

Satisfaction in the education

Satisfaction in LUT education is surveyed among LUT graduates at the time of graduation and after five years in the world of work, and among their employers. In addition to these regular surveys a specific statement of the education was requested from the information technology students for the accreditation process (enclosure 19).

Graduate feedback is collected from all LUT students at the time of their graduation – both Finnish and international students. The feedback is gathered together annually in February-March, and the results are reported at the university level on the intranet and broken down into individual degree programmes. Quality manager is responsible for this process together with the Student Services.

Moreover, feedback is collected annually from LUT graduates with a Master's degree and five years of experience in the world of work. The survey is conducted by LUT Career Services as a part of a national career follow-up. Employer feedback is collected e.g. through industry board. A new procedure concerning employer feedback has been introduced at the beginning of 2010: University follows up on the satisfaction of employers/supervisors in the outcome of thesis projects and in the skills of the students as they transition into the world of work. This questionnaire is sent to the employers and results are reported annually by the quality manager. International Services collects feedback on student and support services from incoming exchange students at the end of their stay and analyses it systematically. LUT students leaving for student exchange write a report upon their return. The report is then read by International Services and published on the university web site. These follow-up practices are described in further detail in LUT Quality Manual and operations manuals of support services. The key results of the quality assurance are presented in the following data tables.

6.3.3. Collected relevant data from the quality assurance system

Enrolment and studies

First year enrolments over the past five years on the consecutive Bachelor's and Master's degree programme in Information Technology have varied during the past five years as shown in Table 10.

Positions show the number of students accepted while Bachelor and Master represent students starting at different levels. Master is further divided into different programs.

Table 10. First year enrolments in LUT IT.

Degree prog.	2010	2009	2008	2007	2006
Accepted	132	137	111	NA	NA
Bachelor (consecutive)	30	40	40	-	-
Master (separate) *	102	97	71	-	-
Started	53	79	85	82	94
Bachelor (consecutive)	25	34	46	29	27
Master (separate) *	28	45	39	53	67
Timo	12	25	19	34	35
International	16	20	20	19	32

The number of students attending in each course is illustrated in Table 11.

Table 11. The number of students attending each course. The arrows illustrate how the same course moves through the table in different years.

Academic year	1	2	3	B.Sc. N	4	5	M.Sc. N	Total
2010-2011	27	24	20	222	30	43	81	447
2009-2010	21	22	25	53	53	39	338	551
2008-2009	29	25	22	42	45	74	363	600
2007-2008	21	25	26	17	103	118	318	628
2006-2007	24	29	85	7	137	103	310	686

International students are important for LUT IT. Table 12 shows the number of students in international programmes of LUT IT as well as short time exchange students.

Table 12. The number of students in international programmes of LUT IT.

Foreign students	2010	2009	2008	2007	2006
Exchange students incoming/ outgoing	15 / 2	15 / 2	21 / 1	19 / 2	
Students in the degree programmes accepted / started	63 /15	71 / 25	50 / 20	X / 19	X / 32

Progress of the students is carefully followed. Teachers and students try together to find the right ways to improve the success in studies to avoid interruptions of studies during the first two years. Table 13 shows the mean accumulation of credits for the first year of students respectively. The goal for the students is 60 ECTS credits per year and as such the studies of IT students are lagging behind.

Table 13. Progression of studies.

Progress of studies	2010	2009	2008	2007	2006
Cumulative credits after the 1st year (mean)	31.4	33.5	31.0	34.1	26.1

Graduation

The number of graduates in Information Technology program is presented in Table 14. The number of Bachelors is increasing, as it is mandatory step towards Master's programme. The number of Masters remains close to 40 graduates with the exception of 2010, in which year students were still able to graduate based on the old degree programme.

Table 14. Number of graduates from LUT IT.

Degree prog.	2010	2009	2008	2007	2006
Bachelor	19	10	5	0	2
Master (consecutive)	85	37	34	39	44
Master (separate)	30	9	25	27	23
Master Total	115	46	59	66	67
Graduates Total in programmes under accreditation	104	47	39	39	46

The mean duration of the studies both in Bachelor and Master's level has been followed and is presented in Table 15. Both mean and median values are presented. The values at this point present the time of graduation from the given point to the Master's degree. From the start of Bachelor's degree it has taken on average 7 to 8 years to get Master's degree and for those starting in Master's programme around 3 years. It should be noticed that in 2010 large number of old students were graduated due to the last chance to graduate with old degree structure.

Table 15. The mean duration of studies.

Study time	2010	2009	2008	2007	2006
Mean					
From Bachelor	9.98	7.39	8.10	7.04	7.86
From Master	4.85	3.72	3.05	3.08	3.06
ALL	8.64	6.12	5.79	5.48	6.31
Median					
From Bachelor	9.59	6.95	6.90	6.94	6.38
From Master	4.30	3.38	2.32	2.32	2.40
ALL	8.77	5.79	5.13	5.42	5.68

The average size of the studies in ECTS credits has also been gathered. The amount of credits at the time of graduation is presented in Table 16. This table presents accumulated credits at the time of Master's degree both in old and new credit system. As part of the graduates still used the old degree structure (180 vs. 120 ECTS credits) until to 2010 these both are shown respectively.

Table 16. The average number of credits at the time of graduation.

Credits in graduation	2010	2009	2008	2007	2006
Credits by old degree structure (180 required)	185.58	183.54	186.58	187.41	187.27
ECTS gredits in new Master's degree structure (120 required)	126.84	125.82	125.19	127.07	NA

From the distributions of final grades (weighted mean) of the graduates a slight emphasis towards grade 3 (good) can be seen (Table 17). Similarly, their grades in the Bachelor/Master Theses approach grade 4 (very good, Table 18). The grading scale of final theses seems to practically omit grade 1. This observation is justified, because the professors at LUT IT have agreed that their common objective is to aim for grade 3 (good) in each evaluated Bachelor/Master's theses. Professors regard the final theses as a process which is carried out in co-operation with the students, supervisors and the guiding professors and therefore it is reasonable to continue this process with the students until they have reached the targeted level.

Table 17. Final grade distributions.

Degree programme	2010	2009	2008	2007	2006
Bachelor					
1.00 – 1.99	1 / 5.3 %	1 / 10 %	0 / 0 %	0 / 0 %	0 / 0 %
2.00 – 2.99	6 / 31.6 %	4 / 40 %	1 / 20 %	0 / 0 %	1 / 50 %
3.00 – 3.99	9 / 47.4 %	3 / 30 %	4 / 80 %	0 / 0 %	0 / 0 %
4.00 -	3 / 15.8 %	2 / 20%	0 / 0 %	0 / 0 %	1 / 50 %
Master					
1.00 – 1.99	1 / 0.9 %	0 / 0 %	0 /0 %	0 / 0 %	0 / 0%
2.00 – 2.99	62 / 53.9 %	20 / 43.5 %	18 / 30.5 %	32 / 48.5 %	33 / 49.3 %
3.00 – 3.99	41 / 35.7 %	24 / 52.2 %	31 / 52.5 %	24 / 36.4 %	28 / 41.8 %
4.00 -	11 / 9.6 %	2 / 4.3 %	10 / 16.9 %	10 / 15.2 %	6 / 9 %

Table 18. Thesis grade distribution.

Thesis Grades	2010	2009	2008	2007	2006
Bachelor					
Grade 1	0 / 0 %	0 / 0 %	0 / 0 %	0 / 0 %	0 / 0 %
Grade 2	0 / 0 %	1 / 10 %	0 / 0 %	0 / 0 %	0 / 0 %
Grade 3	3 / 15.8 %	1 / 10 %	0 / 0 %	0 / 0 %	0 / 0 %
Grade 4	11 / 58 %	5 / 50 %	3 / 60 %	0 / 0 %	1 / 50 %
Grade 5	5 / 26.2 %	3 / 30 %	2 / 40 %	0 / 0 %	1 / 50 %
Master					
Grade 1	1 / 0.9 %	1 / 2.2 %	1 / 1.7 %	0 / 0 %	0 / 0 %
Grade 2	14 / 12.2 %	2 / 4.3 %	3 / 5.1 %	5 / 7.6 %	3 / 4.5 %
Grade 3	34 / 29.6 %	11 / 23.9 %	14 / 23.7 %	20 / 30.3 %	22 / 32.8 %
Grade 4	52 / 45.2 %	24 / 52.2 %	32 / 54.2 %	34 / 51.5 %	32 / 47.8 %
Grade 5	14 / 12.2 %	8 / 17.4 %	9 / 15.3 %	7 / 10.6 %	10 / 14.9 %

Feedback data

Section 6.2.1 presented the feedback and follow-up mechanisms for the modules and the whole degree programme. Table 19 presents an overview of the department level feedback. The mean value of the course evaluation given by the students has been quite stable through the years (mean 3.41-3.95; on scale 1-5) but the response rates have varied considerably.

Table 19. Overview of the student feedback on courses.

Course evaluation	2010 fall/spring	2009 fall/spring	2008 fall/spring	2007 fall/spring	2006 fall/spring
Mean value of responses	3.95	3.81 / 3.79	3.73 / 3.69	3.64 / 3.79	3.41 / 3.74
Number of responses	371	382 / 386	563 / 428	477 / 433	726 / 470
Total number of respondents	447	1006 / 658	1729 / 994	960 / 1284	1534 / 1091
Response rate, %	83.0	38.0 / 58.7	32.6 / 43.1	49.7 / 33.7	47.3 / 43.1

The mean value for LUT IT courses is presented Table 20. It should be noticed that courses have changed during years and there is no data for all the courses all the time.

Table 20. Detailed LUT IT course level student evaluations.

Course number	Course name	2010-2011	2009-2010	2008-2009	2007-2008	2006-2007	2005-2006
CT10A0100	Johdatus tietotekniikan opiskeluun	3.90	3.57	3.64	3.73	-	3.26
CT10A0300	Vertaistuutorointi					-	
CT10A1100	CBU Summer/Winter School in Information Technology						
CT10A4000	Kanditaatintyö ja seminaari		4.00	4.00	4.00	-	3.00
CT10A6000	Diplomityö ja seminaari						
CT10A9100	ECSE International Summer School in Novel Computing						
CT10A9500	Research Methods	3.25			3.89		3.60
CT10A9601	Research Methods, Laboratory Project						
CT10A9700	Summer School on Communications Engineering	4.00			4.56	4.50	
CT30A2002	Tietoliikennetekniikan perusteet	3.90	3.70	3.70	3.80	3.50	3.50
CT30A2200	Tietoliikenneohjelmistojen harjoitustyöt		3.71	-	3.63		3.50
CT30A2800	Käyttöliittymät ja käyttäjäkeskeinen suunnittelu						
	Käyttäjäkeskeiset tietoliikennepalvelut				4.00	2.90	
	User centric service design		3.20	3.60			
CT30A3200	www-sovellukset						
	www-ohjelmointi		3.94		3.77	3.63	3.50
CT30A3700	Tietoturva						
	Tietoverkot ja tietoturva			2.64			
	Tietoturvan perusteet	3.60	3.66	3.70	3.43	3.76	
	Secured communications		2.66		3.69		3.50
CT30A5001	Network Programming	3.50	3.42	4.00	3.88	4.00	3.60
CT30A6000	Communications Software, Protocols and Architectures		3.42	3.33			
CT30A7500	Parallel conputing (BOOK)						
	Parallel computing	3.80		4.30	4.00	4.00	4.10
	Advanced parallel computing			3.00	3.00		4.10
	Design of Parallel Algorothms			4.00	4.00	4.00	
CT30A8300	Wireless Service Engineering			3.57		3.13	
	Langaton tietoliikenne		2.63	3.60			
CT30A8902	Service oriented architecture	3.62	3.39	3.25			
	Web teknologiat			3.94	3.30	3.00	
CT30A8990	Informaatioverkostojen yksilölliset opinnot	3.67					
CT30A9002	Tietoliikennetekniikan seminaari	4.14	3.63	4.24	3.70	4.08	4.00
CT30A9300	Code camp on communications engineering						
	J2EE						4.10
	dotNET	3.80	4.00	3.80	4.10	3.90	
	MUPE				4.30		
	Android		4.20				
	XNA		4.20				
	Qt	4.90					
CT30A9400	Ad hoc and Sensor networking (BOOK)		4.00				
CT30A9600	Research methods, Communications Software Laboratory Work						
CT50A2000	Tietojenkäsittelyn perusteet I	3.44	3.12	3.68	3.54	3.14	3.60
CT50A2100	Tietojenkäsittelyn perusteet II		3.55	3.66	3.38	3.71	4.40
CT50A2310	Tietorakenteet ja algoritmit	4.38	4.37	3.91			
	Algoritmien suunnittelu				2.93	3.90	3.40
	Tietorakenteet ja C-kieli					3.30	3.50
CT50A2601	Käyttöjärjestelmät	3.62	3.87	3.92	3.82	3.50	3.30
CT50A3000	Unix and System Programming	2.70	3.82		-	-	-
CT50A4000	Introduction to Intelligent Computing		4.18				
	Introduction to machine vision and machine learning				4.00	4.10	4.00
CT50A5700	Introduction to Computer Graphics	3.44	4.16	3.50	3.29	3.77	3.00
CT50A6000	Pattert Recognition		4.33	3.64	3.29	4.17	4.20
CT50A6100	Machine Vision and Digital Image Analysis				4.20		
	Machine vision					3.90	
	Machine vision and pattern recognition		4.62				
CT50A6200	Computer and Robot Vision	4.71		4.23	4.17		
	Active and Robot vision						3.90
CT50A6400	Compiler Construction		4.10				
	Languages, compilers and interpreters			3.50	3.08	3.20	
CT50A6500	Älykkään laskennan seminaari		4.00	4.00	3.67	4.00	4.00
CT50A0200	Ohjelmoinnin perusteet	3.90	3.85	3.83	3.60		
	Ohjelmoinnin perusteet A					3.42	3.30
	Ohjelmoinnin perusteet B					3.43	3.50
CT60A0210	Käytännön ohjelmointi		3.88	3.53	3.68		
CT60A2410	Olio-ohjelmointi	4.00	4.15	4.06			
	Olio-ohjelmoinnin perusteet				3.70	3.35	3.10
	Object-oriented programming					4.00	3.10
CT60A4001	Ohjelmistotuotanto		3.55	3.90	3.63	3.32	3.60
CT60A4101	Software Engineering Methods	3.86					
	Ohjelmistotuotannon menetelmät		4.00	3.65	3.77	4.00	3.00
CT60A4301	Tietokannat		4.25	4.10	4.30	3.75	3.80
CT60A4400	Projektinhallinta	3.57	3.80	3.70	3.10	3.77	
CT60A5000	E-Business Technologies						
CT60A7100	Ohjelmistotekniikan seminaari		4.33	-	3.83	4.25	4.60
CT60A7201	Architecture in Systems and Software Development		4.00	3.61	4.25		
CT60A7302	Software Quality, Processes and Organizations	4.00		3.82			
CT60A7400	Fundamentals of Information Systems	3.51	4.08	4.00			
	Information systems research				4.43	4.11	
CT60A7500	Object-Oriented Programming Techniques	4.09	4.13	4.29	3.76		

MSc graduates of LUT IT have also answered to the feedback arranged by the university. The calculated mean values of numerical evaluations collected from the feedback from graduated Masters of Science in 2006 - 2010 show that the satisfaction level has remained relatively stable among the graduated students (mean values between 3.5…4.0, Table 21). The utilized questionnaire in the survey for the graduated students is in enclosure 21 and an example of a questionnaire used in Career and employment survey for the graduates in 2003 is in enclosure 22 (see results in 2.4.6 and enclosure 6).

Table 21. University level feedback survey on MSc graduates from LUT IT.

Satisfaction of the graduate on…	2010	2009	2008	2007	2006	Mean
Number of respondents	68	32	42	44	50	
Course content	3.54	3.63	3.58	3.58	3.54	3.57
Professional abilities	3.51	3.62	3.58	3.71	3.59	3.60
Transferable skills	3.39	3.42	3.33	3.44	3.32	3.38
Knowledge on my own field	3.74	3.87	3.74	3.57	3.92	3.77
The ability to apply theoretical knowledge into practice	3.49	3.55	3.52	3.64	3.36	3.51
Study guidance and athmosphere in the department	3.57	3.56	3.54	3.55	3.43	3.53
Guidance of the Master's Thesis	4.01	3.79	3.71	4.09	3.99	3.92
Mean	3.60	3.63	3.57	3.65	3.59	

The third example is the utilized questionnaire on thesis employer for LUT graduates (enclosure 27). Feedback by the commissioner of Master's Thesis is summarized in Table 22.

Table 22. The Master's thesis commissioner survey results.

Satisfaction of the commissioner of Master's thesis on …	2010
Basic knowledge and skills (scale 1-7)	6.07
Ability to learn new (highest value)	6.44
Ability to analyze results and to make conclusions (lowest value)	5.85
Project management and collaboration competences (scale 1-7)	5.97
Graduate would suit well as company worker	6.59
Graduate is able to work systematicly	5.48
Communication and presentation skills	5.53
Written documentation in Finnish is fluent	5.96
Oral communication in foreign language is fluent	5.37
Over all satisfaction on scale 4-10	8.9

7. DOCUMENTATION AND TRANSPARENCY

7.1 Relevant regulations

To receive the Degree of Bachelor of Science from LUT, at least 90 ECTS credits, including the Bachelor thesis, have to be gained in LUT (total degree 180 ECTS credits). For the Degree of Master of Science in Technology, the minimum is 70 ECTS credits, including the Master's thesis. The degrees and the Finnish universities that can award these degrees are defined in the Universities Act (558/2009) (enclosure 1).

The Head of the degree programme makes the decision regarding the modules included in the degree structure of an individual student, and approves any changes made to the student's personal study plan. Modules that are included in the Bachelor's degree cannot be included in the Master's degree.

Detailed regulations of the degree are given in the University Regulations on Education and the Completion of Studies (enclosure 4). National regulations on Master's level studies for universities are given in the Government Decree on University Degrees (National degree regulations 794/2004) (enclosure 2).

7.2 Diploma Supplement

At LUT a diploma supplement (DS) is formulated by following the directions of the National Board of Education and always attached to the B.Sc. and M.Sc. degree certificates (the actual degree certificate is in Finnish). Although, the DS is in English and meant for international use, it allows all interested parties to gain insight into the structure, content and level of the successfully completed degree, as well as an individual's performance. The diploma supplement is attached to the degree certificate along with the transcript of records. It includes the information about the University, modules included into the degree, as well as the grades of the modules and the structure of the degree (see enclosure 4). The Diploma Supplement indicates how the final mark was calculated (including weighting of marks) so that parties outside LUT can clearly see how each component was incorporated into the final degree. Both major and minor subjects are given an overall grade. The overall grade is the average of all the LUT courses completed by the student in the subject in question, weighted according to the workload of each course (see enclosure 26). More detailed information is available from the attached examples of the LUT diploma supplements, (enclosures 15 and 16, B.Sc. and M.Sc. supplements respectively).