ASIIN   Accreditation Report

Bachelor and Master Degree Programmes
- ## *Information Technology*

offered by
Lappeenranta University of Technology, Finland

Last update: 29.09.2012

ASIIN Accreditation procedure including an on-site visit for

Bachelor and Master Degree Programmes

- *Information Technology*

offered by

Lappeenranta University of Technology, Finland
on 22-23 May, 2012

Quality Labels Applied For

Within the scope of assessing the degree programmes, Lappeenranta University of Technology applied for the award of these labels:

- ASIIN seal for individual degree programmes
- Euro-Inf Quality Label

Audit Team

Prof. Dr. Thomas Ottmann	University of Freiburg
Prof. Dr. Hans-Ulrich Bühler	University of Applied Science Fulda
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A Preliminary Remark

The on-site visit for the Bachelor and Master degree programmes Information Technology took place at Lappeenranta University of Technology, Finland in Lappeenranta on 22-23 May, 2012.

Prior to the talks with the representatives of the university, the peers met to prepare their questions and to discuss the self-assessment report. Professor Dr. Thomas Ottmann was asked to act as speaker of the audit team for the aforementioned degree programmes. ASIIN's Technical Committees 02 - Electrical Engineering/Information Technology and 04 – Informatics/Computer Science are responsible for the accreditation procedure of these programmes.

The peers held discussions with the following groups:

University management, responsible managers of degree programmes, teaching staff, students graduates

Additionally, the auditors inspected the infrastructure and the technical equipment at Campus Lappeenranta.

The following chapters relate to the report provided by the LUT, Finland in April 2012 as well as to the discussions and information provided during the on-site visit including samples of exams and final theses.

The assessment and the award of the ASIIN-seal are always based on the European Standards and Guidelines (ESG). In the case of the award of other seals or labels, the criteria of the respective seal or label-owner (EQANIE, ENAEE) are considered additionally.

Based on the „Euro-Inf Framework Standards and Accreditation Criteria", EQANIE as owner of the label has authorized ASIIN to award the Euro-Inf® Label. The assessment for the award of the Euro-Inf® Label based on the General Criteria of ASIIN as well as on the Subject-Specific Criteria (SSC) of the Technical Committee 04 - Informatics.

The report has the following structure: Chapter B presents the facts which are necessary for the assessment of the requested seals. The information principally stems for the self-assessment report and related appendices provided by the Higher Education Institution. The statement of the HEI is subsequently included with the exact wording. The final recommendation of the peers and the Technical Committees as well as the final decision of the Accreditation Commission are drafted after and based on the statement of the HEI (and additional documents, if applicable).

Any gender-specific terms used in this document apply to both women and men.

B Description of the degree programmes

B-1 Formal specifications

a) Name & Awarded Degree	b) Study-Mode	c) Programme Duration & Credit points	d) first & annual enrolment	e) expected intake	f) fees
Information Technology B.Sc.	Full time	6 semester 180 CP	WS 2005 WS/SS	24 per semester	--
Information Technology M.Sc.	Full time	4 Semester 120 CP	WS 2005 WS/SS	35 per semester	--

B-2 Degree Programme: content concept & implementation

Objectives of the degree programmes	Objectives for the study programmes have been defined and outlined for each programme and made accessible to students and other stakeholders. As stated in the self assessment report and the study guide for information technology the objectives are as follows: The degree programmes in Information Technology shall 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 shall be capable of continuing his/her studies in the field of IT. The degree programmes aims at combining up-to-date research knowledge and the fundamentals of computer science and provides this information to the students with modern and efficient teaching methods. The education in LUT IT shall be international, multidisciplinary and multicultural. 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.
Learning outcomes of the degree programmes	Learning outcomes for the study programmes have been defined and outlined for each programme and made accessible to students and other stakeholders. As stated in the self assessment report and the study guide for information technology (accessible on the LUT web

site to all students, staff members and all other interested parties) the objectives are as follows:

<u>Bachelor's Degree Programme</u>

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 shall have the following learning outcomes and also the superordinate educational objectives:

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

The graduates from the <u>master's degree program in Information Technology</u> shall have a solid foundation in information technology and expertise in the specialties of the major. The graduates shall be able to work in various roles as members of a group both in domestic and international environments.
The graduates with the <u>Master's degree</u>
- are able to take advantage of the disciplines of scientific consideration and reasoning and are able to exploit scientific approaches and methods
- master thoroughly the specialties of the selected major
- are able to act as experts and developers in their fields of specialty during the working life
- understand the foundations of the minor subject selected
- possess good communications skills and proficiency in at least one foreign language

	- possess good skills in presenting, in knowledge and capabilities in cultural and multinational aspects, team work, project work, and in leadership and management - are ready for doctoral studies and life-long learning in working life - 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 - 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 supposed to be mainly given in English language and as such, the graduates are expected to communicate both orally and in writing using English language Furthermore, each major has specified learning outcomes listed in the self assessment report.
Learning outcomes of the modules/module objectives	The objectives of the individual modules are described in a module handbook and the study guides. The module descriptions are available to students in electronic form and on the website.
Job market perspectives and practical relevance	The HEI mentions the following job perspectives for the graduates: 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 reveals that the following: Graduate surveys immediately and five years after graduation are used to collect relevant information on the professional qualification of the graduates. According to the LUT, 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 are made from the Master's graduate survey five years

after graduation:

- 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 shall focus on these areas since they have the widest gap between the importance and the development of the skills.

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

Practical relevance of the programmes shall be achieved through the results of Graduate surveys and by the following arrangements:

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 shall 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 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 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. 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.
Admissions and entry requirements	The following entry requirements are defined in the university regulation on education and the completion of studies. Bachelor's programme The Finnish University Law (2009/558, 37§) rules the entry requirements for the Bachelor's degree. DIA-applicants (joint-application to Studies of Bachelor and Master of Science in Technology) 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. 70 % of the remaining study places are selected based on the success in the matriculation examinations and 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. 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.

The entrance and admission requirements for <u>Master's programme are the following</u>

All students accepted in the Bachelor's programme are also accepted in the Master's degree programme. Applicants should have a B.Eng/ 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.

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.

Curriculum/content

Courses produced by the department 2011 —2012

Courses produced by the department		*ECTS cr*
CT10A0100	Introduction to Studying Information Technology	2
CT10A0300	Peer Student Tutoring	3
CT10A1100	CBU Summer/Winter School in Information Technology	1 - 7
CT10A4000	Bachelor s Thesis and Seminar	10
CT10A6000	Master s Thesis and Seminar	30
CT10A9100	ECSE International Summer School in Novel Computing	1 - 3
CT10A9500	Research Methods	3
CT10A9601	Research Methods, Laboratory Project	1 - 5
CT10A9700	Summer School on Communications Engineering	2

Communications Software laboratory

Head of Laboratory: professor, D.Sc. (Tech.) Jari Porras   *ECTS cr*

CT30A2002	Introduction to Telecommunications	7
CT30A2201	Laboratory Course in Telecommunications Software	5
CT30A2800	User Interfaces and User-Centric Design	7
CT30A3200	Webbed Applications	7
CT30A3700	Information Security	7
CT30A5001	Network Programming	7
CT30A6000	Communications Software, Protocols and Architectures	8
CT30A7500	Parallel Computing	5
CT30A8301	Wireless Service Engineering	7
CT30A8902	Service Oriented Architecture	5
CT30A8991	Individual Studies in Information Networks	2 - 5
CT30A9002	Seminar on Communications Engineering	3 - 4
CT30A9300	Code Camp on Communications Engineering	4
CT30A9400	Ad Hoc and Sensor Networks	5
CT30A9600	Research Methods, Communications Software Laboratory Work	4

Machine Vision and Pattern Recognition laboratory

Head of Laboratory: professor, D.Sc. (Tech.) Ville Kyrki   *ECTS cr*

CT50A2000	Foundations of Information Processing I	5
CT50A2100	Foundations of Information Processing II	5
CT50A2310	Data Structures and Algorithms	5
CT50A2602	Operating Systems	5
CT50A3000	Unix and System Programming	5
CT50A4000	Introduction to Intelligent Computing	5
CT50A5700	Introduction to Computer Graphics	5
CT50A6000	Pattern Recognition	7
CT50A6100	Machine Vision and Digital Image Analysis	7
CT50A6200	Computer and Robot Vision	7
CT50A6400	Compiler Construction	7
CT50A6500	Seminar on Intelligent Computing	4

Software Engineering laboratory

Head of Laboratory: professor, Ph.D. Kari Smolander   *ECTS cr*

CT60A0200	Fundamentals of Programming	5
CT60A0210	Practical Programming	5
CT60A2410	Object-Oriented Programming	5
CT60A4001	Software Engineering	5
CT60A4101	Software Engineering Methods	5
CT60A4301	Databases	5
CT60A4400	Project Management	5
CT60A5000	E-Business Technologies	5
CT60A7100	Seminar on Software Engineering	4
CT60A7201	Architecture in Systems and Software Development	7
CT60A7302	Software Quality, Processes, and Organizations	7
CT60A7400	Fundamentals of Information Systems	7
CT60A7500	Object-Oriented Programming Techniques	5

B-3 Degree programme: structures, methods and implementation

Structure and modularity	The Bachelor's degree in Information Technology comprises the following studies: - General studies min. 103 ECTS cr - Major subject min. 46 ECTS cr - Minor subject min. 20 ECTS cr - Elective studies min. 11 ECTS cr The Master's degree in Information Technology comprises the following studies:

	- General studies min. 18 ECTS cr - Major subject min. 72 ECTS cr - Minor subject min. 20 ECTS cr - Elective studies min. 10 ECTS cr The size of the modules is shown in the above overview of the courses produced by the department. The structure of the Bachelor's degree is described in the University Regulations on Education and the Completion of Studies. LUT IT offers courses together with the Department of Industrial Management from the Faculty of Technology Management, but the students can also take courses offered by other university departments. The modules in the field of mathematics, physics and languages are produced by other departments and units of the university. 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.
Workload and credit points	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. 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). 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 Bachelor's thesis and seminar amount to 10 ECTS credits and the Master's thesis to 30 ECTS credits.
Educational methods	According to the self-assessment report, the following educational methods are in use: The teaching methods consist of lectures, classroom and laboratory exercises, supervised assignments (individual or team work), homework,

	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. According to the self-assessment report, 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. Options for elective modules are available.
Support and advice	Offers for the support and advise of students are provided as described below: 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. The LUT describes in detail the roles and duties of study guidance personnel for Peer Tutor, Tutoring coordinator, Student adviser, Study counseling psychologist, Study coordinator, Head of degree programme, Head of study affairs, Study secretary, Student affairs office, Teacher tutor, Teachers Introductory course, Professors, International services, Career services, Language centre, Library, Origo helpdesk.

B-4 Examinations: system, concept and organisation

Exam methods	According to the self-assessment report and the information gathered during the discussions, the exam methods described subsequently are foreseen: 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.
	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.
	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. 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.
	Students must prepare a written maturity test to demonstrate their native language skills and how well they know the topic of their thesis. 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.
	If the student has demonstrated his or her language skills in connection with the lower university degree, the language of the maturity test on master´s level 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. 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.
Exam organisation	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.
	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 (as stated in the University Regulations). 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. 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 Bachelor's thesis and seminar amount to 10 ECTS credits and the Master's thesis to 30 ECTS credits. A more detailed description of the rules regarding the examinations, enrolment, assessment, and sanctions for unethical conduct are given in the Examination Regulations and in the University Regulations on Education and the Completion of Studies. Compensation guidelines for disabled students are given in the LUT Teacher's Quality Manual

B-5 Resources

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 involved	According to the HEI, the teaching staff is composed as listed. 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.
Staff development	The University mentions the following subject-related and didactical further training for staff: 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.
	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.
Institutional environment, financial and physical resources	The University is divided into three faculties: Faculty of Technology, Faculty of Technology Management and School of Business. The Faculty of Technology is subdivided into four departments: LUT Energy, LUT Metal Technology, LUT Chemistry and LUT Mathematics and Physics. 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. 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 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.
	LUT Information Technology financing of personnel and financial resources

	are described in detail in the self-assessment report. 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 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.
	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.
	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 of the self-assessment report.

B-6 Quality Management: further development of degree programmes

Quality assurance and further development	The LUT describes its quality management as follows: 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 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 also published LUT Teacher's Quality Manual in order to guide teachers to good teaching. The university has set quality targets, which have been derived from the

university strategy. 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.

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.

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. Success of the degree programme is evaluated in many ways, which are described in the self-assessment report. Alumni activities and employment of graduates are evaluated systematically. This includes: Competence of graduates, Quantitative results of a degree programme, Satisfaction in the education.

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.

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.
Instruments, methods & data	Collected relevant data from the quality assurance system are described and analyzed in the self-assessment report. This includes: - First year enrolments in LUT IT. - The number of students attending each course - The number of students in international programmes of LUT IT - Progression of studies - Number of graduates from LUT IT - The mean duration of studies - The average number of credits at the time of graduation - Final grade distributions - Thesis grade distribution - Overview of the student feedback on courses - Detailed LUT IT course level student evaluations - University level feedback survey on MSc graduates from LUT IT. - The Master's thesis commissioner survey results - Career and Employment Survey

B-7   Documentation and transparency

Relevant regulations	The regulations below have been provided for assessment: - Universities act 558/2009 (put in force) - Government Decree on University Degrees (794/2004) (put in force) - University regulations on education and the completion of studies (approved by the rector on 21 June 2011) (put in force) - Study Guide for Information Technology - LUT Quality Manual, Version 4.0 (put in force) - Final thesis instructions (approved by the vice-rector on 9 June 2010) (put into force)
Diploma Supplement and qualification certificate	Samples of the Diploma Supplement in English language are annexed to the self-assessment report. They provide all necessary information (the nature, level, context, content and status of the studies, the success of the graduate as well as about the composition of the final grade). In addition to the national grade, an ECTS grading table according to the ECTS User's Guide is foreseen.

C Assessment of the peers – ASIIN Seal and Euro-Inf Label

Based on the General Criteria for the Accreditation of Degree Programmes and the Subject-Specific Criteria of Technical Committee 04 – Informatics and Technical Committees 02 - Electrical Engineering/Information Technology valid at the time of conclusion of the contract.

Re 1: Formal Specifications

Re a) The auditors considered the **names** of the degree programmes as not fully appropriate to the objectives pursued in the respective programme and the content of the respective curriculum. They discussed this topic with the HEI and came to the conclusion that at least the English title (Information Technology) seemed to be misleading in accordance with the intended qualification profile, which clearly reflects a programme of Computer Science. They learned that the Finnish title seemed to be more appropriate. Further discussion is pointed out in the chapters below (*Learning Outcomes* and *Curriculum).*

The auditors verified whether the awarded degrees comply with Finnish regulations and found that they do.

The auditors took note of the standard period of study and the credit points. In this regard, the peers understood that as the division of the Bachelor and Master degree programme according to Bologna is still a comparably new concept for Finnish universities. The peers saw that around 90% of the Bachelor graduates continue with the Master's degree. Nevertheless, according to the university there is a changing process taking place in which the ministry and society aspire people to turn into the working life sooner than it is the fact currently. The peers acknowledged that LUT tries to strengthen the Bachelor's degree. However the peers had the feeling that at present a clear distinction is not yet put in place. Thus, they recommend pushing forward the nationwide discussion about sharpening and separating the Bachelor's from the Master's degree to better align them with the Bologna process. The Bachelor´s degree should be considered as the first university degree and not only as a "lower" qualification on the way to the Master´s degree. Details are discussed in the chapter below.

The auditors took note of the further formal information provided by LUT.

Re 2: Degree Programme: content concept & implementation

2.1 Objectives of the degree programmes

In general, the level of objectives of these degree programmes seemed to conform to the level of European first and second cycle programmes. In general, the academic and professional classification is appropriate.

2.2 Learning outcomes of the degree programmes

In general, the level of learning outcomes of these degree programmes seemed to conform to the level of European first and second cycle programmes and are published online as well as documented in regulations of LUT. The peers judged them as acceptable but saw room for improvement.

In regard to a recommended sharpening of the Bachelor´s Profile, the auditors judged that a more specific and less generic qualifications profile of Bachelor´s and Master´s graduates is recommendable. This is also valid for a specific job market profile (see chapter below). The peers considered it recommendable to work out a more distinctive qualifications profile for each degree programme, thereby clarifying the acquired competences of graduates and the areas of professional/industrial work they most likely will get into. As programme coordinators and staff conclusively and distinctively described the study aims and learning outcomes to be achieved in the study programmes, the auditors believed the aforementioned recommended aspect to be largely a problem of description, not one of structure. During the discussion with the students, the auditors also gained the impression that the aims of the programme and the envisaged employment opportunities were not completely clear to the students.

In principle, the peers found it difficult to grasp the understanding of information technology. They considered the intended learning outcomes as being more those of Bachelor´s and Master´s Programmes of Computer Science. This impression got intensified during the discussions with the university representatives and students. Furthermore, the peers referred to international professional associations and societies (IEEE-Institute of Electrical and Electronics Engineers; ACM-Association for Computing Machinery) and their professional recommendations/expertise of study programs of information technology / computer science. Thus, the intended learning outcomes do more characterize study programs of computer science, whereas study programs titled information technology do have other focuses of qualification profile. The representatives of LUT referred to the historical background of the term computer science, its application in Finnish Technical Universities and an originally intended engineering profile. Nonetheless they agreed to a misleading translation of the Finnish name of the program and described the adequate Finnish name. This is supported and confirmed by the students.

Taking these precautions into account, the stated objectives and learning outcomes provided the peers with a reference for the evaluation of the programmes` curricula and resources.

Assessment for the award of the EUR-ACE® / Euro-Inf Label®:

In this regard the peers discussed the initial apply of LUT for the EUR-ACE Label. For the reasons mentioned above the experts deemed that the intended learning outcomes of the degree programmes under review do not comply with the engineering specific part of Subject-Specific Criteria of the Technical Committees 02 - Electrical Engineering/Information Technology. Though, the peers judge that they do comply with the Subject-Specific Criteria of the Technical Committee 04 - Informatics. Therefore, it is recommended to apply for the Euro-Inf® Label of EQANIE. The representatives of LUT stated their intent to apply for the Euro-Inf® Label.

2.3 Learning outcomes of the modules/module objectives

The peers assessed that the learning outcomes have been mostly described sufficiently and transparently yielding a sound basis for the assessment of the students` and graduates` knowledge, skills and competences. However, due to the positive and appreciated quality

handbook and its instructions regarding module descriptions the peers recommended improving the module descriptions.

Missing module descriptions are delivered during the talks respectively their existence is shown electronically.

The stated objectives and learning outcomes provided the peers with a reference for the evaluation of the programmes` curricula and resources.

2.4 Job market perspectives and practical relevance

In principle, the auditors gained the impression that graduates have a solid chance for finding employment in the mentioned fields and therefore the desired qualifications will allow for a professional career in the respective areas. However, to better inform the relevant stakeholders, the specific employment perspectives for graduates and the intended practical competences should be clarified. The auditors considered the descriptions of job markets and relating competences as too generic and a lack of possible career paths for the graduates.

The peers deemed the practical elements to be partly sufficient in order to prepare students for dealing with industry-related problems and tasks. After the feedback of students they considered the internship of both programmes as improvable regarding the requirements, and supervision through teaching staff of LUT and therefore the achievement of the intended competences and adequacy of traineeships. Actual, the credit points do only partly reflect the individual achievement and workload. Furthermore: Whereas the Bachelor´s internship is considered as only loosely coupled to professional practice relevant for the intended qualification profile of graduates, the Master´s internship (between 2 and 8 cp) seemed inappropriate regarding the research orientation and relating supervision, its integration in the curriculum and specified rules to award credit points.

The peers considered the classification of the Master degree programme as having a research-oriented profile to be questionable. On the one hand, they see that teachers as well as students are involved in research projects and the department co-operates with various research groups on national and international level. On the other hand, the (practical) research elements, which should be maintained through internships and Masters' thesis are partly doubted.

2.5 Admissions and entry requirements

The auditors discussed with the representative of the higher education institution (HEI) as to what extent the admission requirements have an impact on the quality of the degree programme. In general, they found the admission requirements and procedure appropriate to serve this purpose. They gained the impression that the applicable regulations are transparent and accessible to all stakeholders involved. The peers come to the conclusion that rules are in place to enable flexibility in the admission for those who fall short of some admission or entry requirements.

However, the peers found that the number of students, exceeding the standard period of study is very high mainly due to nonbinding admission requirements. The students are allowed to exceed the standard period of study of each programme and a majority of students makes use of this opportunity. As to the Master´s degree programme, the peers discussed the

consequences of the fact that all students accepted in Bachelor's degree are also accepted in Master's degree. In their opinion this requirement makes it difficult for the university to ensure the requested level of the programme. The peers also understood that students can follow Master modules already during their Bachelor study which consequently leads to a regular extension of the standard period of study. In the discussion with the students they discovered that some students which are about to complete their Master's degree programme sometimes still have to finalise their Bachelor's thesis or basic Bachelor modules like Mathematics. The peers got the feeling that not all students in Master level modules might have the desired competences to successfully complete them on an adequate and expected level. Furthermore, the current system also seems to contradict the separation between first and second cycle programmes as foreseen by the framework of qualifications for the European Higher Education Area because no clear distinction is made. However, the peers took note that the practice is agreed upon among all universities within Finland, and appreciate that LUT is in discussion with the government in order to change this situation. To sharpening the Bachelor´s profile and offer better structured and supported programme due to the achievement of learning outcomes in the standard period of time, it is recommended to devise a practice that Bachelor students are only preliminarily admitted to the Master's degree programme before having completely finished the Bachelor's degree programme. They should be obliged to fulfill the admission requirements within a certain time span. It is recommended that exceeding the standard period of study of the Bachelor´s programme should be the exception, not the rule.

2.6 Curriculum/content

The auditors found the curriculum of the Bachelor's programme and of the Master's programme is by the majority corresponding to the intended learning outcomes. Therefore, their impression intensified that the English name of the program does neither reflect the qualification profile nor the curriculum.

The peers discussed with representatives of the university the extensive contents of mathematics and physics. They considered this proportion not only as to high but also as too unspecific in regard to the special programmes and its intended qualification profile. The peers as well as the representatives of LUT considered it reasonable both to integrate more relevant contents like [discrete mathematics, logic, algebra, methods of proof] and to integrate the proportion into those minors that are in need to special education in physics or mathematics. The contents and amount of the physics and mathematics courses must be tailored to the needs of computer sciences and better reflect the intended learning outcomes and individual study program.

Assessing the curriculum the peers gained the impression, that some fundamental contents of informatics were underrated. In order to enhance the competences of students in those fields of learning, which the auditors believe to be integral parts of a computer science programme, the curriculum of the Bachelor's and Master´s degree programme could be improved by integrating topics like computer architecture, distributed systems, theory of computation. Moreover the peers recognized that fundamental competences of informatics form part of the area electives and that the university advises students which electives to choose. It should therefore be better

assured that all graduates achieve skills and knowledge in these areas which the peers deemed necessary.

In this regard the peers considered the Module "Foundations of Information Processing 1 and 2" as very broad and ambitious to an early stage of study progress.

Re 3: Degree programme: structures, methods and implementation

3.1 Structure and modularity

The audit team found that the ASIIN-criteria for modularization are met. Usually, each module consists of different didactic elements such as theoretical lectures and practical elements in the computer laboratory.

At first the peers considered the major/minor structure of the programmes as unspecific (due to intended qualifications) and non-transparent. The LUT explained the modular structure, opportunities as well as the support for individual study progress. The peers could accept the regulations and practices in principle. However they learned from the students of Master programme that expanding the range of electives by offering specialized courses in the major subjects of the master´s program is highly enquired and considered adequate to offer individual and competence-oriented stud focus and priorities.

The discussions convincingly demonstrated that the HEI generally intends to broaden opportunities to both student exchange and staff exchange as central internationalization instruments, and endeavors to foster both by means of strategically promoting partnerships with national and international universities. The audit team appreciates the measures in place to ensure the opportunity for an exchange semester. Yet, they recommended to further support the international mobility of students in order to strengthen intercultural competences.

The peers found that different modules are in use due to the Bachelor´s and Master´s level. However, the overview in the diploma Supplement does not show the differences of modules and their different use in Bachelor and Master.

3.2 Workload and credit points

The audit team found that, in principal, the ASIIN-criteria for the award of ECTS credits are met. This conclusion has been supported by the students' response, who valued the allocation of credit points to individual modules as overall correctly reflecting their factual workload, thereby taking notice of differences due to varying learning and coping strategies. Nevertheless, the peers supported the planned workload evaluation. Accordingly, they recommended to assess the students' workload systematically and to adapt the ECTS allocation, should that be necessary. Furthermore the mentioned possibility and high use of exceeding the standard period of study of the Bachelor´s programme as well as the options of individual choice of modules effects the award of less than 27 credits per semester.

3.3 Educational methods

The auditors compliment the LUT on a rich spectrum of didactical methods applied for teaching (including especially code camp). The teaching methods used for implementing the didactical concept support the attainment of the learning objectives.

<u>3.4 Support and advice</u>

In principle, the audit team saw sufficient resources to guarantee support and counseling for students. In the discussion with the students they found out that students are satisfied regarding the support from the university.

As mentioned above, the auditors gained the impression, that the freedom of individual study progress and the exceeding of standard period are a result of unbinding regulations and improvable support. They recommended improving the support and supervision of the individual study progress and adequate choice of courses to assure that all students achieve the intended learning outcomes, study progress and adequate credit point per semester. However, they learned from the discussions with representatives of LUT as well as students that there is a peer tutor systems, which intends to give the adequate support for individual study progress. This could be improved and be focused more on the special student group, which – in practice - are mostly part-time students.

Re 4 Examinations: system, concept and organisation

The peers discussed the organization, number and concept of examinations with the students and the teaching staff. The auditors gained the impression that the chosen exam types are oriented at the learning objectives. The peers learned that one supervisor for the final thesis is definitely from the university to make sure that a scientific work is provided. The auditors found that the organization of exams is appropriate and does not affect the theoretically foreseen time of study.

They considered the offer and coordination of 4 examination dates as ambitious, commendable and very attractive for students. However, they also gained the impression that this leads to a very high workload for teachers (cf. chapter 5).

Re 5 Resources

<u>5.1 Staff involved</u>

The peers discussed the qualification of the teaching staff with the representatives of LUT. The auditors considered the qualification of the staff to be adequate in order to facilitate the achievement of the objectives of the degree programmes.

The auditors noted that the professors are expected to carry out research activities and that this can be maintained (on a small scale). They were informed, though, that some projects in cooperation with industry and research activities for the obtainment of a PhD-degree were carried out by some staff members.

The peers discussed the personnel resources with the representatives of LUT. The auditors considered the resources and composition to be improvable. They gained the impression that the generally available staff resources are only partly sufficient for the successful implementation of the programmes. This is confirmed by teachers and students of LUT.

Particularly, the peers noted that the teaching staff has its educational educational origin at the LUT. They stated that external/international experience of teaching staff is a valuable

qualification and external/international expertise should also be taken into account in regard to the further development of the staff.

As very positive aspects the peers comment on the didactical / pedagogical qualification and corresponding engagement of teaching staff as well as the close and good relation between students and teacher/programme coordinators.

5.2 Staff development

The auditors noted that all of the teaching staff members have sufficient possibilities to develop and train their didactic and professional skills. It was positively acknowledged that the good existing possibilities are widely used among the teaching staff.

5.3 Institutional environment, financial and physical resources

During the on-site visit, the peers visited some computer labs and the library.

Overall, the auditors found that the resources are adequate sufficient in order to facilitate the achievement of the objectives of the degree programme. They positively acknowledged the good infrastructure concerning lecture rooms, library etc.

Re 6 Quality Management: further development of degree programmes

6.1 Quality assurance and further development

The auditors detect strong elements of a quality assurance system put into practice. The peers, in particular, were impressed by the detailed quality manual and the teacher's manual which are regarded by the peers as very useful instruments.

In the discussion with the students the audit team got the impression that feedback loops are effectively in practice and the students are satisfied with instruments put in place in order to collect their feedback.

Overall, the peers gained the impression that a well established and well performing quality management system is in place which should be further pursued.

6.2 Instruments, methods & data

The peers found that the quality and quantity of the collected data and its analysis are suitable to provide information about the average time needed to complete the programmes. The data analysis also provided information about the fate of the graduates and the effectiveness of means to avoid possible inequalities within the institution. The quality management system put those responsible in a position to discover and remedy weaknesses. Also, the peers appreciated that measurements are carried out and the degree programmes are adapted as a result of surveys and evaluations.

Re 7 Documentation and transparency

7.1 Relevant regulations

The peers took note of the regulations made available.

Subject to other parts of this report, which may mention aspects which require revision, these regulations include all information necessary about the admission, course and completion of the degree.

7.2 Diploma Supplement and qualification certificate
The auditors took note of the Diploma Supplement.

Subject to other parts of this report which may mention aspects which require revision. Next to that the diploma supplement includes all information necessary.

D Additional Information

Before preparing their final recommendation, the auditors ask that the following missing or unclear information be provided together with the comment of the Higher Education Institution on the previous chapters of this report:

„not necessary"

E Comment of the HEI (05.09.2012)

Comments to ASIIN accreditation report

1. The English name of the programmes
ASIIN report, Assessment of the peers, chapter 1: They discussed this topic with the HEI and came to the conclusion that at least the English title (Information Technology) seemed to be misleading in accordance with the intended qualification profile, which clearly reflects a programme of Computer Science
LUT statement: LUT has considered the feedback of the peers concerning the English title of the degree programmes and agrees with the peers; the English title can be partly misleading in the international context of related degree programmes. LUT will change the English title for the next academic year, if it is possible according to the Finnish legislation (the Universities act and the Government Decree on University degrees).

2. Distinction between BSc and MSc programmes, admission to MSc programmes
ASIIN report, chapter 1: The peers acknowledged that LUT tries to strengthen the Bachelor's degree. However the peers had the feeling that at present a clear distinction is not yet put in place.
ASIIN report, chapter 2.5: The students are allowed to exceed the standard period of study of each programme and a majority of students makes use of this opportunity. As to the Master´s degree programme, the peers discussed the consequences of the fact that all students accepted in Bachelor's degree are also accepted in Master's degree. In their opinion this requirement makes it difficult for the university to ensure the requested level of the programme.

LUT statement: Sharpening and separating the BSc degree from the MSc degree is part of a nationwide discussion inspired, for instance, by the evaluation of the degree reform 2005 carried out by The Finnish Higher Education Evaluation Council FINHEEC. Discussion has arisen also in the engineering field. All the Finnish universities with degree programmes in engineering, LUT included, have decided to develop and strengthen the status of the BSc degree in order to provide the future graduates with better possibilities for student mobility and improved abilities to apply their knowledge and competences also in the world of work.

Clarifying the distinction between the BSc and MSc programmes in accordance with the Bologna declaration is one of the most important development objectives of the education processes at LUT in the near future. The Vice-Rector for education has directed all the departments at LUT to sharpen the distinction between the BSc and MSc programmes. Since the Bachelor's degree of the Finnish universities is quite a new degree; it has been granted only since 2005, the development process is still in progress.

The admission policy is under intensive discussion in Finland. Basically, in the universities students will continue to be admitted straight to the MSc degree programmes in engineering also in future. This is in alignment with the Finnish Government Programme. However, a more clear distinction between the BSc and MSc degree programmes is going to be developed in order to strengthen the two-cycle degree system according to the Bologna process. One possibility, which LUT is considering, is to automate checking the prerequisites of the modules by the student register system.

Furthermore, the student financial aid system in Finland was changed in the autumn of 2011. In the new system, a student cannot receive financial aid for the studies in the MSc degree programme before graduating from the BSc degree programme.

In the degree programmes in Information Technology, the study progress is evaluated systematically twice a year. The aim is to ensure that the students complete the modules at an appropriate pace. If a student has problems with the studies, he/she will be supported by the personnel of the department or by the university counseling personnel. Special attention will be paid to the first and the second year students. The statistics needed are produced by the Student Affairs Office.

3. Qualification profiles
ASIIN report, chapter 2.2: the peers considered it recommendable to work out a more distinctive qualifications profile for each degree programme, thereby clarifying the acquired competences of graduates and the areas of professional/industrial work they most likely will get into.

ASIIN report, chapter 2.4: However, to better inform the relevant stakeholders, the specific employment perspectives for graduates and the intended practical competences should be clarified. The auditors considered the descriptions of job markets and relating competences as too generic and a lack of possible career paths for the graduates.

LUT statement: Hitherto LUT has described the qualifications profile mainly in the marketing material and mainly for the MSc degree programme. LUT will develop the descriptions for the next student recruitment round and also for the curriculum of the next academic year. Special attention will be paid on the descriptions of the competences and qualifications of the graduates from BSc degree.

4. Euro-Inf-label
ASIIN report, chapter 2.2: Though, the peers judge that they [learning outcomes of the programmes] do comply with the Subject-Specific Criteria of the Technical Committee 04 - Informatics. Therefore, it is recommended to apply for the Euro-Inf® Label of EQANIE.

LUT statement: In the accreditation request form LUT requested the degree programmes Information Technology to be evaluated according to the Subject Specific Criteria of the Technical Committee 04, which is relevant for the Euro-Inf® Label of EQANIE.

LUT has decided to proceed according to the recommendation of the peers. LUT has informed ASIIN via email to Jan Lukassen on 31st May 2012 to apply for the Euro-Inf®-label instead of the EUR-ACE -label.

5. Learning outcomes of the modules
ASIIN report, chapter 2.3: However, due to the positive and appreciated quality handbook and its instructions regarding module descriptions the peers recommended improving the module descriptions.

LUT statement: The insufficiencies in the descriptions of the modules will be handled in the future curriculum work, and common instructions will be given to the teaching staff of the degree programmes. The head of the degree programmes assures the quality of the course descriptions before they are published in the study guide.

6. Internship
ASIIN report, chapter 2.4: After the feedback of students they considered the internship of both programmes as improvable regarding the requirements, and supervision through teaching staff of LUT and therefore the achievement of the intended competences and adequacy of traineeships. Actual, the credit points do only partly reflect the individual achievement and workload. Furthermore: Whereas the Bachelor´s internship is considered as only loosely coupled to professional practice relevant for the intended qualification profile of graduates, the Master´s internship (between 2 and 8 cp) seemed inappropriate regarding the research orientation and relating supervision, its integration in the curriculum and specified rules to award credit points.

LUT statement: A development project concerning internships has been started at LUT based on the ASIIN feedback for the other degree programmes in LUT. Internship is described as a module with learning outcomes and other specifications in curriculum 2012-2013. Special attention has been paid to the basis on how the credit points are awarded. The credits awarded of the internship do not directly correspond the time the student works in a company, since it is usual in Finland for students to have a job for the whole summer (3-4 months) to earn some money, and take the internship course at the same time. Instead, the credits awarded correspond to the attainment of the learning outcomes, which the university has specified for the degree programmes. The attainment of the learning outcomes is evaluated based on a report the students do after the internship.

LUT agrees with the feedback and sees that the supervision of internships and especially the research orientation of the internship in the MSc programme have some room for improvement. A new reporting form has been introduced in LUT for the autumn semester 2012, and it will be developed further to assure the research orientation. The supervision of the internship will also be developed according to the career supervision project which has begun at LUT in August 2012.

7. The research oriented profile of the MSc programme
ASIIN report, chapter 2.4: On the other hand, the (practical) research elements, which should be maintained through internships and Masters' thesis are partly doubted.

LUT statement: The theoretical foundation for scientific studies and work is laid down in the BSc degree programme. This foundation is utilized and deepened in the MSc degree programme by applying scientific knowledge to solve practical problems using analytical and scientific means and methods. This ensures that the scientific level of the studies increases continuously from the beginning of the BSc studies to the end of the MSc studies. This principle is valid also concerning the scientific quality of the BSc and MSc thesis.

To assure the scientific quality of the thesis, the department appoints for every MSc thesis a supervising professor, who is responsible for guiding the student's work towards the eligible scientific quality. Every student has also a practical supervisor, who is normally an employee of the company where the thesis is carried out. The practical supervisor has at least a MSc degree in Computer Science or related field of science.

8.   Curriculum/content
ASIIN report, chapter 2.6: The peers discussed with representatives of the university the extensive contents of mathematics and physics. They considered this proportion not only as to high but also as too unspecific in regard to the special programmes and its intended qualification profile. The peers as well as the representatives of LUT considered it reasonable both to integrate more relevant contents like [discrete mathematics, logic, algebra, methods of proof] and to integrate the proportion into those minors that are in need to special education in physics or mathematics. The contents and amount of the physics and mathematics courses must be tailored to the needs of computer sciences and better reflect the intended learning outcomes and individual study program.

LUT statement: The peers refer to important issues concerning the content of the programmes. LUT mostly agrees with the peers, and sees the historical elements and traditions of Finnish higher education in engineering being the reasons for the development of the content of the degree programmes in Information Technology in Finnish Technical Universities. The department of Information Technology (Computer Science) will develop the content of mathematics together with the department of Mathematics and Physics and scrutinize the role of the physics in the programmes. Also the other feedback of the peers concerning the content of the programmes will be considered thoroughly at the curriculum work of the degree programmes. Special attention will be paid to the core topics of computer science and explicit inclusion of selected subtopics into the module contents and, if feasible resource-wise, as new modules with a clear focus in the degree programme structure.

9.   Diploma Supplement
ASIIN report, chapter 3.1: The peers found that different modules are in use due to the Bachelor´s and Master´s level. However, the overview in the diploma Supplement does not show the differences of modules and their different use in Bachelor and Master.

LUT statement: The peers have definitely studied the Self-Assessment Report of LUT very carefully as they noticed inconsistency in the contents of the diploma supplements enclosed to the report. LUT checked the diploma supplements and noticed that a wrong supplement describing the MSc degree programme, which is not under this accreditation process, has been attached to the report. LUT apologises the mistake and encloses a correct version to this statement (enclosure).

10. Support services

ASIIN report, chapter 3.4: They recommended improving the support and supervision of the individual study progress and adequate choice of courses to assure that all students achieve the intended learning outcomes, study progress and adequate credit point per semester. However, they learned from the discussions with representatives of LUT as well as students that there is a peer tutor systems, which intends to give the adequate support for individual study progress. This could be improved and be focused more on the special student group, which – in practice - are mostly part-time students.

LUT statement: LUT has started a development programme of the student guidance based on the evaluation of the counseling processes in 2012. The project will focus on developing the progress of the studies according to the two cycle degree structure and timing recommendations. During the last few years, LUT has also carried out several projects to support the students with delayed graduation. One project was carried out in 2010 and one (KETU-project) is going on at the moment. These projects have been very effective and LUT is considering to establish procedures developed in these projects.

11. Workload of the teaching staff

ASIIN report, chapter 4: They considered the offer and coordination of 4 examination dates as ambitious, commendable and very attractive for students. However, they also gained the impression that this leads to a very high workload for teachers (cf. chapter 5).

LUT statement: The lecturers prepare four examinations for each module. A student can participate in two of these examinations. This assists the student to schedule the examinations and to concentrate better on the exam, and thus improves the student's possibility to pass the exam. This decreases the teacher's workload as well.

12. Staff resources

ASIIN report, chapter 5.1: The peers discussed the personnel resources with the representatives of LUT. The auditors considered the resources and composition to be improvable. They gained the impression that the generally available staff resources are only partly sufficient for the successful implementation of the programmes. This is confirmed by teachers and students of LUT.

LUT statement: LUT is aware of the limited resources of the department. The development of the resources is under consideration of the rectors of the University and the dean of the faculty. The resources will be strengthened e.g. by international recruitment of the personnel more in the future.

Comments concerning the accreditation procedure

We found both the discussions and the report in connection with the ASIIN accreditation very helpful in developing the degree programmes at LUT and especially the programmes in Information Technology (Computer Science). We highly appreciate ASIIN's professional evaluation and the peers' thorough inspection of the programmes, which led to very relevant findings. We want to thank the peers for the open discussions during the visit.

Ilkka Pöyhönen

Rector

F Final Assessment of the peers (13 September 2012)

Assessment

The auditors gained an overall positive impression of the degree programmes offered by LUT.

In particular, they find the following aspects to be very **positive**: Sound financial situation, good infrastructure concerning lecture rooms and library etc, excellent organization of the degree programmes, effective integration of the quality assurance system, rich spectrum of didactical methods, good relation to and cooperation with industry, teacher's manual and quality manual, good relation between students and staff, collaborative efforts between the departments in order to achieve common goals and the well organized support for the students (mentoring etc.).

Areas for **improvement** are mentioned in the recommendations.

The auditors welcome the **comments** given by LUT:

- The peers welcome the understanding concerning the misleading name of the programme. Thus, they consider a requirement still as valid.

- The peers appreciate that clarifying the distinction between the Bachelor's and Master's degree programme is a very important development objective for LUT. They also welcome the decision to develop and strengthen the status of the Bachelor's degree. Nevertheless, the peers understand that this process is still going on. Thus, they consider a recommendation still as valid.

- Regarding more distinctive qualification profiles the peers appreciate the efforts and future plans describes by LUT. The peers can at this stage not assess the success of these plans and consider a related recommendation as necessary.

- The peers take note of the LUT´s statement regarding learning outcomes and internship. They appreciate the introduction of a new report form in connection with the implementation of the career supervision project. Nevertheless, the peers understand that this process is still going on. Thus, they consider a recommendation still as valid.

- The peers positively acknowledge the statements according the research orientation of the MSc programme. They see a sustainable framework of support to bring forward the students qualification in this area.

- The peers take note of LUT's statement regarding the content mathematics and physics within the curriculum. They appreciate the plans to adjust the mathematics and physics content in a more specific way and adjust to actual student needs. Nevertheless, the peers can at this stage not assess the success of these plans and consider a related requirement as necessary.

- The peers take note of LUT's statement regarding the Diploma Supplement and have no further comments.

- Regarding the LUT´s support services the peers appreciate the explanations and also think the LUT is therefore heading in the right direction. Nevertheless, the peers see - on a long term basis - room for improvements in this regard and therefore maintain their recommendation.

- The peers take note of LUT's statement regarding the lecturer´s workload and have no further comments.

- The peers positively acknowledge the statements according the staff resources. They can follow the LUT´s explanation and have no further comments.

The peers recommend the award of the requested seals as described hereafter:

F-1   Concerning the ASIIN Label

Based on the self-report, the onsite discussions and the comments of the HEI, the auditors recommend that the Bachelor's and Master's degree programmes Information Technology offered by Lappeenranta University of Technology will be accredited with the ASIIN seal with recommendations until 30 September 2018.

F-2   Concerning the EUR-INF® Label

The peers deemed that the intended learning outcomes of the degree programme under review comply with the computer science specific part of Subject-Specific Criteria of the Technical Committee 04 - Informatics. Therefore, they recommend the award of the Euro-Inf® label for the <u>Bachelor's and Master's degree programmes Information Technology</u>. The programmes mentioned will be accredited with the Euro-Inf® with recommendations until 30 September 2018.

Based on the self-report provided by LUT and after having completed the audit visit, the peers judge that the programme outcomes of the required level are achieved by the degree programmes presented.

Requirements and recommendations for the requested seals and labels

Requirements	ASIIN
For all degree programmes	
1. The English name of the study program has to reflect the curriculum and intended learning outcomes of the study program (computer science).	1, 2.2, 2.6
2. The contents and amount of the physics and mathematics courses has to be tailored to the needs of computer sciences and has to better reflect the intended learning outcomes and individual study program. (methods of proof, discrete mathematics, logic, algebra-aligned clearly to programme)	2.2, 2.6
Recommendations	**ASIIN**
For all degree programmes	
3. It is strongly recommended to push forward the sharpening and separating the Bachelor's from the Master's degree to better align them with the Bologna process. The Bachelor´s degree should be considered as the first university degree and not only as a "lower" qualification on the way to the Master´s degree.	2.1, 2.2
4. The higher education institution should outline the specific	2.4

qualifications profile and job market perspective and specify possible career paths of their graduates (Bachelor and Master). This description must be publicly available and communicated to all involved stakeholders.	
5. It is recommended that exceeding the standard period of study in the Bachelor´s programme should be the exception, not the rule. The university should devise a practice that Bachelor students, close to graduation, may be allowed to preliminarily enter the master program but are obliged to fulfill all admission requirements within a certain time span.	2.5
6. To ensure that all graduates achieve the intended fundamental competences it is recommended to expand the compulsory curriculum by further fields of informatics such as computer architecture, distributed systems, theory of computation.	2.6
7. The internship should be better bound to the intended learning outcomes. It should be ensured that the award of credit points reflects the individual achievement and workload and are validated as such. Therefore the support, admission and supervision as well as the link to professional practice should be improved.	2.4, 3.2
8. The further development of the teaching staff should take into account external and international expertise.	5.1
9. It is recommended to expand support for mobility of both teaching staff and students.	5.2
10. It is recommended to improve the support and supervision of the individual study progress and adequate choice of courses to assure that all students achieve the intended learning outcomes, study progress and adequate credit point per semester. (tutorial system directed correctly).	3.4
11. It is recommended to improve the module descriptions (reference towards quality handbook)	2.3
For Master Information Technology	
12. It is recommended to expand the range of electives by offering specialized courses in the major subjects of the master´s program.	2.6, 3.1

G Comments of the Technical Committee

G-1 Committee 04 – Informatics/Computer Science (19 September 2012)

The Technical Committee 04 – Informatics/Computer Science discusses the procedure and follows the audit team regarding their proposed recommendations.

The Technical Committee recommends to the Accreditation Commission for degree programmes to award the following Labels:

Degree Programme	ASIIN-seal	Subject-Specific label[1]	Accreditation valid until (max.)
Ba Information Technology, B.Sc.	with requirements	Euro-Inf	30.09.2018
Ma Information Technology, M.Sc	with requirements	Euro-Inf	30.09.2018

Requirements	**ASIIN**
For all degree programmes	
1. The English name of the study program has to reflect the curriculum and intended learning outcomes of the study program (computer science).	1, 2.2, 2.6
2. The contents and amount of the physics and mathematics courses has to be tailored to the needs of computer sciences and has to better reflect the intended learning outcomes and individual study program. (methods of proof, discrete mathematics, logic, algebra-aligned clearly to programme)	2.2, 2.6

Recommendations	**ASIIN**
For all degree programmes	
3. It is strongly recommended to push forward the sharpening and separating the Bachelor's from the Master's degree to better align them with the Bologna process. The Bachelor´s degree should be considered as the first university degree and not only as a "lower" qualification on the way to the Master´s degree.	2.1, 2.2

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[1] Auflagen / Empfehlungen und Fristen für Fachlabel korrespondieren immer mit denen für das ASIIN-Siegel

4. The higher education institution should outline the specific qualifications profile and job market perspective and specify possible career paths of their graduates (Bachelor and Master). This description must be publicly available and communicated to all involved stakeholders.	2.4
5. It is recommended that exceeding the standard period of study in the Bachelor´s programme should be the exception, not the rule. The university should devise a practice that Bachelor students, close to graduation, may be allowed to preliminarily enter the master program but are obliged to fulfill all admission requirements within a certain time span.	2.5
6. To ensure that all graduates achieve the intended fundamental competences it is recommended to expand the compulsory curriculum by further fields of informatics such as computer architecture, distributed systems, theory of computation.	2.6
7. The internship should be better bound to the intended learning outcomes. It should be ensured that the award of credit points reflects the individual achievement and workload and are validated as such. Therefore the support, admission and supervision as well as the link to professional practice should be improved.	2.4, 3.2
8. The further development of the teaching staff should take into account external and international expertise.	5.1
9. It is recommended to expand support for mobility of both teaching staff and students.	5.2
10. It is recommended to improve the support and supervision of the individual study progress and adequate choice of courses to assure that all students achieve the intended learning outcomes, study progress and adequate credit point per semester. (tutorial system directed correctly).	3.4
11. It is recommended to improve the module descriptions (reference towards quality handbook)	2.3
For Master Information Technology	
12. It is recommended to expand the range of electives by offering specialized courses in the major subjects of the master´s program.	2.6, 3.1

H Decision of the Accreditation Commission (28 September 2012)

The Accreditation Commission for Degree Programmes decides to award the following seals:

Degree Programme	ASIIN-seal	Subject-Specific label[2]	Accreditation valid until (max.)
Ba Information Technology, B.Sc.	with requirements	Euro-Inf	30.09.2018
Ma Information Technology, M.Sc	with requirements	Euro-Inf	30.09.2018

Requirements	**ASIIN**
For all degree programmes	
1. The English name of the study program has to reflect the curriculum and intended learning outcomes of the study program (computer science).	1, 2.2, 2.6
2. The contents and amount of the physics and mathematics courses has to be tailored to the needs of computer sciences and has to better reflect the intended learning outcomes and individual study program. (methods of proof, discrete mathematics, logic, algebra-aligned clearly to programme)	2.2, 2.6

Recommendations	**ASIIN**
For all degree programmes	
3. It is strongly recommended to push forward the sharpening and separating the Bachelor's from the Master's degree to better align them with the Bologna process. The Bachelor´s degree should be considered as the first university degree and not only as a "lower" qualification on the way to the Master´s degree.	2.1, 2.2
4. The higher education institution should outline the specific qualifications profile and job market perspective and specify possible career paths of their graduates (Bachelor and Master). This description must be publicly available and communicated to all involved stakeholders.	2.4
5. It is recommended that exceeding the standard period of study in the Bachelor´s programme should be the exception, not the rule. The university should devise a practice that Bachelor students, close to graduation, may be allowed to preliminarily enter the master program but are obliged to fulfill all admission requirements within a certain	2.5

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[2] Auflagen / Empfehlungen und Fristen für Fachlabel korrespondieren immer mit denen für das ASIIN-Siegel

time span.	
6. To ensure that all graduates achieve the intended fundamental competences it is recommended to expand the compulsory curriculum by further fields of informatics such as computer architecture, distributed systems, theory of computation.	2.6
7. The internship should be better bound to the intended learning outcomes. It should be ensured that the award of credit points reflects the individual achievement and workload and are validated as such. Therefore the support, admission and supervision as well as the link to professional practice should be improved.	2.4, 3.2
8. The further development of the teaching staff should take into account external and international expertise.	5.1
9. It is recommended to expand support for mobility of both teaching staff and students.	5.2
10. It is recommended to improve the support and supervision of the individual study progress and adequate choice of courses to assure that all students achieve the intended learning outcomes, study progress and adequate credit point per semester. (tutorial system directed correctly).	3.4
11. It is recommended to improve the module descriptions (reference towards quality handbook)	2.3
For Master Information Technology	
12. It is recommended to expand the range of electives by offering specialized courses in the major subjects of the master´s program.	2.6, 3.1