Open your mind. LUT.
Lappeenranta University of Technology

Lappeenrannan teknillinen yliopisto
Lappeenranta University of Technology

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

Editors: Taija Okkola, Katri Tyster, Anne Jalkala, Leena Tynninen, Timo Pirttilä, Annikka Nurkka

Lappeenrannan teknillinen yliopisto
Hallinnon julkaisuja 185

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

Editors: Taija Okkola, Katri Tyster, Anne Jalkala, Leena Tynninen, Timo Pirttilä, Annikka Nurkka

Lappeenranta 2012

ISBN 978-952-265-259-1 (PDF)
ISSN 0782-3770
Lappeenranta 2012

List of enclosures

1. Universities act 558/2009 (not included)
2. Government Decree on University Degrees (794/2004). (not included)
3. University regulations on education and the completion of studies
4. a) Curriculum matrix tool (not included)
   b) Selected views of curriculum matrix tool (including information requested in ASIIN's tables 1-3). ***Included***
5. **Study guide (ASIIN: Module handbook).** ***Short version included***
6. Tables (not included)
7. Study Plan of Bachelor's degree inc. Yearly workload (not included)
8. Study Plan of Master's degree inc. Yearly workload (not included)
9. Diploma Supplement Bachelor (not included)
10. Diploma Supplement Master (not included)
11. Regulations of Lappeenranta University of Technology (not included)
12. Quality Manual 3.1 (not included)
13. LUT Strategy 2013 (not included)
14. Export and import of teachers (not included)
15. Composition of Staff (not included)
16. a) Course enquiry b) Assessments of courses (not included)
17. Staff handbook forms (not included)
18. FINHEEC's Feedback (not included)
19. Evidence of adequate teaching capacity (not included)

List of figures

List of tables

1. FORMAL DATA

1.1 Name of degree program

Name of the degree program (Finnish)	Tuotantotalouden koulutusohjelma – Tekniikan kandidaatti
Name of the degree program (English)	Bachelor of Science (Technology) in Industrial Management
Language of instruction	Finnish
Contact person	Head of Department, Prof. Timo Pirttilä
E-Mail	timo.pirttila@lut.fi
Telephone number	+358 400 908 426
Fax	+358 5 621 2667
Web address	www.lut.fi/tuta

Name of the degree program (Finnish)	Tuotantotalouden koulutusohjelma – Diplomi-insinööri
Name of the degree program (English)	Master of Science (Technology) in Industrial Management
Language of instruction	Finnish
Contact person	Head of Department, Prof. Timo Pirttilä
E-Mail	timo.pirttila@lut.fi
Telephone number	+358 400 908 426
Fax	+358 5 621 2667
Web address	www.lut.fi/tuta

1.2 Classification of the program

The Master's degree is more research-oriented.

1.3 Classification of consecutive – non consecutive

The Master's degree is consecutive to the Bachelor's degree.

1.4 Degrees to be awarded

The degrees awarded are Bachelor of Science (Technology) in Industrial Management and Master of Science (Technology) in Industrial Management.[1]

[1] As a result of the implementation of the Bologna process in Finnish universities, the present degree structures have been effective since 2005. The transition period (terminated on 31 July 2010) to the new curricula has naturally had its effects on various statistical data, which has to be taken into account when interpreting these data.

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

A degree program is an entity of studies with scholarly and also professional aims. It is planned and organized by a number of units of the university in cooperation and it focuses on a professional field connected to technology and business management, and on the development of that field.

A degree program has two cycles: the lower (Bachelor) and the higher (Master) university degrees. The department also offers separate Master's programs which are not objective of accreditation.

1.5 Standard period of study

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

The measure for the extent of studies is a credit unit. Courses are quantified according to the work load required. The average input of 1600 working hours needed for studies of one academic year corresponds to 60 credits (The Government Decree on University Degrees 794/2004, enclosure 2)

The study guide (curricula) (enclosure 5) presents how tuition (courses) is divided between the study years. The scheduling of courses is planned accordingly.

1.6 Commencement of studies

The academic year of the university starts on 1 August and ends on 31 July. The academic year is divided into two semesters. The autumn semester and spring semester each include two periods lasting seven weeks and at least one additional examination week. New students are recommended to enroll in the autumn for the first period, but it is also possible to enroll at other times. Some students decide to enroll for the third period.

Courses can last from one to four periods. However, the university also offers courses in intensive format. In those cases, the length of the courses varies depending on the course. In the Department of Industrial Management, all courses are offered every year and last from one to three periods. All of the course details are given in the course descriptions available in the study guide (enclosure 5).

1.7 Fees/charges

The education leading to Bachelor's and consecutive Master's degree are free of charge for the student as well as the entrance examinations relating to student admission.

Thus, to have the right to study, students must pay the membership fee of the student union. For academic year 2010-2011 the fee was 103 Euros. The membership gives right to 50 % discount in Finnish National Railways and long-distance busses and right to use Finnish Student Health Services which are located in the campus area. The Health Services include also dentist.

2. OBJECTIVES AND DEMAND – REASONS FOR ESTABLISHING THE PROGRAM

2.1 Educational objectives of the applicant degree program

2.1.1 Overall objectives of the applicant degree program

Industrial management combines the fields of technology and business management. The goal of the degree program is to train students to become equipped for organizational development and business process management by merging technology and management skills. To this end, all students complete a combination degree, which combines business and technology. The curriculum is designed to cater to the professional needs of Bachelor's and Master's level graduates. The Bachelor's degree is primarily considered as a gateway to Master's degree studies, introducing the student to scientific thinking and methods. The Bachelor's degree from the Department of Industrial Management includes 17% technical studies, 19% mathematics and physics studies, 7% general studies, 7% optional studies and 50% industrial management studies. The Master's degree includes 20% technology studies, 63% industrial management studies, and 17% optional studies.

Superordinate educational objectives for the Bachelor's degree and for the Master's degree are based on the Finnish university legislation and are defined in the university regulations on education and the completion of studies, which have been approved by the rector on 16 June 2010 (enclosure 3). The superordinate objectives are accessible to all students, staff members and all other interest groups on LUT's web pages. The superordinate objectives for the Bachelor's degree and for the Master's degree have been analyzed in the light of the ASIIN reference framework, and as a result of the analysis, it can be stated that the objectives correspond well with the special and social competences established by ASIIN (enclosure 4).

<u>Superordinate educational objectives for the Bachelor's degree include:</u>

- fundamental knowledge of the major and minor subjects in the degree, and the ability to follow developments in one's professional field,
- a capacity for scientific thinking and the application of scientific working methods,
- the knowledge and skills required in education leading to the higher university degree and in life-long learning,
- the ability to apply one's knowledge and skills in the world of work, and
- sufficient communication and language skills.

<u>Superordinate educational objectives for the Master's degree include:</u>

- a good knowledge of one's major subject and a fundamental knowledge of one's minor subjects,
- the ability to apply scientific knowledge,
- the ability to take on duties as an expert in and developer of one's professional field,
- the capacity to carry out scientific postgraduate studies,
- good communication and language skills, and
- good presentation, cultural and leadership skills.

University regulations on education and the completion of studies (enclosure 3).

The superordinate educational objectives for the Bachelor's degree and for the Master's degree have been linked to the general learning outcomes of the industrial management degree program and the nature of the knowledge, skills and competences produced by the degree program have been assessed. The linkage between the superordinate educational objectives and the learning outcomes of the degree program is depicted in enclosure 4 b.

The formulation of the learning outcomes of the degree program is part of the continuous development of the Department of Industrial Management. Staff and students have been closely involved in formulating the outcomes, which were initially developed individually by the representatives of the different major subjects, and then jointly developed further in a one-day workshop by an *advisory steering committee*. *The advisory steering committee* consists of the head of the degree program, three appointed student members (and since 2011 four), four professors and three teaching staff members from each major subject, programs' study coordinator and the development coordinator of the department of industrial management. The learning outcomes are further refined based on the feedback from recent graduates and alumni, as well as feedback from employers.

The Department of Industrial Management has recently systematized its connections to industry and other employing interest parties by establishing a*n advisory board*. The ten members working currently in industry or public organizations are alumni of Industrial Management. This process ensures that the learning outcomes are formulated to conform to the current and future requirements of the industry and world of work. Finally, to ensure that the learning outcomes are possible to implement, a *curriculum committee* consisting of students and staff members coordinates the development of the educational program (see chapter 3.2.1).

The Department of Industrial Management has established an Excel-based *curriculum matrix tool* for coordinating information about the educational objectives and learning outcomes. The matrix tool gives an overview of the educational objectives and learning outcomes in relation to courses and aids in analyzing and assessing them systematically (enclosure 4).

The targeted learning outcomes are achieved through multimodal learning, which involves interactive modes of study such as case exercises, group projects, learning diaries and management games and simulations. These types of learning modes are widely implemented at both the Bachelor's and Master's levels, as they enable the use of real-world business problems, and as a result, both motivate students to learn and support the development of skills and competences that are relevant for industry needs.

2.1.2 Description of the learning outcomes to be attained during the course of study

The targeted learning outcomes for the Bachelor's and Master's degree levels of the Industrial Management degree program are introduced in the following and in the study guide (enclosure 5), which is accessible on the LUT web site to all students, staff members and all other parties interested.

The general learning outcomes for the Bachelor's degree provide students with an overview of industrial management and an ability to analyze and evaluate relevant problems within their chosen major subject. General learning outcomes for the Master's degree provide students with a deep insight into industrial management within their chosen major subject and an ability to apply scientific information in order to formulate solutions for complex problems.

General learning outcomes for the Bachelor of Science degree in Industrial Management:

- Define the basic concepts, key methods and theories of different fields of industrial management.
- Identify and analyze processes and their development objects within organizations and interest groups.
- Prepare and structure scientific information related to business and apply theories to solve technical and economic problems.
- Discuss production processes and methods of one's chosen technology field.
- Work in projects and different teams.
- Report about the state of the business environment and the state of the organization in one's mother tongue and in English.
- Specific learning outcomes for the major subject in question.

General learning outcomes for the Master of Science degree in Industrial Management:

- Evaluate functions of business in different fields and interest groups and their impact on the success of the business in an international environment.
- Analyze processes of organizations and their development targets, and innovate alternative solutions.
- Derive the relevant points from a large amount of information and produce decision-making recommendations based on them.
- Evaluate applications in one's chosen technology field from a business perspective.
- Operate as a project group leader, and work and make decisions independently.
- Apply new scientific information to develop further the know-how possessed.
- Specific learning outcomes for the major subject in question.

In addition to the general learning outcomes of the degree program, the Department of Industrial Management has also defined specific learning outcomes for each of its four major subjects: 1) Innovation and Technology Management, 2) Cost Management, 3) Supply Chain and Operations Management, and 4) Industrial Marketing and International Business. The specific learning outcomes for each major subject have been defined both for the Bachelor's degree and for the Master's degree.

The specific learning outcomes for the Bachelor's degree provide students with an understanding of the key concepts of the selected major subject and an ability to analyze information with selected methods and techniques. The specific learning outcomes for the Master's degree provide students with specialist knowledge of the selected major subject and capabilities to identify and solve complex problems and tasks with specific methods (enclosure 4).

2.1.3 Objectives of individual courses

The detailed descripition is presented in the module handbook, i.e. study guide (enclosure 5). The *curriculum matrix tool* (enclosure 4 a) shows the linkage between the superordinate objectives and the learning outcomes of the Industrial Management degree program. The Bachelor's degree and the Master's degree have been handled separately. In addition, the curriculum matrix tool shows how the learning outcomes of the Industrial Management programs are linked to individual courses. Finally, the matrix tool displays the level of know-how (knowledge, skills and competences) each course provides for the student. Information about the modes of study and the assessment formats used in each course have been collected from the module handbook (i.e. study guide) and interviews with teachers and staff members from each major subject. As a result of this process, the level of knowledge, skills and competences for each course have been defined in terms of low/average/high.

The content, learning outcomes and workloads of individual courses are presented in the study guide (enclosure 5), which is accessible on LUT's web pages. In addition to the learning outcomes, the study guide provides students with information about the year and period of study, teacher(s) in charge, course content, modes of study, evaluation, study materials and prerequisites for the course. This information and the learning outcomes are introduced to students also during the first lecture/meeting of the course.

2.1.4 Industry focus, research focus, work internships, professional qualification conferred by the degree

Industry focus and the competency profile

In Finland's engineering education system, the Bachelor's degree is generally considered as an intermediate phase in the progress towards a Master's degree. Therefore, the competency profile of Bachelor's degree graduates of Industrial Management focuses mainly on giving a strong basis for Master's level studies.

Master's degree graduates of Industrial Management are professional developers of organizations and processes from the perspective of their major subject. In addition, the minor subject in technology gives the students an insight into a selected technology field: information technology, energy technology, environmental technology, chemical engineering, electrical engineering or mechanical engineering. As a result of the wide variety of learning methods, Master's degree graduates have good project work skills and are ready to take on managerial responsibilities. The progress of Master's degree graduates is followed by conducting a survey five years after graduation. Graduates have succeeded in their careers and they give merit to the department especially regarding the fact that they have been able to adapt to positions in different industries. In general, the positions of the graduates correspond well with their level of education (enclosure 6, table 2)

Research focus

LUT Industrial Management focuses on researching complex and dynamic business problems that have a strong practical relevance for industrial firms. Research at the department is centered on the following five areas: 1) innovation and technology management; 2) capital, capacity and cost

management; 3) supply chain and operations management; 4) transitional economies in global business and 5) industrial marketing. Research and teaching are strongly integrated and the research groups are largely organized according to major subjects. All staff members are involved both in teaching and research which means teaching staff is identical to the research staff, which ensures that the latest research results can be applied to education at the department. For example, doctoral students and post-doctoral researchers have teaching responsibilities. Both Bachelor's and Master's level students have the opportunity to work as research assistants at the department. Scientifically oriented studies ensure that the Master's degree graduates of Industrial Management have the capabilities needed in postgraduate studies.

Work internships (ASIIN: Industrial placements)

Industrial Management studies are closely integrated with industry practices. For example, students are provided with opportunities to conduct practical assignments for companies during their studies. During the Bachelor's studies, students are required to perform 2 ECTS credits (at least four full-time work weeks) worth of on-the-job training. During their Master's studies, students are required to perform at least 6 ECTS credits (at least 12 full-time work weeks) worth of on-the-job training. The training supports the professional development of the students and allows them to apply the knowledge and skills they have learned as a part of the curriculum. Most students take advantage of the long lecture brake in the summer and, in practice, get much more experience than the minimum four plus 12 weeks.

During the internship in bachelor's level student learns by own experiences what is paid labor, what it is like to work for an employer, what are the basic rules of working life and how one works in a work community. The aim of the work internship in master's level is to provide the basic knowledge about work in the own field, work environment and work community. During the internship student applies possessed knowledge and know-how to work in the own field.

Two work weeks equal to one ECTS credit and students are paid for their work by the enterprise or organization. The instructions regarding a suitable work internship are defined by the head of the degree program. The sizing for the internship differs from the university education for several reasons. Our students are involved in real hands-on training. Learning may be very intensive in the beginning of the internship, but because they are doing real work, the same tasks may repeat often and the learning can not be seen as intensive as university education.

Students are free to choose the most suitable time to perform the training and are themselves responsible for finding a job that is relevant to their studies and supports their professional development. The Career Services of the university provide advice and help to look for work internships in Finland or abroad. Students have on their side also a job-hunting guide Teekkarin Työkirja. It is produced by the Finnish Association of Graduate Engineers, TEK, and universities providing engineering education. The guide consists of articles related to application processes and has also a wide list of enterprises looking for summer workers.

Almost all of Master's theses are commissioned by businesses. This enhances the interaction between the department and industries, and facilitates the employment of graduates.

Professional qualification conferred by the degree

While the knowledge, skills and competences of the students are evaluated continuously during the studies, the professional qualification culminates in the Master's thesis. Typically, the topic of

the Master's thesis focuses on solving a relevant business problem, which demands mastering a combination of technical and managerial skills. The purpose of the scientific Master's thesis is to test that the student is able to digest the knowledge he or she has received during the studies, can apply it to a relevant problem and is capable of evaluating his or her work and solution critically. Additionally, the thesis demonstrates that the student is able to plan a relatively large project (the average duration is six months) and to carry it out successfully.

Additional information about the professional qualification of Master's level graduates is provided in graduate surveys and in surveys five years after graduation (enclosure 6). The graduate surveys (five years after graduation) show that the career development of the graduates has been good and the demands of the work environment have been met by the qualifications and learning outcomes.

2.1.5 Target enrolment / staff-student ratio

The targeted staff/student ratio at the department of Industrial Management is 1:10, which is in line with the national strategy for engineering education in Finland.

The current student/staff ratio is 11.5 (enclosure 6, table 11). This can be considered as relatively good, as the National Cooperation Group for Engineering Education defines in its strategy of future engineering education the aim to be 10. The number of personnel in these calculations does not include student advisers or the personnel of the Study Affairs Services, which are centralized of the Faculty of Technology Management. Student advisers and the Study Affairs Services personnel give counseling to students of Industrial Management e.g. in the preparation of personal study plans and in the scheduling of studies, and strongly supports teaching by taking care of most of the administrative tasks.

The target enrolment for the academic year 2011-2012 is 85 enrolments for consecutive programs (Bachelor's + Master's degrees) and 100 enrolments for non-consecutive Master's programs, which are not included in the accreditation process.

2.2 Demand

2.2.1 Target group

The main target group for the Bachelor of Science studies consists of upper secondary school graduates. In general, applicants should have performed advanced courses in mathematics, and preferably also in physics and/or chemistry. This delimits the amount of potential students significantly. As a part of the LUT strategy, potential students with upper secondary school studies both in advanced mathematics and Russian language are targeted with their own selection process and criteria.

There is one particular target group for the consecutive Master's degree: our own undergraduate students who have earned the degree of Bachelor of Science (Technology) in Industrial Management. The number of study places is checked and verified every year. The number of applicants to the Department of Industrial Management has constantly exceeded the intake quota.

2.2.2 Placement of graduates on the labor market

Graduates with the Bachelor's degree in Industrial Management are not meant to be placed on the labor market, as the degree is an intermediate phase towards the Master's degree in Finland's Technology education. The structure of the curriculum at the undergraduate level mostly includes general studies in technology and business management, and as such, the degree does not result in advanced professional qualifications. Graduates with the degree of Master of Science (Technology) in Industrial Management are placed extremely well on the labor market: for example, in 2008, 81.7%, in 2009 75.8% and in 2010 77.7 % of graduates were employed at the moment of graduation. Graduates are employed by a wide range of organizations. They are employed in different branches and industries. This result supports the conclusion that graduates can have an influence on their career path. Large enterprises, such as Nokia, Kone, Konecranes, Outotec, ABB, Metso, Andritz, Stora Enso and UPM may have employed several graduates per year. Many organizations have also employed graduates year after year. Among employers are presented large, as well as small enterprises and consultancies.

The major subject typically determines the student's first job, as it reflects the student's interests and qualifications. Also on-the-job training periods have an effect and steer the graduate's career choices. In addition, career prospects are typically discussed during the final Master's degree courses, and students have the possibility to use the LUT Career Services. Quite often the first workplace of the graduate is the instance which commissioned the Master's thesis and employed the student during the thesis project.

LUT started to gather feedback from Master's thesis employers since 2010. Graduates are also surveyed five years after their graduation regarding their career situation (enclosure 6, table 7).

2.2.3 Demand from industry

The high employment rate after graduation reflects the high demand from industry for graduates of Industrial Management (enclosure 6, table 6). Graduates have been employed well even during the economic downturn. This signals that the graduates are well qualified to work in industry and that their skills fit the demand. Industrial Management graduates are not tied to any specific industry; instead, they are employed by a wide spectrum of industries. The graduates have good future career prospects, as they are equipped to learn and adapt to different job profiles and industrial contexts. As a result, the success or failure of individual industries does not have a significant impact on the graduates' career prospects.

Also in the future, there will be a strong demand for Industrial Management graduates. The Finnish Association of Graduate Engineers (TEK) and the Confederation of Finnish Industries (EK) have forecasted the future demand for graduates at the Master of Science level. According to TEK, there will also be a need for interdisciplinary engineers. This promises good career prospects for graduates of Industrial Management.

3. EDUCATIONAL PROCESS

3.1 Entry and Admission Requirements

According to the Finnish Universities Act (2009/558) (enclosure 1), universities carry out student selections. *The university board* decides on the number of students to be admitted to the university.

The rector annually decides on the admission procedure and criteria and finally approves the admission of new undergraduate students. Students are accepted to the university to complete either both the lower and the higher university degrees (B.Sc. (Tech.) + M.Sc. (Tech.)) + or only the higher university degree M.Sc. (Tech.) (Universities Act 2009/558, enclosure 1).

The university publishes the annual admission procedure and criteria on 1) the Finnish university admission web site www.yliopistohaku.fi, 2) the LUT web site and 3) the printed admission guide before the admission process begins. The university publishes a list of admitted students on its web site (for applicants who have given permission to publish their name) and on the university bulletin board. A letter of acceptance or refusal with information on how to lodge an appeal against the decision is sent to each applicant (with the exception of the joint application system in technology, which informs refused applicants through a web-based score service). To obtain the right to study, admitted students have to accept their study place and enroll to the university.

3.1.1 Entry requirements for Bachelor's degrees

In Finland, all students accepted into Bachelor's degree studies (180 ECTS credits) in a university are also accepted into the consecutive Master's degree studies (120 ECTS credits) within the same degree program. Bachelor's students are mainly selected through a nation-wide university joint application system in technology (DIA) and through a nation-wide university joint application system (www.yliopistohaku.fi).

The DIA application system is coordinated by a nation-wide joint application committee. The national Universities Act specifies who is eligible to apply to Bachelor's degree studies. Most applicants have completed the Finnish matriculation examination. (Universities Act 2009/558, enclosure 1).

A maximum of 50% of first-year students can be admitted based on their Finnish matriculation examination, without an entrance examination. The entrance examinations are organized in the context of the joint application procedure and are based on the Finnish upper secondary school curriculum in mathematics, physics and chemistry.

3.1.2 General/special variant of higher education admission

Bachelor's degree

About 90% are selected in DIA-application system. In addition to that, there are four special variants of the B.Sc. admission procedure. Students admitted through those variants also have a right to study in the consecutive M.Sc. degree program in Industrial Management. The major subject of Industrial Marketing and International Business offers a special admission route for applicants with advanced studies in Russian in upper secondary school.

Master's degree.

In addition to the consecutive M.Sc. degree, the university has also a separate application system to non-consecutive Master's degree programs which are not objective of accreditation. This system is for applicants who already have a degree from a university or university of applied sciences.

3.1.3 Work internships, work experience

Bachelor's degree

Students applying to Bachelor's degree studies are not expected to have any former work experience or work internships. Professional experience has no relevance in the admission score.

Master's degree

Consecutive M.Sc. program: all M.Sc. students already have some work experience (at least a compulsory internship of 2 ECTS credits included their B.Sc. degree).

3.1.4 Foreign language skills, Finnish language skills

Bachelor's degree

Applicants who have obtained their compulsory education in a language other than Finnish shall provide a certificate of their language proficiency in the Finnish language. Applicants whose mother tongue is Finnish are exempted from this requirement. Sufficient proof of language proficiency can be demonstrated by completing the National Certificate of Language Proficiency test at level 4 or above (= intermediate level, 6 being the highest).

Master's degree

All students accepted into Bachelor's degree studies are also accepted in consecutive Master's degree studies.

3.1.5 Aptitude tests

Bachelor's degree

There are no additional aptitude tests in B.Sc. admission. The entrance examination in the joint application system DIA has tests in mathematics, physics and chemistry, which are considered as relevant indicators in technology.

Master's degree

All students accepted into Bachelor's degree studies are also accepted into consecutive Master's degree studies.

3.1.6 Entry requirements for Master's degrees

All students accepted into Bachelor's degree studies are also accepted into consecutive Master's degree studies. Thus, only students accepted to our own Bachelor's degree have the right also to the consecutive Master's degree without entrance examination. For the separate Master's degrees (not object of accreditation) there are separate entrance examinations. The entry requirements and selection criteria are presented in section 3.1.2. The sequence of courses is clearly defined and presented in the study guide (enclosure 5). Also the prerequisites for every course, if there are any, are presented in the study guide. The student is responsible for fulfilling the prerequisites before attending the course. A topic application for a Master's thesis can be accepted only after the completion of the Bachelor's degree. The master's thesis must be started under professor's supervision.

3.1.7 Transfer from/to the conventional system of qualification

Students may apply to change their consecutive degree program only within their own faculty before the B.Sc. degree is finished. Students may request to change their consecutive degree program to another technology program only after completing their Bachelor's degree. The decision can be made on the basis of the entry points. The decision is made by the head of the degree program and the dean/rector.

Prior learning is recognized and assessed. If a student performs studies in another university or educational institute in Finland or abroad, he/she may request the head of the degree program for credit transfer for these studies. Regarding transfers, the university and faculty applies the provisions in the LUT regulations on education and the completion of studies, the study guide and the faculty web site. LUT Industrial Management has a special working group with teachers, students and study affairs representatives to prepare and provide consultation on matters related to students' credit transfer applications for the head of the degree program.

3.2 Course of study

3.2.1 Curriculum

The vice-rector for education provides instructions that apply to the university as a whole on the preparation of curricula for the next academic year. The head of the degree program is in charge of the degree program overall; This is defined in the university regulations on education and the completion of studies. *The faculty council* makes decisions regarding the curriculum. A curriculum presents the aims and organization of the education, and the course descriptions and learning outcomes of courses in the degree (enclosure 5).

Industrial Management gathers information on development needs for the annual curriculum planning through 1. student feedback: course feedback, feedback from graduates (upon graduation and five years after graduation), 2. employer feedback: through the supervision process of Master's theses, meetings with alumnus, *advisory board,* and 3. university and program level development work and work of management committees/working groups (for example *curriculum committee* and *advisory steering committee*).

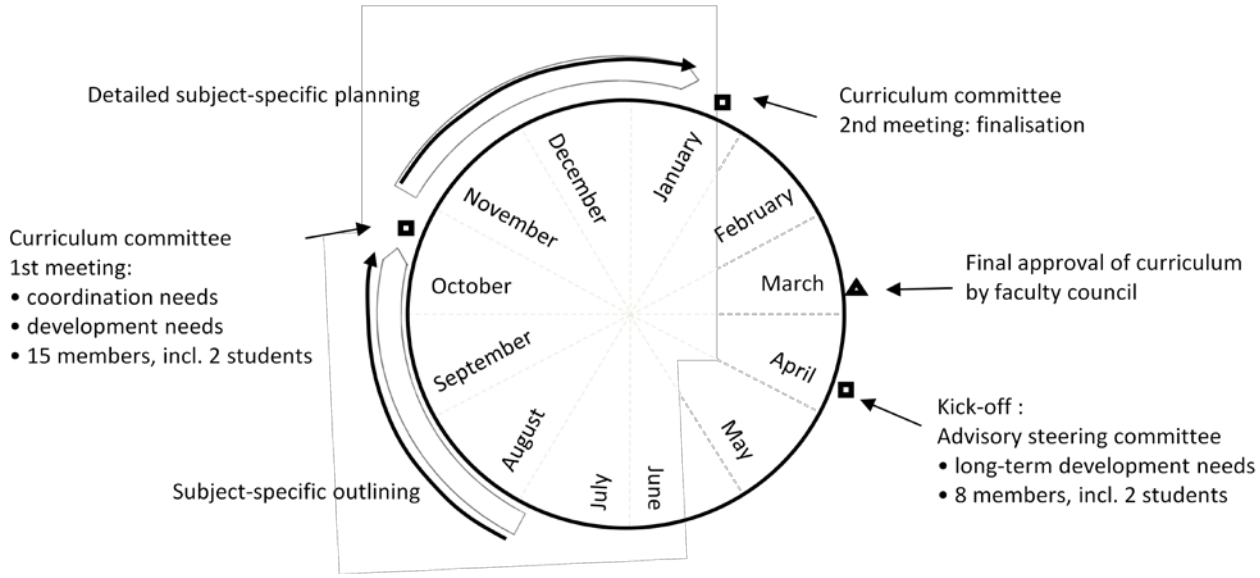

Figure 1. The schedule for curriculum planning, presented as an annual cycle.

The results of the curriculum planning can be seen in the study guide (enclosure 5). The curricula for Bachelor's and Master's degrees are presented in the study guide. The level of the course, the period the course is organized as well as prerequisites are communicated in the study guide.

Learning outcomes, as well as educational level of courses, are presented also in enclosure 4. Enclosure 4 contains also model curricular analysis, ASIIN's table 3.

3.2.2 Orientation – national/international

The orientation of the degree programs is national. The language of instruction and degrees in the university is Finnish (the national Universities Act specifies the language). At LUT, instruction may also be provided in English. Courses offered in English shall be announced in the curriculum. In practice, all course descriptions and a large amount of and course materials are in English. Many students spend a semester abroad. Foreign students attend the same courses as Finnish students.

<u>Bachelor's degree</u>

At LUT, the curriculum is designed to allow students to complete their Bachelor's degree in Finnish if they so choose. Therefore, there are no courses lectured in English that are compulsory for all students. However, the major subject Industrial Marketing and International Business may contain some compulsory studies offered in English.

<u>Master's degree</u>

The consecutive M.Sc. degree program is also aimed at Finnish-speaking students. However, for international Master's programs and foreign exchange students, part of the courses are taught in English. Quite often the Master's thesis is written in English because the company which commissioned the thesis needs the report for international use.

3.2.3 Didactic concept/program type

Both Bachelor's degree and consecutive Master's degree programs are full-time.

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

The group sizes are large (80-350 students) in approximately 35% of courses, and small or medium sized (10-79 students) in 65% of courses. Large courses are mainly included in the Bachelor's degree and are also a part of the curricula of other degree programs. The learning outcomes for these courses focus on learning the key concepts, methods and theories of the field. Real-life, motivating examples and material from the world of business and from visiting lecturers demonstrate the practical importance of the topics with regard to the work life.

In small and medium-sized groups, which are mainly included in the Master's degree, interactive and collaborative learning and learning by doing play an essential role. Small and medium-sized course groups apply teaching methods that promote skills and knowledge needed in real-life situations in the work life. This is achieved through assignments that require practical problem solving, decision making and development of activities, through extensive true-to-life material, and high-pace interactive team work. Advanced courses also include assignments and extensive special projects commissioned by businesses, in which students solve practical problems for the company.

Courses typically have more than one instructor. Pair and team work among teachers enhance the possibilities for study guidance. In large-scale courses, students are usually assessed by the lecturer responsible, but in small and medium-sized courses also the assessment duties are divided among the teachers. Teacher cooperation is also supported by the Blackboard online learning environment. Blackboard is a platform for either blended learning courses or material banks because the aim is to produce courses that combine web-based and contact teaching instead of pure online courses.

3.2.4 Structure

The extent of the Bachelor's degree is 180 ECTS credits and that of the Master's degree is 120 ECTS credits (Government Decree on University Degrees 794/2004, enclosure 2, and university regulations on education and the completion of studies, enclosure 3). A completed Master's degree includes at least 300 ECTS credits. Both B.Sc. and M.Sc. degree structures have been designed in accordance with university regulations (enclosure 3, University regulations on education and the completion of studies, sections 30 to 37).

Table 1. Bachelor of Science (Technology) in Industrial Management 180 ECTS credits

<table>
<tr>
<td rowspan="3">General studies (88 ECTS cr)

Basic competencies in industrial management (42 ECTS cr).

Basic competencies for studies in technology (46 ECTS cr), e.g. mathematics, physics, language and communications studies.

Compulsory studies 88 ECTS cr.</td>
<td>Major studies in industrial management (50 ECTS cr)

Options (the student chooses from):
- Cost Management
- Industrial Marketing and International Business
- Innovation and Technology Management
- Supply Chain and Operations Management

Compulsory studies 45 ECTS cr, incl. Bachelor’s thesis (10 ECTS cr). Alternative studies 5 ECTS cr.</td>
</tr>
<tr>
<td>Minor studies in technology (30 ECTS cr)

Options (the student chooses from):
- Chemical Engineering
- Electrical Engineering
- Energy Technology
- Environmental Engineering
- Information Technology
- Mechanical Engineering

Compulsory studies 6-14 ECTS cr, alternative studies 24-16 ECTS cr (depending on the subject).</td>
</tr>
<tr>
<td>Optional studies (12 ECTS cr)

University level courses (from LUT or another university).</td>
</tr>
</table>

Table 2. Master of Science (Technology) in Industrial Management 120 ECTS credits

Major Studies in Industrial Management (70 ECTS cr) Options: - Cost Management - Industrial Marketing and International Business - Innovation and Technology Management - Supply Chain and Operations Management Compulsory studies 50-52 ECTS cr, incl. Master's thesis (30 ECTS cr). Alternative studies 20-18 ECTS cr. Major subjects in non-consecutive Master's degree programs: - Global Management of Innovation and Technology - Knowledge Management - Technology Entrepreneurship	**General studies (10 ECTS cr)** - Optional studies in technology or in mathematics - Work internship **Minor studies in technology (20 ECTS cr):** Advanced studies in technology – a separate continuation of the minor subject chosen in the B.Sc. degree. **Optional studies (20 ECTS cr)** University level courses (from LUT or another university), e.g. for additional minor subject or studies abroad.

The most significant project in bachelor's degree is the bachelor's thesis. It is well guided and structured. More information about the course, the thesis and seminar can be found in the study guide (enclosure 5) with the course codes CS10A9000, CS20A9000, CS31A9001 and CS30A9001. The basic structure used by all majors is described below.

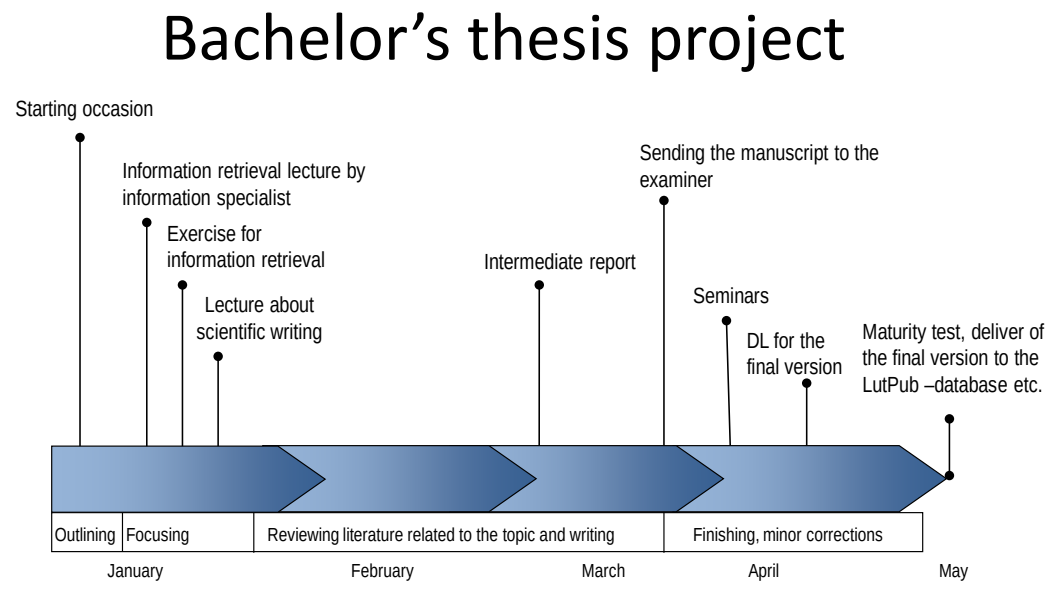

Figure 2. Bachelor's thesis project

Another significant project work is the master's thesis. Master's thesis is an academic thesis, but it usually has a high practical relevance; Typically the master's thesis worker is working in the organization while writing the thesis. This project is described more closely in the chapter 4.3.2.

3.2.5 Workload

The yearly workload (60 ECTS credits per year) is presented in the study guide. At the moment, only face-to-face hours are presented in the study guide (enclosure 5). In the 2011-2012 also the individual work of student will be presented. For more information about this development work, see chapter 6.3. Establishing a total workload with time enough 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.

Examples of study plans at the Bachelor's and Master's levels are presented in enclosures 7 and 8. Also the workloads per semester are presented in these enclosures.

3.2.6 Credit point system/credit points for coursework and examinations

The ECTS credit point system has been applied at LUT since 2005. One credit point equals a workload of 26 hours, including all face-to-face teaching hours, individual study and examinations.

In LUT internships, one ECTS credit corresponds to two weeks of full-time work. The employment contract has to be at least 15 days. The Bachelor's thesis and seminar amount to 10 ECTS credits and the Master's thesis to 30 ECTS credits (enclosure 3, University regulations on education and the completion of studies).

3.2.7 Evaluation

Written examination is only one way to grade students. In addition for example seminar works, case-studies and reports may count on the grade. The assessments methods used in a particular course are presented in the study guide and in *the curriculum matrix tool* (enclosure 4 a). Teachers can fit the examinations to correspond the course in question.

The modes of study are determined in the curriculum. The possible coursework affects the final grade of the course together with the possible examination. In individual cases and for just cause, the teacher responsible for a course has the right to determine an alternative mode and date of completion. The assessment criteria are chosen so as to support the learning outcomes of the course.

Courses are evaluated either on the scale excellent (5), very good (4), good (3), very satisfactory (2), satisfactory (1) and failed (0), or pass – fail. On the five-grade scale where 100 points is the maximum, grade 5 requires 90–100 points, grade 4 requires 80–89, grade 3 requires 70–79, grade 2 requires 60–69, grade 1 requires 50–59 and grade 0 requires 0-49.

Teachers shall forward the grades to the Student Affairs Office and make them known to the students or post them online within a month. Teachers shall keep examination scripts and other

equivalent material, and participant lists of examinations for at least six months after the grades have been published. Grades for courses are entered into the student information system.

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) 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. Three 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 program. For more information see enclosure 3, sections 67-75. (University regulations on education and the completion of studies)

3.2.8 Degree/examination regulations

Binding, extensive university level regulations for degrees and examinations are given in the University regulations on education and the completion of studies (enclosure 1). National regulations on Master's level studies for universities are given in the Government Decree on University Degrees (794/2004) (enclosure 2).

3.2.9 Diploma supplement

At LUT a diploma supplement (DS) is formulated following the directions of the National Board of Education and always attached to the B.Sc. and M.Sc. degree certificates (the actual degree certificates are in Finnish). The DS is in English and meant for international use. It contains information about the degree completed: the type of the degree, extent of the studies, grading, content and qualification.

For more information, please see the models of the LUT diploma supplement attached, enclosures 9 and 10 (B.Sc. and M.Sc. supplements separately).

4. RESOURCES

4.1 Institution and context

University education is governed by the Universities Act (558/2009) (enclosure 1) and the Government Decree on University Degrees (794/2004) (enclosure 2). The roles and responsibilities of the education administration are defined in the administrative regulations of the university. The educational goals are agreed upon annually in the negotiations between the university and the Ministry of Education and Culture. The achievement of the goals affects the financing granted to the university by the ministry. The financing decisions are made on an annual basis.

4.1.1 Description of the institution

The university board decides the strategic long-term educational goals of the university and the degree programs provided by the university. The rector also appoints, when necessary, a board of examiners to handle correction requests concerning study attainments. More information in Regulations of Lappeenranta University of Technology (enclosure 11).

The university has prepared its own Regulations on education and the completion of studies (enclosure 3), approved by the rector. The regulations define the basic procedures concerning education and studies at the university, and the degree programs provided by the university. The regulations are published on the university's web pages.

The university has a vice-rector responsible for education. In addition, each degree program has an appointed head. The vice-rector organizes meetings every two months with the heads of degree programs. The vice-rector also leads the university's supervisory and development group for teaching.

Student representation in the university's administrative bodies is determined by the Universities Act and the administrative regulations of the university. In accordance with the statutory representation in the administrative bodies, students also have representation in the university's supervisory and development group for teaching. In addition, students participate in the development of teaching by giving course feedback, which is collected for each course arranged at the university, and through the teaching feedback survey organized by the Student Union.

The aims and goals of the Department of Industrial Management are discussed yearly with the rector. This also affects the share of finances allocated to the department. Industrial Management provides education which fits well with the goals of the university: we combine technology and business.

For the Organization of LUT, please see page 5 of the Quality Manual 3.1 (enclosure 12).

4.1.2 Committees responsible for teaching in the degree program

The schedule for curriculum design is presented in the section 3.2.1. The advisory steering committee and curriculum committee have an important role in the planning process. The curriculum is planned cooperatively in the curriculum committee, which also makes sure that the entire curriculum of the degree program is a coherent entity. The department's units (innovation and technology management, cost management, industrial marketing and international operations,

supply chain and operations management) and the professors in charge of them are responsible for the major subject(s) and courses they produce, but the head of the degree program is in charge of the entire curriculum. The persons responsible for courses have often a doctoral degree. Courses are developed continuously. Instructors may choose the teaching methods that best suit the topic area of their course.

The teachers in charge of the courses are responsible for executing, evaluating and developing the instruction they provide. Course evaluations are carried out directly after each course as web feedback surveys. In addition, teachers are able to add their own questions to the survey forms. Course-specific evaluations are forwarded to the persons responsible for the courses. The results are also delivered to the heads of the degree programs and the vice-rector for education once in a semester. If an individual course receives a low average score (less than 2.5 on a scale of 1-5, 5 being the highest score), the vice-rector for education handles the matter. Course evaluations are also discussed in the performance and development negotiations between the university administration and the faculty. The results of course feedback surveys are presented in the assessment of courses (enclosure 16 b). The degree programs of Industrial Management use the same student administration services as the degree programs of Information Technology.

4.1.3 Research facilities and main areas of research, R&D activities including an explanation of their relationship to the degree program seeking accreditation

The main areas and foundations of research of the Department of the Industrial Management are presented in section 2.1.4.

The department has one laboratory: the GDSS (Group Decision Support System) laboratory. It is used for research and teaching. For more information see chapter 4.5.3.

At the moment, there are eight operating research groups within the Department of Industrial Management. A research group may be an entire unit (=here major) at the department, or it may consist of persons from several units. The research conducted in the units is closely tied to the corresponding major subject. The research is highly relevant to industries and conducted in cooperation with industries. Because all researchers teach and all teachers research, the contents of the courses are up-to-date concerning both the needs of industries and academic research. Relations to industries are good, and more information about them can be found in the staff handbook forms. Depending on the research project, researchers are paid from the budget of the department or from the budget of the project.

4.1.4 Related degree programs and degrees related to the degree program seeking accreditation

The Department of Industrial Management works in close cooperation with the degree programs of both the Faculty of Technology and the School of Business. The Bachelor’s and Master’s degrees of Industrial Management include courses from the university’s two other faculties to avoid overlapping use of resources. For example the minor subjects in technology are fully produced by technology degree programs. Also courses in mathematics, physics, communication and languages are produced by partners in LUT. Please see the study guide (enclosure 5) for more specific information about the degree structure. Collaboration is also close with the department’s five non-consecutive Master’s programs (not objective of accreditation). After the Master’s degree is completed, graduates are officially qualified for doctoral studies. The Department of Industrial Management also provides opportunities for postgraduate studies. The possibility to complete

doctoral studies is always discussed with the supervisor of the desired specialization area. Applications for doctoral studies are handled by the faculty council.

4.1.5 Areas of specialization in teaching

According to the university's policy in educational planning, teaching must be based on research. The main areas of specialization in teaching at the Department of Industrial Management are congruent with main areas of research, as are the major subjects: Innovation and Technology Management, Cost Management, Supply Chain and Operations Management, Industrial Marketing and International Business. In addition, Entrepreneurial Management and Information and Knowledge Management are taught in separate Master's programs. Most of the courses in these degree programs (not object of accreditation) are open to all students.

Knowledge about enterprises and business in Russia is a significant area of specialization at the department. No other institution outside Russia offers such extensive possibilities to study the Russian enterprise and business environment.

4.2 Partnerships – cooperation related to the degree program

The university's strategic areas of expertise are

- o Energy efficiency and the energy market
- o Strategic management of business and technology
- o Scientific computing and modeling of industrial processes
- o Expertise in Russian business and industry related to the areas above.

The Department of Industrial Management, together with the LUT School of Business covers the area "strategic management of business and technology". Industrial Management also has particularly strong expertise in Russian business and industry. More information is presented in the LUT strategy (enclosure 13).

4.2.1 Cooperation within the institution

At LUT, most courses are open to all students who meet the knowledge prerequisites. No special permission is required to attend courses from other departments or faculties. That is why the best way to describe cooperation within the institution is to present the number of ECTS credits completed. As a consequence of the active collaboration between faculties and programs, students of Industrial Management are high multidisciplinary. Students choose their minor subjects from other departments. Also many students from other departments select Industrial Management as their minor subject. This means that the students who attend the department's courses have different backgrounds, leading to diversity in the groups. The exact information is presented in enclosure 14 "Exports and imports of teachers".

The Department of Industrial Management also works in close cooperation with the guild of students of Industrial Management, Kaplaaki. Kaplaaki makes the students' voice heard and

communicates important trends and observations to the head of the department. To do this in a systematic way, a so-called "*Home Circle*" meets three times per year and discusses current study-related issues at the department. *The Home Circle* consists of the Kaplaaki board and *the management committee* of the department. Students are also represented in all development teams and in *the advisory steering committee* for the degree program.

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

The Department of Industrial Management works in close cooperation with several top Russian universities in connection with the non-consecutive Global Management of Innovation and Technology Master's degree program. This guarantees the students of the program have an opportunity to work with high level Russian students in most Master's level courses lectured in English.

International cooperation related to student exchange is wide-ranging, and it is coordinated by International Services of LUT. The university has several international collaboration agreements related to student exchange. LUT participates in the following exchange programs: Erasmus, Nordtek and ISEP. Students may also take part in so-called "free mover" exchanged and find their own exchange university. In recent years, the most popular exchange destinations for Industrial Management students have included Eindhoven University of Technology, Linköping University, and the University of Stuttgart. During the academic year 2007-2008, a total of 44 students spent at least one semester abroad in student exchange. In 2008-2009 and 2009-2010, the figures were 45 and 43, respectively.

Professors and research staff collaborate with industries continuously. These connections enable businesses to commission Master's thesis research from students. *Advisory board* has also been established to gather ideas and development proposals systematically from former students and interest groups. Employees may also take part in researcher or lecturer exchange. The department also hosts several regular foreign guest lecturers. For more information, please see the staff handbook forms (enclosure 17). In addition, many courses have guest lecturers from industries; for more information, please see the course descriptions in the study guide (enclosure 5).

The student guild Kaplaaki has close cooperation with the international organization of European Students of Industrial Engineering and Management, ESTIEM. Students may also exploit the study opportunities provided for example by the Finnish University Network for Asian Studies[2], other universities in Finland (The Flexible Study Rights Agreement)[3] and the Aleksanteri Institute[4]. Students are informed of these opportunities in the study guide of LUT (the whole version is presented in LUT's web pages).

The Department of Industrial Management has also started cooperation with upper secondary schools by providing their students a lesson about the very basics of industrial management.

---

[2] http://www.asianet.fi/asianet/english/home.html

[3] http://www.joopas.fi/joopas_frontpage_eng.asp

[4] http://www.helsinki.fi/aleksanteri/english/index.html

4.3 Participating staff

4.3.1 Composition

Composition (professors, hourly-paid teachers, academic staff, full-time/part-time academic staff, technical and administrative staff; types of position; number) of staff is presented in enclosure 15. More information about individual staff members is presented in the staff handbook forms. The recruitment process is defined by the university. Many have significant professional experience also outside academia.

4.3.2 Supervision

Industrial Management provides thorough academic guidance for students. The process is presented in detail in Quality Manual 3.1 (enclosure 12, page 33, Table 6.) Peer tutoring in groups of five to eight helps students especially well to integrate into their new academic community. All new students have their own peer tutor who has been trained for the purpose.

Students can reach the staff members in person during the office hours, but also by telephone and e-mail. The department also has a study advisor specialized particularly in practical issues. Also a study coordinator and study secretaries guide students. All contact information is presented on the web pages of the department. Students evaluate the supervision by giving feedback about tutoring already during their first semester and about student guidance services when they graduate. This feedback has been very positive.

In addition, Industrial Management promotes the integration of first-year students through the newly developed concept of teacher tutoring. Each peer-tutored group also has a teacher tutor. The group meets its teacher tutor once during the orientation week and twice after. Finally, every freshman meets with the teacher tutor individually.

Freshmen learn to plan their studies already during their first weeks at the university, when they prepare their first personal study plan. Bachelor's level freshmen may do this by using the electronic tool "eHops" or an Excel form. The personal study plan is compulsory and it is checked by a study affairs personnel member when students start their studies, when they complete their Bachelor's degree and when leaving the topic application for their Master's thesis.

To introduce students to academic research and the doctoral studies, Industrial Management launched the annual "*Industrial Management research afternoon*" in the year 2009. This informative but casual event provides information about postgraduate studies and post-doctoral career opportunities at the university.

For writing the Master's thesis, Industrial Management has developed its own *thesis roadmap*[5], which contains instructions for writing a Master's thesis. The Ministry of Education and Culture has commented on its web pages that this roadmap is a good guide for instructors and writers of Master's theses.

Master's thesis is its own course consisting of the Master's thesis and seminar, 30 ECTS credits. This equals work of half a year. Student can leave a topic application, when she/he has graduated from Bachelor's degree, performed the compulsory work internship and has completed at least 15

[5] www.lut.fi/tuta → Dippa-mappi

ECTS credits from the major. In general most students of industrial management complete their studies expect of the thesis and start it first when they are ready with everything else.

The nature of Master's thesis is both research -oriented and relevant to industry practice. Typically there are two supervisors for the thesis: one professor and one from the commissioning organization. The thesis is examined by two professors. The first examiner is the supervising professor; the second is another professor of industrial management. Dean of the faculty confirms the given grade. Figure 3 presents the timelines of the thesis.

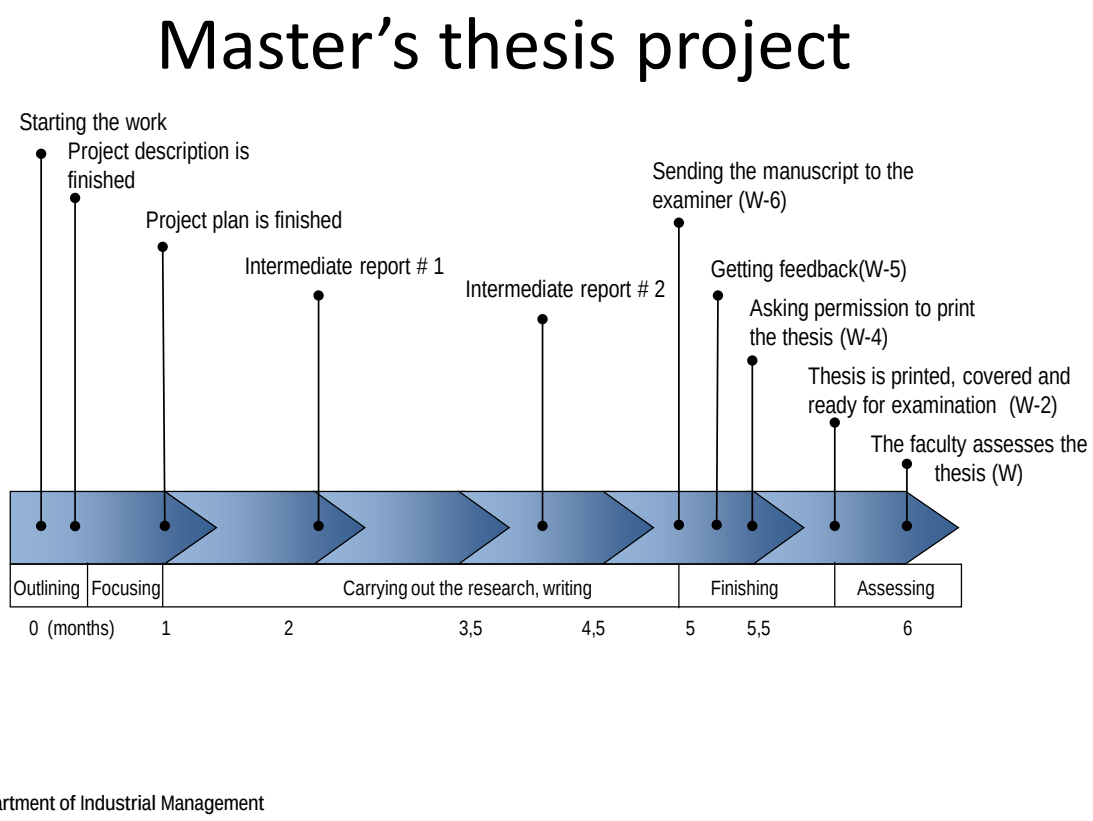

Figure 3. Master's thesis project

4.3.3. Relevant professional development measures/opportunities

Lappeenranta University of Technology aims to create a good working environment for its staff members, and to support their professional development and well-being at work. Functions related to human resource administration are presented (in Finnish) in the quality manual of Personnel Services.

The university regularly organizes 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 training is 25 ECTS credits in total, and it consists of five courses. The aim of the course is to teach university instructors the basic principles of learning and teaching in a higher education institution, curriculum planning and the assessment of learning and teaching. After the training, the teacher is expected to be able to evaluate and develop his/her own teaching and assessment methods. Industrial Management strongly enourages its staff members to complete the university pedagogy training. Industrial Management has also organized its own university pedagogy training during the academic years 2001–2006. These 2.5 credit courses were niche training designed for the Department of Industrial Management. Taking part in this training was voluntary.

Industrial Management also offers its staff members the possibility to take part in staff training outside the university in order to support their professional development and expertise. Staff members have annual performance and development discussions with their immediate supervisor. The parties of the discussion examine results obtained and 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[6].

Industrial Management has also long traditions in organizing an annual development day for the department. In the development day (at the end of May or the beginning of June), current topics are handled in workshops. The development day provides personnel the opportunity to meet, chat and exchange experiences from the year before. This also helps to uphold a spirit of togetherness among the personnel. Normally about 60-70 % of staff members take part in this event.

4.4 Financial and physical resources

4.4.1-4.4.4 Budget

All costs presented in this report are true cost from 2009. They include the regional research units of Lahti and Kouvola. The budget also includes funds from external sources. Investments in research equipment are made from yearly funds and are not considered as investments *per se*. The salaries of professors, associate professors and university lecturers are mostly paid from budget funds. Costs related to teaching, teaching materials, excursions, the maintenance of teaching equipment, rents, study affairs and university administration are financed from the budget. The department has few investments. Computers are leased.

The financial situation of the degree program is secure. The Ministry of Education and Culture covers over 50% of the funding of the department. Also the offices of Lahti and Kouvola receive long-term financing. Moreover, guaranteed financing covers over 60% of the yearly budget. The remaining 40% is received for short-term (one or two years) research projects.

[6] *Tietopankki → Henkilöstö → Kehityskeskustelu*

Table 3. Course funds

Course funds			
	Course funds		
	Staff funds	**Physical funds**	**Invest. funds**
2009	4 458 352	1 317 286	22 617
2008	4 061 930.98	1 392 267.06	
2007	3 719 566.59	1 129 711.03	

4.4.5 Facilities at LUT

The campus area is compact. The university has 45 lecture rooms for teaching, 12 separate rooms for language teaching and 21 computer classrooms and workspaces. The university library serves students, staff as well as outside customers. In connection to the library, there is a help desk for students, Origo. The library and Origo have approximately 100 workspaces, several group work spaces and two computer classrooms where students may study when they are not reserved for instruction. There is also a 24-hour reading room. There are two cafeterias for students and staff, one in the main building and another in the Student Union House on campus. There are also two smaller cafés in the main building. Eight rooms are reserved for student guild activities on campus. There are also two prayer rooms for religious activity at the university. The hobby and meeting space on the ground floor of the Student Union House is at the students' disposal. The Finnish Student Health Service (FSHS) is located on the first and second floors of the seventh wing. There is also a book store in the university.

The student guild of Industrial Management, Kaplaaki, has a guild room located on the third floor in the Industrial Management wing. Students may spend time in the guild room for example between lectures. The room has two computers, a TV, videogames, sofas, a coffee-maker and a table for working. In addition of the services provided to studying, there are also for example a gym, a book store, bar and hairdresser in the campus area.

4.5 Support for teaching and study

Lappeenranta University of Technology has plan for equality in gender and other issues, which is available on the university intranet. The needs of persons with disabilities are taken into consideration at the university, and the university has prepared a report on the accessibility of its facilities, which is also available on the intranet.

4.5.1. Computer facilities: equipment, supervision, access, numbers, tasks performed and restrictions

The university has excellent and suitable computer facilities both for students and staff members. Students have access to computers in the library (75) and in computer classrooms (13 including 239 computers) in the university departments. Students are able to enter the computer classrooms

with their personal electronic key when there is no teaching. Students are assigned a personal user account and password, which they use when they log into the computers. Students use computers for doing research and writing essays, seminar works etc. but also to use the electronic learning platforms like Noppa and Blackboard.

For problem situations there is helpdesk for staff members. Students are helped from Origo.

4.5.2. Library, literature and media facilities

The Lappeenranta science library is the library of LUT. There are course books and other publications, journals, magazines and computer facilities for students in the library. Information specialists in the library provide help to use databases more efficiently.

The electronic services provided by library are very important part of its functions. Databases and e-books can be used also outside the library. Information specialists can be reached also via telephone or e-mail.

Also the student help desk Origo is located in the facilities of the library. An exam aquarium, where examinations and maturity tests can be taken, is located in Origo. There is plenty of working space and a number of computers for study purposes in the library. In Origo students can also borrow laptops, data projectors etc. In renovation 2010 also work spaces for groups were also renovated. The library facilities also include a 24-hour reading area.

4.5.3 Laboratory facilities/equipment

The Department of Industrial Management has one laboratory of its own, the Group Decision Support System laboratory GDSS. It is in active use in education and research. GDSS enables research and development of planning and education processes. The laboratory has been utilized for example to define the critical success factors of companies, to execute SWOT-analyses, generate ideas for new products, define new concepts, select projects, carry out customer need assessment, and to specify requirements for the systems to be purchased. GDSS offers many benefits, like equal and anonymous opportunity to contribute ideas and opinions, help to manage the agenda of the meeting and automatic documentation capabilities.

Students may use computer classrooms located in the department whenever they are not reserved for instruction. The computer classrooms are accessible around the clock for industrial management students with an electronic key. There are also several group work facilities in the wing of Industrial Management.

Special laboratories are not essential for the teaching of Industrial Management. General and computer facilities serve the needs of the degree program. The Department of Industrial Management has purchased the software needed for computer facilities in the department. Moreover, the department has organized additional space for group work.

Students of Industrial Management may use the laboratories of other departments when they take courses produced by other departments.

4.5.4 Academic guidance for prospective and enrolled students

Academic guidance and supervision for enrolled students are organized as presented in section 4.3.2 and in the Quality Manual (enclosure 12).

To provide information to prospective students, LUT's own degree students systematically visit upper secondary schools and arrange briefings for conscripts in military service each academic year. More than one hundred of these presentations are given by LUT students annually. LUT also takes part in the most important national fairs targeted at young people seeking higher education opportunities.

Industrial Management has launched its own concept to student recruiting. Industrial management organizes classes about management and economical issues of industrial enterprises. This lesson is integrated to upper secondary school courses in social studies or entrepreneurship.

Study guidance and teaching staff at Finnish upper secondary schools and universities of applied sciences are systematically informed about the study possibilities and scientific focus of LUT. Material is forwarded to these institutions each autumn. LUT also provides the opportunity to bring groups of students to visit LUT. Annually in November, all upper secondary schools in the surrounding region (approx. a 200 km range) are invited to an open house event, where the program and information provided are tailored for students in their final year of upper secondary school.

5. ATTAINMENT OF OBJECTIVES

5.1 Data and statistics on the success of the degree program

Student surveys

The collection procedure for student feedback is described in section 6.1. Students have the opportunity to give feedback about each course they complete. The electronic questionnaire sent to students after each course includes a set of basic questions, presented in the enclosure 16 a, and possibly supplementary questions added by the teacher. The results of two first basic questions are presented in the enclosure 16 b. The questions three and four are added first for autumn semester 2010. According to these results courses of industrial management have high-level teaching.

First year students answer a survey regarding their experiences about the first months of studies. *The management committee* of the department reviews the results. In 2010 71,2 % of the answerers said they studies have started “well”, 28,8 % “on average level” and zero per cent answered “poorly”.

Graduate surveys

There are two kind of graduate surveys. The graduates answer to the graduate survey at the moment of graduation. Five years after graduation –survey has been conducted twice, in 2007 (graduates of 2002) and in 2008 (graduates of 2003).

For graduate surveys, please see the enclosure 6 which contains accurate information about the placement of graduates and their opinions about the usefulness of the degree. According to the results graduates appreciate their education and they have been successful on the job market.

Employment at the moment of graduation and five years after graduation

The employment rate of LUT Industrial Management graduates has been extremely high, even during the financial recession. This percentage is the highest among the LUT departments, and Industrial Management has always been successful in this comparison. One reason for these excellent results is the fact that Master’s theses are commissioned by industries to solve real-life problems. The company commissioning the thesis often hires the student when the thesis is finished. For more information, see the tables 6 and 7 in enclosure 6.

5.2 Overview and assessment of external evaluation outcomes

External auditing of quality assurance system

LUT passed the external quality audit conducted by FINHEEC (The Finnish higher education evaluation council) in 2009. The audit was performed in autumn 2008. The objective of the FINHEEC audit is to ensure that higher education institutions have a quality assurance (QA) system that supports the continuous development of activities. The audit also ensures that the higher education institution operates in accordance with its objectives and that its activity is internationally reliable.

According to FINHEEC, LUT's quality assurance system supports continuous development. The information produced in the audit is exploited in development measures. LUT has also reacted to the development needs identified by FINHEEC: for example measurement linked to the LUT strategy is being developed.

Appointment as Centre of Excellence in University Education (FINHEEC)

Industrial Management has developed its quality of education actively during the past ten years. Industrial Management has been appointed an exceptional three times as "The Centre of Excellence in university education" by The Finnish Higher Education Evaluation Council (FINHEEC) in the years 2001-2003, 2004-2006 and 2010-2012. For the period 2010-2012, the evaluation panel was international. This recognition is extremely significant, as it is granted only to ten university units (departments of faculties) at a time. LUT Industrial Management is among one of the three units in Finland who have received the recognition three times. No unit has received the recognition more than three times. The feedback includes for example the following comments:

"Well-formulated mission statement. There is very good collaboration between the department and the labour market and clear vision of regional development processes."

"The department has embedded an effective quality culture based on both systematic development work and very positive attitudes towards continual development."

"Delivery of education effectively matches outcomes with teaching. An extensive range of interactive and student-centred learning methods is used."

"Quantitative outputs are excellent. The high quality of graduates was recognised by external stakeholders, particularly the students' readiness for professional life and knowledge of both business and technology."

The feedback in a whole is presented in enclosure 17.

Feedback from Master's thesis supervisors in industries

The university has started to collect feedback from Master's thesis supervisors in enterprises in 2010. The feedback about students was very positive: 93.3% of the supervisors in enterprises gave the score 9 (on a scale of 4-10, 10 being the best) for the Master's thesis. Also the level of expertise was estimated to be very good: approximately 5.55 on a scale of 1-7.

External feedback is also collected in alumni meetings. This information is communicated to the steering group of the degree program. Feedback gained through cooperation with industries is also taken into account. Industry cooperation can be research-related or for example a visit to the firm that commissioned one's Master's thesis.

5.3 Overview and assessment of internal evaluation outcomes

Internal quality audits at LUT

Internal quality audits are LUT's internal procedure to maintain and develop its operations and quality system. It helps to make sure that quality system descriptions match reality.

The first internal quality audit was carried out in 2008. According to the evaluation, the Faculty of Technology Management is at the description stage of the process. The faculty has understood the importance of quality management and has a positive attitude towards it. The auditing team named positive and development points in the faculty. The evaluation can be seen on the LUT intranet.

Nomination as the teacher of the year at LUT

The student union chooses yearly the teacher of the year and the international teacher of the year. Lecturer Juhani Kuronen from the Department of Industrial Management was elected "teacher of the year" by the student union in 2010. The international teacher of the year in 2008 was also from the department of Industrial Management, professor emeritus Tauno Tiusanen.

5.4 Number of students commencing each degree program

Enclosure 6, Table 8 describes the enrollment new students to LUT degree programs. At the moment, students enrolling for Bachelor's degree studies are automatically given the right to complete the Master's degree in the same department. For this reason, students who have completed the Bachelor's degree are not included in the statistics on first-year Master's degree students. Instead, it is assumed they will complete also the Master's degree. The number first-year students enrolled for in Master's degree studies only includes students admitted directly into Master's programs.

5.5 Number of students per course semester and degree program / drop-out rates

In enclosure 6, Table 9, the numbers of students are presented according to the degree program and academic year. The transition period of the Bologna Process has had its impact on these statistics, as the time to complete studies has previously been very flexible in Finland. The first students accepted into the two-cycle Bachelor's and Master's degrees enrolled in 2005. This phenomenon can seen in Table 9, as there are very many "n^{th}" year students, meaning students who have studied for longer than three years at the Bachelor's level or for longer than two years at the Master's level. Master's level students refer to those who have already completed the Bachelor's degree, but there are no barriers to taking Master's level courses already at the Bachelor's level. Consequently, the statistics seem to suggest that we have many Bachelor's students and fewer Master's students, but in fact, there are no formal rules that prevent students from taking Master's level courses before the Bachelor's degree is complete. In reality, many students formally complete and graduate with Bachelor's degree only briefly before completing their Master's degree.

5.6 Graduates

Table 10 in enclosure 6 shows how many students have obtained their Bachelor/Master of Science degree from the Department of Industrial Management at LUT. In July 2010, transition period for completing the 180 credit unit degree of Master of Science (Technology) in accordance with the old degree system came to an end. In other words, students who have received their study entitlement in 2004 or earlier must first complete the Bachelor's degree and only after that the Master's degree. However, the duration of their study entitlement is not limited. The absence of time limits to study entitlements led to prolonged university studies in Finland.

5.7 Staff-student ratio

The staff-student ratio presents the ratio of full-time students to full-time staff members.

Table 4. Student/staff -ratio

Industrial Management					
Year	2009	2008	2007	2006	2005
Student/staff ratio	11,4	12,2	10,1	9,8	11,5

6. QUALITY ASSURANCE MEASURES

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

The university's quality management system is described in the main quality manual[7] and subordinate quality manuals of faculties and other organisational units. These quality manuals also include process descriptions and procedures for key processes. The university's quality management documents and other related material are available on the LUT intranet.

The main 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. The main 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 main quality manual depicts these activities and practices that apply to and obligate the entire university community.

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

1. Lappeenranta University of Technology is known for the best Finnish university education in technology and business and is internationally considered an attractive partner in cooperation.
2. Students at the university obtain high-level academic know-how, including specialist skills in their own field and transferable skills needed to utilize the specialist skills.
3. The university's students and employers of LUT graduates are satisfied with the contents and implementation of the studies. The teaching staff is satisfied with the conditions provided by the university for teaching.
4. The possibilities for lifelong learning are diverse and flexible, and education is arranged according to the needs of the target group.

The university has also published the LUT Teachers' Quality Manual in order to guide teachers and promote good teaching[8].

One of the vice-rectors is in charge of education at the university. He/she manages the educational affairs and development of education of the university in cooperation with the heads of degree programs and *the steering and development committee for teaching.*

The vice-rector and the heads of degree programs have regular meetings where they evaluate and discuss procedures concerning education and needs for development. *The steering and development committee for teaching*, in an advisory capacity, aids the vice-rector in decision

[7] www.lut.fi/en --> Introduction --> Quality Management

[8] http://www.lut.fi/en/lut/introduction/qualitymanagement/qualitymanual/Documents/Opettajan_Laatuopas_B5_Eng_www.pdf

making. The committee, headed by the vice-rector, coordinates and promotes the development of LUT education, and prepares the application procedure for the in-house quality bonus for teaching, which is allocated to units within the university, and prepares the allocation decision for the rector.

Each degree program has *an advisory steering committee*. It supports the head of the degree program in producing, assessing and developing the degree program.

6.1 Evaluation during the degree programs

During their studies, students fill out several questionnaires in which they can give feedback and tell their opinions consernig the studies and conditions at the university. At the beginning of their studies, freshmen are asked to fill out a questionnaire concerning the progress of studies and tutoring of freshmen. This questionnaire, along with one sent to 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 is used to develop study guidance for new students and tutor training.

The progress of studies and the accumulation of credits is monitored by the Student Affairs Office. The results are reported to the degree programs, and the follow-up reports are available on the LUT intranet *(Tietopankki → Laadunhallinta → LTY:n Laatujärjestelmä → Arviointiraportit).* The accumulation of credits is also examined annually to confirm students' eligibility for student financial aid from the Social Insurance Institution of Finland (KELA).

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

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

The feedback for each course is recapitulated by the system administrator every semester with a general reporting form. The reports are forwarded to the heads of degree programs and to the quality manager, who then submits the reports to the vice-rector in charge of education before the performance and development discussions between the university management and faculties. The units' performance target negotiations deal with student feedback, and if the average assessment for a course is very low (e.g. 2.5 or lower), the vice-rector in charge of education shall intervene.

6.2 Evaluation of the success of the degree program

The university management, faculty management, heads of departments and heads of degree programs shall ensure that the education provided by the university is efficient and of a high standard. The success of the degree program is evaluated in many ways, which are described in the following.

Competence of graduates

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

Quantitative results of a degree program

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

Satisfaction in the education

Satisfaction in LUT education is surveyed among LUT graduates at the time of graduation and after five years in the world of work, and among their employers.

Graduate feedback is collected from all LUT students at the time of their graduation – both Finnish and international students. The feedback is gathered annually in February-March, and the results are reported at the university level on the intranet *(Tietopankki → Laadunhallinta → LTY:n laadunhallintajärjestelmä → Arviointiraportit)* and broken down for individual degree programs. The quality manager is responsible for this process together with Student Services**.**

Moreover, feedback is collected annually from LUT graduates with a Master's degree and five years of experience in the world of work. The survey is conducted by LUT Career Services as a part of a national career follow-up.

Employer feedback is collected e.g. through *advisory board*. A new procedure concerning employer feedback has been introdused at the beginning of 2010: the university follows up on the satisfaction of employers/supervisors in the outcome of thesis projects and in the skills of the students as they transition into the world of work. This questionnaire is sent to employers and the results are annually reported by the quality manager.

Moreover, International Services collects feedback on student and support services from incoming exchange students at the end of their stay and analyses it systematically. LUT students leaving for student exchange write a report upon their return. The report is then read by International Services and published on the university web site. These follow-up practices are described in further detail in the quality manual of International and Career Services (*LUTnet → Tietopankki → Laadunhallinta → LTY:n laadunhallintajärjestelmä → Yksiköiden laatukäsikirjat*).

6.3 Further development of the degree program

The department of Industrial Management has a long tradition in development work. The development work made in the department concerns teaching as well as other activities in the department. The most visible element of the continuous development process is the yearly 1.5 day development workshop, held in spring. It gathers staff and representation of students to kick-off

new development projects and to proceed and assess the ongoing ones. The department of Industrial Management is also actively involved in a number of different national development projects for teaching.

The key areas in terms of developing the quality of education at LUT Industrial Management are the following:

Maintain the high level of pedagogy know-how among the staff of the department

The university offers annually its teaching staff a study module in university pedagogy worth 25 ECTS credits. The teaching staff is also offered other training that supports their teaching and its development, such as training in the use of information and communication technology in instruction. The training is coordinated by Personnel Services. See also 4.3.3. The pay system provides an incentive for teachers to develop their teaching and pedagogical skills. The job classification of the teaching staff is based on scientific qualifications and their development, the development of teaching skills and the variety of teaching duties, and responsibility for one's field of science and its development (pay system guidelines on the intranet).

The recognition of teaching qualifications and the adoption of teaching portfolios in the appointment of teaching personnel supports the development of teaching. For teaching positions, the university recruits professionals with not only strong scientific expertise in the field in question, but with pedagogical skills, as well. To this end, applicants for teaching positions must also submit a teaching portfolio or another report on their teaching qualifications. Instructions for compiling a teaching portfolio are available on the intranet [9]. In addition, the appointment of professors requires a trial lecture from the applicant.

Integration of education and research

The principle every teacher researches and every researcher teaches enables the exploitation of the newest research in education provided by the department. Lately, special attention has been focused on the bachelor's theses and their connection to research.

The department of Industrial Management established in 2009 yearly research afternoon of Industrial Management. During the afternoon students have the opportunity to explore the research done in the department and to get an impression of the post-graduate study opportunities.

The department employs also research assistants. Bachelor, as well as master level students can apply the posts.

Strengthening the connections to working life and industries

The department's connections to working life are traditionally superior; the excellent employment rates of the graduates and the close co-operation within research are descriptive examples about that. Thus, to stay in touch with the current development and to get signals about the forthcoming issues, the department wants still strengthen its connection to outside the academia. A well-actualized case about taken action is the advisory board, which is going to assemble twice a year.

[9] *LUTnet → Tietopankki → Henkilöstö → Virantäyttö → Opetuksen meritointijärjestelmä*

Internationalization

Despite of the national orientation of the degree programs, internationalization of students and staff members is strongly supported. Students do already take well the advance of the possibilities to internationalize by studying a semester or academic year abroad. The students of Industrial Management are also acting actively in the European-wide organization ESTIEM (European Students of Industrial Engineering and Management). In the future special attention and operation will be directed to encourage staff to take part to researcher exchange in growing numbers.

Continuing the development process of student workload analysis

At the moment course workloads are represented by representing the ECTS (one ECTS corresponds 26 hours of work) and by representing the amount of the contact teaching. The development process to represent the student workloads more accurately is started in June 2010. The study guide 2011-2012 will contain the student workload divided to different tasks. The department of industrial management aims to even more exact representation. Workload of a course will be divided to weeks. The workloads will be presented at Noppa –portal. Now there are workloads of the pilot courses.This will help students to divide their workload as even as possible.

LUT Industrial Management believes in continuous development. Especially the former development workshops for teaching and learning, and the contemporary annual systematic development work have led to the emergence of a strong quality management culture in the department. Development work is carried out by all staff member in supportive atmosphere. The students' voice as well as the signals from work life has impact on the development work. This is our way to meet the future challenges and ensure the quality of education.

Enclosures

1. Universities act 558/2009 (not included)
2. Government Decree on University Degrees (794/2004). (Not included)
3. University regulations on education and the completion of studies (not included)
4. a) Curriculum matrix tool (not included)
   b) Selected views of curriculum matrix tool (including information requested in ASIIN's tables 1-3). *Included*
5. **Study guide (ASIIN: Module handbook) *short version included***
6. Tables (not included)
7. Study Plan of Bachelor's degree inc. Yearly workload (not included)
8. Study Plan of Master's degree inc. Yearly workload (not included)
9. Diploma Supplement Bachelor (not included)
10. Diploma Supplement Master (not included)
11. Regulations of Lappeenranta University of Technology (not included)
12. Quality Manual 3.1 (not included)
13. LUT Strategy 2013 (not included)
14. Export and import of teachers (not included)
15. Composition of Staff (not included)
16. a) Course enquiry b) Assessments of courses (not included)
17. Staff handbook forms (not included)
18. FINHEEC's Feedback (not included)
19. Evidence of adequate teaching capacity (not included)