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EQ11

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EQ11: Faculty of Engineering (LTH) - self-reflection

Contents

Introduction: The Faculty of Engineering – LTH

The Faculty of Engineering (also referred to by the initials of its Swedish name, LTH – Lunds Tekniska Högskola) has 18 departments which provide strongly research-oriented education in 75 subject areas. The faculty employs just over 1 500 people (corresponding to roughly 1 350 Full Time Equivalents). 160 of our academic staff are professors. Education at the faculty is organized into 16 “Master of Science in Engineering” programmes and five “Bachelor of Science of Engineering” programmes; nine international Masters programmes; one programme each in Architecture, Industrial Design and Fire Protection Engineering; and a range of free-standing courses. We run certain programmes in cooperation with other faculties at Lund University, and also with international partners.

The faculty has 8 300 students (corresponding to 6 200 full-time student equivalents). We are involved in a wide range of international exchange schemes, with 330 students travelling abroad from the faculty every year, and 410 coming to study with us from overseas. Approximately 600 students graduate with a Master of Science in Engineering degree from the faculty every year. The faculty has 600 PhD students including the PhD students financed by industry and exchange PhD students. These last few years the faculty has awarded 70 PhD degrees and 30 licentiate degrees, which, in a historic perspective, are very low numbers. This is an effect of the sharp decline in the number of admitted PhD students during 2004 and 2005. The annual number of PhD four-year degrees has now started to increase and will hopefully amount to its former level of 125. The total annual revenue amounts to MSEK 1 500, of which the under-graduate education costs nearly MSEK 500. Both basic research and applied research are pursued at the Faculty of Engineering. Roughly one third of the sum MSEK 1 500 comes from state grants and two thirds from governmental contributions. Our research is subjected to regular evaluations, and was judged to be of a generally excellent standard in the RQ08 study.

The various Master of Science in Engineering programmes, and the Master of Architecture programme, consist of integrated five-year syllabi. All of our programmes have a strong research base, and are constructed so that they reflect the needs of industry and society. Several programmes include course modules taught by other faculties. As well as being a faculty of the university, LTH is in itself a strong brand which is well established in society and industry, both domestically and internationally. Our lecturers have a genuine interest in education, and are committed to placing students’ learning at the focus of their teaching. Education is seen as an essential aspect of the faculty’s work at all levels. The number of applicants is high, and rising.

Systematic Quality Assurance

The LTH quality work is rooted in the “Strategic Plan of the Faculty of Engineering 2007-2011”. The plan lays down carefully formulated objectives for all three educational cycles, and describes the strategy to be followed and the operative measures to be implemented in order to achieve those objectives. The plan includes strategies for the faculty’s research activities, and for its interaction with society. We have a separate plan for our internationalisation work.

The organisational structure of the faculty is designed to ensure clear responsibility for quality and strategic development in our education. The Faculty Board has the overall managerial responsibility; under it there are four Educational Programmes Boards, each of which is responsible for planning and follow-up for five to eleven programmes. The Educational Boards’ annual reports on quality work are submitted to the Faculty Board. The members of the Faculty Board and the Educational Programmes Boards include representatives from industry. There are three Research Boards; these are also responsible

for issues related to the PhD programmes. We have a faculty guide, the “LTH Manual”, which lays down rules and regulations on educational matters and lecturers’ terms of employment.

Systematic Reviews and Revisions of Programmes and Courses
Quality work at first-cycle level is based on the CEQ course evaluation and reporting system. The system aims to promote discussions about the course in question which then lead to measures being implemented to enhance the content and the teaching of the course. The CEQ system generates the basis for the discussions: students evaluate every course module using a standard questionnaire, and their responses are collated centrally. A compulsory dialogue meeting between lecturers, programme directors and students using CEQ data as input is another important element of the quality process. Following this meeting each stakeholder makes a short, written and public evaluation. Different students’ assessments of one and the same course over a period of time show that the improvements have been made across the spectrum of the courses we provide. Similarly, both students’ and lecturers’ confidence in the system has grown over the years since the introduction.

Programmes and the Educational Programmes Boards submit annual quality reports to the Dean, who in turn reports to the Faculty Board. The Educational Programmes Boards approve programme and course syllabi following an annual review procedure, make decisions in individual cases, monitor quality, and follow up and assess production and performance in our programmes. Within their respective areas of responsibility, the Boards carry out regular SWOT analyses and programme benchmarking.

One way in which we support and develop quality is by ensuring that educational development work is carried on across the faculty. LTH has its own unit for educational (academic) development, called “Genombrottet”; the work of the unit embraces teacher training for higher education, consultative teaching support, evaluations, research into higher-education teaching methods, the dissemination of knowledge, and the creation of meeting places. Teaching qualifications are given high value as a merit for promotion. Lecturers can apply to achieve the teaching qualifications “Excellent Teaching Practitioner (ETP)”; on gaining this qualification lecturers are awarded an immediate salary rise and become a part of LTH’s “Teaching Academy”.

Quality assurance of periods of study abroad is achieved in a three-stage process: we assess students wishing to travel abroad against a set of strict criteria; a detailed study plan is drawn up for exchange students before they leave; and all students on ERASMUS exchanges, on returning to Lund, are required to produce a self-evaluation of their studies abroad using the STARS database (http://www.stars.liu.se). Despite the large volume of students involved, individual follow-up is thorough, and regularly leads us to decide to discontinue individual exchange agreements. The Faculty of Engineering works actively with issues relating to plagiarism and language. A course on “Plagiarism and Academic conduct” is compulsory for all overseas students who come to Lund on exchanges or to follow international Masters programmes. In 2009 LTH introduced a new language policy, and a “plan for language issues” with the aim of stimulating greater clarity and quality with regard to language-use in the areas of governance, integration, internationalisation and education.

Our quality work in PhD education has resulted in several improvements being made; the individual study plans are now updated on an annual basis; we provide special training for PhD thesis supervisors, which is compulsory for all supervisors, in response to requests we now provide general courses for all research students in communication skills, publication methodology etc; and the faculty has established a quality-assured procedure for public defense of PhD theses. There is a set of rules and regulations governing PhD education.

Assessment and Examination of Students
Assessment/examination of students is a complex area, to which the faculty has devoted a great deal of attention. A research project on the subject, focusing on assessment/ examination systems and processes, is currently in progress within “Genombrottet”. Since 2004 the faculty has had two “Assessment Ombudsmen”, who can represent students who are dissatisfied with assessment of grading procedure. The same year also saw the adoption of a policy memorandum for assessment, aimed at promoting good practice and creating clarity for students, departments and Educational Programmes Boards. Course syllabi contain information explaining how performance on the particular course is to be assessed. Written examinations are the main form of assessment used at the faculty, but we also use written and oral presentations of project assignments, and on many courses there is a compulsory laboratory test. The assessment of degree projects follows a set of general guidelines. Quality in assessment is assured in various ways; the examiner and the supervisor are two different persons; degree projects are presented to open seminars; and degree projects are often subjected to external review, since in many cases they involve external actors, such as companies or other organizations. The learning outcomes in the syllabus for the degree project are mapped on the objectives for each qualification as defined in the Higher Education Ordinance.

Competence of Staff and Competence Development Opportunities
Our lecturers’ competence as educators – i.e. leaders, teachers and planners – derives from three areas of particular strength at the faculty; lecturers have close links to the world of research; they have a high level of teaching skills; and they have a contextually broad interface with the world of trade and industry. We have as a target that all lecturers appointed on a permanent employment contract are to hold PhDs. We organize “teaching inspiration conferences” every other year, at which lecturers come together and share their experience of educational development work.

We have no central faculty-wide directives governing the division of lecturers’ duties between teaching, research and competence development – instead, this is a matter which heads of department decide upon. It is a stated ambition of the faculty that lecturers on all programmes should also be involved in research work in their specialist area. When we appoint lecturers who do not have a PhD we draw up a competence development plan which includes doctoral studies. In general, our PhD students are employed on doctoral studentships.

Learning Environment, Resources and Support for Students
The faculty is involved in the ongoing development of the northern campus area (“Campus Norr”) in Lund, which aims to make it an environmentally responsible, attractive and lively campus. Most of the buildings are from the 1960s, and are being successively renovated; the Chemistry Centre has been equipped with modern facilities. The newest building on the campus is the Ingvar Kamprad Design Centre, which was opened in 2002. The campus features a large number of lecture theatres, teaching laboratories, computer rooms, reading rooms, smaller classrooms and open areas where students can meet between lectures. LTH’s Study Centre is a separate building which houses a course library used by a large number of students, and for researchers and PhD students there are several subject-area-specific libraries. Our ICT needs are met by a faculty-wide network. The Faculty Office staff includes study advisors for each programme, and social welfare officers. Study guidance is accorded high priority when decisions are taken on resource allocation. The Faculty Office has an international section which has responsibility for both incoming and outgoing exchange students, international degree-seeking students and summer schools.

Systematic Collection of Information on Course Quality

In addition to what has been described above regarding course evaluations, data relating to study performance are monitored, compiled and subjected to statistical analysis. When necessary, this process leads to appropriate actions being taken. Active follow-up of individual students is carried out by the study advisors. Our analyses of application figures provide input for the dimensioning of the volume of study places made available on each programme. The figures for the number of PhD students, doctorates awarded, and annual students FTEs and APEs (Academic Performance Equivalents), are followed up in a process based on active dialogue with the faculty's departments.

Part 1: Questions related to individual success factors

Area I. Research-based education

RB.1. General principles

RB.1.1. Principles of scientific methods/artistic development and analytical and critical thinking should be taught throughout the curriculum.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
In the programmes this is integrated and progressed from year one and on, but there is much variation between our courses. Some programmes, e g Architecture and Industrial Design, have a higher degree of skill training. Some courses are more focused on facts, e g AAHB03 Experimental Workshop C (http://www.ka.lth.se/kursplaner/arets_eng/AAHB03.html). Some courses have an emphasis on critical thinking, e g FMIF05 Environmental management (http://www.ka.lth.se/kursplaner/arets_eng/FMIF05.html) and an optional course in the PhD four-year education: GEM040F Theory of Science and Methodology of Research.

RB.1.2. Curricula should include elements for training students in scientific thinking/artistic development and research methods.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
Not so relevant: Higher Education Diploma with specialization in Food Science
Very relevant: Master of Science in Engineering, Architecture and PhD four-year education

RB.1.3. Curricula should prepare students for engagement in research/artistic development.

Strongly disagree ☐ ☐ ☐ ■ ☐ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
As in RB.1.2.

RB.1.4. All courses/programmes should be set in the context of active research/artistic development programmes.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
There is and should be a large variation at the faculty.
Low fulfilment: FMAA01 Calculus in One Variable
(http://www.ka.lth.se/kursplaner/arets_eng/FMAA01.html)
High fulfilment: FMA170 Image analysis
(http://www.ka.lth.se/kursplaner/arets_eng/FMA170.html)

RB.1.5. Each faculty should implement a policy on the use of educational expertise in planning education and developing teaching methods.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

▪ Comments on relevance:
LTH has a well established pedagogic strategy which is described in the Educational Development Plan, see Appendix A. A lot of effort, time and money have been invested in pedagogic development at LTH through the last 10 years; now there is a result to be seen. We have a strong brand and a good reputation; the students as well as the teachers choose LTH because they have the perception that the education is of high quality here.

RB.1.6. There should be access to educational experts and evidence of the use of their expertise for staff development and for research in education.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

▪ Comments on relevance:
LTH has its own educational experts at The Academic Development Unit at LTH ('Genombrottet').
The LTH teaching staff also has access to the experts at the Lund University Centre for Educational Development. Teachers attend pedagogical courses to a large extent, within them teachers often develop their own courses, and special pedagogical support is offered to teams of teachers and to individuals for specific projects.
There is a good support for general pedagogical issues, but the support could be improved when it comes to more subject related didactics.

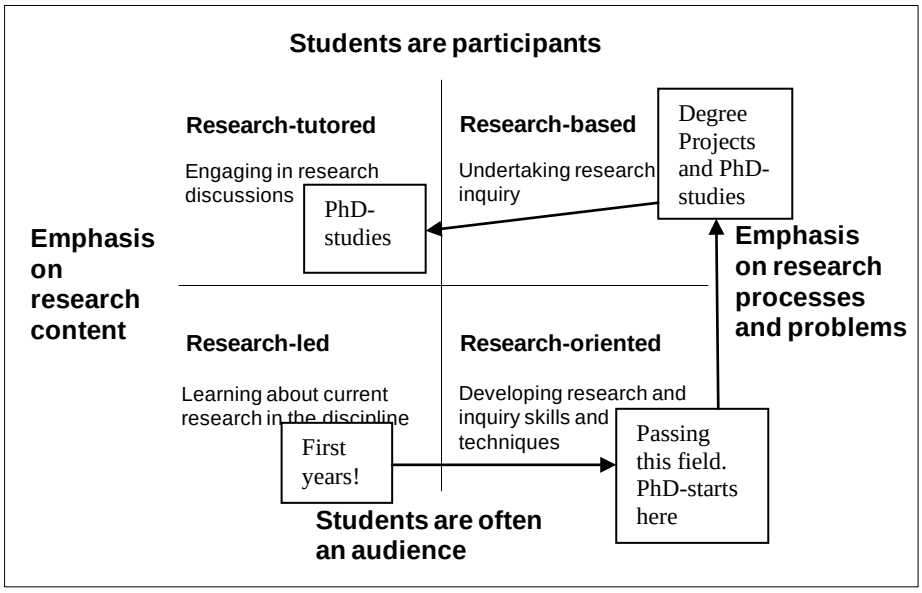
RB.2. Open, strategic questions

RB.2.1. Is research at your faculty 'education-based'? Please give reasons for your answer.
The research is mostly based on external funding. This influences the priorities within research to a large extent which is increasingly problematic with respect to the educational needs in areas where research is less intensive.

RB.2.2. How is 'research-based education' obvious/visible in the courses and programmes at your faculty? Illustrate progression within and between levels.
Almost all programmes start with an introductory course providing an overview over the research field and presenting the professional role you can get after the specific education, but also the scientific developments and trends in the area of study (e.g. http://www.ka.lth.se/kursplaner/arets_eng/FFFA01.html). The programmes continue with basic courses and then proceed with courses where the research approach is progressed, especially in the courses on advanced level in the end the five-year education programmes. Courses at the advanced level can also be used in the PhD four-year education. Degree projects in the master and engineering programmes are often
performed in research groups. Almost all teachers involved in the education at LTH have a PhD and are actively involved in research. The specialisations (i.e. the last two years in the five-year educations) are connected to strong research environments.
Some programmes (e.g. Surveying and Land Management, Architecture) have a special emphasis on the importance of students achieving a strong professional identity.

RB.2.3. Is teaching based on education research included in your definition of 'research-based education'?
Yes.

RB.3. Mark the position/opinion of your faculty on the figure



RB.3.1. Indicate the perspective on links to research in higher education that predominates in courses and programmes at your faculty. (Adapted from Healy)

Comments:
The students at LTH start off in the lower left field in the figure above. Especially for the longer education programmes there is a progression in terms of the attitude to research and the students move in the figure by developing research skills and techniques and the degree projects fall in the upper right field. The PhD education starts in the lower right field, passes the upper right field and ends in the upper left field. Of course there are occasions in the educations when you, for short periods of time, also move in the other direction in the figure (clock-wise).

RB.4. Long-term development of research-based education

Effects of the Bologna-process

- The five-year professional education programmes leading to second cycle (MSc) degrees in engineering and architecture, have been reorganised due to the Bologna-process with one three-year, more or less, compulsory block and one specialisation of two-year. After completion of the three-year education, engineering students may make a degree project for a BSc, while this project is incorporated into the Architecture programme. Almost all Architecture students take a Bachelor, while very few of the engineering students do. The Industrial Design education, which used to be 5 years, has been divided into a pure 3+2 model with consecutive bachelor and master programmes.
- Due to the changes mentioned above, research focus is now more obvious in the last two years of all educational programmes.

Student-active teaching methods

- Activities like PBL (problem-based learning), cases and projects might move the students in the figure above from being an audience to becoming participants. These activities are more frequent at LTH now than they were some years ago.

Area II. Innovation

I.1. General principles

I.1.1. Information and communication technology (ICT) should be used to prepare students for future means of communication between professionals and with employers and customers.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
LTH uses ICT extensively at all levels of education.
We have a large span: most courses use ICT, and some courses deal with the technology:
MAM061 Human-Computer Interaction
(http://www.ka.lth.se/kursplaner/arets_eng/MAM061.html)
EITF25 Internet – Techniques and Applications
(http://www.ka.lth.se/kursplaner/arets_eng/EITF25.html)

I.1.2. Educational strategies should be reviewed and adapted on the basis of graduates´ experiences in current professional practice and feedback from other stakeholders in society.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
Representatives from industry take part in the boards where decisions regarding the structure of the education program take place. Guest critics are used in the Architechture and Industrial Design memes and results from the alumni questionnaires are used when discussing strategies for developing educational programmes. Some of the programmes, e g the Master Programme in Food Technology and Nutrition, are developed in cooperation with local industry.

I.1.3. Aims and objectives of courses and programmes should be known to those concerned.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

▪ Comments on relevance:
The Programme Committees have regular meetings with the teachers involved in the teaching of the courses together with representatives for the students. Here, the aims and objectives of the programmes are discussed. The aims and objectives of the programmes are published in the “Studiehandboken” (on internet). Also the aims and objectives of the courses are published in the syllabus (on the Internet). A lot of the teachers also communicate the aims and objectives of the course when they teach. External stakeholders

such as employers, are not very concerned about the formal learning objectives. Rather, they tend to see the degree from LTH as a guarantee that the graduates have developed a versatile mix of general and specific skills.

I.1.4. Aims and objectives should address readiness for research studies.

Strongly disagree ☐ ☐ ☐ ■ ☐ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
There is a large variety within LTH.

I.1.5. Aims and objectives of courses and programmes should be defined together with and with input from principal stakeholders.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:

I.1.6. Measures of, and information about, graduates´ skills in the workplace should be used as feedback to programme development.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
The Programme Committees get qualitative information through the alumni questionnaires and also through the LTH Career Services, but this can be improved.
High: VBR054 Fire Safety Evaluation
(http://www.ka.lth.se/kursplaner/arets_eng/VBR054.html
Low: FAFA30 Physics: Electricity - Fluids
(http://www.ka.lth.se/kursplaner/arets_eng/FAFA30.html)

I.2. Open, strategic questions

I.2.1. Do you analyse the skills needed by the students you educate to meet the expectations and needs of society in the future? If so, what time scale do you use?
The Programme Committees and the Faculty Committee for Education analyse on programme level. An important aspect is to make sure that the students have a deep understanding of the underlying principles, to create a foundation to ensure that the student can cope with a changing future. Furthermore, teachers/researchers at the LTH departments have a lot of contacts with industry. Implicitly this means that we work on different time-scales. The underlying principles that the students need to understand change rather slowly, while some of the details (in the specializations) may change much quicker.
The Faculty of Engineering seeks to predict the needs for the future: Risk Management and the programme in Biomedical Engineering have been specifically designed to accommodate new needs in society.

I.2.2. What means of communication do you expect to see between professionals and with employers and customers in your educational fields in 2025?
For the education we see a future need for blended learning, i.e. learning activities at campus and cooperation between students face to face mixed by activities on the internet. It can be short films where the teacher explains important key-concepts, quizzes to improve learning and, of course, administration of reports and assignments. The development in other parts of the society will probably be in the same direction. This will put strong focus on both developing fast and secure communication channels on the internet as well as provide good physical environment for studies at campus.

I.2.3. Do you see your role as being to react to the demands of today for academic/professional/artistic competence or to contribute to the future development of society in these areas? i.e. would you characterise your courses and programmes as reactive or proactive in a societal perspective?
The need to be proactive is built into the LTH concept. Otherwise the skills and knowledge of our students would likely be obsolescent already when the students graduate.
Examples of pro-initiatives are the launches of: Computer Engineering (1982), Engineering Nanotechnology (2004), Engineering Mathematics (2004), Master in Sustainable Design (2007) and the educational activities in China.

I.2.4. If you see yourself as proactive – describe your network and cooperation with other relevant stakeholders.
Cross-bordering education within Lund University: cooperation with other faculties.
Also with e g ‘Region Skåne’ (medical care, traffic planning), the Mobile Heights (cooperation for developing ICT), Statistics Sweden (“SCB”).
LTH is also involved in various co-operations with other technical faculties/universities both internationally and in Sweden. Examples include: the coordinated lobbying for extention of the MSc Engineering programmes from 4.5 to 5 years, an initiative with KTH to influence the general entrance requirements from Secondary School, and active participation in international networks to promote student exchange with emerging markets (e.g. Latin America). There are also annual market research (analyses of the surrounding world) conducted by the LTH Communication and Marketing.

I.3. Mark the position/opinion of your faculty on the figure

Figure I.3.1. Criteria for curricular reform. Levels of system design (Adapted from Spear)

I.3.1. Mark the position of your faculty on the lines below.

System

1. X **2.**

1. The skills and knowledge students should acquire in one stage of education before advancing to the next stage are specified.
2. No shared or harmonised expectations of what should be mastered at each stage.

All programmes have compulsory courses, usually for the first three years in a five-year programme. The syllabus specifies which previous requisites that are assumed for a given course.
"On the large scale" this is rather well defined. The LTH five-year education programmes start with three years of essentially compulsory courses. There are course chains given by and in collaborations between departments where skill and knowledge after each course are well defined and synchronized. This requires good communication to give smooth transitions for the students.

Pathway

3. X **4.**

3. It is specified who will provide what skill or knowledge at what stage of education. Learning sequence established.
4. No definition as to what the students should master before moving on to the next stage of education.

Specified, but sometimes there are some problems with the implementation.

Connection

5. X **6.**

5. Those responsible for successive stages communicate with each other to ensure that the learning process is progressing as desired.
6. No such communication or interaction.

The Programme Committees have an important role in supporting communication, for example by regular teachers meetings. They can assign specific tasks to specific courses.

Activity

7. X **8.**

7. The content and educational value of each step is specified.
8. Learning through random interactions.

The Faculty of Engineering typically have 7.5 ECTS courses and the content in each course is specified by the syllabus.

Improvement

9.	X	10.

9. Reform issues address the system (expectations), pathway (assignment of responsibility) and connection (communication between the elements).
10. Proposals for reform are largely about teaching and activities.

The PhD five-year education is positioned quite far to the left.
The first-cycle courses and programmes quite far to the right.

Comments:

The Programme Committees may request changes in pedagogical design of a course, but typically the Programme Committees and the Educational Programmes Boards address system issues. The course evaluation system (CEQ) has a very important role to identify weaknesses in the curriculum design and the linking between courses.
The Faculty encourages Scholarship of Teaching and Learning change pedagogics in a distributed manner rather than in a centralized one.

The management may ask for variety in teaching, but seldom does this on a very detailed level.

I.4. Long-term development of innovation

- Choice of methods for teaching and examination. In-depth learning
  It is not stated at LTH that all teaching should follow the same concept. Instead, the system encourages a variety of different teaching methods. The examination method should be chosen in accordance with teaching method and also here, a variety is preferable. This is also mentioned in the Educational Development Plan".

- ICT as support for learning and communication in professional practice
  Communication skills should be progressed during the education and meet the needs for the professional practise. There have to be activities through the education where students practice different techniques. However, if there is a lack of these activities in the education, there would be indications of this in the alumni-evaluations.

- Societal interaction. Education for future needs
  It is important that the education at LTH also provides social competence and professionals that can interact in society. This is also monitored in the alumni-evaluations and, of course, the people responsible for the education programmes have to be responsive for indications from society and industry.

The Faculty Management also has to be responsive and follow the trends, attitudes of prospective students and cyclical changes in industry to ensure that the Faculty of Engineering has educational programmes that meet future need.

Area III. Outcomes

O. 1. General principles

O.1.1. Checks should be made to ensure that each student has met all expected learning outcomes as they are expressed in course and programme syllabi.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
Checks that test if the student has met the expected learning outcomes are important and the learning outcomes are assumed to be checked in the examination. However, “controlling” the students constantly might may not be the most important task.

O.1.2. Methods used for marking student assessments including criteria for passing examinations should be stated.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
“Stated” is interpreted by LTH as “have been made clear/explicit to the students during the course”.

O.1.3. The reliability and validity of assessment methods should be documented and evaluated.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
Historically, at LTH evaluating has had higher priority than documenting.

O.1.4. Assessment principles, methods and practices should be compatible with educational objectives and promote an approach to in-depth learning.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:

O.1.5. The number of examinations should be reduced by integrating assessments of various curricular elements to encourage integrated learning.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
This varies amongst the programmes.
High: ETI010 Digital Transmission Engineering.
The semesters in the Programme of Surveying and Land Management have specific themes and have integrated courses and exams. However, this can be very complex and the success is based on a sustainable, good collaboration between the teachers.

O.1.6. Assessments should evaluate problem solving, reasoning and communication skills.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐☐☐■☐☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
Problem solving is evaluated in a majority of the written exams. Reasoning is often an important part in problem-based courses (e.g. FMI Environmental Science). Writing technical reports is also a big issue in this course and a lot of effort is put into giving the students good feedback both of the content and the language. It is also important to practise oral presentations and get feedback and this is practised in several project-based courses, e.g. FMA085 Mathematical Communication.

O.1.7. Assessments should evaluate practical skills.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ■ ☐ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
Evaluating practical skills is not so frequent at LTH. However, it is often required that a student has to pass the lab and then also the practical work at the lab also might be evaluated (and not only the written report). This might include handling different technical equipment. In the start of the educational programmes, it is also important to ensure that the students are familiar with the security regulations for working in labs, e.g. KOK012 Organic chemistry. Practical skills are also important at the programmes for Architecture and

Industrial Design. There is a specialisation of Mechanical Engineering in Technical Design and here are also technical skills of great importance, e.g. IDEA35 Designer Tools.

O.1.8. A system of formative assessments of each student should be implemented in each course.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ■ ☐ ☐ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
This has been accomplished in the Architecture programme, where the students get a lot of feedback in courses and their progress is also evaluated on programme level.

O.1.9. The performance of each student should be assessed early enough during a unit of study to allow time for remediation.

Strongly disagree ☐ ☐ ☐ ■ ☐ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ■ ☐ ☐ ☐ Completely

▪ Comments on relevance:
The study advisors do assessment of the results, especially of the first semester. There are also follow-ups of the results of the first year on all programmes. This is one of the indicators in the annual reports from the education programmes. The reports are presented for the Faculty Board every year. It can be mentioned that the study results of the first year have been improved at all programmes during the last years.

O.1.10. A mechanism for course/programme evaluation should be established that monitors the curriculum and student progress, and ensures that concerns are identified and addressed.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

▪ Comments on relevance:
At LTH we have a common evaluation system, where the students evaluate their experience in the course (http://www.ceq.lth.se/include/luwebb/setlang.php?lang=en). The result of each course evaluation form one of the bases for the discussion at meetings where representatives from the teachers, the programme committee and student union participate. Results from the examination, as well as the syllabus, are also considered in this discussion.

O.1.11. Both teacher and student feedback should be systematically sought, analysed and responded to.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
LTH has a faculty-wide evaluation system (including “CEQ”). There is a Faculty Board decision stating that all courses operational evaluation must be performed of all courses programme directors aare supposed to write annual reports. There is quite a rigorous system in place. However, the follow-up may be improved.

O.1.12. Both students and teachers should be actively involved in planning course/programme evaluations and using the results for course/programme development.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
Students are active in programme development. Teachers are active in the programme evaluation, not so much in planning the evaluation, but strongly in using the result.
High: http://www.ka.lth.se/kursplaner/10_11%20eng/VBRA01.html
Low: http://www.ka.lth.se/kursplaner/10_11%20eng/FMA415.html

O.1.13. Course/programme evaluation should involve the management and administration.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
The LTH definition of “management and administration” includes the Programme Directors and the Administrative Services at the Faculty Office and they are involved in the evaluation. The result of the Course Experience Questionnaire is easily accessible to everyone at the web-site. Here also the concluding comments from the teachers, programme directors and students written after the evaluation meeting can be read.

O.1.14. A wide range of stakeholders should have access to course and programme evaluations, and their views on the relevance and further development of the curriculum should be considered.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
Teachers, programme directors and student representatives have the possibility to write down suggestions for coming course development as comments in the evaluation system.

O.2. Open, strategic questions

O.2.1. How do you make sure that all students achieve the expected learning outcomes?
Course level: This is a responsibility for the course coordinators and the examiners.
Programme level: This is a responsibility for the Programme Directors and Educational Programmes Boards. LTH regularly carries through surveys to Alumni, which provide information of this kind.

O.2.2. Do results from assessments form part of the agenda of meetings of the faculty board/management?
The yearly reports from the Educational Programmes Boards, which are based on the reports from the individual programmes are discussed and approved by the Faculty Board in a plenary meeting.

O.2.3. What assessment methods are used at your faculty? Give reasons for your choice in relation to expected learning outcomes.
Written and oral examinations, laboratory works, project works, presentations and written reports. Written examinations partly dominate due to tradition. For large student groups this is also the least expensive choice and perhaps the only possible one due to limited education budgets.

O.2.4. Give reasons for your choice of teaching methods in relation to expected learning outcomes that stimulate in-depth learning and provide students with the ability to identify a need for change and initiate improvement work in their future professional roles. Describe ongoing activities in this area.
Referring to the policy presented in "Educational development plan for undergraduate and master's programmes at LTH for 2008-2011", Enclosure A, we prefer educational variation at LTH. This makes greater demands on individual lecturers since then he/she must consciously take sides and argue in favour or his/her chosen form of tuition. This awareness and requirement for argument is a condition for the continued development which is necessary to achieve good tuition. As an example of the diversity case seminars can be mentioned, e.g. in the course MIO022 Management Organisation.
LTH also has structured activities through the Academic Development Unit ("Genombrottet") improving the pedagogical faculty discussion. The activities include consulting in course development processes, teacher training courses, and a bi-annual campus conference: http://www.lth.se/genombrottet/lths_pedagogiska _inspirationskonferens.html

O.2.5. To what extent and in what way do your students participate in learning activities outside of the direct education in courses/programmes?
Many students take on to work part-time as instructors in the LTH Supplemental Instruction, at council schools for twelve-yearolds, and at LTH for younger students.
Quite a number of students take part in a national competition of programming and "Teknik-SM". Also many students are active within the LTH yearly campaign for attracting new students. A large number of students, who themselves study in the last years of the longer programmes, work as instructors at seminars and laboratories in courses they have passed.

O. 3. Mark the position/opinion of your faculty on the figure

There is no figure related to this area.

O. 4. Long-term development of outcomes

- Course evaluations, including students' results in examinations

  LTH has a faculty-wide course evaluation system in place since 2003 where the major stakeholders (students, teachers, and programme directors) discuss and document their experience of the courses. The documentation includes not only the written statements from the stakeholders, but also participation rates, pass rates, and the student evaluation outcomes.

  The Programme Directors, as well as the Educational Programmes Boards, deliver annual reports. These reports are presented for the Faculty Board and feed-back of the reports is also given to the Educational Boards and Programme Committees.

  All course plans are reviewed every year.
- Independent degree projects

  There is an ongoing faculty project since 2009 on how to determine a good degree project. Many degree projects are conducted in cooperation with industry. The degree project supervisor is always distinct from the formal examiner. Results from student evaluations of the process of performing the degree project can be found at the web-site: http://www.ceq.lth.se/examensarbete.

Area IV. Alignment

A.1. General principles

A.1.1. The entire spectrum of educational interventions and assessment systems should be shaped to best meet individual and societal needs and ensure successful acquisition by all graduates of the skills required for their future professional roles.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
Through recent alumni-evaluations and the ongoing CEQ-evaluations we know that most students are quite satisfied with the education and the courses. Through our network with industry we know that employers are very satisfied with the students who have graduated from LTH.

A.1.2. The skills to be acquired by graduation should be linked to and specified in relation to research studies and future professional practice.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
The teaching should not be guided exclusively to a specific, now existing, professional practice. It must be pro-active so that the graduates can meet future professional needs. Again our industry employers seem to be very satisfied with our graduates. Concerning research studies, most of our research groups have no difficulties in recruiting very skilled students to the PhD education. However, in some cases there is hard competition from the labour market.

A.1.3. The curriculum and instructional methods should ensure that students have responsibility for their learning process and are prepared for lifelong, self-directed learning.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
For the long educational programmes, the process during the initial three-years is not in itself creating the desired skill and is more aimed to create a foundation for future studies. The two

final specialisation years fulfil the desired skill. The Bachelor of Engineering programmes however, lead to a profession in three years. And our industry employers seem to be satisfied with our graduates from the longer as well as the shorter educations.

A.1.4. Study guidance based on monitoring of student progress, and addressing social and personal needs of students should be provided.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

▪ Comments on relevance:
We have study advisors who perform follow-ups of the results of the students and they can design special study plans for students with problems. We also have social welfare officers who can provide help when students have social or personal problems.

A.1.5. The faculty should have sufficient physical facilities for the staff and the student population to ensure that the curriculum can be delivered efficiently.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
Most of the buildings at campus Lund are now about 50 years old and since some years there is an ongoing programme for renovation. Right now, the Architecture building is closed for renovation and the students and teachers are evacuated to other buildings. In the centre of the campus area we have a large study centre with a lot of facilities for self study and group activities. There are also rooms for similar activities in the other buildings. The Campus Helsingborg is quite newly renovated and well fitted for the students at the Bachelor of Engineering programmes.

A.1.6. The learning environments for the students should be improved by regular updating and extension of the facilities to match developments in educational practices.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
As in A.1.5.

A.1.7. Libraries and ICT (information and communication technology) facilities should be sufficient in size and breadth to support education and other aims of courses/programmes.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
The facilities are probably sufficient, but the introduction to the facilities during the first years might be improved.

A.1.8. Students and teachers should be able to use ICT for self-study, accessing information and working in professional systems.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:

A.2. Open, strategic questions

A.2.1. Are decisions on teaching and assessment methods on individual courses and programmes centralised or decentralised? Please specify.
The actual decision-making on teaching and assessment is often decided at departmental level by the individual teacher or team of teachers in dialogue with the programme level. The formal decisions are made by the Educational Programmes Boards on faculty level.

A.2.2. Are discussions on the linking of expected learning outcomes, teaching and assessment (alignment) part of the agenda of the faculty board/management?
This is often discussed as a tool in pedagogical courses in higher education wherein a lot of the teachers at LTH take part. It is also often a part of the solution when there are problems in a course and this can be discussed at the level of faculty board/management.

A.2.3. Do you use the evaluation model described in the EQ11 project plan at the level of individual courses and programmes or even at faculty level? Is it modified? How? If it is not used – why not?
The system we use for quality assurance of the education at LTH is described in the introduction of this document. We focus on the results of the assessments, the experience of the students when they take courses and the dialogue between students, teachers, Programme Directors. Of course, we also take input from alumni, industry, research community and the surrounding society and bear the aims from the syllabi in mind. We believe that is in accordance with the model described in the EQ11 plan.

A.2.4. How do students contribute to quality development at your faculty?
The students are represented at all official boards and in Programme Committees. All programmes have student boards monitoring educational issues, including the comments made by students in the formal documentation. These boards are parts of the very active

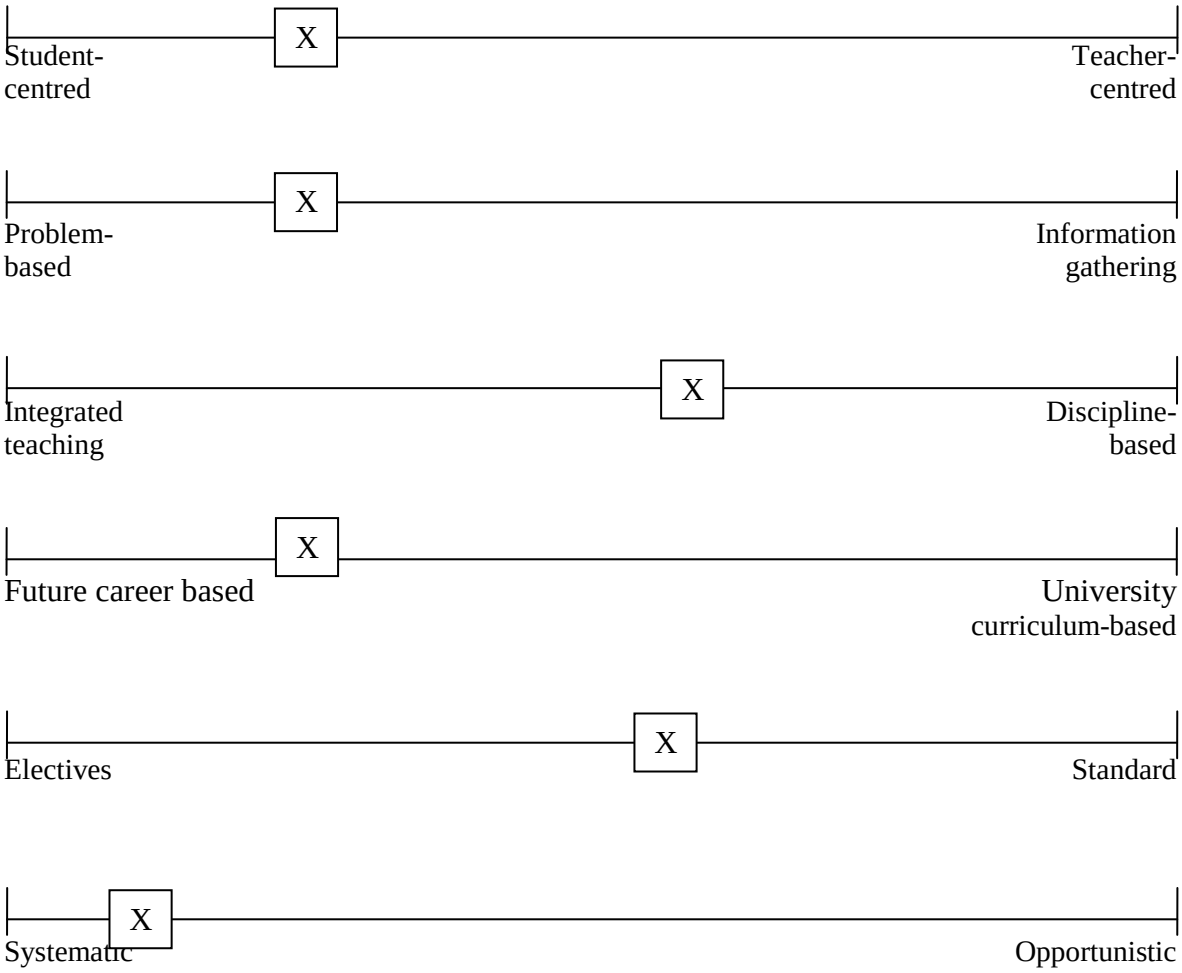
student union (TLTH) at LTH. Concerning the PhD education TLTH has an active group of PhD students. These students are contributing substantially to the quality development at the faculty level and the university level as well.

A.2.5. How many hours of teacher-led educational activities do you offer each student on courses/programmes at your faculty on average each week?
Approximately 25 during the periods of study, four periods of seven weeks. In the first years there is more of teacher-led education and later on more time for reflexion and independent work.

A.3. Mark the position/opinion of your faculty on the figures

A.3.1. Mark the position of your faculty on the lines below.

Figure A.3.1. Learning environment – SPICES (Adapted from Harden)



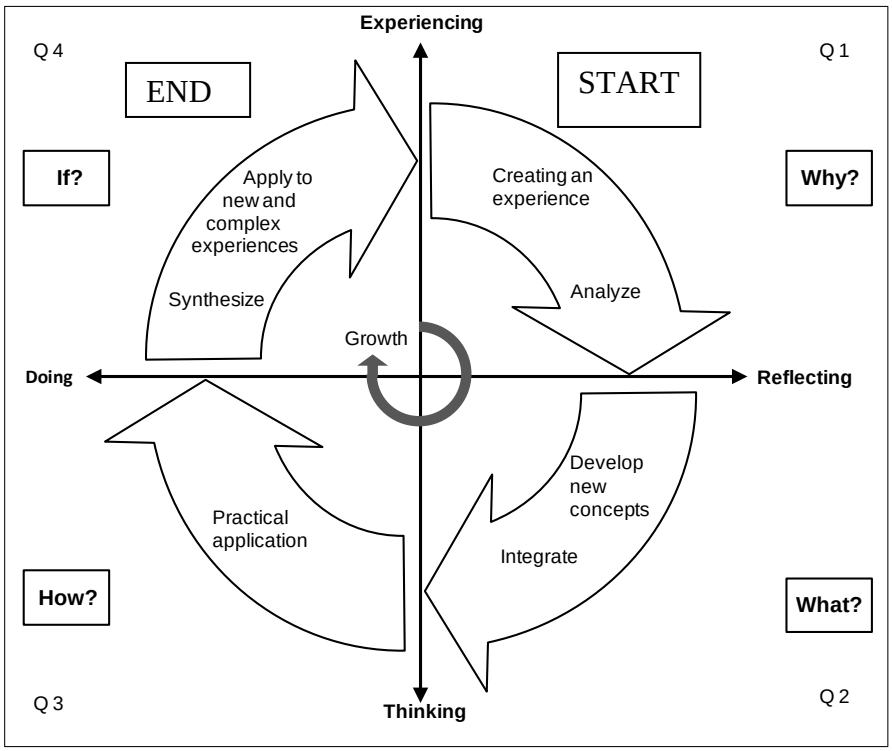
Comments:

The initial three years of the long, professional educations are mostly discipline based, then the teaching gets more and more integrated. The initial three years are more or less compulsory, the final years are more elective.

A.3.2. Illustrate where the learning process on your courses and programmes usually starts and concludes.

- In quadrant 1 personal meaning and motivation is set for what is to follow.
- Quadrant 2 represents acquisition of new knowledge and concepts.
- In quadrant 3 the students make personal practical applications.
- Quadrant 4 involves syntheses and extension. The knowledge is applied in new and more complex experiences.

Figure A.3.2. Curriculum planning framework (Adapted from Kolb, D.A. and Armstrong, E.)

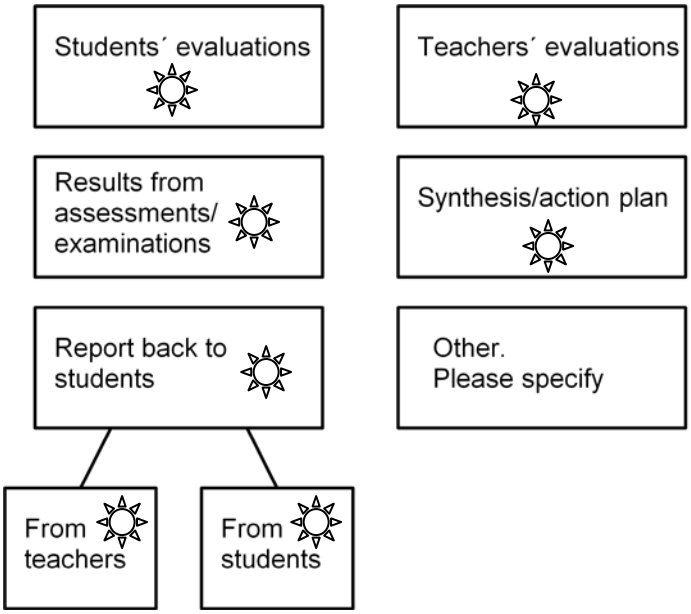


Comments:

The long educational programmes at LTH start in Q1 and end in Q4. The Bachelor of Engineering programmes, however, ends in Q3, they are supposed to be built on known knowledge. The PhD-education might be described as making further loops on a more advanced level in the four quadrants.

A.3.3. Which of these components do you regularly use at your faculty for evaluations at the level of individual courses and programmes, or even at faculty level. Please tick the relevant boxes.

Figure A.3.3. Evaluation of courses and programmes



Comments:

The tics in the figure are represented by suns. The evaluation system in use at LTH is described in Enclosure A. All the boxes marked by tics are building stones in the evaluation system.

A.4. Long-term development of alignment

Describe and characterise the long-term development work relating to alignment. Illustrate using the selected quality indicators in the project plan. Provide your answer in the form of 3 - 5 bullet points for each quality indicator.

<u>Choice of method for teaching and examination</u>

- Alignment is a keyword at many of the pedagogical courses offered by "Genombrottet" and it is often a central part in the projects that the teachers focus on in these courses. The projects are supposed to be realised as course development in the courses where the teachers already are involved.
- It is crucial that the courses are aligned and all parts in a course are reflected in the examination. Otherwise that part of the course might easily be dropped out by some students.
- Alignment is closely linked to "progression". At LTH we require that there is a progression in the complexity of the examination, expressed in terms of the SOLO-taxonomy. Thus, a course on Basic level (upper) must include elements of multi-

structural examination. To qualify for Advanced level, there must be elements of “extended abstract” built into the examination. “Extended abstracts” refers to the highest level in the SOLO-taxonomy where integrated aspects on a topic may be conceptualised at a higher level of abstraction and generalised to a new topics or areas.

Decision making structures and resource allocation

- LTH is a big faculty with a lot of education programmes and a great diversity in research. It is a challenge to create a fair resource allocation system that makes the system work perfect. Sometimes there have to be compromises; like strategic recruitments of staff for teaching in areas where the research has problems getting funding in order to keep the broad educational programmes going.
- The matrix organisation at LTH with a special organisation for the education programmes that do not overlap with the departments is a prerequisite for the cross-disciplinary broad educational programmes. This organisation works as the motor (as an internal force) for the quality development of the programmes.

Student cooperation

- Student representatives are involved in the programme committees and education boards and contribute to the development of alignment.
- LTH supports the student union financially, for example by compensating for a full-time official that works with internationalisation, which is a key quality dimension.

Area V. Management

M.1. General principles

M.1.1. There should be an implemented policy for which the academic staff are responsible, within which they have freedom to design the curricula and allocate the resources necessary for its delivery.

Strongly disagree ☐ ☐ ■ ☐ ☐ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ■ ☐ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
The Educational Programme Boards have this responsibility, as long as the curriculum conforms with policy decisions taken by the Faculty Board (i.e. the aim of the programme and the structure as related to the degree requirements). When curricula are revised, resources are re-allocated. However, since many courses are given across LTH, the departments teach in different programmes at LTH, which means that coordination is required. The heads of departments are responsible for the course delivery.

M.1.2. Educational resources should be distributed in accordance with educational needs.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
Educational resources are distributed to carry the costs where the teaching occurs in the organisation, according to teaching intensity and the number of students. LTH faculty level allocates resources designated for student laboratories directly to the departments in order to encourage laboratory work.

M.1.3. A course/programme (curriculum) committee should be given the responsibility and authority for planning and implementing the curriculum to secure the objectives.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
Securing the programme objectives requires that the resource allocating system provides the programme committees and directors with tools for implementing. However, at LTH the Programme Committees do the actual planning while the Educational Programmes Boards

take the formal decisions. A new budget system takes into account special needs, i.e. staffing ratio and, to a certain extent, use of labour intensive pedagogic methods.

M.1.4. A course/programme (curriculum) committee should be provided with resources for planning and implementing teaching and learning methods, student assessment, evaluation and innovations in the curriculum.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
The matrix organisation at LTH leaves implementing of teaching and learning methods and student assessment to the departments, while evaluation and innovations in the curriculum often are done in cooperation with the stakeholders.

M.1.5. Staff, students and stakeholders should all be represented on the course/programme (curriculum) committee.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ☐ ■ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
Stakeholders as well as the staff have representatives in the Educational Programmes Boards and in the Faculty Board. The students have representatives in every decision-making body, however not in the LTH presidium.

M.1.6. The course/programme (curriculum) committee should make changes to the education offered in response to feedback from the community and society.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
Industry (“the stakeholders”) have representatives in the LTH Educational Programmes Boards. The LTH international outlook is constantly influenced by alumni networks and the LTH Business Council. The Student Union also arranges Labour Market Days annually.
As a consequence of demands from the Society, it has been made compulsory in the LTH five-year programmes that every student is required to study a minimum of courses in e.g. sustainable development and economics.

M.1.7. The faculty should have an implemented policy on student representation and appropriate participation in the design, management and evaluation of the curriculum.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

▪ Comments on relevance:
At LTH there has been a policy of students being represented in this, *de jure* and *de facto*, since the 1960's.

M.1.8. Student activities and organisations should be encouraged and facilitated.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

▪ Comments on relevance:
LTH supports student activities on every level and the cooperation between TLTH and LTH works quite well.

M.1.9. The faculty should have a policy on recruiting academic staff that outlines the type, responsibilities and balance of teachers to deliver the curriculum adequately; the responsibilities should be explicitly specified and monitored.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ■ ☐ ☐ ☐ Completely

▪ Comments on relevance:
When recruiting staff many factors must be taken into consideration, e.g. subject relevance, pedagogic qualifications and potential for attracting future research funding. This means that the possibilities to pick and choose are somewhat limited and that such a policy might be utopian.

M.1.10. The faculty should have an implemented policy which addresses a balance of capacity for teaching, research, integration and application, with appropriate emphasis on both research attainment and teaching qualifications.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

▪ Comments on relevance:
The faculty is heavily dependent of funding for research from different external sources. The external funding often requires funding from the faculty as well and the faculty resources left for strategic efforts prioritised by the faculty management, is limited. But the economical system for higher education in Sweden, including LTH, is built on an interaction between research and education and almost all teachers at LTH are actively involved in research. The

balance between research and teaching for an individual teacher depends on the funding situation at the specific department.

M.1.11. Staff policy should include teacher training and development and teacher appraisal.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

▪ Comments on relevance:

In the Educational Development plan there is a reference to a decision by the Faculty Board in 2005 of a mission for the heads of departments to provide possibility for the academic staff involved in teaching to attend 1.5 weeks of courses for pedagogic competence development each year. This is still a good benchmark and for 2010 the statistics show a volume that corresponds to about 1 week per full-time equivalent academic staff. The Academic Development Unit ("Genombrottet") provided 516 course weeks in total divided in 303 weeks for academic staff and 213 weeks for PhD students. The ETP is one example of teacher appraisal and up till now 83 have been awarded. The group of teachers with ETP consists of 18 women and 65 men or 27 full professors, 44 assistant professors (universitetslektorer) and 12 lecturers (universitetsadjunkter).

M.1.12. The faculty should have defined and published standards of conduct for the teacher-learner relationship, including written policies for addressing violations of those standards.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

▪ Comments on relevance:

LTH follows the Lund University guidelines for student rights and adapts an attitude of responsiveness in case a conflict occurs. There is no written LTH policy for handling these matters, since they are often delicate and related to individuals. The heads of department are responsible for the staff and for the working conditions within a department. LTH has two "Assessment Ombudsmen" that students can turn to in case of a student and a teacher having disparate views on the assessment of an examination. They handle 10-12 cases a year and the experiences from this system are very re-assuring.

M.1.13. The full faculty should meet often enough for all faculty members to have the opportunity to participate in the discussion and establishment of policies and practices

Strongly disagree ☐ ■ ☐ ☐ ☐ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ■ ☐ ☐ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:

This is next to impossible at the LTH level. However, each programme normally invites all teachers to a meeting/workshop at least once a year.

M.1.14. Board/committee members´ terms of office should be overlapping and long enough to permit them to gain an understanding of the entire course/programme.

Strongly disagree ☐ ☐ ☐ ■ ☐ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ■ ☐ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:

The mandate periods are usually three years. As a rule there is some overlapping in each board, but that cannot always be achieved.

M.1.15. The board/committee should have sufficient autonomy to direct resources, including remuneration of teaching staff, in an appropriate manner in order to achieve the overall objectives of the course/programme.

Strongly disagree ☐ ☐ ☐ ■ ☐ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:

The LTH Faculty Board has an overall responsibility for the economy. The Programme Committees should not be involved in regulating the teachers' salaries or allocating individual teachers to certain courses as this is the responsibility of the Head of the Department in question. In the new LTH resource allocation system, the Educational Programme Boards get some means for allocating additional resources to specific courses.

M.1.16. Financial resources should be adequate to sustain sound education and accomplish the aims and objectives of the course/programme.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:

M.1.17. Pressure for departmental self-financing should not compromise the educational mission or lead to the enrolment of more students than the department´s total resources can accommodate.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

▪ Comments on relevance:

Decisions on enrolment are not taken at the departmental level. This is a matter for the faculty level. The educational programmes consist of a mix of courses belonging departmental boarders.

M.1.18. The administrative staff should be appropriate to support the implementation of the educational programmes and other activities and ensure good management and deployment of resources.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

▪ Comments on relevance:

M.1.19. The faculty management should maintain a programme of quality assurance and submit itself to regular review.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

▪ Comments on relevance:

There is an annual follow-up of the LTH strategic plan in the annual reports from the programmes, via the four educational boards, to the Faculty Board. This boardhas recently required similar reports concerning the PhD education.

M. 2. Open, strategic questions

Provide examples from plans, assessments and/or minutes from the autumn semester 2010 or spring semester 2011 to support all your answers.

M.2.1. How do you know from your own standards that the quality of a course or programme at your faculty is high?

The teachers work in a research-based environment. LTH has its own Course Experience Questionnaire system which is constantly followed up and the system of annual reports. There are also alumni surveys supplementing information as well as the LTH analyses of the surrounding world. LTH has a large number of incoming exchange students, including double-degree students, that express satisfaction with the educational quality at LTH.

M.2.2. How do you prioritise education in relation to research at your faculty?

LTH has its own Pedagogic Academy, appointments of Excellent Teaching Practitioners (ETP). Pedagogic qualifications are given high priority when recruiting teaching staff.

The teaching is performed in accordance to the faculty mission as stated by the Swedish state authorities. As this governs the recruitment base for future researchers, this means that the extent of the education indirectly rules the extent of research. The faculty research resources and demands for co-financing research projects also have an influence on prioritising. But there is a connection between education and research and these two need each other: education needs to be carried out in a research-based environment and research needs education in order to attract PhD students.

M.2.3. Which of these activities would you consider your primary obligation?
As the engineering faculty within Lund University, LTH has the obligation, set by the government, to educate 2625 Masters of Science in Engineering, to increase the volume in Bachelors of Science in Engineering education by 3% and to award 380 doctoral degrees during the period 2009-2012. (http://www.eken.lu.se/upload/plan/RegleringsbrevLU2010.pdf) But as stated in the answer to question M.2.2., this also requires a well established research.

M.2.4. Does your decision making structure support the needs of education? Provide a simple diagram to demonstrate levels of decision making and resource allocation in relation to your courses and programmes.
Yes
(http://www.lth.se/fileadmin/lth/lthhandboken/organisationforvaltning/organisation/arbetsordning_un_pl.pdf).

M.2.5. Describe how and where you would decide on a major change to one of your courses/programmes with consequences for resource allocation at all levels.
If there is need for a major change in an education programme with consequences in resource, allocation can be initiated from the Programme Management and decided in the Educational Programmes Boards. If there is a need for a change in a course the responsible teacher is also involved in the process but the decision is always made in the Education Programmes Boards. The resource allocations are then implemented through a dialogue between the chairs of the Education Programmes Boards and the Management of the Faculty. In the future system of resource allocation the programme management will get a framework for the total cost of a programme and hence a more efficient tool for a constructive dialogue with the departments concerning the implementation,

M.2.6. Describe the budget process to allocate financial resources to an individual course or programme from the faculty board level.
The budget discussions have so far been handled by the Director of the Faculty Management, the Assistant Dean for Coordination of the Education Programmes and the Heads of the Departments. The Programme Management will be more important in the future system for resource allocation.

M.2.7. What proportion of your overall education budget is allocated to the core activity of education and what proportion to support/administrative functions?
This depends on the definition of ”core activity of education”. At LTH we have a faculty organization for student support and programme administration. These costs are not budgeted at the departments, but central, at the faculty level. Including these costs in the core activities we spend about 50% of the economic resources on the core activities and 50% on the administration.

M.2.8. Do you believe that you have the financial basis needed for your courses/programmes?
Due to the cutbacks and rationalisations that have been made during the last years, e.g. the number of laboratory exercises has been decreased, the currently allocated faculty grants are sufficient for upholding the quality of the education.
If not – how do you prioritise the resources you have?

M.2.9. What would be you first and second priority if you had more money?
The first priority should be to decrease the number of students in the groups in the first year in order to increase opportunities for teacher-student feedback and communication. Lectures for groups with about 200 students are not pedagogically efficient. Of course, improving the physical study environment for both students and teachers also should have positive effects on student learning. The second priority would be to increase the budget allocation to degree projects and project-based courses. It is also important to encourage teachers to find good combinations of teaching and research.

M.2.10. How do you ensure continuity of competent leadership over longer periods for your courses/programmes?
The LTH Programme Directors are usually assigned for three years, and after that for another three years. The chairs of the Education Programme Boards have long experience and serve as mentors for the Programme Directors. The Academic Development Unit at LTH, "Genombrottet", has a course "Academic Leadership". Furthermore, the administration serves as a "backbone" that complements the academic organisation with continuity and stability.

M.2.11. Describe your policy to find, select and educate the educational leaders of tomorrow.
The educational leaders are identified in the organisation by the elective committees and appointed by the Faculty Dean. The Heads of Departments have an important role when considering the appointment by the elective committees. The pedagogical courses organised by "Genombrottet" as well as the pedagogical campus conference held every second year are important nodes for the networking of the LTH teachers. Potential future educational leaders are often identified in these networks. The leaders are educated by the courses and through introduction activities arranged by the faculty administration in the beginning of their missions.

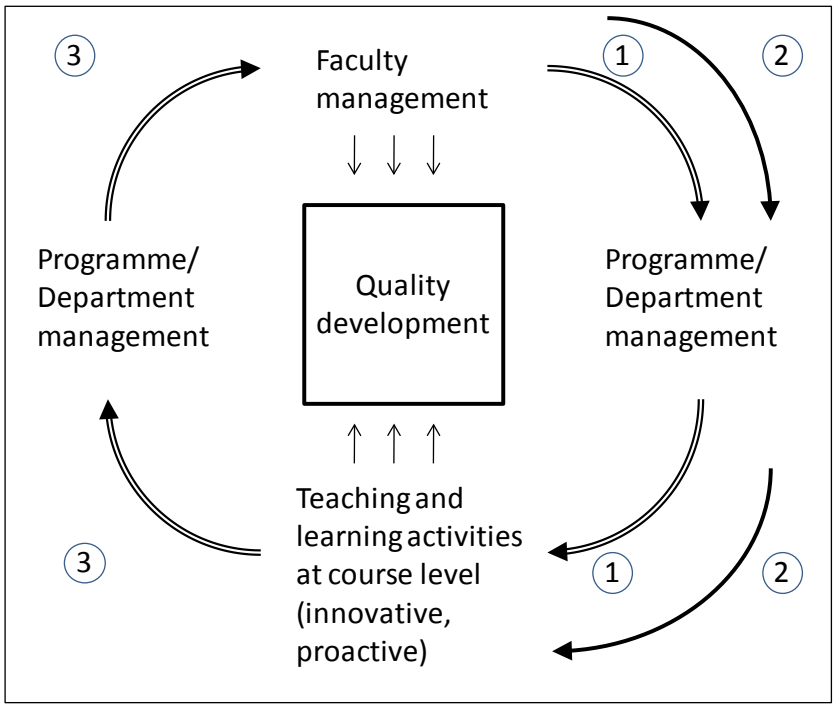
M.2.12. Do you support and encourage education research and academic documentation of reform and development work?
Yes, we have a rewarding system for pedagogical activities, a "Teaching Academy", where the teacher gets the ETP-award, Excellent Teaching Practitioner. The teacher gets an increase in salary and the department corresponding resources. When applying for ETP, the teacher has to submit a pedagogical portfolio where the pedagogical reform and development work has to be documented. Educational research leading to publications in international journals or presentations at international or national conferences is performed by many teachers at LTH, especially by the ETP teachers and those teachers affiliated to The Academic Development Unit at LTH," Genombrottet".

M.2.13. Provide examples from the academic appointments board *(lärarförslagsnämnd)* to illustrate decisions on recruitment of teachers on the basis of teaching qualifications in a competitive situation.
At LTH the lecturers ('universitetsadjunkter') always get promoted to assistant professors ('universitetslektorer') when becoming PhD's. There are also possibilities to get promoted on pedagogical merits as well as merits in academic leadership. Right now there is slightly more than 10 senior lecturers active at LTH promoted on pedagogical merits. Pedagogical merits are always an important part at promotions as well as in recruitment processes.

M.3. Mark the position/opinion of your faculty on the figure

Which management strategy within education predominates at your faculty? Please comment and illustrate with a figure (***D.)*** constructed according to the examples shown in A, B and C. Please also illustrate the communication between faculty management and programme/department management.

B.



Teaching and learning activities are continuously developed and reformed at teacher/student/ course level, based on ongoing analysis of scientific/artistic developments and the needs of students, society, employers and other stakeholders, and education research. The faculty management and programme/department management is well-informed about ongoing global developments. Clear long-term development goals are agreed and known to all students and teachers. Quality development is built from below and supported from above. Reform work congruent with the long-term goals is supported by the faculty management. Teaching staff, students and administrative staff work together to develop education. Directives from above are general and usually confirm what is already ongoing.

1. Strategic support
2. Directives (general)
3. Feedback on innovations, suggestions

Comments:

The management structure described in (***B.)*** fits best for describing LTH. The evaluation system on course level (CEQ) condensate into the annual reports where the strategic plan is followed up as well as evaluations on programme level are central parts in the quality

development system for the education at LTH. Here the documentation of the development is secured.
The communication between the faculty management and the management of the educational programmes take place in the meetings in the Faculty Committee for Education ("Utbildningsberedningen") where the four education boards are represented by their chairs and the faculty management is represented by the Dean, the Assistant Dean of Education and the Assistant Dean of International Affairs. There are also meetings for dialogue between the Dean and the Programme Directors. The chairs of the Educational Programmes Boards are also represented at these meetings. The matters discussed at the meetings are e.g. ideas for new education programmes, changing of programme structures, follow ups of evaluations or surveys or changes in the conditions for the students due to changes in the Swedish system for study loans (CSN).

M.4. Long-term development of management

Describe and characterise the long-term development work relating to management. Illustrate using the selected quality indicators in the project plan. Provide your answer in the form of 3 - 5 bullet points for each quality indicator.

Decision making structures and resource allocation

- The new resource allocation model is to be implemented. This will provide the programme directors with better prerequisites for a fruitful discussion with the departments when the programme committee proposes a course for a special need in an educational programme. It might concern special teaching methods, size of student groups or that the program committee wants to see progression of a special skill of the students in the actual course.
- It is important to do thorough follow ups of different parts in the strategic plan to ensure that it is implemented. This is done for the education in the annual reports but both the strategic plan and the follow up can be better. It is also important to provide the right tools, i.e. economic resources, to ensure the implementation.
- The connection between the directors of study for the PhD-education on the departmental level and the directors of study on the faculty level are to be improved.

  Student Cooperation

  - There is a big need for student representatives at all levels - and this has been the fact at LTH for a long time
  - The student representatives need an introduction to get to know the organization of LTH when they start their missions. This is done by the student union, TLTH, but it can be improved. The communication between the student representatives can be improved in some areas.
  - The required meetings in the evaluation system where representatives for the students, teachers and Programme Committee discuss the outcome of the experiences of a course is very important and here the student representatives are really crucial.
  - The student representatives in the Programme Committees, Educational Programmes Boards and the Faculty Board are very important and their contributions are highly valued.

Area VI. Scholarship

S.1. General principles

S.1.1. Excellence in teaching should be recognised.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
At LTH we have a pedagogical academy and a system for rewarding pedagogical excellence (*Enclosure A*).

S.1.2. Basic teaching requirements for all teaching positions should be clearly expressed and implemented.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

▪ Comments on relevance:
When recruiting staff many factors must be taken into consideration, of course the teaching requirements should be as clearly stated as possible. The work of 'Genombrottet' has now significantly influenced the teaching at LTH.

S.1.3. Levels of higher teaching skill and teaching excellence should be clearly expressed and implemented.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

▪ Comments on relevance:
The ETP system is a means of expressing and implementing teaching excellence.

S.1.4. A system to assist teachers to develop and document teaching skills should be in place.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

▪ Comments on relevance:
When applying for ETP the teacher has to write a pedagogic portfolio and there is a course offered by The Academic Development Unit at LTH , where the teacher gets tools for the writing process.

S.1.5. The faculty should expect teachers involved in educational development work to disseminate their results.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

▪ Comments on relevance:
Not all teachers are very good in following up their developments but there has been a lot of improvement in follow ups through our evaluation system.

S.1.6. The faculty should have an implemented staff policy which addresses a balance of capacity for teaching, research, integration and application, with appropriate emphasis on both research attainments and teaching qualifications.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
The faculty policy clearly states that this should be the case. It is a challenging task for the departmental heads to involve staff that mostly teach in research projects and staff that focus on large research projects in teaching.

S.2. Open, strategic questions

S.2.1. Academic scholarship traditionally includes research, teaching, integration and application, for example clinical work for health care academics, collaboration with industry, commercial patents, etc. Do you consider your faculty to be scholarly in all activities you are involved in? If not – why not and what do you lack?
All academic staff is scholarly in at least one of these areas of activities, but the individual variations in focus are large. In comparison with comparable faculties, LTH has a strong focus on scientific and pedagogic scholarship. However, there is a large variation and, in some areas, we are heavily focused on industrially and/or commercially oriented scholarly activities.

S.2.2. Is it possible today for an individual member of teaching staff to be excellent in all these four scholarly activities at the same time? Is it desirable?
It is vital that the teaching staff that the students meet in total is excellent in all four activities. However, it may be hard to achieve for an individual teacher. All teaching staff should be encouraged to develop different areas during various phases of their career.

S.2.3. Do you request your teaching staff to be excellent in one of these activities and highly competent in the others? Or is it sufficient to be excellent in research?

Of course it would have been an ideal situation if all the teaching staff at the faculty was excellent in all activities but sometimes that can be hard to fulfil. In practice, the balance depends on how a department is funded, whether it is through a large volume of teaching, by external research grants or, which is the more preferable, a well balanced mix of both.

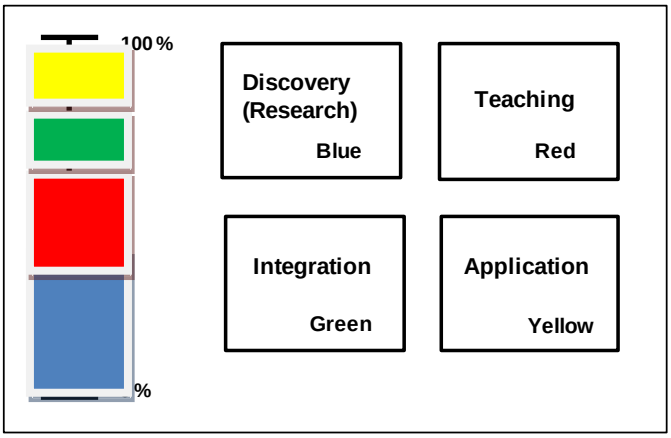
S.2.4. Do you have regular pedagogic seminars at your faculty? If yes; do you organise them yourselves, or do you utilise the university programme?
Through The Academic Development Unit at LTH, there is a lot of activities with focus on pedagogic issues at LTH, e.g. seminars, courses and conferences. Teachers at LTH also utilise the activities organised by CED, the central university unit. The Educational Programmes Boards and Programme Managements also arrange different kinds of meetings and seminars with pedagogic focus.

S.2.5. How many senior and how many junior staff members (number and percentage of entire staff) participated in such seminars during spring and autumn semesters 2010? Enclose the programme for the seminar series during this time.
It is impossible to get an overview over all different activities with pedagogic focus at LTH during this period of time. Just to give some examples: the courses at The Academic Development Unit at LTH engaged 248 teachers for longer or shorter courses, all four Educational Programmes Boards had thematic day meetings engaging 120-150 teachers in total. There was a Pedagogic Inspiration Conference too with about 120 participants. There have also been different activities arranged both by the programmes and the departments. Examples of popular themes during the period are coming educational evaluations, alignment of educational programmes and quality assurance of degree projects.

S.3. Mark the position/opinion of your faculty on the figure

Use the blocks to build a pillar that you consider represents the extent of scholarship at your faculty. The height of each block should represent the relative proportion of each academic activity in your overall competence. 100% represents your total competence.

Figure S.3. Academic scholarship



Comments:

- Research (blue): 45%
- Teaching (red): 30%
- Integration (green): 10%
- Application (yellow): 15%

The green and yellow areas are also parts in both the red and blue areas, i.e. application and integration are important parts in both teaching and research. It is very hard to split the activities up.

S.4. Long-term development of scholarship

Assessment of teaching qualifications

- The ETP system at LTH includes state-of-the-art assessment of teaching qualifications
- Teaching experience and pedagogic reflexion are assessed at promotions and recruitments through the work of the appointment boards

Links to research in education, including education research/development

- Through the activities at The Academic Development Unit at LTH ("Genombrottet") a lot of the teachers at LTH are active in publications in international journals with focus on pedagogic development in higher education and both national and international conferences in the area.
- The ambition of "Genombrottet" of putting a focus on these questions has really had success. This development started about 10 years ago and the process is just accelerating.

Area VII. Internationalisation

Int.1. General principles

Int.1.1. Students graduating from courses/programmes should be able to participate in international professional work in their fields.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
The educational programmes are internationally adjusted and bench-marked by exchange contracts and Double Degree-agreements. The students get employed internationally and perform well in international companies.
High fulfillment: Environmental Engineering, http://www.lth.se/english/education/programmes/master_engineering/environmental engineering/.
Lower fulfillment: Surveying and Land Management, http://www.student.lth.se/English/education/programmes/master_engineering/engin_surveying:land_managem/
For this latter programme, the professional field is more national, which leads to a national programme. This may be more of a problem for business than for our university.
Lower fulfillment: Bachelor of Science in Engineering programmes. Here the expectations are to educate engineers for the national market.

Int.1.2. Lund University should strive for international mobility of teachers.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

▪ Comments on relevance:
In internationalisation concerning the teachers at the undergraduate level there is a large variation between and within different departments at LTH. Teachers active in research and in courses for the PhD students are normally strongly engaged in international activities, also in courses for incoming international students.
A survey of the LTH international collaborations show that faculty exchange is a part of close to 200 collaborative international research projects. In the programmes of Architecture and Industrial Design external, international examiners are frequent.
Exception: The programmes of Bachelor of Science in Engineering.

Int.1.3. International students at all levels should be integrated with Swedish students in courses and programmes at Lund University.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
LTH has no courses given for international students only. That would counter-act our ambition to promote Internationalization at Home. However, the introductory course for PhD students will from this Spring term on also be lectured in English.

Int.1.4. It is an important part of internationalisation to recruit teachers from other countries to teach on courses and programmes at Lund University.

Strongly disagree ☐ ☐ ☐ ■ ☐ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ■ ☐ ☐ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
International faculty may be a good thing, but singular individuals do not influence the whole LTH community.
Recruitment internationally must be followed up with solid pedagogic education, adjusted to the Swedish educational culture. The teachers need to be integrated (but not assimilated). The recruitment is done on a departmental level and the needs, culture and recruitment vary a lot.

Int.2. Open, strategic questions

Provide examples from plans, assessments and/or minutes from the autumn semester 2010 or spring semester 2011 to support all your answers.

Int.2.1. Give examples of international cooperation within education at your faculty that benefits all parties involved.
1 LTH's international educational networks T.I.M.E (focus on double degrees), Magalhaes (Europe – Latin America) and subject-oriented networks, like CUMULUS (industrial design).
2 The China Profile for Electrical Engineering, Computer Engineering and Information and Communication Technology at Zhejiang University, China.
3 The four week Linfeng Summer Research School, organized in cooperation with Xiamen University, China.
4 Erasmus Mundus Joint Master programmes in Fire and Safety Engineering, and in Food Innovation and Design, as well as commitments within Erasmus Mundus Action 2.
5 Structured exchange, notably as pre-approved semesters for 3rd year students at University of Connecticut and at University of Waterloo, Canada.
6 An EU-US ATLANTIS policy oriented project with Virginia Tech, Politecnico di Milano, TU Wien and University of Kentucky.

Int.2.2. Give examples of international cooperation within education at your faculty that aims to integrate international, intercultural and global perspectives in the aims, organisation and delivery of your courses/programmes.
1 The China Profile and the Linfeng Summer Research School
2 ECMI, a network that organizes a summer school in industrial computational mathematics

3 Summer courses within BEST (Board of European Students of Technology)
4 International field trip within the Master Programme in Sustainable Urban Design
5 Engineering Training Course with internship periods abroad.
6 Internationalization at Home through an integration project within Water Resources and a large number of courses available in English to enable exchange students to take part. The number of courses is now 130.

Int.2.3. Does your faculty collaborate and benchmark with other international higher education institutions?
Yes, mainly by double degrees within the T.I.M.E network, with UniKaiserslautern and with Kyushu University.

Int 2.4. What proportion of students with international experience as exchange students or with international courses, practical training or projects as part of their education do you strive for at your faculty? What should be the minimum duration of such international studies?
In the Strategic Plan of LTH (*Enclosure E*) there is an overall goal of 25% of all the students taking a degree from the 300 ECTS professional degree programmes. For 2010 the fraction ratio is about 20%. At programme level the goal is 15%. For the period 2008-2010, there was a great span ranging 37% for the industrial engineering and management programme to 2% for Computer Engineering.

Int.3. Mark the position/opinion of your faculty on the figure

There is no figure related to this area.

Int.4. Long-term development of internationalisation

Describe and characterise the long-term development work relating to internationalisation. Illustrate using the selected quality indicators in the project plan. Provide your answer in the form of 3 - 5 bullet points for each quality indicator.
Students ability to participate in international contexts

- Internationalisation is a strategic issue for the LTH Board with quantified objectives in the LTH strategic plan. There is a plan since 2004 for internationalisation of the education, renewed and completed with a plan of action for 2007-2011. This plan is followed up annually (*Enclosure B*). A language policy was established in 2008 (http://www.lth.se./fileadmin/lth/Spraakpolicy/eng.pdf).In the decision by the LTH Board, there is both a mission and responsibilities related to labour market needs and graduate employability.
- The fraction of exchange students (incoming and outgoing students in relation to the number of total FTE), puts LTH among the most internationally active institutes in Sweden. This prepares the students for international activities and contributes to Internationalization at Home in accordance to the LTH policy.
- LTH offers 400 courses for exchange students, generally taught in English. This gives our graduates on master level a professionally oriented proficiency in English and possibilities to interact with international students (Internationalization at Home).
- LTH offers dedicated language courses for LTH students. The languages are Japanese, Chinese, French, Spanish, German and English.

- 6% of all degree projects on master level are carried out abroad,
- The activities in China (the China Profile, the summer school) are specifically designed to meet labour market needs.

Teaching staff mobility

- Newly developed exchange programs with North America all have strong involvement from the Programme Directors in question have planned the structured exchange on site.
- New double degree agreements with Keio University and Kyushu University all rely on involvement and, normally, mobility of teaching staff.
- New activities involving teaching staff mobility have been created, based on international cooperation on departmental level (Erasmus Mundus Joint Masters, an EU-Canada project, joint courses at Zheijiang University and Xiamen University).
- The International Office actively promotes teaching staff to apply for national and EU mobility grants.
- Programme Committees may apply for funding for travel to current and potential partners.
- LTH is currently about to sign two agreements on coutelle on PhD level which, will involve and enhance teaching staff mobility.

Area VIII. Cross-boundary activities

CB.1. General principles

CB.1.1. If necessary, it should be possible to bring in additional teaching expertise and/or educational resources from academic or professional organisations outside your own course/programme or faculty.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ☐ ■ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
Many courses in the programmes have external lecturers from other faculties and from industry. There are also courses from other faculties. LTH has an “Engineering Training Course” (credit awarding internships) available for all five-year programmes. For many years the LTH students have been able to get valuable training experience through the organisation IAESTE. Approximately 2/3 of all degree projects are carried out in industry.

CB.1.2. The added value from such cooperation is easy to identify.

Strongly disagree ☐ ☐ ☐ ■ ☐ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
The students appreciate the external lecturers. In some cases the cooperation with other faculties makes it possible to have courses in scientific subjects where there is a lack of competence within the faculty. The students find that visits in industry are valuable.

CB.1.3. Courses and programmes should cooperate across faculty boundaries.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
In some programmes (e.g. the five-year programmes of Engineering Physics, Nanoscience, Biotechnology, Environmental Engineering) students meet students from other faculties within the same course. It could, however, be good if one worked with the possibilities to mix students from different faculties more than is done presently. It is important that this is done with care so that the mixture does improve the quality of the courses. Degree projects carried out in industry and in the academy itself often lead to employment. PhD courses are often attended by students from different faculties, e.g. the course package in “Life Sciences”

which attracts PhD students from Engineering, Medicine and Science (http://www.cob.lu.se/postgrad/courses.html).

CB.1.4. Students should be prepared for combined leadership/membership of professional teams.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
Some programmes have courses with project work enabling the students to cooperate, e.g. Technology Management. Risk Management. This is also planned for the new Biomedical Engineering Programme starting in the Autumn of 2011.

CB.1.5. Shared learning activities with students from different courses/programmes should be prioritised.

Strongly disagree ☐ ☐ ☐ ☐ ■ ☐ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ■ ☐ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
Shared learning activities are a part of the aim and purpose of several programmes, but not all. There are at least two different types of courses: Courses where student mix but with the same background and courses where students with different backgrounds mix with the aim that they shall contribute with their specific knowledge to fulfil the aim with the courses.
High: Technology Management, Risk Management, PhD four-year education.
Low: Bachelor of Science in Engineering programmes (with some exceptions)

CB.1.6. There should be cooperation within teaching, leadership and administration between different courses/programmes.

Strongly disagree ☐ ☐ ☐ ☐ ☐ ■ Strongly agree

To what degree has this been accomplished in your courses and programmes?

Not at all ☐ ☐ ☐ ☐ ■ ☐ Completely

If variable, name one course with high and one with low fulfilment. Provide links to the course syllabi.

▪ Comments on relevance:
Such cooperation is a vital part of the organization of all educational activities at LTH.

CB.2. Open, strategic questions

There are no open questions related to this area.

CB 3. Mark the position/opinion of your faculty on the figure

There is no figure related to this area.

CB.4. Long-term development of cross-boundary activities

Interprofessional teaching and learning

The LTH strategic plan states that LTH shall work with cross-boundary activities. This might be implemented in many ways:

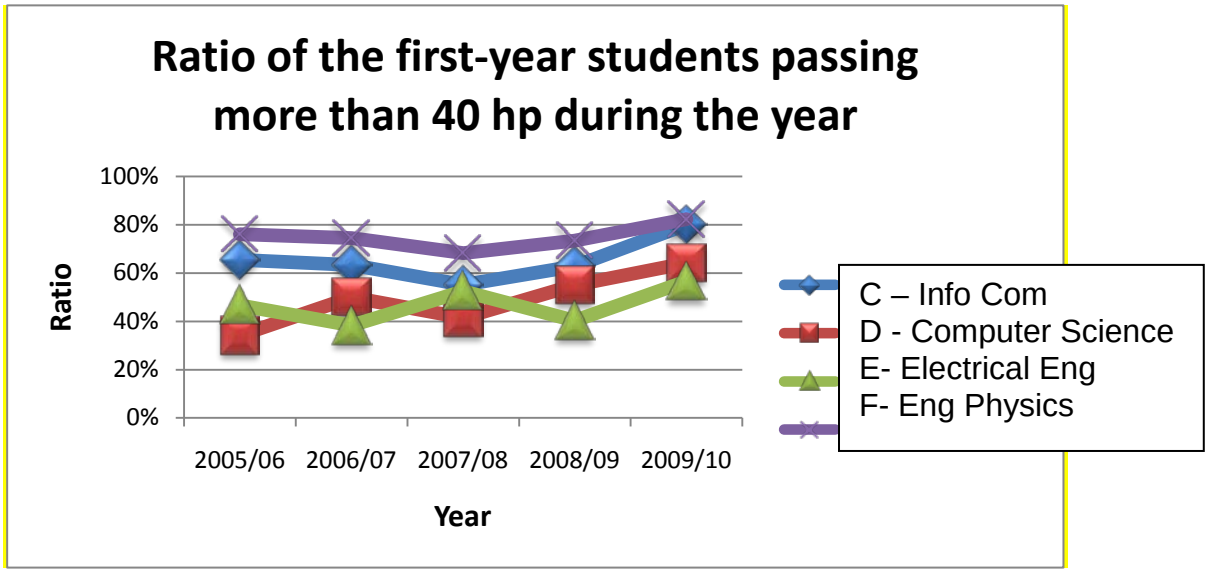
- Cooperation between programmes, courses, other faculties and industry may be developed further.
- Integrate students more with other programmes and faculties and involve more international students
- There might be problems in teaching in a specialisation when mixing students with different backgrounds because of diversity in pre-knowledge. These problems are currently addressed at course level.
- The “China Profile” where the students mix studies in Chinese and the Chinese culture with engineering is a well working concept that might be transferred to other educational programmes and other countries.
- There is a potential to develop more cross-boundary activities for the teachers, even within departments.
- There is a need for organised “meeting points” for students and teachers from different countries.

Part 2. Questions related to faculty specific areas

A. Are there quality indicators other than those specified that are of particular relevance to your faculty (maximum three)?

Describe and characterise your long-term development work relating to these additional quality indicators.

1. First-year experience
   Quantitative goals expressed in the strategic plan (*Enclosure E*) are followed up in the annual reports of the Programmes. One of these goals is that more than 75 % of the beginners at an educational programme should pass more than 40 hp (of possible 60hp) during the first year. A lot of effort has been made to improve the educations in order to improve the results of the students, i.e. improving the structure of the educational programmes (e.g. deciding which courses that are given in parallel , pedagogical improvements in the teaching of Mathematics, SI-mentors and an improved introduction to study. To give some illustrative examples, the result of four engineering programmes for the last five years can be seen in the graph below. The same development can be seen for most of the educational programmes at LTH.



2. Development of Scholarship of Teaching
   Scholarship of Teaching (SoTL) is the main idea in the pedagogical development plan (*Enclosure A*) and the main inspiration for the pedagogical development at LTH during the last 15 years. Some of the keywords in SoTL like peer review of teaching, making experiences of pedagogical trials public and faculty development enhancing teaching and learning are really on the track at LTH today through activities like the pedagogical conference (every second year), an increasing number of publications in peer-reviewed journals in the subject and the existence and the activities of the pedagogical development unit ("Genombrottet").

The pedagogical discussions are lively among teachers, both within the same departments and subjects but also across the faculty, often including the students. The focus of education at LTH has really moved from teacher centered to become more focused on student learning. There are also far going plans of establishing Engineering Education as a subject for research education at the faculty to further strengthen the pedagogical development and prepare the faculty for taking part in teacher education for teachers active in elementary and high school in engineering related subjects.

3. Internationalisation
According to the policy LTH shall educate engineers, industrial designers and architects with international experience and skills relevant for a global labour market. In order to achieve the international experience there is a quantified goal in the Strategic Plan that of all graduated M.Sc. in Engineering, architects and industrial designers (5 years) 25% shall study at least 3 months outside Sweden. This goal is broken down at programme level to a minimum of 15%. The studies abroad are followed up each year in the annual reports and there is a large variation among the different programmes. In the compilation of the annual reports from the academic year 2009-2010 ("Sammanställning av läsårsrapporter I grundutbildningen 0910", *Enclosure D*), it can be concluded that a many of the programmes fulfil the programme goal. The faculty in total reaches about 21%, i.e. slightly below the goal. There are several activities to reach the goal, e.g. finding international partner universities where students quite easily can exchange the fifth or sixth term, new attractive destinations in Asia and in the Americas, more stream-lined application procedures, and, last but not least, increased involvement from the programmes. There has also been made a number of efforts during the last years to integrate the incoming international students socially and academically in LTH, e.g. connect them to a programme identity and increase the number of courses given in English during the first three years of the programmes.

B. Contrast three strong educational processes at your faculty against three development processes.

Describe and characterise your long-term work with the development processes and obstacles to development when compared to the strong educational processes.

1. Quality assurance of Degree Projects
A project with the title "What characterises a good Degree Project work at LTH?" started in 2010 and is going to be reported in June 2011. The ambition of the project is to find criteria for determining the quality of Degree Projects at the faculty and many interesting observations of the enormous variation among the Degree Projects have already been made. Some works are done in close relations to companies, often related to solving a specific question of high importance to a company, while other works are directly involved in research activities at a department. The results of

these latter Degree Projects are often used as pre-studies for research projects. Sometimes the Degree Projects can be used as parts of scientific publications. This variation makes it quite challenging to find criteria that can be applicable for all types of Degree Projects. Different possibilities to assure high quality of the process of working with the Degree Project have been identified. One possibility is to e.g. include a requirement in the syllabus of a written and approved project plan from all the students before starting off with the Degree Project. Due to the matrix organisation at the faculty, the Educational Programmes Boards and the Programmes Managements are responsible for the educational programmes. However, due to tradition almost all responsibility connected to the Degree Projects is in practise connected to the departmental level. This means that some Programme Managements do not feel that they have power to effect the process around the Degree Projects or the responsibility for the outcome.

2. Specialisations

   Due to the Bologna process the five-year engineering programmes have been revised and structured into blocks of three years of more or less compulsory courses and two years of specialisations. The specialisations include combinations of compulsory and optional courses. They are designed to secure the advanced level of the education, i.e. the excellence, and they are closely related to active research groups at the faculty. The research connection of the educations has increased due to this revision of the engineering programmes. Of course there has been a great deal of discussions during the revision process concerning which courses are to be included in the specialisations.

3. The introduction to the studies

   There is a long tradition at the faculty of taking good care of new-coming students and introduce them to academic studies, “nollning”. About 1 000 students are active in introducing around 1 500 new students each year. It is an impressing engagement! This is a very important period for new students when long-lasting friendships are connected that facilitate the coming, quite tough studies at LTH. But the introduction has had a bad history of alcohol comsumption, activities on the verge of harassment and got a really bad reputation that scared some potential students. This has been a problem that we have given substantial attention over the last years. Now there is a great change in attitude. The student union (TLTH) is very active in this development, e.g. they have a written policy for the attitude to alcoholic use and work on arranging activities that appeal to all new students (*Enclosure F*). The study advisors work with educations for the students involved in the introduction. Important issues at these

educations are leadership, equality and how to act as a role model. The new-coming students start one week earlier than students in the higher year. The schedule for that first week of study is dedicated to a mixture of teambuilding activities and lectures, planned in cooperation with the students in the higher years and the Programme Managements. It is not an easy task to change attitudes and, of course, this breaking off with tradition has caused many arguments. It has been a highly important process affecting the success in studies as well as the LTH reputation, the brand.

Enclosures

A. *Educational development plan for undergraduate and master's programmes at LTH for 2008-2011. Dated February 27, 2009.*
B. *Plan for the internationalisation of education at bachelor's and master's level. Dated December 30, 2010.*
C. *Verksamhetsberättelse Lunds Tekniska Högskola 2010. (http://www.lth.se/fileadmin/lth/omlth/vb/lth_vb_2010.pdf*
D. *Sammanställningen av läsårsrapporter i grundutbildningen 0910. Dated February 18, 2011.*
E. *Lund University, Faculty of Engineering Strategic Plan 2007-2011. Dated May 8, 2007.*
F. *TLTHs alkoholpolicy. Dated May 6, 2008.*