SELF-ASSESSMENT REPORT

Informatics and Information Technology Study Programme

Group Evaluation

Tallinn University

Tallinn 2013

Contents

Study programme group	**Informatics and Information Technology**
Higher education institution	Tallinn University
Brief description of the self-evaluation process	An initial meeting of the programme coordinators of informatics and information technology (later *IT*) study programmes was held on 15th of March 2013 – tasks concerning composition of self-evaluation report were distributed and on the dates agreed. The Director of the Institute of Informatics (Professor Peeter Normak) prepared and distributed the initial version of the *General Part* of the Self-Evaluation Report on 21st of March. The programme managers prepared the self-evaluation reports of separate programmes before the end of May. The initial version of the report was discussed in the general meeting of the Institute of Informatics on 21st of June and submitted to EKKA on 9th of August 2013.

A. GENERAL PART

1. An introduction to Tallinn University

Tallinn University (later referred as *the university* or *TU*) is a public university focusing primarily on the fields of humanities and the social and natural sciences.

TU is a result of merging several higher education institutions that took place mainly during 2004-2005, after the Estonian parliament *Riigikogu* passed an amendment to the University Law in February 2005. Predecessors of Tallinn University are the following, formerly independent institutions:

- Tallinn Pedagogical University
- Estonian Institute of Humanities
- Institute of History of Estonian Academy of Sciences
- Academic Library of Estonia

The largest founder of Tallinn University was the former *Tallinn Pedagogical University*. It has carried on the traditions of Estonian teacher training that dates from 1919, when a Teachers' Seminar was established in Tallinn under the guidance of leading specialists in educational sciences. Through a series of reorganizations this seminar was turned into a higher educational establishment in 1952 and finally obtained the status of a public university in 1992. Since then, it has been the fastest-growing university in Estonia, and has also expanded its scope of academic activities. In the mid nineties two former institutes of Academy of Sciences - *Institute of Ecology* and *Institute of International and Social Studies* – were also merged with the Tallinn Pedagogical University.

The *Estonian Institute of Humanities* was established in 1988 as the first private university in the Eastern bloc countries. Very soon it became one of the centres of intellectual activity to propose critical reinterpretations of history, to introduce new paradigms of cultural analysis as

well as to develop academic programmes in fields such as Asian studies and anthropology, which were not available anywhere else in Estonia.

The *Institute of History* was established in 1947 and has been a research institute working under the auspices of the *Academy of Sciences of Estonia* until the founding of the Tallinn University. Since 1990, the institute has collaborated closely with the Estonian Institute of Humanities and later, with the Tallinn Pedagogical University in organising the teaching of history in Tallinn, while continuing its research work in the fields of archaeology, history, ethnology and art history. In the course of the establishment of the university, all history programmes have been transferred to the Institute of History.

The *Academic Library of Estonia*, now called the Academic Library of Tallinn University, traces its origins to the year 1552, when St. Olaf's Church in Tallinn created a library that consisted mainly of donated books. Presently the collection of the library numbers around 2.5 million items.

After 2005 several more academic institutions in Tallinn joined the university, among them *Academy Nord* and *Tallinn Pedagogical College* being the largest.

Currently academic units of the university consist of 19 institutes, 6 colleges and the library (http://www.tlu.ee/en/Contacts).

The main strategic development documents that determine the priorities of the university are the following[1]:

- Tallinn University Development Plan until the year 2014.
- Tallinn University Research and Development Strategy for 2012-2016 (later *R&D Strategy*).
- Tallinn University's Internationalisation Strategy 2008-2015.

In its activities, the university adheres to the following basic values - *openness*, *quality*, *professionalism* and *unity***.**

2. The scope of academic activities of the university

According to the ISCED classification, the fields of training and research in TU comprise the following study programmes:

- humanitarian sciences and arts (48)
- social and behavioural sciences (35)
- education (33)
- natural and exact sciences (19)
- health and well-being (12)

However, the amount of R&D is distributed differently: humanitarian sciences and arts, social and behavioural sciences, and natural and exact sciences having about the same total budgets that exceeds significantly the total budget of research for the two remaining fields.

Study programmes on informatics and information technology are offered in two academic units of the university – *Haapsalu College* (at the applied higher education level) and *Institute of Informatics* (at the bachelor, master and doctoral levels).

The overall theme of the Institute of Informatics – *digital ecosystems* – belongs to the list of nine strategic themes of the university and the IT study programme group belongs to the focus

[1] http://www.tlu.ee/en/university/documents

area of *Digital Environment and Digital Media.* For the years 2014-2020, there will be a total of three focus areas. Teaching of the educational technology programme belongs to Tallinn University's area of responsibility in Estonia, according to the agreement signed 28.01.2013 between TU and the Estonian Ministry of Education and Research.

3. Academic structure and administration

The academic structure of Tallinn University included seven faculties at the end of 2007: Philology, Educational Sciences, Physical Education, Fine Arts, Mathematics and Natural Sciences, Social Sciences, and the Estonian Institute of Humanities. The University had three colleges: Haapsalu College, Rakvere College and the Baltic Film and Media School. In addition, the Open University, Estonian Pedagogical Archives-Museum and the Academic Library belonged to the university, as well as five institutes: the Institute of History, the Estonian Institute of Demography, the Institute of International and Social Studies, the Institute of Ecology and the Institute of Educational Research.

In spring 2007 a reform of the academic structure of the university was initiated. It was caused by the need to unify the different structures of the institutions that joined the university after 2005. The aim of the reform was to integrate research and teaching in order to improve the quality of studies and the calibre of research and to simplify management and reduce administrative levels. The faculties were partly split and reorganised into institutes. The Senate of the university approved the new structure on November 12, 2007, and it entered into force from January 1, 2008.

TU is administered according to the traditions and within the context of Estonian laws and charters of European universities. TU is an organization with a three-level management structure: university level, unit (institute) level and sub-unit level. The highest collegial decision-making body is the *Senate*, which includes the rector, vice-rectors, directors of academic units (institutes, colleges, the library) and the representative of the trade union. About 1/5 of the Senate consists of students. The Senate forms commissions, which prepare issues within their areas of competence for plenary meetings of the Senate. Currently the Senate has commissions dealing with development, economics, research and study.

The board (also called the council) of an institute includes the director, representatives of all study programmes and major research groups, representatives of professors and of lower ranking academic staff, representatives of the professional community and of students. The main tasks of the board of an institute are: adoption of statutes, strategic development plans and budgets, approval of study programmes and their amendments, election of academic staff members (except professors and principal investigators who are elected by the Senate).

The board of an institute is also authorized to establish sub-units (centres, labs etc) of the institute, and their mode of operation. Normally subunits do not have a board, or further subdivisions.

The Student Union is legally defined as an autonomous structural unit of the university. The highest representative body of students in TU is the *Student Assembly*, comprised of students from every institute and regional college and of a representative of doctoral students. The daily work of the union is organized by the 3-member *Student Board*, which is elected by the assembly and assisted by the Student Union office employees. In every institute and college there is a local student council. Student-representatives participate in commissions and working-groups in every level of the university.

4. Key indicators

Most of the following key indicators of the university and the Institute of Informatics (IFI) are from the report dated 31 December 2012.

- R&D budget of academic units (2012): TU – € 7,528,856; IFI – € 658,312.
- Teaching & learning budget of academic units: TU – € 10,267,380; IFI – € 633,003.
- Number of students: TU – 10,209 (Prof. HE – 1191[2], BA – 5,885, MA – 2,756, PhD – 377); IFI – 405 (BA – 217, MA – 173, PhD – 15)
- Number of graduates: TU – 1 546 (Prof. HE – 44, BA – 936, MA – 554, PhD – 12); IFI – 33 (BA – 17, MA – 16)
- Graduated with nominal time: TU – 815 (Prof. HE – 43, BA – 521, MA – 247, PhD – 4); IFI – 14 (BA – 6, MA – 8)
- Teaching staff: TU – 346 FTE (full-time equivalent positions); IFI – 11.45 FTE
- Researchers: TU – 138 FTE; IFI – 11.5 FTE
- Non-academic staff: TU – 375 FTE; IFI – 14.1 FTE
- Academic staff with PhD: TU – 214 FTE; IFI – 14.25 FTE[3].
- International academic staff: TU – 41 FTE; IFI – 5.5
- Average age of academic staff: TU – 47 years; IFI – 42 years.

5. Structure of study programmes

The general structure of study programmes in the university is uniform and has been planned by the Study Commission of the Senate and approved by the Senate. The respective institutes, according to certain confirmed rules draw up the objectives of the study programmes and modules within them. Subsequent to discussion by the institute‘s council, the study programme is presented to the Study Commission for amendments. The final version of the study programme is presented to the Senate for approval. The study programmes are freely available on the university’s Study Information System ÕIS[4].

The university adopted and has used the 3+2 study system (3 years of Bachelor’s studies + 2 years of Master’s studies) since the academic year of 2002/2003, as well as the ECTS credits system (one credit point corresponds to 26 hours of work by a student). The statute of study programmes stipulates the following general structure of study programmes:

Professional higher education (PHE) programmes (180 credits):

- General subjects – 16 credits, of which at least 4 credits are from electives
- Core subjects – at least 76 credits, of which at least 25% are from electives
- Practice – at least 30 credits
- Free electives – 24 credits

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[2] The largest majority is from Tallinn Pedagogical College that joined TU in 2012.

[3] The relatively high proportion of academic staff without a PhD degree is partly caused by the fact that IFI offers basic computing courses to the whole university.

[4] http://ois.tlu.ee/pls/portal/ois2.ois_public.main

- Thesis or final exam – 6 or 12 credits

Bachelor programmes (180 credits):

- General subjects – 16 credits, of which at least 8 credits are from electives
- Core subjects – 80-110 credits, of which 20-50% are from electives including professional practice with at least 3 credits
- Free electives – 24-48 credits
- Thesis or final exam – 6 or 12 credits

If a study programme contains a minor then its volume should be 48 credits.

Master programmes[5] (120 credits):

- General subjects – 8 credits, of which at least 4 credits are from electives
- Core subjects – 66-80 credits, of which 25-50% are from electives including professional practice with at least 3 credits
- Free electives – 16 credits
- Thesis 16, 24 or 30 credits or final exam – 16 credits

6. Positioning of informatics study programmes

The initial catalyst that started an informatics program at the university was an all-union policy that was introduced in the mid-1980s when Estonia belonged to the Soviet Union. At that time the authorities considered computer skills to be the "second literacy". Consequently, the "Secondary School Teacher of Mathematics and Informatics and Basic School Teacher of Physics" programme was started in 1986. After an ambitious "Tiger Leap" program of computerization of schools in Estonia was launched in 1996 it became evident that there was a great need for developers of educational software. The bachelor level *Informatics* programme was started in 1998. A master programme of *Multimedia and Learning Systems* was developed in parallel so that the first graduates (2001) could immediately continue their studies on that programme. The programme was developed with involvement of some well-known universities of the area (University of Twente, Tampere University of Technology, Institute of Technology Tallagh) and it became unique in the whole of Europe.

Education has remained as the main application area of IT in Tallinn University to the present day. Over time the education area was expanded into some other "soft" IT areas for which there was a demand and which was not being met by other Estonian universities: interaction design, serious games and digital safety issues.

After the Institute of Informatics moved to the new *Astra* building in 2012, the total space was approximately doubled. Moreover, all computer labs were equipped with the latest technology. Therefore, the infrastructure for conducting academic activities satisfies all the needs. Interestingly, there were no complaints concerning infrastructure even before 2012.

In terms of the budget, the Institute of Informatics, which was in the 8th position in 2007, is currently the second largest institute of the university. Teaching and R&D activities are quite balanced in the institute – the budget for each of these is about 50% of the total budget. The same can be said about the academic staff – 11.50 FTE researchers (including post-doctoral

[5] Teacher training study programmes have different structures.

researchers) and 11.45 FTE teachers. In fact, most of the researchers do some teaching and the teachers engage in research.

In pursuing the need for regional development and at the request of *Lääne county* (Läänemaa) a 3-year Professional Informatics programme was started in *Haapsalu College* in 1999, with one study group (22 students). One characteristic of the teaching in the College is that, besides the involvement of teachers from the Institute of Informatics, teachers from other higher education institutions as well as top experts from the industry are also involved. The Applied Computer Science study programme cooperates closely with employers, companies and other institutions in the region. General objectives of the study programme are: 1) To provide basic knowledge in the field of computer science in order to create software based on the use of multimedia and to apply it in different environments, to develop and administer the infrastructure of ICT; 2) To provide conditions in order to compete effectively in the labor market, to be motivated for continuing education and professional development; 3) To support ICT development in the Lääne region through addressing the practical needs of local institutions and companies.

7. Aggregated data on study programmes in the IT study programme group

The aggregated data regarding the programmes are presented in the following table:

Title of a study programme	Level (PHE, BA, MA)	Year of the launch of the programme	Responsible structural unit	Admission 2012	Graduates 2012	Number of students 31.12.2012
Applied Computer Science	PHE	2006	Haapsalu College	21	12	63
Computer Science	BA	2000	Institute of Informatics	81	17	217
Management of Information Technology	MA	2002	Institute of Informatics	15	7	72
HCI/IMKE[6]	MA	2006	Institute of Informatics	10	5	35
Educational Technology	MA	2010	Institute of Informatics	13	-	36

[6] HCI – *Human-Computer Interaction*; IMKE – *Interactive Media and Knowledge Environments*.

8. A brief description of the most important developments in the IT study programme group between evaluation periods

All the abovementioned programmes passed a transitional evaluation in 2010. Therefore we will focus on the subsequent analyses for the years 2010-2013.

There have been three major changes during these years:

1) The Educational Technology programme was opened in 2010 and the Multimedia and Learning Systems programme was closed.
2) The distribution of credits among the modules in the structure of the study programmes of the university was changed in 2012.
3) The *Interactive Media and Knowledge Environments* (IMKE) programme was renamed as the *Human-Computer Interaction* (HCI) in 2013 and correspondingly adapted.

The decision for the ***first*** change was based on the request of different stakeholders (schools, the *Tiger Leap Foundation*, *Estonian Information Technology Foundation*, the *Estonian Development Fund*, and also the *Ministry of Education and Research*) who came to an understanding of the continuously growing role of technology in education. Educational institutions started to establish educational technologists' positions without the availability of properly qualified people to hire. As there was and still is a general political decision in Estonia that the total number of university programmes should be reduced, *Multimedia and Learning Systems,* being the closest to the *Educational Technology* study programme was closed.

The ***second*** major change was initiated by the Institute of Informatics and the Institute of Mathematics and Natural Sciences of the university in 2011. Formerly, the core subjects could only take up to 50% of the credits in the programmes. The new general model is much more flexible and the structure of IT programmes in the university became more similar to those in other universities in Estonia. For example, the following comparative table presents the structure of bachelor programmes in Informatics in Estonian universities:

University	General	Core Subject	Free electives	Thesis
Tallinn University	16	110[7] or 134	24	6
Tallinn University of Technology	22	144	6	8
University of Tartu	24	84, 108 or 132	15	9

There were a number of reasons for the **third** major change:

- The name *Interactive Media and Knowledge Environments* was not understood in the wider community of stakeholders (especially the term *Knowledge Environments*).
- Two new international programmes that were opened in 2011 in Estonia overlapped with IMKE to a certain degree: The *Design and Development of Virtual Environments* master's programme at the *University of Tartu* (http://www.ddve.ee/) and the *Crossmedia Production* master's joint program of *TU Baltic Film and Media School* and *University of Tartu*

[7] In the event that a student selects a minor from another study programme

- (http://www.bfm.ee/programmes/crossmedia/crossmedia-production-ma/). The second programme actually included a whole module of IMKE.
- Professor of Interaction Design, David Lamas, who became the IMKE programme manager in 2010, formed a promising and internationally active research group of researchers and doctoral students in HCI. It was purposeful to exploit this competence and maximize it in educating students as well.

Dynamics of the number of students during the last three years are presented in the following table:

Programme name	No of students			Admission			Dropout			No of graduates		
	2010	**2011**	**2012**[8]	**2010**	**2011**	**2012**	**2010**	**2011**	**2012**	**2010**	**2011**	**2012**
Applied CS	57	58	63	21	19	21	6	2	3	8	14	12
Computer Science	161	188	217	59	92	81	27	37	50	14	18	17
Educ. Technology	13	23	36	13	12	13	0	3	0	-	-	0
Management of IT	71	68	72	17	21	15	8	11	3	8	16	7
HCI/IMKE	31	30	35	11	11	10	4	3	3	3	7	5
Total	333	367	423	121	155	140	45	56	59	33	55	41

The total number of students in ICT at all levels (including PhD) has increased in the university during the last three years by 17.4%, which is slightly higher than in other Estonian universities (7.1% in Tallinn University of Technology and 14.3% in the University of Tartu).

Minor changes in study programmes have been made each year. The standard procedure is as follows: (1) The programme manager collects and systematizes the feedback from the stakeholders (students, teachers and occasionally also from employers and graduates) and other relevant information and forwards it to the programme council; (2) The programme council elaborates recommendations to be discussed in the council of the institute/college; (3) The council of the institute/college makes the final decision. Sometimes some additional activities are undertaken, for example general meetings of the institute or discussions with students studying on corresponding study programmes etc.

It is also noteworthy that the institute started summer and winter schools with „Experimental Interaction Design“ course in 2011. Another summer school course („Design of Serious Games“) was started in 2013.

The biggest problem currently is, that because the institute was not involved in the IT Academy programme, the institute and its students lack a number of opportunities that other universities (Tallinn University of Technology and University of Tartu) enjoy.

9. Overview of R&D activities in IT

Most of the research in the Institute of Informatics is conducted under the title *Digital Learning Ecosystems*. An overview of the R&D activities of the Institute of Informatics as well as a selection of current and recent R&D projects can be found on the institute's web page[9]. There is a video clip (mostly in Estonian) offering a glimpse of the R&D activities of the institute[10]. The biggest project currently being coordinated by the Institute of Informatics

[8] As of 31.12.2012

[9] http://www.tlu.ee/en/institute-of-informatics

[10] http://htk.tlu.ee/htk/et/2012/09/video-clip-about-us/

is an EU 7th FW large-scale integrated ICT project *Learning Layers – Scaling up Technologies for Informal Learning in SME Clusters*[11]. The members of the institute are currently participating in three COST Action networks: *TwinTide* (http://twintide.org), *ENERGIC* (http://www.cost.eu/domains_actions/ict/Actions/IC1203) and *MUMIA* (http://www.mumia-network.eu/). The members of the institute founded an Estonian SIGCHI Professional Chapter of ACM[12]: *EstCHI* – the *Estonian Society of Computer-Human Interaction* in 2010. The *World Usability Day* (http://wud.tlu.ee/) is one of the activities of *EstCHI* and has already become a truly international event. Another big event that the institute organised in 2012 was the *OST'12: Open and Social Technologies for Networked Learning* conference (http://ifip-ost12.tlu.ee/).

Publication of research results has been intensified during 2010-2013 as well. The members of the institute published only 15 ISI reflected papers in 2010; this number was increased to 28 in 2011 and to 35 in 2012.

About half of all *innovation shares* obtained by Tallinn University are executed at the Institute of Informatics (Innovation share is a programme of *Enterprise Estonia* that supports innovation and university-enterprise cooperation). This is certainly one of the reasons why the institute was repeatedly declared as the most entrepreneurial institute of the university in 2012.

The institute considers it important to involve students in R&D and related activities. Each year at the end of the spring term, two big events are organized in which students present their R&D results – the practice conference for undergraduate students in June and the e-Vent (http://htk.tlu.ee/event/) for graduate students in May.

Research at the institute underwent a successful international evaluation in computer science in 2010. Moreover, as education is the main application area of R&D, education related research at the institute was also evaluated with positive results in educational research[13] in 2012.

The institute has a weekly research seminar to which interested people from other institutes (including those from outside the university) are invited as well. For the list of last semester's presentations (spring 2013), see – https://sites.google.com/site/ifi8106/

Currently, the biggest problem for the Institute is the lack of resources for implementing research results and for the development of prototypes into full-featured software.

10. Learning/teaching process

The *Study support system* consists of the following main components: (1) the institute's web page (see http://www.tlu.ee/informaatika_instituut/), (2) Studies Information System, ÕIS (http://ois.tlu.ee/), and (3) individual and group counselling (supervisor, programme manager, study assistant, Head of Studies of the institute). Mailing lists are predominantly used for group counselling. These are created using the year of admission – for example itj12@lists.tlu.ee, itjl11@lists.tlu.ee etc. The supervisor and the programme manager are usually the first contacts in the academic content matters (selection of optional and free elective courses, determination of the topic for the thesis etc) while the study assistant and the

[11] http://learning-layers.eu/

[12] http://www.sigchi.org/connect/local-sigs

[13] http://www.academia.edu/2540723/Educational_Research_in_Estonia_2007-2011_Evaluation_Report

Head of Studies are the first contacts in administrative matters (registration to the courses and assessments, composing applications for scholarships etc). For mobility questions, the *International Collaboration Coordinator* of the institute assists the students as well.

For supporting students in determining a topic for their thesis and choosing a supervisor, the institute uses its own in-house register (http://www.cs.tlu.ee/teemaderegister/). The register is freely accessible and also contains examples of possible titles for a thesis. These are of three types: (1) Already taken ("Registreeritud teemad"), (2) Available ("Vabad teemad"), (3) Already completed and defended ("Kaitstud tööd"). In the latter case the theses can be downloaded (except those that contain confidential data). The register was released in 2011; the theses that were completed earlier can be downloaded from the institute's web page. Students are well informed about the principles of academic writing and related legal issues; there have been no cases of fraud/plagiarism.

For quality assurance, the standard quality procedures and criteria of the university are applied: feedback surveys after each semester; additional occasional feedback from students, alumni, employers; analyses of heads of programme councils; discussions at programme councils and at the council of the institute. The programmes are revised each year in March or April.

Quality assurance of teaching/learning has the following major elements:

1) Documentary – freely available course descriptions in ÕIS, detailed course programmes (http://www.tlu.ee/et/informaatika/oppetoo/kp13_1), guides for some courses (for example IFI7028 *Practical Training* or for writing *Master Thesis*) and other documents in the institute's web. Course programmes also contain descriptions and deadlines for students' independent work, assessment criteria, and lists of course materials. All course programmes undergo a quality check by the quality manager of the university. The general principle is to distribute independent work of students evenly throughout the whole semester. Home assignments are normally discussed at the beginning of the next class.
2) Regular feedback questionnaires from the students at the End of each semester. Lecturers have access to the feedback of their own courses only; the Director and Head of Studies have access to the complete feedback. This allows a generalized report to be made as well as the improvements of each course/lecturer to be tracked separately.
3) Usage of different e-Learning Tools such as *Moodle* or *IVA* (a home made development), a dedicated web pages (example: http://minitorn.tlu.ee/~katrin/cmsSimple/ for *Data Analysis* and *Research Methods* courses), a public personal web area (example: http://www.tlu.ee/~pnormak/PJ-2012/ for IFI7003 *Project Management* course), or *wikiversity* (example: http://beta.wikiversity.org/wiki/Ethics_and_Law_in_New_Media) for supporting learning activities. Although the e-Learning Centre of the university offers ECHO 360 recording, students sometimes record and share the lectures themselves (an example for IFI7003 – http://bambuser.com/channel/Onu).
4) Involvement of colleagues from other institutions in co-supervising and reviewing students' theses, and in graduation committees.

11. Cooperation with other higher education institutions

University of Tartu has always been TU's major university partner in Estonia. This cooperation had already started in the mid-1990s in the framework of the EU Tempus

programme. Depending on the scope of a project, some other universities were usually invited to cooperate as well. For example, besides UT, both *Tallinn University of Technology* and the *Estonian Academy of Arts* were partners in administering the Tempus Joint European Project 12418 "Creation of Master Programme in Multimedia and Learning Systems" (1997-2001).

The major cooperation in Estonia currently takes place with the *Design and Development of Virtual Environments* master's programme of *University of Tartu* (http://www.ddve.ee/) and with the *Crossmedia Production* master's joint program of the *TU Baltic Film and Media School* and *University of Tartu* (http://www.bfm.ee/programmes/crossmedia/crossmedia-production-ma/).

However, cooperation with foreign universities is much more extensive. This is mainly caused by the following two reasons. Firstly, in order to cover the ICT area as broadly as possible from the academic viewpoint, there is a well-established division of work among Estonian universities. Therefore the scope of TU is quite different from those of other Estonian universities. Secondly, leading EU universities have often invited the institute (or its *Center for Educational Technology*, or its *Interaction Design Laboratory*) to become partners in their projects.

The Institute of Informatics has currently Erasmus agreements with 33 institutions in Europe (http://www.tlu.ee/et/informaatika/oppetoo/valismaa/Erasmus-partnerid).

Cooperation with enterprises and different organisations is quite extensive as well. The institute represents the university in the Estonian *Association of Information Technology and Telecommunications*; the institute is also represented on the *Information Technology and Telecommunications Qualifications Committee* (skills council) of the *Estonian Qualification Authority* etc.

B. SELF-EVALUATION OF STUDY PROGRAMMES

1. Applied Computer Science

Title of the study programme	**Applied Computer Science**
Academic unit responsible for conducting the study programme	Haapsalu College
Principal compiler of the Self-evaluation of the Study Programme, Study Programme Manager,	Piret Lehiste, Study Programme manager
Brief description of the process of self-evaluation of the study programme	March-April 2013: Collecting and analysing data by the Head of Study, Liina Viiret. May 2013: Coordinating materials with members of the teaching staff, Mehis Küla and Aimar Lints and the Head of Development, Liina Põld. May-June 2013: Introducing the self-analysis report and compiling a work plan with the Programme Manager, Piret Lehiste.

a. Study programme and study programme development

The Study Programme of Applied Computer Science was opened at **TU Haapsalu College** in the autumn semester of 2006 and at that time was the first applied higher education curriculum at TU. About 50% of the curriculum was based on the bachelor´s curriculum of Informatics offered at Haapsalu College from 2001-2006. Pursuing mainly the needs of local entrepreneurs, the proportion of *practice* was significantly increased in comparison to the previous curriculum.

Curriculum development takes place according to the general procedure established by the university. The Curriculum Council, coordinated by the Head of Study, Liina Viiret, plays the leading role and the College Council approves any changes. In the academic year 2012/2013, the Curriculum Council consisted of the following members:

- Aimar Lints – Lecturer of multimedia, head of curriculum
- Mehis Küla – Teacher of multimedia
- Jaagup Kippar – Lecturer of programming
- Andrus Rinde – Lecturer of multimedia
- Ilmar Türk – Student (3rd year) - applied computer science

- Siim Sildver – Student (2nd year) - applied computer science
- Rainer Aus – Representative of employers (Elion Ettevõtted AS)
- Berit Hiieväli – Representative of the alumni
- Liina Viiret – Head of Study

In planning changes, the Curriculum Council incorporates the feedback received from students, lecturers, alumni and employers as well as an analysis of the labour market. The average grade given to subjects in the curriculum of applied computer science during the previous years has been the following: For 2009 – 4.41; for 2010 – 4.40; for 2011 – 4.50; for 2012 – 4.61. Feedback from lecturers and teachers is received through individual interviews. A general alumni feedback questionnaire is organized every 3-4 years (these have been completed in 2005, 2008, 2012). Employer feedback is mainly received during the students´ practice through the supervisors of practice at the companies (through the supervisor of the university).

Although the curriculum is supervised every year, the most important **changes** were implemented during the initial period (from 2006-2008). The following changes were made during the previous three years: (a) in 2011, MLM6202 *Discrete Mathematics* was substituted by MLM6106 *Mathematics in Practice*, it being better suited for an applied higher education curriculum and (b) in 2012, the number of compulsory subjects of the specialization increased; the subjects HKI5026 *Operating System Administration* and HKI5004 *Web Programming* were added and elective subjects (HKI5040 *3D-Animation* and IFI6060 *The .NET Framework* were also added. In 2013, the subjects of *Educational Technology* were added among the electives of the specialization. This allows integration of the specialization in Haapsalu College (the module of educational technology is compulsory for the students of the specialization of *Class Teacher*).

*b. **Resources***

TU Haapsalu College has a total of 14 lecture rooms for delivering lectures, of which:

- 8 are for general subjects
- 3 are computer labs (PC labs with 17 and 21 places and a MAC lab with 17 places).

Also laptops (4 devices) and tablets (iPad – 14 devices), 2 MacPro's as well as equipment to organize live video broadcasts via the Internet are available. Sound-studio equipment and facilities for video conferencing are available for delivering lectures. As a technical solution, the Polycom VSX 7000 teleconference device is used, as well as a TV, video projectors and an interactive board (SMART Board). The necessary equipment is combined into a fully mobile unit (except the SMART board) that enables the organization of video lectures in other rooms as well, if necessary.

As a special device, students can also use the CNC milling machine *Kosy2 A4 Anwendungsspezifisch Z160* with the necessary software. Also a photo studio is equipped for conducting photo and video sessions. Studio backgrounds of different colours *(Manfrotto)* and lighting for photography and filming can be used. The studio has stands for photo and video cameras. A *Canon EOS 40D* camera with different objectives *(Canon EF-S 17-85 IS USM, Canon EF 70-300mm f/4-5.6 IS USM, Canon EF 35mm f/2) is available*. An external-flash *Canon 430 EX,* a studio flash-set BIG Helios 600x and a light-box, "*BIG Ready to go Digital Studio"* for taking pictures of smaller objects and product photos are also available. There are three different video cameras in the studio for filming (1 Sony Ex1R and 2xPanasonic HDC-TM900). For lighting, there is a projector set with a stand: LED PAR-64B Pro (4 pieces) + Proel Spsk-310 + T-rod.

In the study-centre library, students have 5 computers with touch screens at their disposal for participating in web-based courses and accessing digital study materials and e-databases. Students can use 3 printers for printing. The study-centre library also enables colour printing and scanning and photocopying of necessary materials. The printing fee is centrally calculated with the help of the print server and *PaperCut* software that is connected to the personal user account of every student in the college computer system. All students have free access to Wi-Fi connection.

All students and lecturers have access to the e-databases of the TU Academic Library, incl. original databases: http://www.tlulib.ee/index.php/et/inforessursid/originaalandmebaasid as well as licenced databases: http://www.tlulib.ee.ezproxy.tlu.ee/index.php/et/inforessursid/e-andmebaasid (e.g. EBSCOhost Web, JSTOR Arts & Sciences I, II, III, IV and others).

In addition to technical resources, Haapsalu College has developed several information systems to support the study activity of students. Most of these systems have been developed during the study process by the students themselves and are results of practical tasks:

- TU Haapsalu College webpage (http://www.hk.tlu.ee/) – important information related to study organization.
- The "Start" page of the college (http://www.tlu.ee/et/haapsalu-kolledzh/start) – easy and quick access to all the solutions of the college information system. It is used as the start page of the browser in college computers. The Start page also includes the college timetable system.
- A web-based file storage room "Sahtel" created in the college (www.hk.tlu.ee/sahtel) – enables the lecturers to share digital study materials to students and the students, to upload homework.
- Video Chronicle (http://www.youtube.com/user/hktudengid/) – for sharing the videos taken during college events and studies

c. Teaching and learning

The organization of the study process in Haapsalu College takes place in accordance with TU Study Regulations. The study programme of applied computer science prescribes daytime study. This means that for every ECTS credit point, 10 academic hours have been organized in the classroom as lectures and seminars. The volume of independent work of students has been calculated as no less than 13 hours per ECTS credit point.

To ensure the quality of study, Haapsalu College conducts training sessions for new members of the teaching staff; there is always counselling available from a trained mentor. All members of the teaching staff have an obligation to compile a course description of their subject (a short summary of the subject which includes important information that doesn´t change every semester) and a course programme (outlining for every semester specifically the content of the starting study period through the activity of every lecture/seminar and giving the description of all compulsory homework and assessment criteria).

The TU central Study Information System ÕIS (http://ois.tlu.ee/) supports the study process – the initial registration of studies and compilation of a study plan, course description, curricula and study organizational feedback once each semester. As a general rule, the members of the teaching staff use supporting electronic learning environments (e.g. Moodle) to conduct studies. Google services are available through the TU gmail account facility. Operative information exchange on study organization takes place through the TU Haapsalu College mailing lists and the students have the opportunity to interact with each other.

For applied higher education, practical training is an important part of study. The first and second year practices take place mainly in the college study labs in the form of team practice. Groups of students solve specialized practical tasks that are related to theoretical knowledge acquired during previously completed courses. Group activity work also develops a readiness to work in a team. Members of the teaching staff, who are involved in the subject courses, supervise the practice. The preferred practice tasks are related to real life situations and have been specifically selected. Through this, a student has contact with a customer and gains experience in dealing with clients.

Individual practice during the third study year takes place in a company or an establishment under the supervision of a local representative. The duration of practice is one and a half months and is regulated by the practice guidelines and practice journal. The student compiles a practice report during the practice period that must later be defended before a committee.

Study quality is evaluated mainly through feedback questionnaires from students (once each semester) and from alumni (once in every 3 years). Assessment by the Curriculum Council is considered and the opinion of the theses supervisors and reviewers as the involved specialists is also valued. Based on student feedback previously analysed with the responsible members of the teaching staff, we have made changes, for example in group sizes and the software used and also corrected the division of subjects and replaced some of the courses.

In order to better support the study process, student counselling is provided through the following positions:

- ***Study Coordinator*** – Organizes current study-related processes. Counsels students in regard to accreditation of previous study and work experience (APEL). Mediates interaction between members of teaching staff and students. Monitors the procedure for participating in workshops and organizes individual working time of students. The study coordinator provides operational support in the event of problems occurring.
- ***Study Programme Manager (Director of Curriculum)*** – Advises students in taking electives and open electives and selecting modules. Gives advice for compiling individual study plans. In APEL the Programme Manager is the assessor of the content who gives feedback to the student on APEL.
- ***Head of Study*** – Counsels students in regard to the Study Regulations. Supports students in the technical issues of the university's Study Information System, ÕIS. Cooperates with the study programme managers in implementing the corrections resulting from feedback and the development of curriculum content.
- ***Coordinator of international cooperation –*** Counsels students in regard to conducting practice and study abroad.

d. Teaching staff

The teaching staffs of Applied Computer Science are divided into three relatively equal groups: (1) members of teaching staff of the TU Institute of Informatics; (2) ordinary staff members of TU Haapsalu College; (3) experts in the IT field. Relationships with most of the members of teaching staffs have been positive and stable since the creation of the study programme (2006). On average the students assess teachers in their feedback with a grade of 4.1 - 4.6 (maximum 5.0). We offer support to new teachers through teacher training offered by the teacher education department of Haapsalu College and, if necessary, we appoint a mentor to a teacher, who offers support in the selection of course programmes, study and assessment methods as well as the conduct of study (also observes lectures and practical courses).

Trained specialists in the study field, who participate in teaching, bring the necessary contact with actual professional work necessary for a study programme of applied higher education. To provide the academic context, the head of study/study coordinator advises the members of the teaching staff in order to guarantee the necessary formal requirements. During the first years of work, a full-time member of the teaching staff of the IT field in Haapsalu College will be appointed as a responsible member of the teaching staff.

Supervisors of practice and final papers are mostly the same members of the teaching staff who conduct study in the main subject related to the topic of the final paper. The supervisor will have a master´s degree. In cases where specialists without a respective academic background and degree are involved in the supervision process, a co-supervision by two members of teaching staff is used with one providing academic quality and the other supervising the content.

e. Students

Based on statistics, an average student of applied computer science of TU Haapsalu College is a young male from Haapsalu or nearby who has been admitted right after completing gymnasium or after completing an IT specialization at a vocational school. During the last 4 years, our study groups have consisted of 19-23 students (17 of these state-funded student places, the rest non-state funded or self-financed). Competition for one student place (also for non-state funded) has been as follows: in 2010 – 2.2 applications per student place, in 2011 – 2.8 applications per student place, in 2012 – 1.9 applications per student place (the year in which the group size was increased).

Upon admission, we have assessed the applicants from two aspects: (1) a professional suitability test (50%) where the applicant's prior experience and knowledge in the field of ICT and multimedia so far are assessed; (2) a discussion (50%) that reveals the general attitude of the student, his/her motivation to study in the given study field and the readiness to manage one´s own studies. From autumn 2013, we will also take into account the results of the best two state exams at the end of gymnasium (in cases where the state exams were compulsory for the candidate).

Despite the popularity of the specialization, the percentage of graduates in the applied computer science curriculum of Haapsalu College is too low. About 14% of students interrupt their studies during the first year (for such reasons as inappropriate selection of specialization or unsuitability of daytime study for working students) and about 6% interrupt their studies during the second year (usually for family reasons or due to the commencement of full-time employment). During the last four years, statistics show that no students have interrupted their study during the third year. However, a number of students (about 10% of those admitted) postpone completion of the final subjects and writing the final thesis as required by the Study Regulations and are also most likely to interrupt their studies at a later date. Many of these students are those who have taken the opportunity of academic leave due to service in the Estonian Defence Forces, during their study. Statistics show that it is not easy for them to achieve the customary rhythm again later when they continue in a different group and also they have many debts. The proportion of those people who interrupt their studies during the additional year due to an increase in workload is also significant. It is somehow a credit to our specialization that students of applied computer science find specialized work (82% of the alumni) and our purpose is to continue to motivate them to complete their studies. For this purpose we use counselling services for students who fall behind in their studies (compilation of an individual study plan, support for finding a topic and a supervisor for their final paper, etc.) and organize support for group members (joint seminars in the preparation process of a final paper). The average percentage of graduates during the last four years is 53%.

f. Aggregate analysis of the study programme

	Strengths	Challenges
Study programme	Good contact with all target and integrated groups (students, alumni, TU IFI, Curriculum Council, employers)	Achieving synergy with other study programmes of the college and understanding the prospective needs of local enterprises.
Resources	Good study environment and creation and implementation of software solutions necessary to the college by students.	Budget increase for purchasing new equipment.
Teaching and learning	Large proportion of practice in the study programme provides significant experience in the specialization. The system for counselling students is working well.	Some specialists of companies do not have academic experience in conducting study.
Teaching staff	High quality of members of teaching staff and top specialists involved in study (high evaluations given by students)	Several teachers of key subjects drive from Tallinn to Haapsalu to conduct study.
Students	Small student groups, good cooperative spirit and contact with members of teaching staff and alumni.	High dropout rate of students, especially during the first semester and the additional year.

g. The action plan

Activity	Responsible	Deadline	Expected outcome
Using mentors to support the new members of teaching staff	Programme manager	January 2014	The new members of teaching staff have received continuing support, particularly in the case of additional issues arising during study
Plan for integrated cooperation with other specializations of Haapsalu College	Head of study, Programme manager	January 2014	We are aware of the possibility of cooperation between specia-lizations in order to apply these
Approving changes in curriculum	Programme manager	April 2014	Amendments of the programme for 2014 have been approved.
Developing cooperation agreements with compa-nies where students work	Head of study, Study coordinator	June 2014	Students study with full load and the drop-out rate has decreased
Alumni feedback for labour market analysis	Programme manager	December 2014	There is a mapping of the respective needs of companies.
Compiling project applications	Programme manager	According to oppor-tunities	Enough modern study equipment is available

2. Computer Science

Title of the programme	**Computer Science**
Programme holder	Institute of Informatics
Programme manager	Inga Petuhhov E-mail: inga.petuhhov@tlu.ee
Composition of self-evaluation report	The procedure was as follows: the programme manager composed the first version of the report, the report was discussed and approved at the Institute's general meeting at 21st of June 2013.

a. Study programme and its development

The bachelor´s study programme of Informatics was opened in the year 2000 and was compiled based on the needs of the labour market, a comparison with study programmes of other universities and the IEEE and ACM recommendations for compiling study programmes "Computing Curricula 2001" (which at that time had project status). Later, the recommendations of the IEEE/ACM curriculum framework SE2004 "Software Engineering 2004" were mainly taken into account when improving the programme. The programme was fully accredited in 2002 and also successfully passed the transition evaluation in 2010.

Presently, the Programme Council includes the following persons:

1) Inga Petuhhov, teacher of software engineering, Programme Manager
2) Peeter Normak, Professor of Informatics, Director of the Institute
3) Kaido Kikkas, Associate Professor of social and free software
4) Jaagup Kippar, lecturer of software engineering
5) Heli Tohver, Head of Study of the Institute
6) Marek Kusmin, co-owner, developer at Codeborne
7) Tanel Toova, alumnus
8) Kristjan Tammekivi, student

In the last three years, two significant changes have been implemented in the programme. In 2010, two elective modules were formed from specialization subjects (Software development and Digital media), each amounting to 25 ECTS credit points. There were two reasons for the implementation of these modules: (1) Enabling systematic education in the field of digital media (until that time Estonian universities did not offer this at the bachelor´s level) and (2) based on student feedback, making it easier to select electives and with the opportunity to compile a more suitable timetable. In 2012, TU Statute of Curricula was amended and the volume of the module of introductory subjects was decreased and the volume of specialization subjects was increased. In order to increase the quality of research work, the subjects IFI6085 - *Research Seminar* I and IFI6086 - *Research Seminar* II were added to the curriculum; proposals for adding these subjects were made by both the students and members of the teaching staff. At the same time, the content of selective modules (now in the amount of 24 ECTS credit points) was changed, e.g. the following new subjects were added: IFI6092 - *Foundations of Software Testing*, IFI6093 - *User Interfaces of Web Applications* and IFI6094 - *User-centred Design Methods*. The compulsory mathematics subjects (MLM6206 -

Elementary Number Theory, MLM6212 - *Foundations of Discrete Mathematics* and MLM6214 - *Foundations of Set Theory and Logic*) were re-structured and their volume increased.

In the alumni feedback questionnaire conducted in 2012, more than 80% of the students estimated that the learning outcomes outlined in the programmme had been achieved in their case.

Based on the 2011/2012 student-feedback, the average evaluation of the programme' subjects on a 5-grade scale was 4.60 (including a rating 4.62 for the employees of the Institute, which is one of the highest in the university). The highest average grade for compulsory specialization subjects was given to the course IFI6060 - *The .NET Framework* (4.88) and the lowest average grade to the subject IFI6020 - *Cryptology in Data Security* (3.93). The reason for the latter could be the fact that the course is still in the developmental stage. (The lecturer taught that subject for the first time.) The highest scores were given to the courses taught by Jaagup Kippar and Andrus Rinde (an average 4.7 and 4.8 respectively). From the comments given in the feedback, it appears that students value most: clear explanations, sufficient study materials and a cooperative teaching staff with a positive attitude.

In previous years, the subjects MLM6222 - *Linear Algebra and Analytic Geometry* (4.13) and MLM6202 *Discrete Mathematics* (4.09) have been the most problematic. Several students emphasized that it is not suitable for them to have the subjects taught together with the students of mathematics, because they are not familiar with the specialized subjects of informatics. Low evaluation of the mathematics courses was the reason why a set of mathematics courses designed specifically for the students of informatics was developed and since the spring semester in 2013, the mathematics subjects are taught separately to the informatics students; it allows a better understanding of the needs of informatics studies.

Although the curriculum is in Estonian, foreign students who do not have a command of the Estonian language have completed several of its subjects. Subjects have been taken independently in agreement with members of teaching staff by using materials in English. For example, two students completed the subject IFI6058 - *Practical Work*, in which they participated by completing projects of the Centre of Educational Technology and compiled a practice report in English.

The strength of the curriculum is its broad base that enables students to have an overview of different IT fields of study, thus enabling them to continue studies in the master´s level curricula but with a different orientation. A relatively large volume of electives as well as open electives, allows every student to study the topics that are of special interest to him/her in depth. There are no significant changes planned in curriculum development in the following years. The target is that, in the 2014 version of the curriculum, the requirements of a professional standard for the *Senior Software Developer*, level 6, established in May 2013, will also be incorporated into the curriculum.

b. Resources

The study infrastructure fully satisfies the needs; all computer laboratories are equipped with the newest technology. One problem that has been mentioned is the limited facilities for charging laptop batteries.

All courses are covered with study materials as follows: (1) lecture notes corresponding to the content of the course compiled by the member(s) of the teaching staff; (2) slide presentations of lectures and tasks in practical courses; (3) additional materials (mainly Internet-based and in English); descriptions of technologies, e-books, and others. Members of the teaching staff

have an obligation to keep the materials they have compiled updated and to amend these materials if and when necessary (e.g. when the content of the course is altered).

The availability of literature for preparing and updating courses fully meets the needs of the members of the teaching staff. The yearly allocation from the Estonian Information Technology Foundation for the purchase of study literature helps to make this possible.

Students gave a very high evaluation to the availability of study materials – the average grades in the 5-grade system are usually between 4.7 and 4.9, and at times even 5.0. In contrast however, students in some courses complain about the volume of study materials available. In only one course, students complained about the scarcity of study materials (IFI6023 - *Computer Graphics*). Study materials for some courses have been blamed for mistakes (IF6020 - *Cryptology in Data Security* and IFI6052 - *Interface Development for Database*). Members of the teaching staff have been separately informed of the problems identified by students (although the members of teaching staff have access to the results of the feedback questionnaire on their subject).

Software constitutes a significant part of the resources. Most subjects assume the use of *freeware*, thus students will not have a problem installing software at home. Unavailability of software has been mentioned only in the case of the course IFI7041 *Data Analysis: Descriptive Statistics* that has been designed for the use of SPSS. At the same time, the university computer classrooms are also available for doing homework. A MSDNAA contract has been concluded for the use of Microsoft software.

c. Teaching and learning

Study of curricula takes place on five weekdays– from Monday to Friday. The subjects taught by the institute are located in the timetable in a way that students can choose additional suitable electives of the specialization.

Every year a new list is created and posted for the admitted students and this is used to forward information to the whole group (support staff and members of teaching staff). A student´s tlu.ee mail address is used to forward personal information meant for the student. Students have been informed that a regular check of their university mailbox is compulsory. Students usually turn to their study assistant with their academic and administrative problems for further guidance if necessary.

The supervisors of student papers are usually the employees of the institute. For more specific topics there have also been external supervisors. Where the supervisor does not have an academic background (for example, an expert in a company) it is recommended to choose a second supervisor from TU who will monitor the compliance of the work with academic requirements. The most significant problems in supervising student papers have been the following: (1) supervisors have not answered the questions of students fast enough and (2) some students have sent their course papers or graduation papers to supervisors for reviewing so late that the supervisors have been put under significant time pressure. Generally, students remain satisfied with the supervision of research papers – according to the 2012 alumni questionnaire the satisfaction level was 77%.

Students have the opportunity to participate in research and development mainly within the projects conducted at the Centre for Educational Technology. They also participate in the *innovation share* projects of companies. According to the specificity of the project, the members of the teaching staff related to the project make proposals to individual students regarding their participation in the project.

During the second semester, the students will complete the subject IFI6084 - *Software Engineering Project* I. During this course, students acquire comprehensive experience in software engineering – starting from defining the requirements to testing the working software. At the beginning of the semester, the supervising member of the teaching staff chooses a suitable task from those suggested by companies and assigns them to student groups of 4-5 members. The whole development process takes place in close cooperation with the respective company. The course ends in June with an intensive 2-week development period that ends with a public presentation of the created software. It is recommended that those students who are not yet employed on speciality during the 3rd course choose the subject IFI6058 - *Practical Work*. Practice is regulated by the practice guidelines and if a student has no opportunity to find a practice place, the practice coordinator will help him/her find a place. The student must still apply himself/herself and be able to confirm a practice place. A form has been compiled for reporting (a practice journal to reflect one´s activity and experience). A student will be appointed a supervisor by the university who visits the student at the practice place and communicates with the local supervisor. This is one way to collect information from employers for curriculum development.

In classroom study there is a maximum of 13 contact work hours on average for each credit point. Individual work is given to students in the amount that would be required for passing a course with a total of 26 hours of work per one credit point from a student with average study capacity. It appears from the results of the feedback questionnaire that in general, the work done to complete a course compared to the amount of credit points received for it is in balance (4.3 – 4.9 grades on a 5-grade scale).

If a student has studied at a higher education establishment before and has interrupted their studies, compulsory subjects can be transferred. Open electives and electives that have been previously taken, cannot be taken into account.

d. Teaching staff

Division of the members of teaching staff in the compulsory subjects in 2012/2013 was as follows: (a) 60% from the Institute of Informatics and other TU Institutes, (b) 16% employees of companies and (c) 24% lecturers from other universities (schools). External lecturers are used mainly when there are no members of the teaching staff from within the institute who have sufficient competence to teach a given subject. For example, subject IFI6014 *Operating Systems* is taught by TUT Professor Vello Kukk who has long teaching experience, the subject IFI6054 *Agile Software Development* is taught by Marek Kusmin, a former lecturer of the institute and presently a software developer for a software company, CodeBorne. The supervisors and reviewers of final papers are mostly members of the teaching staff at the Institute.

For several years, the chairman of the thesis defence committee has been TUT Professor Emeritus Leo Võhandu and the representative of employers is Ants Sild (CEO of Baltic Computer Systems).

In the feedback questionnaire, students are asked to evaluate the opportunities that are available to contact a member of the teaching staff and whether they feel the presentation of a subject is clear and understandable. If there are problems in making contact with external lecturers, then the study assistant will assist the student. Clarity in the presentation is a problem with more complicated subjects, but despite this fact, only a few subjects have an average grade below 4.0. In two of these cases the subject has been taught for the first time or taught for the first time through E-learning. One external lecturer has been replaced within the last three years (subject IFI6018 *Networks and Data Communications*).

Currently, the subjects of the curriculum are covered with competent lecturers who are generally highly rated by the students. The involvement of practitioners in the study process is considered positive. At the same time, the involvement of employees from other universities and companies as teachers involves some risk. For example, the previous lecturer of the subject IFI6072 *Computer Hardware* had to give up teaching the subject due to the increasing workload in the main employment position. Also, the high teaching load of the lecturers in the institute can be seen as a risk and the fact that usually the members of teaching staff are not doubled (i.e. a given subject is taught by only one member of teaching staff). Commencing on 1 January 2014, the number of full-time teachers teaching the curriculum will increase by one teacher. However at the moment the scarceness of resources does not allow any significant increase in the academic staff.

e. Students

Commencing with the 2013 admission, the requirements for admission to the study programme are as follows: (a) one state exam in mathematics, physics, geography, chemistry or biology, (b) a state exam of the candidate´s own choice plus an admission exam. The admission exam has two parts – written and oral – and helps to define, among other things, the interest level of the student up to the present time and the motivation to study in the given specialization, competence in the English language as well as in the level of logical thinking.

Students have a significant amount of freedom in designing their studies. In addition to the previously mentioned avenues available for specialization (24 ECTS credit points) and choice of open electives (24 ECTS credit points), the students can take advantage of Erasmus agreements in order to study abroad for a semester or even longer. The Erasmus coordinator informs students of these opportunities and supports the students in formalizing papers and communicating with the respective universities. During the last three years, two students have been studying abroad.

Relatively speaking, there are many students who interrupt their studies, especially during the first study year. The main reasons for the interruption are insufficient progress, inappropriate selection of a specialization and failure to pursue the organizational requirements for study set out by the university. If a student chooses an inappropriate specialization, there is no point in trying to retain the student. In cases where other problems exist, the Head of Study and the study assistant try to determine the reasons and offer support to the student and depending on the situation, may also offer the student the opportunity of taking academic leave. In advanced stages of the course, students are already involved in specialized work and tend to lose their motivation to study and to eventually graduate. In this case much depends on the place of employment, whether it supports and facilitates the continuation of education or not. Statistical data on the number, dropouts and graduation are given in Section 8 of part A of the report. Several students have also been re-matriculated later and they have successfully graduated.

For completing previously interrupted studies (without paying the tuition fee), a state programme TULE was available in 2010-2013. Seven students came to study within the programme and so far three of them have graduated.

According to the questionnaire conducted in 2012, half of the students are satisfied with the university Study Information System and 56% of the students are satisfied with the movement and exchange of study organizational information within the institute. Most of the students interviewed (70%) are pleased with the helpfulness of the employees of the institute and their attitude towards students.

When we analysed the reasons for exceeding the standard period of study, it appeared that about half of the students have satisfactorily completed the subjects in the requested amount of time with only a seminar paper and bachelor´s thesis remaining to be completed. Both papers demand greater independence from a student but nevertheless, it is apparently necessary to increase the role of supervisors in guiding students and conducting the papers in order to improve the situation.

f. Aggregate analysis of the study programme

Based on the above-mentioned assessment it can be concluded that the strengths of the curriculum are:

1) Broad-based study programme: although the programme is focused on software engineering, it includes courses covering hardware and the development of analytical thinking. This enables the student to identify his/her interests and abilities in the broader field of IT.
2) Students have wide freedom of selection in completing the curriculum. This allows students to basically compile an individual study plan by mainly focusing on topics of interest.
3) Implementation of the study programme is smooth and the feedback given suggests the following: lecturers deliver the subject courses satisfactorily, the study infrastructure is adequate and modern and effective counselling supports studies.

Most important fields for improvement:

1) Identifying as early as possible those students who would potentially interrupt their studies and motivating them to continue and offering support where necessary.
2) Improving the productiveness of seminar and final papers mainly by an earlier selection of the topics and increasing the proactivity of supervisors.
3) Increasing the resources necessary for study activity to enable the creation of additional teaching positions and a decrease in the workload of existing teachers.

g. The action plan

Activity	**People responsible**	**Deadline**	**Expected result(s)**
Complete the guidelines for compiling seminar and bachelor´s papers with a mechanism supporting the effectiveness of supervision.	Director of the Institute	20.12.2013	Guidelines have been completed.
Add communication tool to the theses' register.	Director of the Institute	1.03.2014	The tool is implemented.
Completing the curriculum pursuant to the requirements of the professional standard "Senior specialist of software engineering - Level 6".	Programme manager	1.03.2014	The Council of the Institute has approved the new version of the curriculum.
To analyse the effect of the	Director of the	20.12.2014	The number of

changes in the Universities Act to studies and interruption of studies and develop adequate improvement measures.	Institute		students who completed the study during standard period of study has increased and the proportion of students who have interrupted their studies has decreased.
Find additional resources to conduct study.	Director of the Institute	20.12.2015	The average load of classroom work of the members of teaching staff does not exceed the normative by more than by 20%.

3. Management of Information Technology

Title of the study programme	**Management of Information Technology**
Programme holder	Institute of Informatics
Programme manager	Professor Peeter Normak, peeter.normak@tlu.ee
Description of composition of the process of self-evaluation of the study programme	The procedure was as follows: the programme manager composed the first version of the report, the report was discussed at the institute's general meeting 21.06.2013, jointly with the institute's council members.

a. Study programme and its development

This is the only master's level ICT programme in Estonia that is based on the corresponding national occupational qualification standard referred to as *IT Manager*. The *Information Technology and Telecommunications qualifications committee* (skills council) of *Estonian Qualifications Authority* adopted the initial version of the standard on 30.03.2000.

A number of leading Estonian IT companies (*Cell Network*, *Helmes*, *Microlink* etc.) were involved in the development of the programme, with the IT division of the *Estonian Union Bank* (now SEB) as the strategic partner. The programme received full accreditation in 2004. The latest version of the standard that currently complies with the *European Qualifications Framework* (the level of the standard *EQF Level 7*) was adopted on 15.06.2012, and the programme was correspondingly updated (as a result of the regular – annual – revision of the programmes of the institute by programme councils). Two new courses were developed (IFI7045 *Information Security Management*, and IFI7073 *ICT Procurements and Contracts*) and some already existing courses were updated.

Currently the programme council consists of the following persons:

- Professor Peeter Normak, Head of the programme council
- Paul Leis, technology director, SEB bank
- Zahhar Kirillov, alumnus

- Professor Rein Kuusik, Director of the Institute of Informatics, Tallinn University of Technology
- Ants Sild, CEO, Baltic Computer Systems, member of ICT occupational qualification committee in ICT of the *Estonian Qualifications Authority*
- Martin Sillaots, researcher
- Tiina Sillaste, student
- Üllar Tammiste, student

The average students' feedback over all courses of the programme during the academic year 2011/2012 on the scale 1 … 5 was 4.35 (4.44 for the teachers of the institute). Note that ten years ago in 2003, the average was 3.9. The highest average rating (4.81) was given to the course IFI7009 *Master Seminar* and the lowest (3.42) to the course IFI7013 *ICT Strategic Management*. The main reasons for the latter were: (1) there were no systematic course materials; ppt-presentations – although quite thorough – were the only original course materials, (2) homework requirements and evaluation criteria were unclear, (3) the lecturer had a patronizing attitude toward some students. Concerning this course, the course programme and the course environment in Moodle was updated.

The specificity of the programme is that it contains courses that are partly or even fully taught by high-level experts from companies. This can be considered to be a strength (practice-oriented), but it is also challenging at the same time (pedagogical mastery of teachers is not guaranteed). A major redesign of the study programme is scheduled for 2015, after the opening of an international professorship in *ICT Innovations and Entrepreneurship* at the institute.

b. Resources

The infrastructure for studies should be rated as *very good*.

However, the availability of original systematic course materials is quite different. There are some courses with full coverage of comprehensive original course materials, but there are also courses in which the independent work of students' is based almost entirely on different sources (mostly web-based). The latter concerns exclusively non-permanent staff (lecturers from industry) or optional and free elective courses of other institutes.

Concerning other institutes, there are basically only two types of actions for improvement that are possible (and used): (1) inform other institutes about the requests of the students, and (2) inform the students about the feedback to the courses by students from previous years.

Concerning non-permanent staff, the following options are used to improve the teaching: (1) the lecturer will compose or update the course materials, (2) the lecturer will be replaced or (3) the course will be removed from the programme. Normally option (1) applies. However, the option (2) was used only once during the last few years (IFI7021 *Development of Infrastructure of Information Technology*) and option (3) has also been used only once (the course about e-commerce was removed because of critical feedback from the students).

The feedback from the students indicates that the coverage and availability of course materials is satisfactory; even the complaints of students concern not so much the coverage and content of course materials, but the inconvenience of handling the dispersed sources.

c. Teaching and learning

The classes for the compulsory courses and most of the optional ones take place on weekends – every second Saturday and Sunday. This is a reasonable schedule since almost all of the students are employed; this also allows people living outside of the Tallinn region to attend. Class attendance is very good.

All compulsory courses have on average about 5 contact lessons *per* ECTS credit, except IFI7028 *Practical Training*, and *Master Thesis*. The Practical Training (internship in industry) begins with an *Induction Seminar* where the objectives and practical issues are discussed. Each student has two tutors/supervisors – one from the company and one from the institute. Normally the thesis' supervisor will act as supervisor of practical training as well. Before the practical training, every student is required to compose and agree on a work plan with the tutors (4-6 tasks and completion dates). Should a student have difficulties in finding a proper company for practical training, the programme manager will help. Practical training normally lasts ten weeks and ends with the final conference and submission of a form-based report. The university tutor is obliged to visit the company and discuss the work of the student together with the company tutor at least once during the practice. It is suggested that students form clusters of 2-3 companies and organize mutual visits to their colleagues' companies to share experiences.

There seems to be no major problems concerning the learning/teaching process. The most frequent complaints/suggestions concerning teaching during the last year were: (1) the absence of compact course materials (already discussed above), (2) the need for more concrete case studies during the classes and (3) a lack of clarity in assessment criteria.

One aspect for potential improvement that deserves on-going attention, unfortunately does not depend on the university/institute to any great degree and the question remains – how to motivate industry people who are involved in the teaching process to devote more time to composing course materials and to the individual tutoring of students.

d. Teaching staff

Close cooperation with the industry in developing and running the study programme is also reflected in the teaching staff. Experts from the industry teach three (3) out of the nine (9) compulsory courses – IFI7013 *ICT Strategic Management*, IFI7022 *IT Operations and Management*, and IFI7026 *Legal Issues Related to IT-Development*. Moreover, industry experts cover some topics in some other courses (IFI7021 *Development of Infrastructure of IT* and IFI7073 *Procurements and Contracts*) as well.

Industry experts and sometimes colleagues from other universities are also involved in other types of academic activities:

1) Ants Sild and Leo Võhandu (*professor emeritus* of Tallinn University of Technology) are permanent members of the graduation committee.
2) In supervising theses: in 13 cases in 2011-2012 (out of 22 students who graduated in these years) the supervisors or co-supervisors were from outside the university.
3) Reviewing the theses: in 17 cases the reviewers were from outside the university. If a supervisor is from the university, then the reviewer is necessarily from outside the university. This principle was abandoned only once – when the Head of the university IT department assessed a thesis that was supervised by an IFI staff member.

The formal qualification of teachers is satisfactory – only three teachers of compulsory courses do not have a Doctoral degree (two of them are from the industry). However,

compared to other study programmes of the institute the risks associated with the teaching staff are the highest, because the institute does not have an effective means of influencing lecturers who do not belong to the IFI staff. On the other hand, students highly value the practical experience that these people are able to share.

Currently, we see the following main options for improvement: (1) Use local assistants or co-teachers for courses that are offered by visiting lecturers (this practice is already partly implemented and seems quite promising) and 2) Involve the academic network of the new professor of ICT innovations and Entrepreneurship.

e. Students

The study programme is quite popular – more than 2/3 of students pay tuition (€1916.00/year).

Since there is no requirement for applicants to possess a bachelor degree in ICT, the admission test plays an important role in determining the suitability of the applicants. The test consists of two elements: (1) a motivation letter (1-2 pages) where the applicant describes his/her competences and professional activities in ICT, and expectations regarding the master's programme, and (2) an interview where the motivation letter, possible topic of the master thesis, plans for a professional career, and the readiness of the student to bear the study load are discussed. The admission test also includes an oral test of English. A detailed description of the admission test is published on the institute's web page.

During the last three years, a total of 53 students were enrolled which is about 50% of the total number of applicants (105) who successfully passed admission tests. For those students who need to upgrade their ICT competences we strongly suggest the use of optional courses and free electives for that purpose.

The dropout rate is about 40% (see the table in section 8 of part A of the report). Composition of the thesis is a bottleneck – in many cases the student completed most or all of the regular courses, but did not complete a thesis. Some students who leave will be matriculated again later and will complete the studies successfully.

Alumni will remain on the mailing lists of the institute. This facilitates contacts with the graduates – informing them about conferences, asking for feedback and suggestions, inviting them to different events, etc.

In order to increase the graduation rate, the supervisors are asked to be more proactive. We are currently discussing the possibility of updating the register of students' theses with student-supervisor interactive functionality (http://www.cs.tlu.ee/teemaderegister/).

f. Aggregate analysis of the study programme

We consider the following as the strengths in the study of the *Management of Information Technology* programme:

1) The programme is based on a corresponding occupational qualification standard that was developed with substantial involvement of industry experts.
2) Industry experts are involved in running the programme; this offers students the possibility to gain a better understanding about real life problems and their possible solutions.
3) An emphasis is also put on the development of the generic skills of students – teamwork skills, presentation skills and reasoning skills.

We consider the following to be the main challenges:

1) Ensuring the supply of comprehensive course materials for all courses.
2) Ensuring high quality of all the courses of the programme.
3) Motivating students to devote more time to learning and decreasing the dropout rate.

Comment: The Skype Company initiated the development of an international *Information Technology Entrepreneurship* master's programme a few years ago. This programme with three core modules (ICT innovation, entrepreneurship, leadership) was developed with the involvement of colleagues from Skype, Tallinn University of Technology and University of Tartu. However due to the lack of resources, it never became established. After hiring a professor in ICT innovations and entrepreneurship, the project of setting up this study programme will be resumed.

g. Action plan

Activity	Responsible	Deadline	Expected outcome
Add communication tool to the theses' register	Director of the institute	1.03.2014	The tool is implemented
Developing a complete set of course materials for the course IFI7013 *ICT Strategic Management*.	Programme manager	1.09.2014	Course materials are available
Application to open an international professorship in ICT Innovations and Entrepreneurship	Director of the institute	1.09.2014	Application is submitted
Conducting the procedures of election of professor in ICT Innovations and Entrepreneurship	Director of the institute	1.06.2015	The professor's position is filled
Revision of the study programme	Programme manager	31.12.2015	New version of the programme

4. Human-Computer Interaction

Title of the programme	**Human-Computer Interaction**
Programme holder	Institute of Informatics
Programme manager	Professor David Lamas, david.lamas@tlu.ee
Description of the process of self-evaluation of the study programme	The programme manager composed the first version of the report, the report was discussed at the institute's general meeting 21.06.2013, jointly with the institute's council members.

a. Study programme and its development

The Human-Computer Interaction programme (initially having the name *Interactive Media and Knowledge Environments*, later in this section "*programme"*) was launched in 2006 as the sole this type of programme in the Baltic Region. The programme was initially designed to address the challenges and opportunities offered by the emerging knowledge environments. This programme received full accreditation on 19 May 2008; the programme council has updated its programme yearly since then to reflect the evolving understanding of the field.

The programme council includes members from Academia and Industry as well as representatives of students and alumni. As of today, its composition is as follows:

- David Lamas (Professor, Head of the programme council, Institute of Informatics)
- Tobias Ley (Professor, Institute of Informatics)
- Kaido Kikkas (Associate Professor, Institute of Informatics)
- Hans Põldoja (Researcher, Institute of Informatics)
- Renira Rampazzo Gambarato (Associate Professor, Baltic Film and Media School)
- Indrek Ibrus (post-doctoral researcher, Baltic Film and Media School)
- Lauri Läheb (Management Services Director, EMT)
- Hegle Sarapuu (Chief Experience Officer, Trinidad Consulting)
- Ilya Shmorgun (alumnus)
- Argo Ilves (student)
- Meren Tamm (student)

All revisions and updates were equally important and mainly focused on keeping the list of elective courses as up-to-date as possible. The 2012 revision was the most extensive and focused the programme on Interaction Design, as a core discipline of the programme. This was, of course, based on broad discussions within the programme council while also actively involving the students.

Although there is no prescribed sequence of courses, a learning path is suggested for each semester and the programme team supports students while choosing their courses. Coherence is achieved by a shared understanding of what the programme is all about. Lecturers and also students share this vision since each has a voice in most of the structural and content-related decisions.

So far, the best overall feedback was 4.98 (on a scale from 1 to 5), awarded to a course on *Philosophy of Cognition* (IFI7153), which students described as very interesting. On the other hand, the lowest feedback has been awarded to *New Interactive Environments* (IFI7144). It was rated 3.75 mainly due to the lecturer's lack of clarity when presenting new topics and also due to somewhat unclear evaluation criteria. Most courses, however, have been rated 4.5 or above.

This programme is entirely read in English and its courses are popular among exchange students. The programme also benefits from exchange staff and it is common to have anywhere from 10% to 30% of the credits read by visiting lecturers every semester. The Erasmus programme is one of the most popular sponsors but others include ongoing research projects and local incentives (funding) to improve the quality of higher education in Estonia.

One of the programme's strengths is its relatively strong international component that could form the basis for targeting joint or double degrees with partner universities.

A possible area for improvement is the programme's connection with industry and business which, although it exists, is still weak and of no consequence other than to facilitate an adequate comparison between the programme's learning outcomes and the industry needs and expectations.

b. Resources

The rooms are spacious, well lit and equipped with state of the art technology. Also the new computer labs are equipped with new computers and adequately support the programme's activities. No problems have ever been raised by the students or lecturers.

Additionally, this programme benefits from the *Interaction Design Laboratory,* which has the specific resources needed for this programme. The Interaction Design Laboratory was established in 2009, as a research, design and innovation unit contributing to the Institute of Informatics knowledge and skills on human-computer interaction design. Currently, the Interaction Design Laboratory has an active team of researchers and practitioners that explore the boundaries of the field while applying acquired competences in both academic and industry-based projects. The Laboratory is equipped with state of the art hardware and software and has numerous types of devices (iPhones, iPads, iPods, Android tablets, Kindles, large touchscreens) and a comprehensive set of alternative input-output devices (Phidgets, Arduino, Sifteo). This Laboratory successfully supports specific courses and hosts master thesis projects, providing an effective link between the programme and some of the Institute's research and development projects.

The programme also boasts a private library of some 20 to 40 titles and has been regularly added to since the initial deployment of the programme.

As for specific course material, the study programme successfully used incentives such as BeST (http://www.e-ope.ee/best) to foster the development of compulsory and elective courses. As such, there are over 10 programme-specific courses with systematically and originally developed content that is fully available online, for example (http://ifi7159.wordpress.com/). There are other programme-specific courses that exist with specially developed content. In addition, depending on the sources (such as textbooks, articles and web-based content) there are other courses curated by the lecturers, which students then use to deal with their activities. The latter are mainly elective courses or courses from other institutes.

The feedback from the students indicates that the coverage and availability of the course materials are adequate and at the most, students comment on the under-curated content selection, which becomes apparent due to either a very large or very dispersed collection of documents and/or sources. When these opportunities for improvement are identified, the lecturer in charge will be informed about the students' comments and concerns and asked to address them in a timely manner.

c. Teaching and learning

At the present, the sessions for most courses take place every two weeks on Fridays and Saturdays as most students work full-time (both in Tallinn and around the country) and this schedule allows them to come to the university and fully commit to classes in short intensive periods. Classes were previously organized in the evenings but most students would arrive late, tired and still with their minds still set on work-related problems.

Most compulsory courses have an average of 5 contact hours per credit, one exception being the *Master Thesis Seminar* (IFI7158) in which approximately half the time is composed of contact hours. In most courses, the face-to-face sessions are complemented by independent and online, designed activities. In fact, in the specific case of this programme, a strong online community has been promoted since the initial students admitted now benefit from a network of peers, lecturers and supervisors much larger than the group they belonged to when attending their classes. Independent and online activities tend to be evenly distributed

throughout the semester. Home assignments when set, are normally discussed at the beginning of the forthcoming session.

Master theses topics are worked on from the commencement of the *Master Thesis Seminar* course (IFI7158), with students invited to introduce relevant challenges from their work context but are also exposed to ongoing research and development projects. Also pre-set topics are compiled and made available to students through the Institute's *Thesis Topic Register* (http://www.cs.tlu.ee/teemaderegister/). While attending the Master Thesis Seminar, students are introduced to the principles of academic writing and related ethical and legal issues. There are no cases of fraud to report.

Generally, the overall teaching and learning process is supported by:

- The Institute's web page (http://www.tlu.ee/et/informaatika/);
- The programme's website (http://hci.tlu.ee/);
- The studies information system (http://ois.tlu.ee);
- Group counseling (mainly through each group's mailing list, for instance imke12@googlegroups.com and imke11@googlegroups.com);
- Individual mentoring (through individual meetings with the programme manager); and
- Supervision (specifically focusing on issues related to the master thesis).

The programme manager and the supervisor are usually the first contacts for academic issues while the Head of Studies and the study assistant are the first contacts in the case of administrative matters. The Institute's International Collaboration Coordinator assists both incoming and outgoing students as well.

Finally, the quality of the teaching and learning process relies on three major elements:

- Thorough documentation such as the course descriptions freely available in the studies information system, detailed course programmes available through the programme's website (http://hci.tlu.ee/courses/seminars/), extensive online course content (available on wikiversity, blogs and other online environments), and other documents available through the Institute's web page (such as the "Regulations for the master thesis preparation process in TU Institute of Informatics" of the master thesis, available at http://www.cs.tlu.ee/instituut/english_web/documents/PDF/Regulations_master_thesis_writing_2011_fall.pdf);
- Regular feedback questionnaires are collected from the students upon conclusion of each course and passed along to the respective lecturers, then to the programme manager and finally to the Director of the Institute. All are requested to act upon the feedback either by considering the collected information when planning the content of the next course, in the case of the individual lecturers, or by discussing the main trends and emerging concerns in the programme and Institute's councils, in the case of the programme manager and the director; and
- Involvement of colleagues from other institutions in joint thought courses (such as IFI7150 *Entrepreneurship and E-Commerce* and IFI7108 *Digital Interactive Audio*), in thesis co-supervising and review activities, and in graduation committees.

There seems to be no major problems concerning the teaching and learning process apart from the lack of stronger relations with industry partners as already mentioned. In the case of this programme, we believe it would be beneficial to engage with non-academic partners in the pursuit of the real challenges of industry to be addressed by our students and in particular, the pursuit of insight into how the topics of our programme impact companies and businesses.

d. Teaching staff

Teaching activities reflect the strong relationship between the programme and relevant research and development networks since both compulsory and elective courses benefit from the input provided by colleagues from other Estonian higher education institutions (for instance, IFI7161 *Design Theory and Methodology*, IFI7129 *Introduction to Graphic Design*), foreign post-doc researchers (for instance, IFI7153 *Philosophy of Cognition*, IFI7102 *Computer Skills and Programming Update*) and invited specialists (for instance, IFI7154 *Developing Interactive Systems*, IFI7113 *Interactive Television*).

Foreign colleagues, colleagues from other Estonian higher education institutions, industry experts and doctoral students are also involved in other types of academic activities:

- Leo Võhandu (Professor Emeritus of Tallinn University of Technology) and Ants Sild (BCS) are permanent member of the graduation committee.
- Foreign colleagues, post-doctoral researchers and doctoral students co-supervised 4 theses submitted in 2010/2011 and 2011/2012 (out of 12 students who graduated during these years). Colleagues from other Estonian education institutions and doctoral students are currently co-supervising 5 ongoing master thesis projects (out of 23).
- Foreign colleagues, colleagues from other Estonian higher education institutions, and industry experts also collaborated as reviewers in 17 theses in situations when the supervisor is from the university and the reviewer is then invited from outside the university. This principle was not followed in five cases.

The number on teachers with formal qualification is very acceptable, since only one of the lecturers in the compulsory courses does not have a doctoral degree. Also, when compared to other study programmes of the institute, the risks related with teaching staff are moderate, since in most cases, local teaching assistants collaborate in courses that are offered by external lecturers. Finally, we currently see the benefits of the involvement of industry experts as collaborators; jointly reading selected courses, as one of the main improvement opportunities, as far as teaching is concerned (we certainly are aware of risks related with the involvement of people from industry).

e. Students

The programme has been able to attract slightly over 15 candidates every year after peaking with 25 and 33 candidates in 2009 and 2010 respectively. Out of the 67 students admitted so far, 13 dropped out (20%), 35 successfully completed the programme (52%) and the remaining 19 are actively participating in the programme's activities. The average time for completion is slightly below 3 years.

Students come from very diverse backgrounds (informatics, communication sciences, design) and thus far about 10% are foreigners who come from Finland, Italy, Iran and Portugal.

The admission procedure requires, on top of the standard proof of required qualifications and English language proficiency, the submission of:

- A digital portfolio containing up to 6 samples of the candidate's work as illustration of his/her experience and capabilities on the academic or professional level; and
- A motivation letter including a statement of research intentions clearly indicating the reasons for applying for the programme, and describing the candidate's current research goals by proposing a potential research topic.

Alumni are successfully placed in Industry working with organizations such as *Riigi Infosüsteemi Amet*, *Eesti Energia*, *Microsoft*, *Nortal*, *SEB* and *Skype*. Some are also successfully placed in Academia where they now pursue doctoral studies. Alumni remain members of their group's mailing lists, which facilitate following-up on the development of their careers as well as direct dissemination of news, events and other activities.

Nonetheless, we see attracting a higher number of applicants as a challenge, as well as increasing the percentage of applicants from abroad.

f. Aggregate analysis of the study programme

The main strengths of this programme are:

- The availability of state of the art resources;
- The strong online community built around the programme;
- The openness of the programme to input from foreign colleagues, colleagues from other Estonian higher education institutions, industry experts, post-doctoral researchers and doctoral students; and
- The additional emphasis on the development of teamwork, presentation and reasoning skills.

We consider the following as the main challenges:

- More comprehensive Industry relations, namely on reading jointly organized courses, on joint student supervision and on a steady supply of case studies and challenges; and
- Increasing the number of applicants, as well as increasing the percentage of applicants from abroad.

g. Action plan

Activity	**Responsible**	**Deadline**	**Expected outcome**
To reinforce formal relations with industry partners within the programme	Programme manager	31.06.2014	Increased number of courses with direct input from industry, increased number of thesis driven by industry challenges
To raise the visibility of the programme both in Estonia and internationally	International Collaboration Coordinator	31.06.2014	Increased number of applicants (including applicants from abroad)

5. Educational Technology

Title of the study programme	**Educational Technology**
Academic unit responsible for conducting the study programme	Institute of Informatics
Principal compiler of self-evaluation of the study	Hans Põldoja, researcher, hans.poldoja@tlu.ee

programme, study programme manager until 30.06.2013	
Brief description of the process of self-evaluation of the study programme	The procedure was as follows: the study programme manager composed the first version of the report; the aggregate analysis of the study programme and action plan were composed by the teachers of core subjects, the second version of the report was sent for feedback to the students and other teachers. The elaborated version of the report was discussed at the institute's general meeting (21.06.2013).

a. Study programme and its development

Educational Technology at the master level study programme in Tallinn University was launched in 2010. The programme was designed to address the need for specialists who would be able to design and apply new innovative teaching methods and to support teachers in integrating information and communication technology into the learning process.

In addition to the National Higher Education standard, the learning outcomes take into account two additional levels of competence: the Teachers' ICT competences and the Academic staff ICT competences.

The process of developing the study programme follows the standard procedures of the Institute of Informatics. Students complete the feedback surveys after each semester. The Manager of the study programme occasionally gathers additional feedback from the students and teachers. The feedback is discussed once a year in meetings with students and teaching staff. The proposed changes to the study programme will be discussed at the study programme council and the council of the institute.

Currently the study programme council consists of the following persons:

- Hans Põldoja, Researcher, Head of the study programme
- Peeter Normak, Professor
- Kai Pata, Senior researcher
- Mart Laanpere, Researcher
- Ingrid Maadvere, Student
- Meeri Sild, Student
- Tiia Niggulis, Educational technologist, Tallinn Secondary Science School
- Marge Kusmin, Head of Educational Technology Centre, Tallinn University of Technology
- Andrus Rinde, Lecturer, alumnus

After the first year minor changes were made to the study programme based on students' feedback. The core course IFI7003 *Project Management in Software Engineering* was moved to electives, and IFI7060 *Learning Analytics* was added to the list of core courses. A new elective course IFI7059 *Digital Media Production* was added to the programme to support the development of skills for creating digital media elements for learning content.

In 2012 the structure of all master programmes was changed in Tallinn University. The amount of general subjects was decreased from 15 ECTS to 8 ECTS and the amount of core subjects was increased. Master thesis seminars were introduced to the programme in order to support the process of thesis writing. Also a new elective course IFI7064 *Learning Management Systems* was added to the study programme. The study programme follows the logical sequence and coherence of subjects. For example IFI7065 *Master Thesis Seminar I* is offered in the second semester when the students are required to register their topic. IFI7007 *Research Methods* is offered in the third semester when the students are already working on their master thesis. IFI7066 *Master Thesis Seminar II* is offered in the fourth semester when the students are completing their thesis.

In 2013 the study programme has reached a stable level and no changes were made. In some cases recommendations were given to the teachers about adjusting the course content.

The average student feedback for all courses during the 2011/2012 study year was 4.47 (on a 5-point scale). Average feedback for core courses was 4.49. The highest rated core course was IFI7052 *Learning Environments and Learning Networks* (4.75) and the lowest rated compulsory core course was INT7059 *Knowledge Management* (4.15). The only elective course with an average rating below 4,0 was IFI7061 *Multimedia Development* (3.92). The main reason for this rating was that the course was based on *Adobe Flash* software that was complicated for students who did not have the necessary programming skills. Feedback for the lecturer's teaching skills was rather positive. The content of the course has now been changed to better meet the needs of the target group.

The study programme has been compared with similar programmes in foreign universities during the design process of the programme. The closest programme was the Educational Technology minor programme in the University of Turku.

The Institute of Informatics organizes the annual summer school "PSST! - Personal & Shared Strategies for Teachers in Web 2.0" jointly with Pädagogische Hochschule OÖ (Austria) and five other partner universities. In 2012 three master students from the Educational Technology master's programme participated in the summer school.

b. Resources

Practical lessons are conducted both in Windows and Mac-based computer labs that are equipped with up to date hardware and software. The students are also able to borrow mobile devices as well as audio and video recording equipment from the Interaction Design Lab. Free wireless network covers all the university facilities. Independent work time in computer labs is offered on a scheduled basis to students who do not have commerical software on their personal computers.

The availability of learning materials varies between the courses. Some courses are covered with comprehensive original course material while other courses use selected research papers as course readings. Feedback from the students indicates that for some students, the language barrier is an issue in studying research papers. The lecturers can apply for a funding to support the development of original learning content and e-courses (various funding programmes provided by The Information Technology Foundation for Education). This funding has been used to develop original content for IFI7051 *Principles of Learning Design* and modules for other courses. Learning resources in several courses have been published as Open Educational Resources under the Creative Commons licenses (IFI7051 *Principles of Learning Design*, IFI7053 *Creating Digital Learning Resources*).

The *Academic Library* of the university provides students and staff with access to the main research databases that are relevant to the field of educational technology. However, the library lacks access to some of the databases (AACE EdITLib, Inderscience).

c. Teaching and learning

All the classes for core subjects take place during weekends — every second Saturday and Sunday. This allows students who are working full time and/or living outside Tallinn area to also attend the classes. Only general and elective courses offered by other institutes take place during the regular working days. Therefore the attendance record in classes is very good.

The electronic study support system consists of the regular services of the institute as well as those of the university: the institute's web site, the Study Information System ÕIS, the register of thesis topics and the dedicated web site of the Educational Technology master's programme (http://htmag.tlu.ee) which contains general information about the programme and various guidelines for the students, such as referencing, using library databases, etc.

Most of the core courses are provided using a blended learning approach where face-to-face lessons are supported with independent work in an online learning environment. The lecturers are free to choose the learning environment that is most suitable for their needs. This guarantees that the learners will get experience with various learning environments. Both the widely known learning management system (Moodle) and the locally developed systems (Dippler, EduFeedr, IVA) are used in the courses.

Special attention has been given to the use of open and personal learning environments. All students use a personal study blog where they publish reflections and assignments from different courses. A number of courses use blogs as the main component of the learning environment (e.g. http://opikeskkonnad.wordpress.com, http://oppematerjalid.wordpress.com, http://ifi7056.wordpress.com). Additional Web 2.0 tools such as SlideShare, Twitter, Mendeley and others are used in the courses.

Similar to all other study programmes, in order to assure the quality of the teaching and learning process, the teachers are required to prepare the following documents:

1) A course description that contains general information about the course (brief description of course content, learning outcomes, assessment methods, literature, etc.). Course descriptions are available through the study information system ÕIS.
2) A course programme that contains general information from the course description and detailed information for that specific year (dates and topics of lessons, description of independent work, etc). Course programmes are made available online two weeks before the beginning of the semester.

The lecturers are encouraged to revise their courses according to the quality guidelines of *Estonian e-Learning Development Centre* and to apply for the Quality Mark. In 2013 the course IFI7053 *Creating Digital Learning Resource* received the e-course Quality Mark and the "e-Course of the year" award (among 66 candidates).

The quality of teaching is assessed through the feedback questionnaire that is conducted among the students at the end of each semester. The main complaints raisen by the students are: (1) absence of learning resources in Estonian, (2) limited feedback from the lecturers and (3) unclear assessment criteria.

Students must register the topic of their master thesis during the second semester. The institute provides a number of topics that are related to our on-going research and development projects. The students are also free to propose their own topic. In the event the

supervisor is from outside the institute, the institute will assign a second supervisor from within the institute.

d. Teaching staff

The researchers of the Centre for Educational Technology in the Institute of Informatics deliver most of the core courses in the study programme. This guarantees that course content is in line with the latest research on the field. We have also involved lecturers from other institutes (INT7059 *Knowledge Management*), our PhD students (IFI7062 *Educational Technology Infrastructure Seminar*, IFI7064 *Learning Management Systems*), and working educational technologists (IFI7057 *Counselling in Educational Technology*, IFI7059 *Digital Media Production*) in teaching.

The formal qualifications of the teaching staff are considered satisfactory – two compulsory courses (out of 14) have teachers who do not have a doctoral degree. Industry experts and colleagues from other universities are involved in the graduation committee and also as opponents of master's theses.

Researchers who are teaching the core courses are not eligible for a free semester (academics who have a teaching position are entitled to a free semester once during the 5 year period). This means that the researchers must develop their courses in parallel with their other work responsibilities.

Another problem related to the teaching staff is the workload of supervisors. Currently 23 master students are under the supervision of 5 lecturers of core courses. In order to divide students between supervisors more evenly we have to involve our PhD students and external experts in supervising. Currently only 4 students are supervised by an external expert or a PhD student.

e. Students

There were 12 state financed study places in the Educational Technology master's programme. On average, we have had 1.5 candidate applications for 1.0 study place. The admission exam consists of the following elements: (1) a motivation letter (1-2 pages) in which the applicant describes his/her experience in the field of educational technology and his/her expectations of the master's programme; (2) an e-portfolio in which the applicant presents his/her existing educational technology competences and supporting evidence; (3) an interview in which the motivation letter, e-portfolio and possible master thesis topic are discussed; and (4) a reading test of English.

There is no requirement for applicants to possess a bachelor degree in ICT since most of the students have a background in education. Most of the students are adult learners who have already completed their education a number of years previously (typically as teachers) and are now doing a second master's degree. About 2/3 of the students are employed in schools as teachers and/or educational technologists. Some students have used the possibility of receiving credits for their previous studies and working experience through the VÕTA system (Accreditation of prior experience and learning).

During the first 3 years, 8 students have defended their master's thesis. As almost all of the students are working full time it is complicated to complete the studies in a nominal study time of 2 years. Typically it takes 2.5 to 3 years to complete the studies.

f. Aggregate analysis of the study programme

Strengths:

- Suits learners from various backgrounds and future perspectives
- Uses modern pedagogical approaches and different learning environments
- Provides personalized support for learners
- Strongly connected to research

Areas for improvement:

- The proportion of teachers having teaching positions should be increased.
- The coherence of the master's programme could be improved (some overlapping assignments, sequence of courses).
- Supervision of master theses is not distributed equally between the teaching staff.
- Supervision of apprenticeship practice needs to be improved.
- Students have limited English skills to work with scientific literature.

g. The action plan

Action(s)	**Person(s) responsible**	**Term**	**Expected result(s)**
Improving the coherence of study programme (learning outcomes, assignments, sequence of courses)	Programme manager	2014	The coherence of study programme is improved
Improving the supervision of apprenticeship practice (contracts with practice organizations, rewarding the work of local supervisors)	Programme manager	2014	Students receive more local support during apprenticeship practice
Open at least two teaching positions for the study programme	Director of the institute	2014	New teachers are hired

C. AGGREGATE ANALYSIS OF THE STUDY PROGRAMME GROUP

The following is a general overview of *strengths* and *challenges* presented in the analysis of separate study programmes.

The study programme group has the following more important ***strengths***:

1. ***An innovative and open-minded staff with development potential.***

The staff members constantly keep track of new teaching/learning tools and methods exploited elsewhere, and experiment with these in the local context. This makes learning stimulating and inclusive.

2. ***A very high average teaching quality.***

The pedagogical spirit of the largest component of Tallinn University – Tallinn Pedagogical University – still prevails: the weighted average student feedback for all courses of the study programme group during the 2011/2012 study year was 4.54 (on a 5-point scale). This ensures sufficient numbers of applicants for studies.

3. ***A high capability to prepare and conduct local and international projects.***

The Institute of Informatics is the only institute of the university that has study programmes on all three levels (bachelor, master, doctor) and that has a research and development budget that is bigger than teaching and learning budget. In particular, the Institute of Informatics and Haapsalu College have both participated in a number of study programme development projects, and the staff members have been invited as experts in study programme development internationally. This allows offering truly research-based education and involvement of the most promising students in conducting projects.

4. ***An academic identity is unique in the Baltic and Nordic regions.***

Although there are study programmes in Nordic countries that have certain similarities to an individual study programme (for example, Master's Programme in Human-Computer Interaction of Umeå University), the overall nature of the IT study programmes at Tallinn University is unique – these are interdisciplinary and human-centred. Therefore, there are good prospects for offering master programmes in English which are currently being taught in Estonian thus attracting more international students.

5. ***Flexibility of the study programmes***

Elective courses form relatively big part of the modules of core courses of the study programmes. For example, it is 26,3% in the case of bachelor programme. Moreover, the total volume of free electives is relatively big as well. This allows students to compose in fact an individual study programme, according his/her interests and needs.

6. ***The general theme of the Institute of Informatics – digital ecosystems – is declared a development priority in the university.***

The fact that the university's strategic development documents prioritize Informatics creates favorable conditions for more extensive inclusion of IT courses into non-IT study programmes, and as a result, produces a synergy that results from an emerging interdisciplinarity.

7. ***Excellent work environment.***

All requests of the institute were fulfilled in the design and construction of the Astra building, where most of the Institute's facilities are currently located. This offers the possibility of providing every staff member with working conditions that meet their individual needs.

The study programme group has the following more important ***areas for improvement***:

1. ***The high teaching load of academic staff (of teachers and of some researchers).***

Salaries were lowered in Estonia during the recession years of 2009-2011. Therefore, in order to keep the salary level unchanged, the workload of the academic staff was increased instead and currently is on average about 40% higher than the nominal workload. Under the nominal load, the average monthly salary of the academic staff would be about € 1200.00 – a figure that is absolutely not competitive, especially in the IT area. In this respect we can identify the following opportunities for improvement:

- An application by the IT Academy programme to include at least one study programme in the list of supported study programmes – until now the university has not been offered the possibility of applying.
- Involvement of more doctoral and master students in the teaching process.

2. ***The lack of resources for establishing and running a software development laboratory.***

The students have developed a number of interesting and promising software prototypes with good potential during practical training sessions. However, these prototypes will probably never be developed any further into full-featured software products, mainly because of the time constraints of the courses. A *software development laboratory* would offer students an opportunity to develop their prototypes into usable software, under the guidance of experienced and professional software developers. Thus, we can identify the following opportunity for improvement:

- Finding support for establishing and running the software development laboratory.

3. ***The lack of a full-time lecturer in some important subjects.***

This mainly concerns the *Management of Information Technology* Master's programme. Although it was decided to rely heavily on industry experts from the very beginning of this programme it is purposeful to strengthen the academic competences of the university in these subjects as well. The improvement opportunities are different, depending on the subject.

For example:

- In teaching information systems courses cooperate with Tallinn University of Technology.
- In IT innovations, appoint an international professor.

4. ***Low graduation rate of students.***

This problem has already been partly solved for Master's students – most of the thesis topics are related to the professional activity of the students. However, this is not the case for most of the Bachelor students since these students normally choose the topic for their thesis in their second year, before they are employed (Some become employed in the second year but most are employed in their third year). Consequently, we can identify the following opportunities for improvement:

- More comprehensive cooperation with companies to facilitate a closer combination of studies with the professional activities of the students.
- Increasing pro-activity of the academic staff in supervising students.
- Financial contributions as a result of the new university law that requires students who are not collecting sufficient credits to pay tuition fees.

5. ***Missing industry experience of the academic staff***

Full-time academic staff members have their whole work experience obtained in educational institutions. Movement between the industry and academina has been one-way – from academia to the industry. The following activities are invisaged:

- Sabbaticals in the industry for academic staff members.
- Involvement of university teachers in joint development projects with the industry.

6. ***The small number of international students.***

It is quite difficult to motivate the students towards international mobility and taking a semester or a full year in a university abroad. Therefore, *internationalization at home* seems to be a more promising strategy, in which students experience studies in a multi-ethnic environment at their home university. Here we can identify the following improvement opportunities:

- Launch joint modules or whole study programmes with partner universities abroad (for example, under the Erasmus Mundus programme),
- Offer more courses taught in English in study programmes that officially have Estonian as the language of instruction.
- Switch the language of instruction from Estonian to English for the Educational Technology master programme.

Annual action plans for the institute and the college are the main instruments for implementing the recommendations of the self-evaluation reports of the study programmes. These plans identify critical problems as well as other significant problems that should be dealt with in the upcoming year. Before accepting a new annual plan, the Director should report on the resolutions of last year's problems to the Council of the institute or college.

D. APPENDICES

Appendix 1 – The Curricula

The curricula are form based. The terminology differs slightly from this used in the documents of Estonian Higher Estonian Higher Education Quality Agency. For example, the term *Curriculum* is used instead of *Study programme*, and *Head of curriculum* instead of *Programme manager*.

a. Applied Computer Science

1. Name of the curriculum in Estonian	**RAKENDUSINFORMAATIKA**
2. Name of the curriculum	Applied Computer Science
3. Level	Professional Higher Education studies
4. Organization of studies	Stationary
5. Institution	Tallinn University, Haapsalu College
6. Load (ECTS)	180
7. Standard period of study in semesters	6 semesters (3 years)
8. Category of curriculum	Informatics and information technology
9. Curriculum code	3361
10. Head of the curriculum	Piret Lehiste
11. Language of instruction	Estonian
12. Other languages required	English
12. Initial registration date of curriculum	23.08.2004
14. Admission requirements	Secondary education or equivalent foreign qualification; Exams: a) National examination result of the candidate's choice 25% b) National examination result of the candidate's choice 25% c) Entrance examination 50%
15. Major specialization	Applied Computer Science
16. Minor studies and other	-

specializations	
17. General objectives of curriculum	The main aim is to facilitate broad-profiled professional training in IT applications in various fields (mostly focusing on hypermedia) and to support the development of IT-related competencies, e.g. in software development or infrastructure. To create preconditions for readiness to compete in the job market, professional self-development and lifelong learning. To support the development of IT in the region by completing practical tasks assigned by local organizations and enterprises.
18. General learning outcomes of curriculum	The graduate: • Has a broad knowledge base in various fields of IT • Knows how to integrate and implement IT in different fields • Can analyse, design and test different kinds of hypermedia components • Can communicate with clients and business partners • Understands the need for professional development and readiness for life-long learning
19. Name of academic degree or diploma received at graduation	Diploma of Professional Higher Education
20. Document issued at graduation	Diploma and diploma supplement
21. Description of curriculum structure	**Major: Applied Computer Science** General Courses 8/8 (8 ECTS compulsory, 8 ECTS optional) Selected Core Subjects 0/41 Introduction to the Speciality 14/0 Multimedia 18/0 Programming 17/0 Computer Networks and Information Systems 14/0 Placement 30/0 Electives 0/24 Research Paper 6/0 **TOTAL: 180 ECTS**
22. Elective studies/ Options for completing the curriculum	Within elective courses in the core courses module, the student can choose a specialization from specialty electives. Under the free electives, students can choose compatible minor courses or courses from study programmes of other institutes or universities.

23. Requirements for graduation	For graduation, the student has to complete the programme in the given workload (180 ECTS) and also pass obligatory courses, research paper, etc. Preconditions for graduation are: a foreign language proficiency at the B2 level (Common European Frame-work of Reference); adequate computer literacy for university studies; proficiency of Estonian at the C1 level (Common European Framework of Reference) for Russian medium upper secondary school graduates.
24. Additional information	Contact: Aimar Lints, aimar@hk.tlu.ee, www.hk.tlu.ee

MODULES OF CURRICULUM

Name of module: General Courses		**Load: 16 ECTS**
Objectives	To create prerequisites for acquisition of basic professional knowledge; The formation of integrated knowledge of different psychological trends and implementation opportunities; skills to use appropriate methods and tools to research and collect information and critically and creatively interpret it; To initiate and coordinate professional projects; To be ready to act as an entrepreneur in the specialty field.	
Learning outcomes	The student is ready to participate actively in society and respect different views and values; Has an overview of the basic knowledge in information technology or supportive disciplines (mathematics, social sciences, economics).	
Evaluation of the module Assessment is subject-based at the end of the course (at an assessment or exam).		
Subjects		
Code	Subject title	Load ECTS
	Compulsory subjects 8 ECTS	
MLM6106	Mathematics in Practice	4
KUR6110	Introduction to Ethics	4
	Elective subjects 8 ECTS	
MLF6001	Physical Picture of the World	4
INT6001	Information Seeking: Sources and Methods	4
HKH6004	Basics of Marketing	4
HIF6011	Introduction to Philosophy	4

Name of module: Introduction to the Specialty		**Load: 14 ECTS**
Objectives	To create preconditions for a systematic understanding of various aspects, terminology, concepts and principles of information technology.	
Learning outcomes	The student possesses abilities to create, develop and manage information technology solutions (hardware, software, networks, and programming).	
Evaluation of the module Assessment is subject-based at the end of the course (at an assessment or exam).		
Subjects		
Code	Subject title	Load ECTS
	Compulsory subjects 14 ECTS	
HKI5004	Web Programming	3
HKI5023	Computer Hardware I	3
HKI5025	Programming Fundamentals	5
HKI6014	Operating Systems	3

Name of module: Computer Networks and Information Systems		**Load: 14 ECTS**
Objectives	To create prerequisites for development of IT systems' design and administrative skills.	
Learning outcomes	The student: (a) Has basic knowledge for analysing possibilities and understands the necessity for combining the organization's IT and business processes; (b) Knows computer networks, communication network administration and data defence organization; (c) Is able to cleverly solve security problems.	
Evaluation of the module Assessment is subject-based at the end of the course (at an assessment or exam).		
Subjects		
Code	Subject title	Load ECTS
	Compulsory subjects 14 ECTS	
HKI5026	Operating System Administration	3
HKI5013	Information Systems I	5

HKI6003	Cisco Network Academy I	3
HKI6009	Cisco Network Academy II	3

Name of module: Multimedia		**Load: 18 ECTS**
Objectives	To create conditions for the development of creativity and its use for knowledge acquisition in information technology, hyper-and multimedia, digitized audio, digital video, animation, media files and computer graphics processing, designing publications and e-magazines.	
Learning outcomes	To know and be able to use multimedia (audio, video, design, layout, photography); To have knowledge of product design methods and user-centred design; To be able to analyze, plan and design hypermedia products.	
Evaluation of the module Assessment is subject-based at the end of the course (at an assessment or exam).		
Subjects		
Code	Subject title	Load ECTS
	Compulsory subjects 18 ECTS	
HKI5008	Multimedia	4
HKI5011	Multimedia Design	5
HKI5033	Layout and Preparation for Printing	3
HKI5034	Basics of Advertising Design	3
HKI6001	Computer Graphics	3

Name of module: Programming		**Load: 17 ECTS**
Objectives	To create prerequisites for knowledge and skills in programming and software development.	
Learning outcomes	The student: (a) Is able to solve programming tasks within given limits, select and use appropriate methods; (b) Is able to programme Hypermedia software and test it in different languages; (c) Is able to programme interactive graphical user interfaces and link	

	databases; (d) Has a knowledge of software development techniques, processes and the technical means used.	
Evaluation of the module Assessment is subject-based at the end of the course (at an assessment or exam).		
Subjects		
Code	Subject title	Load ECTS
	Compulsory subjects 17 ECTS	
HKI5002	Programming I (Java)	5
HKI5003	Programming II	3
HKI5006	Web Scripting	3
HKI5007	Design and Development of Web Applications	3
IFI6009	Software Engineering	3

Name of module: Core Selected Subjects		**Load: 41 ECTS**
Objectives	To create the prerequisites for professional specialization in various fields of IT.	
Learning outcomes	The student is able to develop professionally in various fields of IT.	
Evaluation of the module Assessment is subject-based at the end of the course (at an assessment or exam).		
Subjects		
Code	Subject title	Load ECTS
	Elective subjects 41 ECTS	
HKI6005	Application Software	4
HKI5012	Databases	3
HKI6027	Practical Programming	3
HKI5015	E-Commerce	3
HKI5030	IT and Law	4
HKI5040	3D Animation	5

HKI5041	Audio Production	5
HKI5024	Project of Specialty I	3
HKI5042	Search Engine Optimization	3
HKI5010	Video Designing	5
HKI5017	Basics of Project Management	4
HKI5020	Seminar	4
HKI5028	MA Seminar I	3
IFI6051	Web Frameworks	3
IFI6028	Programming of Graphics and Music	3
IFI6060	The .NET Framework	4
HKI6010	Data Security	4
HKI5032	Basics of Digital Photography	3
IFI6030	3D Modelling	5
HKI5059	Basics of Robotics	3
HKI5044	Teaching and Learning in the Digital Age	3
HKI5045	Basics of Multimedia	3
HKI5046	Digital Literacy	3
HKI5047	Digital Media Production	4
HKI5048	E-society, law and security issues in e-learning	3
HKI5049	Creating Digital Learning Resources	3
HKI5050	Mobile Learning	3
HKI5051	Presentation Technologies in the Classroom	3
HKI5052	Game-Based Learning	3
HKI5053	Web-Based Learning Environments and Networks	3
HKI5054	Educational Video Design and Implementation in the Classroom	3
HKI5055	Principles of Instructional Design	4
HKI5056	Counselling in Educational Technology	3
HKI5057	Developmental Project in Educational Technology	3
HKI5058	Apprenticeship Practice in Educational Technology	4

Name of module: Placement		**Load: 30 ECTS**
Objectives	To acquire professional experience through hands-on activities.	
Learning outcomes	The student: (a) Shows initiative in initiating projects, a sense of responsibility, leadership and teamwork skills in the execution of the activities; (b) Can solve specific problems by using a variety of IT tools to collect information independently and interpret it critically and creatively; (c) Is able to solve IT problems with the support of a supervisor; (d) Is able to participate in team work; (e) Is capable of independent and professional self-improvement; (f) Will be able to apply the acquired knowledge and skills in his/her professional employment; (g) Is able to act in the field of computer science as a specialist or an entrepreneur.	
Evaluation of the module Assessment is subject-based at the end of the course (at an assessment or exam).		
Subjects		
Code	Subject title	Load ECTS
	Compulsory subjects 30ECTS	
HKI5035	Practice of Multimedia	7
HKI5036	Observation Practice	8
HKI5037	Practice of Network Administration	7
HKI5038	Enterprise Practice	8

Name of module: Electives		**Load: 24 ECTS**
Objectives	To create opportunities for individual development and development of intellectual interests, including foreign language skills.	
Learning outcomes	The student: Is able to explain specialty related problems orally and in writing and participate in professional discussions; Has acquired additional knowledge in the context of professional specialization; Is able to orientate in an interesting IT area and acquire extra knowledge	

	based on personal learning interests.
Evaluation of the module	Assessment is subject-based at the end of the course (at an assessment or exam).

Choice criteria:The choice is based on the learner's individual goals within the same curriculum or from other curricula. Within the electives' module the learner must raise his/her language competence level to B2 (if needed).

Name of module: Research Paper	**Load: 6 ECTS**
Objectives	To create an opportunity to research and analyze a problem in the field of information technology through academic writing.
Learning outcomes	The student: (a) Is able to identify and formulate problems related to the speciality, analyze and evaluate different solutions; (b) Is able to gather and interpret information independently and critically; (c) Is able to formulate questions and analyze them verbally and in writing; (d) Can write a research paper in accordance with the requirements and present the results.
Evaluation of the module	The module will be assessed as a whole at the final exam. Work will be graded during the thesis defence procedure.

b. Computer Science

Curriculum	
1. Name of the curriculum in Estonian	**INFORMAATIKA**
2. Name of the curriculum	Computer Science
3. Level	Bachelor
4. Organization of studies	Stationary
5. Institution	Tallinn University
6. Load (ECTS)	180
7. Standard period of study in semesters	3 years
8. Category of curriculum	Informatics and information technology
9. Curriculum code	1605
10. Head of the curriculum	Inga Petuhhov
11. Language of instruction	Estonian
12. Other languages required	English
13. Initial registration date of curriculum	22.08.2002
14. Admission requirements	Secondary education or equivalent foreign qualification; Exams: a) State exam in one of the following subjects: Mathematics, Physics, Chemistry, Geography or Biology. b) State exam on the choice of the candidate. c) Admission test.
15. Major specialization	Informatics (Digital Media) 140 ECTS Informatics (Software Engineering) 140 ECTS
16. Minor studies and other specializations	Digital Media 24 ECTS Software Engineering 24 ECTS
17. General objectives of curriculum	To create the prerequisite for learning basic concepts, theoretical bases, the most important application domains and the general trends in informatics; Support the formation of competence in software development, to work in software development teams in various roles, including ICT management and support services; Develop students' analytical skills, ability to apply

	knowledge and skills in solving practical tasks, the ability to use professional literature and databases, and teamwork skills; Establish conditions for the application of ICT in various areas, as well as understanding risks associated with the implementation of the ICT; Create the conditions for lifelong learning and continuation of education on information technology-related master's curriculums on in TU in preference to other universities.
18. General learning outcomes of curriculum	The graduate: • Knows basic computing concepts and principles, important computing applications and major developing trends • Knows the ICT terminology in Estonian as well in English and is able to use this in both the written and spoken form • Manages the basic methods of the software development life cycle (requirements specification, design, coding, testing, documentation) including teamwork skills and has an overview of software development technologies and methods • Can create and process different media types and use them in software development • Is ready to comply with professional, ethical and copyright requirements and to assess the opportunities and threats of software applications • Manages the techniques necessary for independent study and is able to plan their professional career and to continue their studies at the master's level
19. Name of academic degree or diploma received at graduation	Bachelor of Science in Engineering (BSc)
20. Document issued at graduation	Diploma and diploma supplement
21. Description of curriculum structure	**Specialization**: Informatics (Digital Media) General Courses: 8/8 ECTS (8 compulsory, 8 optional) Core Courses: 81/29 ECTS Digital Media 24/0 ECTS Free electives 24 ECTS Final thesis 6 ECTS **Specialization**: Informatics (Software Engineering)

	General Courses: 8/8 ECTS Core Courses 81/29 ECTS Software engineering 24/0 ECTS Free electives 0/24 ECTS Final thesis 6 ECTS TOTAL: 180 ECTS
22. Elective studies/ Options for completing the curriculum	Within elective courses in core course modules, the student can choose a specialization in software engineering or digital media direction. Under free electives students can choose consistent minor courses or courses from study programmes of other institutes or universities.
23. Requirements for graduation	For graduation, the student must complete the programme in the given workload and also pass obligatory courses, final thesis, etc. Preconditions for graduation are: a foreign language proficiency at B2 level (Common European Framework of Reference); adequate computer literacy for university studies; proficiency in Estonian at C1 level (Common European Framework of Reference) for graduates of middle/upper secondary school with Russian as the study language.
24. Additional information	Contact: Inga Petuhhov, inga.petuhhov@tlu.ee http://www.tlu.ee/informaatika_instituut/

MODULES OF CURRICULUM

Name of module:	**GENERAL SUBJECTS**	**Load: 16 ECTS**
Objectives	To enable acquisition of the basics of the analytical methods that support the study of specialisation subjects and develop skills of oral and written expression.	
Learning outcomes	Upon successful completion of the module, a student: Has basic knowledge of other study fields, a broad outlook and more developed skills of oral and written expression; Knows simpler methods of data analysis and is ready to apply these.	
Evaluation of the module	Assessment is subject-based at the end of the course (at an assessment or exam).	
Subjects		
Code	Subject title	Load (ECTS)
	Compulsory subjects 8 ECTS	

IFI7041	Data Analysis: Descriptive Statistics	4
EKO6005	Oral and Written Communication	4
	Elective subjects 8 ECTS	
INT6001	Information Seeking: Sources and Methods	4
MLM6106	Mathematics in Practice	4
PSP6002	Social Psychology	4
PSP6049	Theory of Management	4
MLF6905	The Laws of Nature	4
RIM6013	Basics of Entrepreneurship	4
PSP6048	Organizational Behaviour	4
AKJ6041	Basics of Law	4
KOK6045	Communication and Society	4

Name of module:	**CORE COURSES**	**Load: 110 ECTS**
Objectives	To introduce the basic concepts of informatics, theoretical foundations, key application areas and methods; To introduce opportunities for the wide use of ICT and the potential dangers arising from its use; To build a foundation for analytical thinking abilities and professional development.	
Learning outcomes	After passing the course a student: • Is familiar with basic computing concepts and principles; • Has an overview of important computing applications in both the private and public sectors, as well as major developing trends; • Is able to assess the feasibility of implementing the software (including the opportunities and threats); • Has the teamwork skills for software development; • Is ready to comply with professional, ethical and copyright requirements; • Knows the ICT terminology in Estonian as well as in English and is able to use this on both written and spoken form; • Is able to learn new applications.	
Evaluation of the module	Assessment is subject-based at the end of the course (an assessment or exam).	
Subjects		

Code	Subject title	Load (ECTS)
	Compulsory subjects 81 ECTS	
IFI6020	Cryptology in Data Security	4
IFI6019	Theoretical Computer Science	5
IFI6084	Software Engineering Project I	3
IFI6014	Operating Systems	3
IFI6018	Networks and Data Communications	4
IFI6068	Introduction to Information Systems	4
IFI6088	Research Paper	3
IFI6049	Intellectual Property and Data Protection	3
IFI6076	Web Programming	4
IFI6086	Research Seminar II	2
MLM6206	Elementary Number Theory	4
IFI6085	Research Seminar I	2
IFI6074	Programming Fundamentals	4
IFI6009	Software Engineering	3
IFI6038	XML Applications	3
IFI6072	Computer Hardware	3
IFI6063	Ethical, Social and Professional Aspects of Information Technology	4
IFI6083	Algorithms and Data Structures	4
MLM6214	Foundations of set theory and logic	4
IFI6069	Basic Course in Programming	4
IFI6013	Design and Development of Databases	3
IFI6057	Intelligent Systems	4
MLM6212	Foundations of Discrete Mathematics	4
Optional courses: at least 29 ECP		
IFI6089	Software Engineering Project II	3
IFI6077	3D Modelling	4
IFI6087	Maintenance of Computers and Networks	4
IFI6073	Computer Hardware Lab	3
IFI6053	3D Models and CAM	3
IFI6096	Data Tables and Spreadsheets	3
IFI6042	GLP Based Desktop Environments	3
IFI6058	Practical Work	5

IFI6071	Object Oriented Programming in C++	3
IFI6070	Intelligent Computer Use	4
IFI6040	The Web Applications of Python and Zope	3
IFI6045	MS Windows Operating Systems	3
IFI6033	Current Problems in IT Development	3
IFI6067	Using Apple Software	3
IFI6047	Basics of Digital Photography	3
IFI6091	Object-oriented Web Applications	3
IFI6062	Creating Digital Documents	3
IFI6090	Database Lab	3
IFI6055	E-marketing	3
IFI6046	Methods and Practices of Free/open-Source Software	4

Name of module:	**Digital Media**	**Load: 24 ECTS**
Objectives	To create the prerequisites: • For developing multimedia-based software; • For developing and design of multi-media elements; • Using multimedia elements on web pages.	
Learning outcomes	After completing the module a student: • Knows the nature and usage of different types of digital media and basics for their presentation in analogue and digital form; • Knows the basics and standards for creating web pages; • Knows the principles of usability and accessibility of applications; • Can conduct the design process for multimedia-based software; • Can create and process different media types (graphics, videos, audio, animations).	
Evaluation of the module	Assessment is subject-based at the end of the course (at an assessment or exam).	
Subjects		
Code	Subject title	Load (ECTS)
	Compulsory subjects 24 ECTS	
IFI6078	Media Technology	3
IFI6094	User-Centered Design Methods	3
IFI6023	Computer Graphics	4
IFI6028	Programming of Graphics and Music	3

IFI6022	Digital Media	4
IFI6056	Creating Web Pages	3
IFI6075	Multimedia	4

Name of module:	**Software Engineering**	**Load: 24 ECTS**
Objectives	Support the formation of competence in software development, to work in software development teams in various roles, including ICT management and support services; Support the formation of practical competence in creating different software applications, using programming languages and the acquisition of new ones.	
Learning outcomes	Is able to select and use appropriate tools, technologies and methods in software engineering; Manages all the basic methods of the software development life cycle (requirements specification, requirements analysis, general design, detailed design, coding, integration, testing, documentation); Is able to use different programming languages and learn new languages; Is able to create applications based on either a procedure or object oriented paradigm.	
Evaluation of the module	Assessment is subject-based at the end of the course (at an assessment or exam).	
Subjects		
Code	Subject title	Load (ECTS)
	Compulsory subjects 24 ECTS	
IFI6054	Agile Software Development	3
IFI6095	Web Frameworks	3
IFI6052	Interface Development for Database	4
IFI6093	User interfaces of web applications	3
IFI6092	Foundations of Software Testing	3
IFI6059	Programming of Applications	4
IFI6060	The .NET Framework	4

ELECTIVES	**Load: 24 ECTS**
Objectives	Objective of open electives is to create opportunities for students for individual development and realization of student's intellectual interest. Open electives can also be used to raise the level of language and social competence. For learning subjects from a field in which student will further

	apply his ICT skills. Also for deeper knowledge in informatics (also taking courses from other universities).
Learning outcomes	Is able to communicate in the mother tongue and other languages using various communication technologies; Manages the communication skills necessary for work and is ready to be an active member of civil society; Has developed professional knowledge and skill sets according to specific interests, allowing personalized development in the chosen field; Has achieved CEFR B2 level skills in a foreign language; Has achieved CEFR C1 level skills in the Estonian language for graduates of the schools with Russian as the study language.
Evaluation of the module	Assessment is subject-based at the end of the course (at an assessment or exam).

IFI6100	**Bachelor's thesis**	**Load: 6 ECTS**
Objectives	The goal of the thesis is to allow the students to study and analyze a chosen problem in the field of the curriculum, using state-of-the art theories and methods as well as to develop the skills of academic writing.	
Learning outcomes	The graduate: • Is able to use local and global literature and other written materials, also electronic equipment; • Knows general quality criteria for exploratory and development work and on the basis of these is able to assess the quality of work on the same level; • Knows the basic research types and logic their methodological structure; • Is able to set up appropriate research questions and development goals and to plan and carry out theoretical or development research; • Is able to structure a research paper, according to the requirements and present the results in a convincing way; • Can use correct terminology in the written and spoken form.	
Evaluation of the module	A defence committee evaluates a bachelor´s thesis by considering both the quality of the work itself and the actual defence process. The committee will base the decision on the grade on the evaluation of the members of the committee, which have been formed during reading the work and the defence.	

c. Management of Information Technology

Curriculum	
1. Name of the curriculum in Estonian	**Infotehnoloogia juhtimine**
2. Name of the curriculum	Management of Information Technology
3. Level	Master studies
4. Organization of studies	Cyclical studies - studies are organized on Saturdays and Sundays, every other week.
5. Institution	Tallinn University
6. Load (EAP/ECTS)	120
7. Standard period of study in semesters	4 semesters
8. Category of curriculum	Business and administration
9. Curriculum code	1704
10. Head of the curriculum	Peeter Normak, PhD
11. Language of instruction	Estonian
12. Other languages required	English
13. Initial registration date of curriculum	22.08.2002
14. Admission requirements	• Bachelor degree, professional/applied higher education or equivalent qualification; • At least one year of professional experience in the field of ICT; • Admission test: motivation letter (up to 2 pages); an oral test of English; conversation (weight 2). The aim of the conversation is to verify the competence of the applicant in IT, find out his/her expectations of the studies, a possible topic of the thesis and his/her plans for a professional career.
15. Major specialization	Management of Information Technology, 96 ECTS
16. Minor studies and other specializations	-

17. General objectives of curriculum	To provide the students with conditions that support the development of: • Wide-profiled professional competences in ICT management (plan and implement IT systems and ensure their functioning); • Research based and innovative approaches in working on relevant positions as well as readiness for personal professional development; • Competences necessary for working on ICT management related professions (CIO, ICT manager, ICT project manager etc); • Competences that encourage doctoral studies and academic research careers.
18. General learning outcomes of curriculum	A graduate: • Knows the theoretical foundations of ICT systems, basic issues and development trends • Is able to analyse ICT processes independently, assess the impact of changes to the basic processes of the enterprise and use scientific methods in planning and implementing ICT strategies • Is able to manage maintenance and development of ICT services in a company and to find innovative and adequate solutions in changeable and unexpected situations • Has the necessary communication and team-working skills for involving different partners • Is ready to follow established professional, ethical and intellectual property protection principles, analyse their own professional activities and plan professional growth • Tolerates different values and attitudes, actively participates in civic society • Is able to continue studies at the PhD level
19. Name of academic degree or diploma received at graduation	Master in Business Administration (MBA)
20. Document issued at graduation	Master diploma and Diploma Supplement
21. Description of curriculum structure	**Specialization**: Management of Information Technology General Subjects: 4/4 (4 ECTS compulsory, 4 optional) Core Subjects: 39/27 Free electives: 0/16

	Master thesis: 30/0
22. Elective studies	The objective of open electives is to create opportunities for the individual development and realization of the student's intellectual interests. Open electives can also be used to raise the level of language and computer skills.
23. Requirements for graduation	A student needs to: • Complete the full load of curricular studies • Compose and defend a master thesis • Have skills of one foreign language at the B1 level of the European Language Portfolio (ELP) • Have ELP C1 level skills in the Estonian language (for graduates of the schools with Russian as a study language).
24. Additional information	Contact: Peeter Normak (peeter.normak@tlu.ee)

MODULES OF THE CURRICULUM

Name of module:	**GENERAL SUBJECTS**	**Load: 8 EAP/ECTS**
Objectives	To provide the students with conditions which support the development of skills for the composition of academic texts.	
Learning outcomes	The students are able to develop academic texts.	
Evaluation of the module	Evaluation is subject-based (graded or pass/fail)	
Subjects		
Code	Subject title	Load (EAP/ECTS)
	Compulsory subjects 4 EAP/ECTS	
EKE7043	Estonian Writing Skills	4
	Elective subjects 4 EAP/ECTS	
HIF7401	Philosophy of Science	4
IFI7044	Data Analysis: Inferential Statistics	4
INT7081	Information Policy and Strategy	4
MLM7204	Mathematical Modelling	4
PSO7106	Organization Theory	4
RIJ7021	Strategic Management	4

The module is compulsory for completing the curriculum. Students must select as many elective courses as necessary to reach the required 8 credits.

Name of module:	**CORE SUBJECTS**	**Load: 66 EAP/ECTS**
Objectives	To provide the students with conditions that support development of IT competences, managerial competences, communications competences and readiness for individual professional development, necessary for working in relevant professions.	
Learning outcomes	The student: • Knows the basic principles and approaches, research questions and methods, regulations (including standards and specifications) as well as information sources (including scientific literature) concerning IT systems; • Is able to compose an IT strategy for an organisation, prepare implementation plans, determine suitable business solutions and is able to document and present them in an adequate manner; • Is able to complete tasks necessary for IT strategic management (analysing market trends, composition of IT strategy etc), for IT development (planning of development activities, preparation of projects, planning and coordination of professional development of staff etc) and for IT maintenance (ensuring functioning of IT infrastructure, necessary support services, data security, licensing, etc) and • Is able to use different methods for analysing and developing IT processes, to conduct tasks related to the development of business strategy (such as the elaboration of development plans, increasing the effectiveness of the business processes, etc) as well as personnel development (develop IT staff, ensure motivation and the necessary devotion, compose the tasks, work division and schedules, assess the results, arrange cooperation with other units, etc).	
Evaluation of the module	Evaluation is subject-based (graded or pass/fail)	
Subjects		
Code	Subject title	Load (EAP/ECTS)
	Compulsory subjects 39 EAP/ECTS	
IFI7003	Project Management in Software Engineering	6
IFI7009	Master Seminar	6
IFI7013	ICT Strategic Management	5
IFI7021	Development of Infrastructure of Information Technology	4
IFI7022	IT Operations and Management	5

IFI7026	Legal Issues Related to IT-Development	4
IFI7028	Practical Training	6
PSO7014	Group Processes in Organisations	3
	Elective subjects 27 EAP/ECTS	
IFI6009	Software Engineering	3
IFI6068	Introduction to Information Systems	4
IFI7007	Research Methods	4
IFI7008	Advanced Used of Application Software	4
IFI7023	Information Management	4
IFI7025	Maintenance of Windows Workstations	4
IFI7027	Applied Activities in the Area of Specialisation	6
IFI7030	Financial Management	4
IFI7038	21-st Century Concepts in Information and Meaning	4
IFI7039	Server Side Interactive Technologies	4
IFI7045	Information Security Management	4
IFI7073	ICT Procurements and Contracts	4
IFI7105	Open Source Management	4
IFI7115	Security and Privacy Matters	3
PSO7002	Theory of Management	5
PSO7003	Personality and Social Psychology in Organisations	5
PSO7004	Personnel Management	5
PSO7037	Negotiations	4

The module is compulsory in order to complete the curriculum. Students must select as many elective courses as necessary to reach the required 66 credits.

FREE ELECTIVES	**Load: 16 EAP/ECTS**
Objectives	To create opportunities for students for individual development and realization of student's intellectual interest. Open electives can also be used to raise the levels of language skills, especially English. If the student does not have a bachelor's degree in ICT, the module serves as a tool to improve the necessary ICT competences as well.
Learning outcomes	Professional knowledge and skill set developed by specific interests and allowing personalised development in the chosen field; European Language Portfolio (ELP) level B1 level skills in a foreign language; ELP C1 level skills in the Estonian language (for graduates of the schools with Russian as the study language).

Evaluation of the module	Evaluation is subject-based (graded or pass/fail)

This module is compulsory in order to complete the curriculum. Students must select as many elective courses as necessary to reach the required 16 credits.

IFI7040	**MASTER THESIS**	**Load: 30 EAP/ECTS**
Objectives	To support development of research as well as academic writing and presentation skills in an actual topic of IT management, based on adequate theories and research methods.	
Learning outcomes	Is able to formulate a research problem, to choose appropriate research methods and conduct problem analysis based on scientific literature; Is able to present a chosen topic in a systematic, correct and interesting manner , in accordance with the requirements for the composition of academic texts; Has a deeper knowledge in the area of the master thesis.	
Evaluation of the module	The master thesis will be evaluated by a defence committee, which will base the evaluation on the thesis as well as the defence process. The master thesis defense session is open to the public.	

The module is compulsory in order to complete the curriculum.

d. Human-Computer Interaction

Curriculum	
1. Name of the curriculum in Estonian	**Inimese ja arvuti interaktsioon**
2. Name of the curriculum	Human-Computer Interaction
3. Level	Master studies
4. Organization of studies	Cyclical studies - studies are organized on Thursdays, Fridays and Saturdays, every other week.
5. Institution	Tallinn University
6. Load (EAP/ECTS)	120
7. Standard period of study in semesters	4 semesters
8. Category of curriculum	Informatics and information technology
9. Curriculum code	80405
10. Head of the curriculum	David Lamas, PhD
11. Language of instruction	English
12. Other languages required	-
13. Initial registration date of curriculum	30.03.2006
14. Admission requirements	International applicants for whom English is not the native language are required to provide proof of their English language proficiency. Exceptions are made only for applicants who completed their previous studies fully in English. One of the following is accepted: • FCE (First Certificate in English): A • CAE (Certificate in Advanced English): C • CPE (Certificate of Proficiency in English) : C • IELTS (International English Language Testing System): 5.5 • TOEFL (Test of English as a Foreign language) paper version: 525, internet based: 70, computer-based: 196 (Tallinn University Code number is: 0449). • CEF (Common European Framework of Reference for Languages: learning, teaching, and assessment): B2
15. Major specialization	Human-Computer Interaction, 96 EAP
16. Minor studies and other	-

specializations	
17. General objectives of curriculum	To provide the students with conditions that support the development of: • An understanding of new media as a medium and the knowledge of how to explore the aesthetic and functional potential of new media by being creative and experimenting with the materials; • The necessary skills to launch new media as products and services, considering how they relate to existing social, cultural, economic and technological systems; • An awareness of the use of new media as a critique, making the social, cultural and ethical implications of new media tangible, and therefore debatable; • To create the conditions so that graduates are able to develop sound, new media related, professional careers namely as new media managers, designers, developers, specialists, educators, researchers and others assuming visionary thinking and critical knowledge of the field.
18. General learning outcomes of curriculum	A graduate: • Recognizes the use of new media as a critique, making the social, cultural and ethical implications of new media tangible, and therefore debatable • Is able to analyse new media based solutions and draw adequate conclusions and generalizations • Has necessary communication and team-working skills for involving different partners • Understands new media as an ever evolving and morphing domain and acknowledges the need to further develop his/her new media competencies • Is able to plan, compose and apply new media products and services • Is ready to follow established professional, ethical and intellectual property protection principles • Is able to continue studies at the PhD level.
19. Name of academic degree or diploma received at graduation	Master of Science in Engineering (MSc)
20. Document issued at graduation	Master diploma and Diploma Supplement
21. Description of curriculum structure	**Specialization**: Interaction Design General Courses: 4/4 (4 ECTS compulsory, 4 optional)

	Core Courses: 42/24 Electives: 0/16 Final thesis: 30/0
22. Elective studies	The objective of open electives is to create opportunities for individual development and realization of the student's intellectual interests. Open electives can also be used to raise the level of language and computer skills.
23. Requirements for graduation	Students must complete all curricular studies and compose and defend a master thesis in the English language. Students must acquire C1 level in English.
24. Additional information	Contact: David Lamas (david.lamas@tlu.ee)

MODULES OF CURRICULUM

Name of module:	**GENERAL SUBJECTS**	**Load: 8 EAP/ECTS**
Objectives	To create the foundation for development of generic skills as well as analytical instruments necessary for the profession.	
Learning outcomes	The students will be able to analyse existing or collected data, elaborate predictions, devise conclusions, suggest generalizations, and evaluate the quality of the adopted solutions, within a broader but systematic view of related knowledge areas.	
Evaluation of the module	Evaluation is subject-based (graded or pass/fail)	
Subjects		
Code	Subject title	Load (EAP/ECTS)
	Compulsory subjects 4 EAP/ECTS	
IFI7044	Data Analysis: Inferential Statistics	4
	Elective subjects 4 EAP/ECTS	
BFI7020	Introduction to Creative Industries	4
HIF7401	Philosophy of Science	4
IFI7041	Data Analysis: Descriptive Statistics	4

The module is compulsory in order to complete the curriculum. Students must select as many elective courses as necessary to reach the required 8 credits.

Students may select additional elective courses for this module from among all subjects listed as master level general subjects of Tallinn University

Name of	**MAJOR SUBJECTS**	**Load: 66 EAP/ECTS**

module:		
Objectives	To create the conditions for students: • To build a sound and comprehensive understanding of human-computer interaction, rooted in established theories and practical skills, through a shared international educational experience; • To develop advanced transferable skills from an undergraduate base in computing or design to postgraduate knowledge in human-computer interaction; • To integrate creative ideas and insights into established knowledge and practice; • To instigate social aspects of working in individual, team-based and networked environments; • To expand project-oriented working methods and skills, as well the context and opportunities of monitoring, reporting and presenting progress in project work, to share results and ideas with peers; • To continue the progression towards individual specialization and a career profile; • To gain a critical understanding and an ability to make sound judgments with regard to complex ethical and accessibility issues related to human-computer interaction; • To gain advanced analytical skills in relation to complex published material and an understanding of academic standards and conventions, including common review and evaluation practices.	
Learning outcomes	The student will be able to: • Apply advanced skills in a variety of settings related to the design, development and evaluation of software and technical systems; • Critically appraise different methods of research and demonstrate the ability to select appropriate strategies of data collection, analysis and evaluation; • Engage in critical reflection and analysis of the social and economic impacts of how humans relate with and through software and technical systems in order to challenge the working practice of the individual and industry as a whole; • Demonstrate individual orientations that allow establishing and deepening new or existing professional careers; • Work in a range of typically cross-national, project and team-based technologically mediated working environments; • Have a comprehensive image of the discipline as a whole, being able to position their work with respect to other knowledge areas and concepts; • Know how to access, refer and use research results in their professional practices in an epistemologically and ethically defensible manner, and in accordance with different conventions.	
Evaluation of the	Evaluation is subject-based (graded or pass/fail)	

module		
Subjects		
Code	Subject title	Load (EAP/ECTS)
	Compulsory subjects 42 EAP/ECTS	
IFI7003	Project Management in Software Engineering	6
IFI7007	Research Methods	4
IFI7154	Developing Interactive Systems	5
IFI7155	Evaluating the User Experience	5
IFI7156	Interaction Design Methods	5
IFI7158	Master Thesis Seminar	4
IFI7159	Foundations of Human-Computer Interaction	5
IFI7161	Design Theory and Methodology	4
IFI7171	Philosophy of Human-Computer Interaction	4
	Elective subjects 24 EAP/ECTS	
IFI7102	Computer Skills and Programming Update	3
IFI7128	User Modeling and Recommender Systems	4
IFI7129	Introduction to Graphic Design	4
IFI7137	Ethics and Law in New Media	5
IFI7157	Practice	4
IFI7160	Current Topics in Human-Computer Interaction	4
IFI7162	Ubiquitous Computing	4
IFI7163	Game Design	5
IFI7164	Mobile Devices Workshop	4
IFI7165	Design for All	4
IFI7166	Semantic Computing	4
IFI7167	Social Computing	4
IFI7168	Experimental Input and Output Workshop	4
IFI7169	Accessibility Workshop	4
IFI7170	Designing for User Engagement	4
IFI7172	Human-Centred Computing	4
IFI7173	Multimedia Computing	4
IFI7174	Web Workshop	4

This module is compulsory in order to complete the curriculum. Students must select as many elective courses as necessary to reach the required 66 credits. Elective courses may be selected according to the student's research interests.

FREE ELECTIVES		**Load: 16 EAP/ECTS**
Objectives	The objective of open electives is to create opportunities for the individual development and realization of the student's intellectual interests. Open electives can also be used to raise the level of language and computer skills.	
Learning outcomes	Unconstrained knowledge and skills according to the student's own orientation	
Evaluation of the module	Evaluation is subject-based (graded or a Pass/Fail)	

This module is compulsory in order to complete the curriculum. At least 16 EAP of courses taught by Tallinn University or partner universities need to be selected for completing the curriculum.

IFI7040	**MASTER THESIS**	**Load: 30 EAP/ECTS**
Objectives	To provide the students with conditions that support: • The development of an in-depth knowledge in a specific area; • Their specializations based on an individually focused task; • The development of their communication skills, written and oral expression and the exploration of new technologies in this process.	
Learning outcomes	The student can: • Express themselves, in oral, written and technology-mediated ways and in the ways required by enterprises, organizations or the academic community; • Can operate within the constraints of common review and evaluation practices.	
Evaluation of the module	The master thesis will be evaluated by a defence committee, which will base the evaluation on the thesis as well as the defense process. The master thesis defense session is open to the public.	

The module is compulsory in order to complete the curriculum.

e. Educational Technology

Curriculum	
1. Name of the curriculum in Estonian	**Educational Technology**
2. Name of the curriculum	**Haridustehnoloogia**
3. Level	Master Studies
4. Organization of studies	Cyclic studies - studies are organized on Fridays and Saturdays of each alternate week.
5. Institution	Tallinn University
6. Load (EAP/ECTS)	120
7. Standard period of study in semesters	4 semesters
8. Category of curriculum	Informatics and Information Technology
9. Curriculum code	100279
10. Head of the curriculum	Kai Pata, PhD
11. Language of instruction	Estonian
12. Other languages required	English
13. Initial registration date of curriculum	30.11.2009
14. Admission requirements	Bachelor degree: The admission examination consists of a motivation interview (50 % of the total grade) and the presentation of a portfolio to demonstrate educational technology competences (50 %). During the motivation interview the readiness and motivation of the applicant for the successful completion of educational technology competences and mastering the profession will be evaluated. The applicant's expectations of using educational techno-logy in his/her future job will be discussed. The portfolio contains the motivation letter and the examples of artifacts composed by the applicant using educational technology, as well as evidence demonstrating the applicant's current educational technology competences based on the

	teacher's educational technology competences standard. The portfolio will be presented at the admission exam.
15. Major specialization	Educational Technology, 96 EAP
16. Minor studies and other specializations	-
17. General objectives of curriculum	To support the formation of educational technology knowledge and competences and the creation of opportunities for their application in educational institutions; To support the development of both research-based and inquiry-based approaches in the educational technology domain and to provide the competences for working as an educational technologist in institutions for developing learning activities and learning environments in the institution; To support the development of specialists who apply innovation principles for planning the community development in educational organizations.
18. General learning outcomes of curriculum	The graduate: • Knows the educational principles in educational technology and their development trends, explains actual problems and solution possibilities and associates these with different aspects of learning; • Effectively organizes and supports the learning activities of different domains using educational technology, develops both personal and others' learning environment, guides teachers and learners to support learning and learning motivation and to integrate educational technology into learning activities, guides the development of educational technology at the institution; • Applies scientific methods and educational technology tools to analyze the learning process and learning environment, to evaluate learners' development and to support educational technology innovation; • Participates in professional discussion, topic communities and international networks; • Analyzes personal professional activities and plans professional development both in academic and in vocational spheres, also internationally.
19. Name of academic degree or diploma received at graduation	Master of Science in Engineering (MSc)

20. Document issued at graduation	Master diploma and Diploma Supplement
21. Description of curriculum structure	**Specialization**: Educational Technology • General Courses: 4/4 • ICT development and knowledge management in organization 18/0 • Learning design 13/0 • Core Courses: 16/19 • Electives: 0/16 • Final thesis: 30/0
22. Elective studies	The objective of open electives is to create opportunities for the students individual development and realization of their intellectual interests. Open electives can also be used to raise the level of language skills.
23. Requirements for graduation	In order to complete the curriculum, the student must pass the curriculum subjects in the predetermined ICTS load, as well as passing the compulsory subjects and developing and defending the Master's thesis; Skills of one foreign language at the B1 level of the European Language Portfolio; Graduates of schools with Russian as the language of instruction, require skills of Estonian at the C1 level.
24. Additional information	Contact: Kai Pata (kai.pata@tlu.ee) Programme's website (in Estonian): http://htmag.tlu.ee

MODULES OF CURRICULUM

Name of module:	**GENERAL SUBJECTS**	**Load: 8 EAP/ECTS**
Objectives	To create possibilities for the development of general skills and analytical instruments required for qualification in the profession.	
Learning outcomes	Based on accessible data can analyze, prognosticate, make correct inferences and generalizations and evaluate the quality of solutions.	
Evaluation of the module	Evaluation is subject-based (graded or a Pass/Fail)	
Subjects		
Code	Subject title	Load (EAP/ECTS)
	Compulsory subjects 4 EAP/ECTS	
IFI7044	Data Analysis: Inferential Statistics	4

	Elective subjects 4 EAP/ECTS	
BFI7020	Introduction to Creative Industries	4
EKE7043	Estonian Writing Skills	4
KAK7022	Educational Sociology and Politics	4
KAN7022	Social practice in learning and for learning	4
KOK7058	Communication in the Modern Era	4
KUR7075	Creativity as a Component of Education	4
MLG7010	Global Ecology	4
MLM7204	Mathematical Modelling	4
PSO7106	Organization Theory	4
PSP7004	Development Studies and Development Assessment	4
RIT7012	Social and Political Theories	4
RIT7024	Civil Society and Democracy	4

The module is compulsory in order to complete the curriculum. Students must select as many elective courses as necessary to reach the required 8 credits.

Name of module:	**MAJOR SUBJECTS**	**Load: 35 EAP/ECTS**
Objectives	To support the development of skills for independent research and development work and to support the process of composing a Master's thesis. To offer experience in applying acquired theoretical knowledge in the apprenticeship practice under an experienced supervisor. To support the development of deeper technical and pedagogical competences in narrow areas relevant to the learner's motivation, interests and future plans.	
Learning outcomes	• Ability to work as a team member in educational technology development work; • Ability to apply scientific methods for studying the learning process and learning environment; • Ability to design a learning environment using information technology and educational technology tools; • Ability to create, adapt and distribute digital learning resources; • Ability to map and analyze personal professional activities and plan professional development.	
Evaluation of the module	Evaluation is subject-based (graded or Pass/Fail)	
Subjects		
Code	Subject title	Load (EAP/ECTS)
	Compulsory subjects 16 EAP/ECTS	

IFI7058	Apprenticeship Practice in Educational Technology	10
IFI7065	Master thesis seminar I	3
IFI7066	Master thesis seminar II	3
	Elective subjects 19 EAP/ECTS	
IFI7003	Project Management in Software Engineering	6
IFI7013	ICT Strategic Management	5
IFI7025	Maintenance of Windows Workstations	4
IFI7026	Legal Issues Related to IT-Development	4
IFI7031	Activity Learning in School Informatics	3
IFI7038	21-st Century Concepts in Information and Meaning	4
IFI7039	Server Side Interactive Technologies	4
IFI7041	Data Analysis: Descriptive Statistics	4
IFI7059	Digital Media Production	3
IFI7061	Multimedia Development	5
IFI7062	Educational Technology Infrastructure Seminar	3
IFI7063	Implementation of Video Research	3
IFI7064	Learning Management Systems	3
IFI7115	Security and Privacy Matters	3
KAT7005	Teacher as Counsellor	3

The module is compulsory in order to complete the curriculum. Students must select as many elective courses as necessary to reach the required 35 credits.

Name of module:	**ICT development and knowledge management in an organization**	**Load: 18 EAP/ECTS**
Objectives	To support the dfevelopment of research-based and inquiry-based approaches in educational technology domains and to provide the competences for working as an educational technologist in institutions in order to develope learning activities and learning environments in the institution. To support the development of specialists who apply innovation principles in the planning of community development in educational organizations.	
Learning outcomes	• The knowledge of educational principles in educational technology, its theoretical research trends, actual problems and interdisciplinary solution possibilities and the competences for associating these with different aspects of learning; • Ability to effectively organize and support the learning activities of different domains using educational technology, to develop personal and others learning environment, to guide teachers and learners to support learning and learning motivation, using effective methods for organizing his/her learning and councelling learners and teachers in integrating educational technology into their learning processes and guiding the	

	institutions educational technology in the community's research and development. • Competency in using educational technology in areas that are needed for developing the general educational technology competences in institutions, organizing life-long learning and the ability to critically assess ones actions while solving the problems in his/her discipline. • Competences and motivation to work in teams and networks, involving different partners, showing initiative, responsibiity and skills in teamwork and leadership. • Ability to use scientific methods and educational technology tools in the learning process and for the development and analysis of the learning environment, for the evaluation of the learners development, and innovation with educational technology. • Ability to professionally abide by the ethical rules of society and demonstrate tolerance towards different attitudes and values in society. • Ability to analyze personal professional activities and plan Professional Development in both vocational and academic spheres and also internationally.	
Evaluation of the module	Evaluation is subject-based (graded or Pass/Fail)	
Subjects		
Code	Subject title	Load (EAP/ECTS)
	Compulsory subjects 18 EAP/ECTS	
IFI7007	Research Methods	4
IFI7055	Innovation Technologies	4
IFI7056	Research Trends and Evaluation in Educational Technology	4
IFI7060	Learning Analytics	3
INT7059	Knowledge management	3

The module is compulsory in order to complete the curriculum.

Name of module:	**Learning design**	**Load: 13 EAP/ECTS**
Objectives	To support the development of general educational technology competences and knowledge and create possibilities for their application in educational institutions; To develop research-based and inquiry-based approaches in educational technology and to provide the institution's educational technologist with experiences in conducting developmental research in the development of learning activities and the learning environment.	
Learning	• Knowledge to support the learning process with educational technology	

outcomes	and the ability to connect it with different aspects of the learning process; • Ability to develop the learning environment using the resources of educational technology, e.g. planning the learning process, creating digital resources and e-learning practices; • Ability to work in a development team and also as the team leader, involving different partners (teachers, colleagues etc.); • Preparedness to analyze personal professional activities and plan self-development, ability to use scientific methods for analysing and developing the learning process; • Knowledge and ownership of professional and ethical requirements; • Knowledge of planning and conducting e-learning projects.	
Evaluation of the module	Evaluation is subject-based (graded or Pass/Fail)	
Subjects		
Code	Subject title	Load (EAP/ECTS)
	Compulsory subjects 13 EAP/ECTS	
IFI7051	Principles of Learning Design	4
IFI7052	Learning Environments and Learning Networks	3
IFI7053	Creating Digital Learning Resources	3
IFI7057	Councelling in Educational Technology	3

The module is compulsory in order to complete the curriculum.

FREE ELECTIVES	**Load: 16 EAP/ECTS**
Objectives	The objective of open electives is to create opportunities for students' individual development and the realization of their intellectual interests. Open electives can also be used to raise the level of language skills.
Learning outcomes	• Knowledge and competences according to student's choice • Skills of one foreign language at the B1 level of the European Language Portfolio; • Graduates of schools with Russian as the language of instruction require skills in the Estonian language at the C1 level.
Evaluation of the module	Evaluation is subject-based (graded or pass/fail)

This module is compulsory in order to complete the curriculum. Students must select as much elective courses as necessary to reach the required 16 credits.

IFI7040	MASTER THESIS	Load: 30 EAP/ECTS
Objectives	• To support the development of the student's independent thinking and orientation with professional and specialized literature; • To develop skills for conducting an educational technology research project, analysing the results and composing research reports and a Master's thesis considering the requirements of different target groups	
Learning outcomes	• Ability to apply scientific research methods in developmental projects for creating learning designs • Ability to apply participatory design and case study methods for evaluating the educational technology potentials, problems and/or situations in educational institutions and proposing solutions • Ability to compose and present a written scientific report, analyse data and research results; ability to present results orally and also in written format • Readiness for research-based teaching and councelling of the learning process by using educational technology • Ability to professionally follow the ethical rules of society and demonstrate tolerance towards the different attitudes and values in society • Ability to analyze personal professional activities and plan Professional Development, in both vocational and academic spheres as well as internationally	
Evaluation of the module	The Master's thesis will be evaluated by a defense committee, which will base the evaluation on the thesis as well as the defense process. The Master's thesis defense session is open to the public.	

This module is compulsory in order to complete the curriculum.

Appendix 2 – Course programmes (syllabi)

There are two types of documents that describe the courses at the university – form-based *course cards* and *course programmes*.

Course cards contain the constant data of the courses (objective, short description, learning outcomes, assessment methods, prerequisite courses, teacher, compulsory and replacement literature) and these are freely accessible in the university Study Information System.

Course programmes are more thorough; these contain additional variable information that is valid specifically for the forthcoming delivery of the course (for example, additional information about the content of the course). Course programmes are not freely available – these are sent to the students who have registered in the course. The constant data on course cards and course programmes is common to both while the teachers are free to compile the variable data.

a. Applied Computer Science

Course programme – HKI5010 Video Designing

Course code HKI5010	Video Designing		
ECTS credits: 5	Contact hours: 60	Semester: Autumn/Spring	Examination
Course objective:	Video Designing with *After Effects* is for those students who are interested in working in the video field, or for Adobe users wishing to expand their skills in video effects.		
Brief description of course content:	This course covers the core concepts and skills necessary to excel in motion graphics animation and visual effects, as well as advanced approaches and techniques. In this course students will create compositions applying motion and animated effects to media elements, create transparency in layers using mattes, masks, and stencils, animate objects in 3-D space, and more. Independent work: Watch at least 3 online tutorials and using the methods and techniques learned, make their own video which is at least 10 seconds long. Students make one tutorial on their own using the screen casting program and then present it before examination.		
Learning outcomes	After taking this course, the student will be able to create visual effects for use in web video and podcasts, broadcast television, and even film. Upon completion, students will be able to: • Create projects and compositions with media clips that play in a sequence • Apply animated effects and motion to sequenced media elements		

	• Manipulate the sequence and duration of footage items into hierarchies through parenting and nested compositions • Blend transparencies with masks, track mattes, and modes • Create complex animations with keyframe and velocity control • Create and use 3-D animations and effects • Integrate After Effects elements with other applications • Render compositions and choose appropriate rendering options and codecs
Assessment methods	Graded assessment.
Responsible lecturer	Aimar Lints, MSc
Title in Estonian	Videotöötlus
Prerequisite course	-
Compulsory literature	Adobe Creative Team (2012). Adobe After Effects CS6 Classroom in a Book
Replacement literature	E-course at https://moodle.e-ope.ee/course/view.php?id=2617
Subscription to the course and exam	All assigned homework should be completed (a total of 10 videos to be presented).
Requirements for independent work	Students should describe how they have completed their videos. All videos should be uploaded to YouTube channel
Assessment criteria	Every student should have a basic knowledge of video terminology and should understand how to use layers, masks, cloning, 3D layers, lights, scenes, cameras, motion tracking and expressions in *After Effects*. Every student develops 10 video clips using different techniques: 10% - create a banner 10% - create an animation 10% - produce a clip in which music controls the animation 10% - create special effects such as fire, clouds, smoke. 10% - correct colours in video footage 10% - create a scene using 3D and lights 10% - create a motion tracking in a clip 10% - use an expression in a clip 10% - produce a clip while watching online tutorials 10% - create their own video tutorial (using own materials) All videos should have their own text, photos, video footages and

	different ideas! 91-100 = A 81-90 = B 71-80 = C 61-70 = D 51-60 = E Below 51 = F
Information about the content of the course	Topic 1: AE interface, workspace, composition video formats, rendering methods. Making a motion graphics from raster and vector files. Topic 2: Using layers and "stopwatch" to make an animation. Different types of animation. Text animations. Using sound in AE. Topic 3: Making an animation using masking, puppet tool. Making a text effects. Drawing shapes. Kinetic writing effect. Topic 4: Video tone correcting, cloning and painting tools. Using old photographs. Green screen removal from video (chroma key). Generating fire, clouds, smoke. Topic 5: Motion tracking with roto brush. Video image stabilizing methods. Topic 6: 3D and light, using different cameras. Scripting and expression writing.

Course programme – HKI5023 Computer Hardware I

Course code HKI5023	**Computer Hardware I**		
ECTS credits: 3.00	Contact hours: 36	Semester: Autumn/Spring	Examination
Course objective:	The objective of the course is to give theoretical knowledge about computers setup, parts and overview of hardware manufacturers.		
Brief description of course content:	Introduction to hardware course. The overview of PC history. The principles of the constitution of PC. Different manufacturers and architectures. Overview of the components and peripherals. Independent work: student writes an academic report about hardware related topic, which he/she has chosen from list provided by lecturer and does a short presentation to presents this report to his/her class.		
Learning outcomes	A student has: 1) Overview of PC history 2) Knowledge about principles of the constitution of PC		

	3) Knowledge about different manufacturers and architectures 4) Overview of the components and peripherals
Assessment methods	Graded assessment is based on the results of one´s academic report and test. Test comprises theoretical material and identifies whether the student is able to apply the material covered during the course.
Responsible lecturer	Mehis Küla
Title in Estonian	Riistvara I
Prerequisite course	-
Compulsory literature	Chambers, M., L. (2006)., Arvuti ehitamine võhikutele. ; Clements, A. (2006)., Principles of Computer Hardware. Lecture Notes can be found at http://hk.tlu.ee/sahtel
Replacement literature	Riim, A. (2004)., Arvuti lauaraamat 2004: 100 küsimust ja vastust arvutikasutajale. ; Mueller, S. (2006). , Upgrading and repairing PCs. ;
Subscription to the course and exam	-
Requirements for independent work	The report must be at least 5 pages long and must comply with all style requirements stated by Haapsalu College. Presentation of this report must be 7 minutes (not including time for questions).
Assessment criteria	Prerequisite for examination is completion of independent work. On the examination there are different questions with maximum points shown for that question. To pass the examination, student must get at least 51% of points. Grading scale is following: 0% - 50% - “F” 51% - 60% - “E” 61% - 70% - “D” 71% - 80% - “C” 81% - 90% - “B” 91% -100% - “A”
Information about the content of the course	Lesson 1: Introduction to course, general overview of computer history. Lesson 2: Introduction to central processing units (CPU) - their speeds, types, technical data and manufacturers and different architectures. Lesson 3: Introduction to memory - general information about RAM and

	ROM. SRAM, its usage fields and parameters. Installation of most common memory chips and their types. Getting to know their technical parameters. Lesson 4: Getting to know different data carriers - hard drives and their controllers, types and parameters. Getting familiar with ATA, SATA and SCSI standards. Building principles of hard drive and it's working principles. Floppy's and floppy drives. Optical drives and tape drives, flash drives. Lesson 5: Introduction to graphics cards - different video card types and parameters. Expansion slots for video cards and their technical data (AGP, PCI-E). Outputs of graphics cards (VGA, DVI, TV-out, HDMI). Different usage fields of GPU. Lesson 6: Introduction to motherboard and it's technical information. Chipsets of motherboards, input-output (I/O) - addresses. Extension slots, integrated devices, interfaces. Tasks and types of BIOS, it's configuration software, updating and error codes. Getting to know computer power supply unit. Lesson 7: External peripherals - different types of printers. Displays and their types, technical information. Scanners, mice, tablets and other external devices. Lesson 8: Practice in laboratory - students disassemble a computer and later put it back together and update BIOS. Basic troubleshooting. Lesson 9: Students present their report to their colleagues. Lesson 10: Examination

Course programme – HKI5030 IT and Law

Course code HKI5030	**IT and Law**		
ECTS credits: 3.00	Contact hours: 42	Semester: Autumn/Spring	Examination
Course objective:	To create the general knowledge of the legislation regulating IT-area, get to know the legal risks related to the IT-area and the situations, where the advice of an expert is needed in order to optimize the risk.		
Brief description of course content:	General principles of law, copyright law, neighbouring rights, rights of the creator of database, the use of the works without the consent of author and/or without payment, industrial intellectual property, the rights of the data subject, public information, data with limited access, principles of the personal data processing, license agreements, author's agreements, e-business, services of the info-society, private remedies, IT-crimes. Individual work: study of the legal acts using electronic databases; individual analyses of the IT-cases.		
Learning outcomes	Ability to find direction in the material legal norms regulating IT-area,		

	knowing the author's rights, knowing the rights of the personal data subject.
Assessment methods	Examination
Responsible lecturer	Eero Johannes
Title in Estonian	IT ja õigus
Prerequisite course	-
Compulsory literature	Pisuke, Heiki. Autor ja ülikool : autoriõiguse alused / Tartu Ülikooli Kirjastus, 2004 Tikk, Eneken ; Nõmper, Ants. Informatsioon ja õigus / RoschierRaidla. - Tallinn : Juura, 2007 Laws and regulations: Copyright Law, Law of Obligations Act, General Part of Civil Code Act, the Penal Code, the Personal Data Protection Act, Trademark Act, the Information Society Services Act, the Public Information Act, the Digital Signature Act, the Electronic Money Institutions Act, EENet subdomain registration rules. Precise references to the regulatory provisions of IT activities are given during the lectures.
Replacement literature	**Laws and regulations:** Copyright Law, Law of Obligations Act, General Part of Civil Code Act, the Penal Code, the Personal Data Protection Act, Trademark Act, the Information Society Services Act, the Public Information Act, the Digital Signature Act, the Electronic Money Institutions Act, EENet subdomain registration rules. **Web links** www.riigiteataja.ee – legislation www.autor.ee – a portal on copyrights www.eau.org – Estonian Authors' Society www.wipo.org - World Intellectual Property Organisation www.aki.ee – The Data Protection Inspectorate www.epa.ee – Estonian Patent Office **Literature:** Rosentau, Mario. Intellektuaalse omandi õigused infotehnoloogias : autori isiklikud õigused // Juridica (2007) nr. 9 Pisuke, Heiki. Autor ja ülikool : autoriõiguse alused / Tartu Ülikooli Kirjastus, 2004 Tikk, Eneken ; Nõmper, Ants. Informatsioon ja õigus / RoschierRaidla. -

	Tallinn : Juura, 2007 Tikk, Eneken. E-õppematerjalide autorite õiguskaitse - romantikast üksi ei piisa // A&A : [infotehnoloogia ajakiri] (2006) nr. 3/4 Tikk, Eneken. Spämmi vastu aidaku end igaüks ise // Arvutimaailm (2005) nr. 1 Tikk, Eneken. Alltöövõtuga seonduvad õigusprobleemid tarkvaraarenduses // Arvutimaailm (2005) nr. 3 Tikk, Eneken. Andmebaaside õiguskaitse EL-is // Arvutimaailm (2004) nr. 5
Subscription to the course and examination	-
Requirements for independent work	In the course of independent work, the course participants solve IT- and law-related problems, the procedure is discussed during the lectures.
Assessment criteria	To pass the course, the student is required to take a written examination where the following is assessed: his/her ability to navigate in the key legislative norms governing IT, the copyright legislation, and the data subject's rights, the ability to take into account the rights of other persons, the ability to exercise his/her own rights, and to recognize the legal risks. The minimum requirements for passing the examination: The student is familiar with the basic concepts and fundamental principles in the field of IT and the law, and is able to implement them in the simplest cases. The student is able to locate in the legislation a norm that is to be implemented. The student is able to solve a problem with a combined effect of several regulatory norms. The exam is taken in the form of a test where the student evaluates IT- and law-related statements (true/false). Use of sources is allowed.
Information about the content of the course	***Lesson 1*** Estonian legal system, private and public law; who is right? Who decides? Copyright, copyright sources, the general principles of copyright, copyright protected works. Results that are not copyright protected. Machine as an author? IT-solutions as copyright protected works, copyright prerequisites of an author, the burden of proof, author's individual rights, author's economic rights, author's moral rights in the field of IT, Copyright Law and the Law of Property, persons possessing the copyrights, works created while fulfilling work duties, works created in the public service, works created in the teaching process and their subsequent use, copyrights for students and teachers, audiovisual works and related matters, audiovisual work versus IT-solutions, derivative works. Whose consent is

	required for the use? Orphan works. The duration of a copyright, a free use of works. Referrals and quotations. Free use of works in the IT field, linking, backup copies. Reverse projection. Rights related to copyright. Legal protection of databases, the rights of the database creator. The database user rights. Duration of the database user rights. Independent work: To examine the legislation, to solve cases independently, to prepare for a discussion ***Lesson 2*** Protection of personal data. General principles for the protection of personal data. Sources of the personal data protection law. Concept of personal data. Concept of the processing of personal data. Ordinary personal data and sensitive personal data. The data subject. The data processor. Personal data processing principles. Confidentiality requirement. Processing personal data without the data subject's consent. Processing personal data with the data subject's consent, consent legalization, consent validity, and withdrawal. Freely processable data. The public media and the processing of personal data, "the overriding interest". The right to request the termination of data processing. The use of a person's external image. Processing personal data of the deceased. Automated decisions. The data subject's rights. Independent work: To examine the legislation, to solve cases independently, to prepare for a discussion ***Lesson 3*** E-society. Legal aspects of domain registration. Banned domains. Requirements for a domain. The legal significance of domain registration. Revocation of registration. Trademark in e-society, trademark on the web. Domain versus brand. Information society services, the concept. Sources of legal regulation. The use of e-mail, spam, commercial communication. Limitations of responsibility and liability in the provision of information society services. When must the service provider intervene? E-contracts. Specifications of e-contracts. A digital signature. General principles for the award of contracts. Contract form. Use of digital signatures in private law relations. Use of digital signatures in public law relations. The digital signature-like solutions E-money and e-money institution. E-money-like solutions. Electronic means of payment Independent work: To examine the legislation, to solve cases independently, to prepare for a discussion

	Lesson 4 Author's contracts, license agreements. General principles for the award of contracts. Negotiations. Negotiations for IT contracts. Declarations of Intention: direct and indirect. Silence as a declaration of intention? Awarding a contract through a representative. The contract validity period. Termination of the contract, withdrawal from the contract. Purpose of the contract: employment contracts and agency contracts. Standard terms and conditions. The concept of author's contract. Classification of author's contracts. Author's contracts and license agreements. The form of an author's contract. Essential conditions of an author's contract. Types of licenses. Software licenses. GPL licenses. Creative commons Independent work: To examine the legislation, to solve cases independently, to prepare for a discussion. ***Lesson 5*** Private rights of action. Liability. Guilt. Penal liability versus private liability. Evidence. Prohibition requirements. The claim of the fulfilment of an obligation. The claim for damages. The claim for interest. The claim for termination of a contract. Price reduction requirement. Rights of action regardless of liability. Independent work: To examine the legislation, to solve cases independently, to prepare for a discussion. ***Lesson 6*** IT offenses. General principles and sources of criminal law. Guilt according to criminal law. Who can be punished? Penalties for IT offenses in the Penal Code. IT offences according to some specific laws (the Copyright Act, the Personal Information Protection Act, etc.). Independent work: To examine the legislation, to solve cases independently, to prepare for a discussion ***Lesson 7*** External peripherals – different types of printers. Displays and their types, technical information. Scanners, mice, tablets and other external devices. ***Examination***

Course programme – HKI5040 3D Animation

Course code HKI5040	3D Animation		
ECTS credits: 5.00	Contact hours: 50	Semester: Autumn/Spring	Final test
Course objective:	Students will have practical skills in 3D modeling and animating those models.		
Brief description of course content:	Modeling 3D using most common and basic tools. Basic usage of textures and introduction to Bodypaint. Creating simple simulations. Animating different objects in 3D environment. Introduction to real life applications of 3D animations and models. Rendering final products. Independent work: students have to continue independently projects started in the class.		
Learning outcomes	A student has: 1) Students are familiar with 3D modelling techniques 2) Basic skills in rigging, animating and texturing 3) Knowledge about different 3D software 4) Theoretical understanding of three-dimensional computer graphics		
Assessment methods	Pass-fail assessment		
Responsible lecturer	Mehis Küla		
Title in Estonian	3D Animatsioon		
Prerequisite course	none		
Compulsory literature	Lecture Notes can be found at http://www.hk.tlu.ee/~aimar		
Replacement literature	MAXON Computer Ltd, “Cinema 4D R13 manual”, 2011		
Subscription to the course and exam	-		
Requirements for independent work	Completion of projects started in the class		
Assessment criteria	To pass, the student is required to create at least 15 seconds long video animation, that is on the same level on difficulty as the demo animations showed in the course materials and for which student has used different		

	methods learned during the course.
Information about the content of the course	***Lesson 1***: Introduction into 3D. User Interface – the use of the views, moving objects on screen, preview visualization (rendering), attribute and object manager, the use of the help file. The creation, use and modification of different curves (spline). Different uses of curves (Loft NURBS, Sweep NURBS, Extrude). Demonstration of keyboard shortcuts. The primary rendering settings for rendering images and animations. Grouping of objects. The usage of different deformers. Addition of keyframes. Introduction to the addition of lighting. ***Lesson 2***: Presentation of materials and creation of materials with different properties. The usage of Hypernurbs. Making routes for animations and their modification. Animation viewing. Independent task: to create a text and make the Earth + 2 self-modelled objects orbit around it. The completed work must be rendered into a video clip. ***Lesson 3***: Working with polygons – the usage of a variety of tools. Three different methods for modelling polygons. Elaboration of the models. Selection with selection tools and saving. ***Lesson 4***: The use of the Hypernurbs' weightmapping. A more thorough introduction to the use of lighting and cameras. Independent task 2: to create a race track and cars racing on it. The completed work must be rendered into a video clip ***Lesson 5***: A comprehensive introduction to rendering – Ambient Occlusion, Global Illumination, Physical rendering. Exporting to various programmes. The use of the compositing tag. ***Lesson 6***: Building up a character and adding physics-based clothing to it (dress-o-matic). ***Lesson 7***: Construction of a skeleton for the character, different tools and work practices that are associated with it. The use of automatic skeletons. ***Lesson 8***: Rigging and animation of the skeleton, changing the geometry of the objects according to certain data (morphing). ***Lesson 9:*** Various simulations – to make a car move in a life-like manner with the help of motors, springs, shock absorbers and joints. Creation of objects with varying density, mass and elasticity and their inter-reactions. Cloth and hair simulation. ***Lesson 10***: Examination

Course programme – HKI6001 Computer Graphics

Course code HKI6001	Computer Graphics		
ECTS credits: 3.00	Contact hours: 36	Semester: Autumn/Spring	Examination
Course objective:	Optional subject in informatics. To develop the knowledge about creating esthetic layout graphics and necessary technical skills to do it.		
Brief description of course content:	The basic principles of compositions, design and colouring. Colour-room and colour-models. The main concepts of computer graphics. Vector and bitmap graphics. The formats of graphic files and their usage areas. Computer graphics implement areas. Introduction of graphic packets. CorelDraw vector graphics program. Posing vector graphic based tasks and solving practical tasks. Tasks that grade into bitmap graphics sphere. Working with bitmap program Adobe PhotoShop. Creating animations. Work process of graphics info and specific problems with scanning and printing. Calibrating devices. The design aspects and conception of web-pages. The design of web pages, advertising posters and logos. Independent work: creation of graphics that are presented on examination.		
Learning outcomes	Students know the principles of composition and coloring; can design with the help of vector graphics program and Adobe PhotoShop (bitmap graphics program).		
Assessment methods	Examination. During the course, a student collects 50 p (for a written test and practical tasks). 50 p at the exam (examination paper: to design brand symbols for a company – a logo (raster and vector graphics), a poster, web design).		
Responsible lecturer	Rando Ojassoo		
Title in Estonian	Kujundusgraafika		
Prerequisite course	-		
Compulsory literature	McClelland, D., Ulrich-Fuller, L. (2007)., Photoshop Bible. ; Sinivee, I. (2003)., Illustrator Bible		
Replacement literature	Rahula, V. (2006). , Fotode töötlemine arvutiprogrammis PHOTOSHOP CS2. ; Bouton, G., D. (2007)., Photoshop. The express line to learning.		
Subscription to the course and examination	Requirements that should be fulfilled in order for a student to be admitted to an exam: the student must have carried out all the tasks in the course, which provide 50% of the total credit points for the course		

Requirements for independent work	Independent work: the student is required to tackle the tasks in graphic design assigned by the teacher, which are then presented as homework and also at the examination.
Assessment criteria	***The student can collect up to 50 points at the lectures***: Pop quiz (at the university) 20 p – to assess the student's knowledge of the theoretical part of the course Poster (at home) 15 p – the student has made use of methods and technical solutions covered in the lectures, and the work has been presented on time Product package (at the university) 5 p – the student has made use of methods and technical solutions covered in the lectures, and the work has been presented on time Banner (at home) 5 p – the student has made use of methods and technical solutions covered in the lectures, and the work has been presented on time Logo (at the university) 5 p – the student has made use of methods and technical solutions covered in the lectures, and the work has been presented on time ***At the exam 50 p*** Examination paper contains a design of company's symbols – a logo (raster and vector graphics), a poster, a website (the designing is done at home and then presented ***at the examination 29 April 2012***) ***The grade is based on the total of points collected during the course*** A (excellent) – 91–100 points B (very good) – 81–90 points C (good) – 71–80 points D (satisfactory) – 61–70 points E (sufficient) – 51–60 points F (fail) – 0–50 points
Information about the content of the course	The focus of the course lies on practical tasks based on a designer's everyday work patterns. The most frequently used software is Adobe Photoshop. The course also gives students an introduction to Adobe Illustrator. Students shall be given an overview of different layouts (newspapers/magazines, posters, the web). Students learn about essential and different kinds of details in various designs. Students learn to process photos that are in the worst condition. Rules and differences of a poster and voluminous pages. A great number of practical tasks is carried out. During the course, a number of situations will be enacted on e.g. how

	a designer must create a design based on very limited information and find solutions in different situations. During the course, students will learn many Photoshop techniques. Also, they will learn the basic techniques of Illustrator, and create the design and the logo for the packaging of a well-known product. ***Course topics:*** • Introduction to the Adobe Photoshop environment • Colour models • Resolution and file size • Tools • Layers • Masks • Layer styles • Most common raster formats • Foto compression • Text processing ***Photos and photo processing:*** • what is important in a picture, how to cut (examples and explanations) • tonality, contrast, sharpness, etc. • reparation of damaged photos • photomontage • masks and layers ***Different layouts:*** • Text-intensive page – examples, explanations • Advertising poster – examples, explanations, poster design • Web page – examples, explanations, website design

b. Computer Science

Course programme – IFI6019 Theoretical Computer Science

Course code IFI6019	**Theoretical Computer Science**		
Volume 5 ECTS	Contact hours: 56	Semester: Autumn	Examination
Learning objective:	The aim is to offer basic knowledge about the main structures of theoretical computer science – finite automata, formal languages, solvability, complexity – and their basic properties as well as skills to apply the knowledge acquired for solving various exercises.		
Short description:	Scope of theoretical computer science. Basic notions from graph theory and formal languages. Finite automata and recognizable languages. Regular expressions; correspondence between regular expressions and finite automata. Algebraic treatment of finite automata and regular languages. Pumping-lemma for regular languages. Context-free grammars and their normal forms. Pumping-lemma for context-free languages. Pushdown automata. Turing machines and type 0 languages. Chomsky hierarchy. Solvability and complexity of algorithms. Petri nets. Independent work: acquiring lecture notes and solving exercises.		
Learning outcomes:	A student: • Understands basic concepts, results and problems of a problem area (finite automata and formal languages) of theoretical computer science; • Is able to solve exercises related to finite automata and formal languages; • Is able to analyze finite automata, grammars and languages.		
Assessment methods:	Examination. The score has two components: solving exercises (40%) and theoretical questions – definitions, results, proof of a theorem (60%).		
Lecturer:	Peeter Normak		
Title in Estonian	Teoreetiline informaatika		
Prerequisite course	MLM6212 Foundations of Discrete Mathematics.		
Compulsory literature:	Peeter Normak, Teoreetiline informaatika (Theoretical Computer Science). Lecture notes. TLÜ informaatika instituut 2012		

	Lecture Notes can be found at http://www.tlu.ee/~pnormak/TI-2012/.
Replacement literature:	1) Michael Sipser, Introduction to the Theory of Computation, ISBN 0-534-94728-X. 2) John E.Hopcroft, Jeffrey D.Ullman, Introduction to automata theory, languages and computation, Addison-Wesley, 1994 (www-db.stanford.edu/~ullman/ialc.html).
Subscription to the course and exam	Subscription is free for those who have passed the course MLM6212 Foundations of Discrete Mathematics. Subscription is free for those who have registered to the course and to the examination. Every student can have up to three attempts to pass the exam.
Requirements of independent work	1) Working with the lecture notes: learning the material of the last class prior the next one; 2) Performing home assignments given at the End of each class. There are 1-2 tutors in each year nominated from the best students. The tutors consult with their peers in completing home assignments.
Assessment criteria	The criteria for marks A – 9,0 credits or more. B – 8,0 … 8,9 credits C – 7,0 … 7,9 credits D – 6,0 … 6,9 credits E – 5,0 … 5,9 credits.
Information about the content of the course	The classes take place on Wednesdays and Thursdays at 10:15-11:45 in A-402 throughout the whole Autumn semester. ***Lecture 1***: The organisation of the course and exam. Scope of theoretical computer science. Formal languages and formal relations. ***Exercise 1***: Formal languages and relations. ***Lecture 2***: Graphs. Proof methods used in the course. ***Exercise 2:*** Graphs. Proof methods used in the course. ***Lecture 3***: Deterministic finite automata and regular languages. ***Exercise 3***: Deterministic finite automata and regular languages. ***Lecture 4***: Non-deterministic finite automata. Theorems on classes of regular languages. ***Exercise 4***: Construction of non-deterministic finite automata. ***Lecture 5***: Mealy and Moore automata.

	Exercise 5: Construction of Mealy and Moore automata. ***Lecture 6***: Regular expressions. ***Exercise 6***: Regular expressions. ***Lecture 7***: Generalized non-deterministic automata. ***Exercise 7***: Generalized non-deterministic automata. ***Lecture 8***: Pumping-lemma for regular languages. Myhill-Nerode theorem. ***Exercise 8***: Pumping-lemma for regular languages. ***Lecture 9***: Context-free grammars and languages. ***Exercise 9***: Context-free grammars and languages. ***Lecture 10:*** Greibach and Chomsky normal forms of context-free grammars. ***Exercise 10:*** Greibach and Chomsky normal forms of context-free grammars. ***Lecture 11***: Pumping Lemma for context-free languages. Stack automata. ***Exercise 11***: Pumping Lemma for context-free languages. Stack automata. ***Lecture 12:*** Context-sensitive grammars and languages. Turing machines. ***Exercise 12***: Context-sensitive grammars and languages. Turing machines. ***Lecture 13***: Bounded Turing machines and halting problem. Solvability of algorithms. ***Exercise 13***: Bounded Turing machines and halting problem. Solvability of algorithms. ***Lecture 14***: Complexity and complexity classes of algorithms. NP-completeness. ***Exercise 14***: Complexity and complexity classes of algorithms. NP-completeness. January: Examination.

Course programme – IFI6020 Cryptology in Data Security

Course code IFI6020	Cryptology in Data Security		
ECTS credits: 4	Contact hours: 42	Semester: Spring	Examination
Course objective:	To create premise for obtaining a systematic overview about the modern cryptography (theorethically as well as practically) that is needed for every contemporary IT specialist or mathematician for orientating in their field.		
Brief description of course content:	The course begins from the cryptography history. Next explains the main concepts of cryptography. It gives a basic systematic overview of symmetric cryptosystems including block cipher and stream cipher and move to the asymmetric cryptosystems. It introduces the well known protocols, main concepts of data security and practical applications of cryptotech. Every student must prepare homework, complete 75% of course tasks given during classes, pass test and examination. Independent work: Homework includes two practical tasks. Students have to provide the prepared programs or the step-by-step calculations (the level of bits), also the explanations.		
Learning outcomes	A student has: • Knowledge about the theoretical basis of cryptography. • Ability to orientate in basic concepts and algorithms of cryptography. • Practical skills in encrypting and decrypting using different algorithms. • Knowledge about data security and implementation of cryptography in this field. • Knowledge about the practical use of cryptotech.		
Assessment methods	Each student must pass the examination and one test before the examination. The examination consists of written theoretical work and practical tasks. The course grade will be calculated in the following way: 50% of examination results, 35% of test results and 15% of the homework.		
Responsible lect-r	Erika Matsak		
Title in Estonian	Krüptoloogia meetodid andmeturbes		
Prerequisite course	MLM6202 - Diskreetne matemaatika (Discrete Mathematics)		
Compulsory	Hanson, V. 1997 Infosüsteemide turve. 1. osa: turvarisk; Hanson, V.,		

literature	Buldas, A., Lipmaa, H. 1998 Infosüsteemide turve. 2. osa: Turbe tehnoloogia; Praust, V. 2001 Digitaalallkiri – tee paberivabasse maailma.
Replacement literature	J. Katz, Y. Lindell. 2007 Introduction to modern cryptography; A. Manezes, P. Oorschot, S. Vanstone. 2001 Handbook Of Applied Cryptography; J. Tablot, D. Welsh. 2006 Complexity and Cryptography. An Introduction; T. Beltier, J. Beltier, J. Blackley. 2004 Information Security Fundamentals.
Subscription to the course and exam	Requirements that should be fulfilled in order for a student to be admitted to an exam: approved homework, a positiv result in the course test and the presentation of work done at the practicum (work placement). A re-exam can only be taken on certain weeks and predetermined dates.
Requirements for independent work	Independent work comprises practical homework. Students may choose their homework in the lecture. The homework numbers must be registered with the teacher. Participation in the practicum and the lectures is of use to successful homework. Homework must be documented in accordance with the requirements and defended at a seminar. Students may attend a consultation by a teacher every week on a certain day of the week and at certain time.
Assessment criteria	Assessment criteria: Criterion 1: Theoretical basis A – The student is able to explain 91–100% of the theoretical aspects of encryption (see the description of the subject) regarding the asked questions in a written test. The student knows a number of different algorithms in detail and is able to compare the strengths and weaknesses of the algorithms. B – The student is able to explain 81–90% of the theoretical aspects of encryption (see the description of the subject) regarding the asked questions in a written test. The student knows a number of different algorithms in detail and is able to compare the strengths and weaknesses of the algorithms. C – The student is able to explain 71–80% of the theoretical aspects of encryption (see the description of the subject) regarding the asked questions in a written test. The student knows a few (more than four) algorithms in detail and is able to compare the strengths and weaknesses of these algorithms. D – The student is able to explain 61–70% of the theoretical aspects of encryption (see the description of the subject) regarding the asked questions in a written test. The student knows some (more than two) algorithms in detail and is able to compare the strengths and weaknesses of these algorithms. E – The student is able to explain 51–60% of the theoretical aspects of encryption (see the description of the subject) regarding the asked

	questions in a written test. The student knows at least one algorithm in detail and is able to name the strengths and weaknesses of that algorithm. Criterion 2: Practical knowledge (The use of reference material is allowed) A – The student encrypts plaintext and decrypts cryptograms with the help of known modern algorithms (91–100% of the taught material). The student is able to programme realizations of several simple algorithms. B – The student encrypts plaintext and decrypts cryptograms with the help of known modern algorithms (81–90% of the taught material). The student is able to programme realizations of several simple algorithms. C – The student encrypts plaintext and decrypts cryptograms with the help of known modern algorithms (71–80% of the taught material). The student is able to programme realizations of a few (at least four) simple algorithms. D – The student encrypts plaintext and decrypts cryptograms with the help of at least two (one symmetrical and one asymmetrical) known modern algorithms. The student is able to programme realizations of some (more than two) simple algorithms. E – The student encrypts plaintext and decrypts cryptograms with the help of at least one known modern algorithm. The student is able to programme the realization of at least one simple algorithm.
Information about the content of the course	Topics of the lectures: 1. History of cryptography 2. Introduction to cryptography, problems and definitions 3. Practice. Encryption of words using Caesar cipher, Vigenere's cipher. CocoVilla and the expert system for classifying cyber events. Formation of security classes and selection of security methods according to classes of security. 4. Symmetric-key algorithms. Bases, block ciphers, stream cipher. Feistel network. DES (Data Encryption Standard). 5. Symmetric ciphers. Blowfish, IDEA. Different methods for generating random numbers 6. Practice (block ciphers, stream cipher, Feistel network) 7. Encryption standards. Advanced Encryption Standards (AES). Algorithms MARS, Serpent, Twofish 8. Algorithms Rijndael and RC6. Algorithms and their mathematical bases. 9. Practice (Rijndael) 10. Public-key cryptography. Asymmetric key algorithms. RSA. 11. Hash-functions and authentication. Most frequently used algorithms. MD5, SHA-1, SHA-2.

	12. Practice. Hash-functions. 13. Digital signature. Requirements and standards 14. Key exchange methods and authentication. Third-party Key Agreement Protocols. 15. Practice. Digital signature in Estonia 16. Password cracking with rainbow tables. “Salt” in password encryption. Protocol IPSec, Internet Key Exchange Protocol (IKE). 17. Protocols SSH, SSL and TLS 18. Practice. Password checking using MD5 and SHA-1 19. Test 20. Defending homework 21. Defending homework + elimination of debts

Course programme – IFI6074 Programming Fundamentals

Course code IFI6074	**Programming Fundamentals**		
ECTS credits: 4	Contact hours: 56	Semester: Autumn	Examination
Course objective:	The objective of the course is to provide theoretical knowledge and practical skills for computer programming. The course introduces the fundamental concepts of procedural programming as a foundation for more advanced study of computer science. This course is also set up to develop the ability to think algorithmically, use known simple algorithms for data processing and other simple tasks. The student attains main concepts of procedural programming language and skills in using procedural programming language and integrated programming environments for writing, testing and debugging programs.		
Brief description of course content:	Topics covered: machine level representation of data, overview of programming languages. Fundamental programming constructs: syntax and semantics of a high-level programming language, variables, data types, arithmetic and Boolean expressions, and assignment. Simple I/O, conditional and iterative control structures, functions and parameter passing structured decomposition. Fundamental design concepts and principles. Independent work: As an independent piece of work is necessary to solve two tasks, provide programs and activity diagrams of algorithms.		
Learning outcomes	A student has: • Write, compile and debug simple computer programs, given the problem statements; • Identify particular arrangements of program constructs to use as solution patterns for simple programming problems; • Model aspects of real life problems as data objects so that they can be manipulated in a computer program; • Predict the behaviour of programs that use conditional and iterative control structures.		
Assessment methods	Examination. Grade consists of test and written examination. Examination has a prerequisite: written test.		
Responsible lecturer	Inga Petuhhov		
Title in Estonian	Programmeerimise alused		
Prerequisite course	-		

Compulsory literature	Lecture Notes can be found at http://www.cs.tlu.ee/~inga/progbaas/
Replacement literature	A. Downey. How to Think Like a (Python) Programmer.
Subscription to the course and examination	Requirements that should be fulfilled in order for a student to be admitted to an examination: a positiv result in the theoretical course test (i.e. the test has given at least 51% of the total points). It is possible to re-take the test at the end of the term. Practicum attendance is mandatory. In case of absence, the tasks assigned in the lecture must be done independently before the next lecture, as it provides a better understanding of the new material. In addition, two tests are done during the course, which aim to give students feedback on their academic progress. Because the tests give no credit points it is not possible to re-take them in case of failure, but everyone has an opportunity to correct and finish their tests later, and, if desired, to obtain new feedback.
Requirements for independent work	Independent work: in order for students to properly remember what they learn each week, they need to finish independently the work they started at the practicum. In addition, they need to do the task they have been given and read a certain number of chapters of the course material. In the following lesson, it is always possible to ask questions concerning the homework. Tasks in the following lessons are partly based on work carried out in the previous lessons, which is why it is essential to solve the tasks properly every week. Students need to do their compulsory reading, which is subject to a written test.
Assessment criteria	Assessment criteria (theoretical knowledge is assessed with a written test and the practical knowledge is assessed with an examination task): 1. Knowledge of the concepts of procedural programming A – The student is familiar with the concepts, he/she is able to make associations between the concepts and with a specific language, and with requirements occurring in algorithming and coding. B – The student is able to make associations between concepts and apply them in practice. C – The student is able to make associations between concepts. D – The student is able to give examples of the most frequently used concepts. E – The student is able to explain the most essential concepts. 2. Knowledge of the basic structures of the procedural language and data types.

	A – The student knows the statements and data types of the procedural language. He/she is able to combine and use them in the right way and explain how they operate. The student knows language constructions more widely and is able to make generalisations in different languages. He/she is able to understand a relatively simple foreign programme. B – The student knows statements in a procedural language. He/she is able, with the help of reference material, to learn new language constructs, functions, and additional data types, and use them purposefully. C – The student is able to read a foreign programme and identify and explain the language constructs used in it. He/she is able to select appropriate data types for the variables and suitable language constructs for the algorithm. D – The student is able to choose data types for the variables that fit the purpose. He/she uses purposefully the most common language constructs in the programme. E – Based on one example, the student is familiar with the language constructs typical of procedural languages, and is able to explain how they work. He/she knows the basic data types and their characteristics. He/she can use them in a realization of an algorithm containing a sequence, a selection, and an iteration. 3. Writing of a programme code. The use of simpler standard algorithms (summation, counting, max, min) in a program code, their purposeful use in problem-solving. A – When writing a programme code, the student is able to combine successfully various algorithms, without resorting to the standard functions. The programme takes into account exceptions and errors, and the emergence of runtime errors is prevented at all phases of the work of the programme. B – When writing a programme code, the student is able to combine successfully various algorithms, without using the standard functions. The programme takes into account exceptions and errors, and the emergence of most important runtime errors is prevented. C – When writing a programme code, the student is able to combine various standard algorithms, without using the standard functions. The student uses a variety of code examples. D – The student uses several standard algorithms in the programme. He/she is able to change the code examples so as to be able to solve other similar problems. E – The student understands the code examples. He/she is able to change a code example so that it can solve another task slightly different from the first one. 4. Problem analysis and composing of the solving algorithm A – The student is able to compose algorithms to solve problems of average complexity, which cannot be solved with standard techniques. The algorithms are composed optimally and they do not waste

	memory or time. To present the algorithm, the student uses an activity diagram. B – The student is able to compose algorithms to solve problems of average complexity, by using both standard algorithms and their combinations. The algorithms are composed optimally and they do not waste memory or time. To present the algorithm, the student uses an activity diagram. C – The student is able to compose an algorithm to solve problems of simple complexity, by using several standard algorithms and their modifications. To present the algorithm, the student uses an activity diagram. D – The student is able to compose an algorithm to solve problems of simple complexity, by using several standard algorithms. To present the algorithm, the student uses an activity diagram. E – The student is able to compose an algorithm to solve problems of simple complexity, by using one or two standard algorithms. To present the algorithm, the student uses an operation scheme. 5. Programme code correctness and compliance with the rules A – The programme code is correctly commented, the names of the variables correspond to their purpose and best practices, and they are selected systematically. The code is indented the usual way, and can very easily be followed and read. B – The programme code generally follows recommendations and practices and is easy to read both in terms of structure and content. C – The programme code mostly follows recommendations and is generally easyto read thanks to commentaries. D – The programme code follows recommendations but is over- or under-commented. The names of the variables are mnemonical but they have been chosen quite randomly. E – The programme code generally follows recommendations but there are shortcomings in terms of the names of the variables, the commentaries, etc. 6. Programme code debugging A – The student is able to debug a programme by using prints as well as debugging tools of the programming environment. The student can identify and eliminate the majority of syntax errors before compiling. B – The student uses prints of the variables to debug the programme code. He/she is able to do it purposefully and by doing so, he/she locates errors. The student can identify some syntax errors before compiling. C – The student uses prints of the variables to debug the programme code. He/she successfully finds the syntax errors with the help of feedback from the environment. D – The student is able to debug his/her programme but it does not always target the component. Some randomness occurs even in the

	interpretation and use of syntax error messages. E – The student is able to debug his/her programme but he/she often does it by the trial-and-error method, i.e. that the debugging is not systematic. Some randomness occurs even in the interpretation and use of syntax error messages. 7. Programme testing A – The student is able to compile tests to check the majority of situations, as well as to assess the behavior of the programme in case of error. He/she is able to explain the purpose of each test. B – The student is able to compile a test to find logical errors that may occur rarely, and only with certain inputs. He/she uses the equivalence class testing method to find the tests. He/she is able to explain the purpose of the tests. He/she knows that exhaustive testing is not possible. C – The student is able to compile tests to find the most important errors. The test compilation is first and foremost based on the structure of the programme code. He/she is able to explain the purpose of each test. D – The student is able to compile tests and test his/her programme to find the most important errors. E – The student is able to test his/her programme with random inputs, but the inputs are such as to ensure the correct functioning of the programme in case of no errors and a standard workflow. The student cannot explain exactly why he/she has compiled such tests in particular.
Information about the content of the course	The classes will take place on Thursdays, at 10:15-11:45 and 12:15-13:45. Week 1. 1) Introduction. General introduction. Programming. Algorithm. Recording an algorithm – the activity diagram. Sequence as part of the algorithm. Sequence and parallelism in the activity diagram. 2) Algorithms for solving problems. Week 2. 1) Introduction to Python. Using the IDLE. Variables, arithmetic expressions. Input and output. Syntax errors. 2) Simple programmes with a sequence. Week 3. 1) Selection as a building block of the algorithm. Tasks with selections. Selection in the activity diagram. Relational operators. Conditional statement in Python. 2) Solving tasks. Week 4. 1) Data representation on the computer: bit, byte, word. Numerical data presentation. Positional notation. Textual data in a digital presentation. The main data types. Different code tables. 2) Logical expressions. Block structure of the program and the program code indentation. Week 5. 1) An iteration as a building block of an algorithm. Simple algorithms for aggregation and counting. 2) Solving tasks. Week 6. 1) Testing in more detail. Compilation of tests for problems that

	are already solved. 2) Written test 1. Week 7. 1) Structured data types: arrays/lists. The use of strings. 2) The use of arrays in data processing. The use of standard algorithms (aggregation, counting, max, min) in an array. Week 8. 1) Tasks for processing larger amounts of data. The use of standard algorithms. 2) Arrays – solving tasks. Week 9. 1) Use of text files for storing data. 2) Solving tasks week 10. 1) Creation of functions. 2) Written test 2. Week 11. 1) Sub-program: a bit of theory. Sub-program as the basis of procedural programming. Procedure. Function. Data exchange between sub-programmes. Global and local variables, and the scope. Modules. 2) Preparation for "multidimensionality." Week 12. 1) Multi-dimensional array (a list in a list). 2) Solving tasks: two-dimensional data + text file + use of functions. Week 13. 1) Solving tasks: two-dimensional data + text file + use of functions. 2) A test on concepts and language constructions. Week 14. 1) Solving tasks. 2) Solving tasks.

Course programme – IFI6075 Multimedia

Course code IFI6075	**Multimedia**		
ECTS credits: 4	Contact hours: 42	Semester: Spring	Examination
Course objective:	The objective of the course is to provide theoretical knowledge (basics of design etc) and practical skills for the creation multimedia based software using different authoring tools and existing media files.		
Brief description of course content:	The nature and concept of multimedia. Authoring tools. Basic principals of design. Text (fonts and styles, usage). Use of computer graphics. Colours (colour theory, colour space, usage). Creating multimedia based software using authoring tool Adobe Flash. Course consists of seminar type lectures and practical classes where students are expected to be actively involved. Independent work: In addition every student must submit individual assignment, where he/she demonstrates the ability and skill of creation of multimedia based applications.		
Learning outcomes	A student has: • After this course student knows and understands the concept of multimedia; • Basic design principles; the nature and usage of different types of digital media. • Student can choose multimedia elements appropriate for her aims; • Can use at least one multimedia authoring tool and create multimedia based applications.		
Assessment methods	Examination. Prerequisite for access to examination is active participation at lectures. To pass examination, students must timely submit their individual assignments (50% of grade) and pass written test (50% of grade).		
Responsible lecturer	Andrus Rinde		
Title in Estonian	Multimeedium		
Prerequisite course	IFI6001 - Arvuti töövahendina		
Compulsory literature	Lecture Notes can be found at http://www.cs.tlu.ee/~rinde/mm_materjal/		
Replacement literature	To pass this course student must participate in classes.		

Subscription to the course and exam	Number of participants depends on size of computer lab. To access to examination student must submit all homework for deadline.
Requirements for independent work	Students must submit individual assignments, where he/she demonstrates the ability and skill of design and creation of multimedia based applications.
Assessment criteria	Each higher level includes all the lower levels. 1. Design A – Is able to create balanced design, can take into account different design principles and explain his/her decisions. B – Is able to choose appropriate colour scheme for his/her multimedia application and explain it. C – Is able to choose suitable media elements and explain his/her choices. D –Is able to format good looking textual information taking into account readability issues. E – Knows most important design principles, can choose proportions and elements for user interface for his/her multimedia application. 2. Multimedia software development A – Is able to create multimedia applications which can communicate with other applications. B – Is able to create multimedia applications which uses external media and data files. C – Is able to manipulate with different objects, use different interaction methods. D – Is able to manipulate with different objects, create basic simulations. E – Is able to use multimedia authoring tools to create basic slide-show like applications.
Information about the content of the course	The classes take place on Mondays at 14:15 – 15:45 and Tuesdays at 8:15 – 9:45
Week 1 – 28.01.2013	Lecture: Introduction to course, the concept and history of multimedia. Communication – why multimedia.
Week 1 – 29.01.2013	Exercise: Introduction to authoring tool Adobe Flash Professional CS6. Creation of objects and simple animations.
Week 2 – 04.02.2013	Exercise: Morphing, masking, using audio in Flash animation.

Week 2 – 05.02.2013	Exercise: Different objects, guided animations.
Week 3 – 11.02.2013	Lecture: Introduction to design, most important design principles.
Week 3 – 12.02.2013	Exercise: Using bitmap graphics in Flash, skeletal animation.
Week 4 – 18.02.2013	Exercise: Introduction to ActionScript programming language. Creation of basic interactions, frame actions.
Week 4 – 19.02.2013	Exercise: Manipulating with objects, response to different events.
Week 5 – 25.02.2013	Lecture: Introduction to design of software user interface.
Week 5 – 26.02.2013	Exercise: Individual work.
Week 6 – 04.03.2013	Exercise: Reading data from XML file, using external files.
Week 6 – 05.03.2013	Exercise: Dynamic object handling with ActionScript, classes.
Week 7– 11.03.2013	Exercise: Managing object hierarchy, handling child and parent objects. Arrays.
Week 7 – 12.03.2013	Lecture: Text, history, principles of formatting, readability.
	Week for individual work. No classes.
Week 8 – 25.03.2013	Exercise: Manipulating text with ActionScript.
Week 8 – 26.03.2013	Exercise: Using object's internal timeline
Week 9 – 01.04.2013 14:15 – 15:45	Exercise: Using audio with ActionScript.
Week 9 – 02.04.2013	Exercise: Individual work on finalizing application (game) created during classes.
Week 10 – 08.04.13	Lecture: Colours, Colour models, palettes. Principles of using colours.
Week 10 – 09.04.2013	Exercise: Manipulating colours with ActionScrip (creating "coloring book").
Week 11 – 15.04.2013	Exercise: Drawing with ActionScript (creating painting application).
Week 11 – 16.04.2013	Exercise: Manipulating bitmap graphics with ActionScript.

Week 12 – 22.04.2013	Lecture: Principles of using different media elements.
Week 12 – 23.04.2013	Exercise: Using Audio and video clips dynamically with ActionScript.
Week 13 – 29.04.2013	Exercise: Using PHP for data exchange between Flash application and server.
Week 13 – 30.04.2013	Converting Flash animations to Javascript ang HTML 5.
Week 14 – 06.05.2013	Individual work, Q&A.
Week 14 – 07.05.2013	Assessment of homework.
	Examination

a)

Course programme – IFI6076 Web Programming

Course code IFI6076	**Web Programming**		
ECTS credits: 4	Contact hours: 54	Semester: Autumn	Examination
Course objective:	To give understanding of possibilities and risks of web programming; to develop applicable web programming skills.		
Brief description of course content:	Web development principles and tools. Web server programming. Technical possibilities. Technologies in use. PHP. Data exchange between client and server. Planning of data tables. Joining tables. SQL commands. User input validation. Authentication and authorization. Javascript tools and possibilities. Constructing program logic. Independent work: Creating web applications by subjects studied at school. Four applications individually, one as groupwork. Finishing programming examples which started at school.		
Learning outcomes	Course participant can plan web site and do also simpler and middle-level programming works. He can appraise successfulness of a web project, can suggest tools and calculate approximate work amount in hours. A student: • Understands possibilities and risks of web programming • Can create static web pages • Can make calculators working in web pages • Can connect data in web page to one SQL data-table • Understands one-to-many and many-to-many connections in databases and make web interfaces for data in such structure. • Can authorize web users and manage them rights.		
Assessment methods	Examination. Presentation of homeworks and group work. Theory seminar. Solving exercise in examination day.		
Responsible lecturer	Jaagup Kippar		
Title in Estonian	Veebiprogrammeerimine		
Prerequisite course	-		

Compulsory literature	Lecture Notes can be found at http://minitorn.tlu.ee/~jaagup/kool/java/loeng/veebipr/veebipr1.pdf
Replacement literature	Web programming e-course http://www.e-ope.ee/repositoorium?@=6f6m#euni_repository_10890
Subscription to the course and exam	Participation in courses is voluntary, but useful for studies. For completing the course and subscription to exam must be done all homeworks, control work and seminar. Student must register himself to exam through ÕIS (the Study Information System).
Requirements for independent work	Web site with included header, footer and menu Workflow-application with different user roles Control work User interface to two joined data tables User interface to at least three joined data tables Group work Exam exercise Seminar Explanations • Web site with included header, footer and menu Web site for real or fictitious event or organization. Repeating parts for pages will be included from separate files. Web site must be so correct, that you could show it to your future boss. • Workflow-application with different user roles Workflow maintenance pages (at example order management). Separate web pages for different jobs and roles. Also needed SQL-sentences and table dumps with sample data. • Control work Work at classroom, where exercise given by teacher, exercise uses one data table ning design made by existing HTML-template. • User interface to two joined data tables Data can be sorted and searched and viewed by category. User interface by HTML-template. Administrator can add, delete and change data. • User interface to at least three joined data tables Part of group work, where one part from bigger application will be put completely to work so, that users with different roles can see and possibly change data in these tables.

	• Group work Size of group 2-4 persons. For data can be used table schema from database course (at example guest-house database in amount of 10-20 joined data tables). Describe roles and create views and page structure for different jobs. Compare pages with database – have we all needed data or is all data needed? Before creating web pages fill data tables with usable data and make example SQL-queries. Presentation of group work in the morning of exam day. • Examination exercise At start of exam each group presents his work. Each group will send application address, description and needed passwords to teacher. Each student will choose exam exercise. Each paper have exercise three levels. For getting final result must be done all homeworks and at least one level in exam. With first completed level is course final mark C, with second level B, with all three levels A. After completing the exercise it will presented to teacher and answered to questions about solution. Quality of homeworks, group work and seminar can be change exam mark by one unit to up or down.
Assessment criteria	Criterion 1 • Knows web programming possibilities and dangers A – can do previous tasks independently and also help groupmates B – append to previous can with teacher plan and test usability and security of web application C – can analyze design of web application including security side D – can describe possibilities, their background, list popular dangers E – can list possibilities Criterion 2 • Can make static web pages • Can put calculators to web pages • Can make web user interface to data table • Knows one to many and many to many joins in database and can them use on own web applications. A – Can as teamleader realize and coordinate creating web application comfortable to end user. B – Can as member of workgroup plan and realize database schema and web user interface based on this schema. C – Can make web applications with administrative interface and business logic

	D – Can make web applications with administrative interface E – Can make web user interface for separated data tables
Information about the content of the course	Week 1 Overview of PHP. Running samples, using learning material. Week 2 Creating web site with includable parts (header, footer, menu). Week 3 Data table. Connection to MySQL. Showing first homework. Week 4 Web user interface to data table. Web application for fake event. Week 5 Searching and sorting data. Use learning material and solve exercises. Week 6 Changing data in web. Designing homework in this. Week 7 Using HTML mockups and graphical HTML redactor in web application. Week 8 Structuring program code. Functions and classes. Page templates. Week 9 Many to many joins in database and user interface to it. Week 10 Authentication and authorization. Planning group work. SVN for program code maintenance. Week 11 Longer selects from database. Data table as multiple copy in one query. Subqueries. Analyze of groupworks. Week 12 Automathical testing. PHPUnit and Watir. Week 13 JavaScript, client-side possibilities. Week 14 Seminar. Talk oriented by questions. Examination Groupwork presentation and solving exercise.

c. Management of Information Technology

Course programme – IFI7003 Project Management in Software Engineering

Course code IFI7003	Project Management in Software Engineering		
Volume 6 ECTS	Contact hours: 28	Semester: Autumn	Examination
Learning objective:	To allow the student the possibility of acquiring knowledge in general project management and in software project management as well as skills in software project management.		
Short description:	Introduction to the course. The basic concepts, process models and structures of projects and project management (including Project Management Body of Knowledge PMBOK, Project Management Maturity Model PMMM, Organizational Project Management Maturity Model OPM3, Project Manager's Competency Development Framework, PRINCE 2). Basic principles and methods for initiation, planning and execution of projects. Project management software. Basic principles, models and methods of software project management (Cascade model, XP, RUP, CMM-SW, CMMI-SW, SPICE, NASA SPI, COCOMO II etc). Independent work: Each student (1) performs three analyses based on the lecture materials (estimated amount of work – 48 hours); (2) prepares a project plan, or an analysis of a practical project or an analytical report of a topic in project management (43 hours); (3) a review of a project plan composed by a fellow student (22 hours); (4) assessment of five project plans composed by fellow students (15 hours).		
Learning outcomes:	A student has: • Knowledge about the basic structures, models and principles of general project management and of software projects in particular; • Skills for the development of a (software) project plan; • Ability to assess the (software) project plans.		
Assessment methods:	Examination. The grade is awarded using three components (of equal weight): (1) project plan/analysis/analytical report, (2) presentation (written and oral) of the project plan/analysis/analytical report, (3) review and assessment of project plans of fellow students. It is recommended that project plans are prepared in groups. Project plans cannot be form-based; it can also be a Master's project. A guide is available for discussing mistakes and deficiencies most often		

	encountered in the work done in previous years. Each assessment should contain (exactly!) three major strengths and three major weaknesses of the assessed work.
Lecturer:	Peeter Normak
Title in Estonian	Projektijuhtimine tarkvaraarenduses
Prerequisite course	None
Compulsory literature:	Projektijuhtimine. Lecture Notes. Normak, P. (2012). Lecture Notes and other learning materials and documents can be found at www.tlu.ee/~pnormak/PJ-2012.
Replacement literature:	A Guide to the Project Management Body of Knowledge (PMBOK Guide; 2008). Project Management Institute. Highsmith, J. (2010). Agile project management: Creating innovative products. Addison-Wesley. Managing Successful Projects with PRINCE2; 2005 edition. Office of Government Commerce. TSO, London. ISBN 0113309465. Software cost estimation with COCOMO II. Boehm, Barry. (2000). Information Technology Project Management. Schwalbe, K. (2002). Software project management: A unified framework. Royce, Walker. (1998). Kerzner, H. (2001). Strategic planning for project management using a project management maturity model. NB: Replacement literature does not contain examples discussed in classes.
Subscription to the course and examination	Subscription is free. The examination consists of three parts with the following deadlines: 1) Oral presentations of examination work take place during the autumn examination session (at the beginning of January); the presentation should be made in MS Powerpoint or OO Impress. 2) Examination work should be sent to the given address during the week immediately following the presentation. 3) Review and assessments should be sent to the given address before the 18th of January.
Requirements of independent work	(1) To perform home assignments given at the end of each class; discussion of home assignments takes place at the beginning of the next class; (2) Timely execution of all assignments necessary for passing the course (described in previous section).

Assessment criteria	1. Criterion (examination work) A – The examination work is excellent in most of the criteria and very good in others: existence of all necessary components/aspects, logical and thorough approach, language use, the topicality/importance of the problem. B – The examination work has a few problems, the subject of the project is topical. C – The examination work has a few deficiencies, the subject of the project has a local importance. D – The examination work has some major deficiencies. E – The examination work has some major deficiencies and the topic is not significant. 2. Criterion (presentation of examination work) A – the presentation is excellent (it is topical, original, realistic, consistent, well structured, full of clarity, interesting, promotes discussion with the listeners and provides added value to the listeners). B – the presentation is very good. C – the presentation is good. D – the presentation is satisfactory. E – the presentation is weak. 3. Criterion (review and assessments) A – The review and assessments are completely adequate and thorough. B – The review and assessments are adequate and thorough. C – The review and assessments have some gaps (some aspects are not discussed or receive inadequate treatment). D – The review and assessments have some deficiencies (some aspects are not discussed or receive inadequate/wrong treatment). E – The review and assessments have significant deficiencies (several aspects are not discussed or receive inadequate/wrong treatment).
Information about the content of the course	The classes take place on Sundays at 14:00-17:15 in A-402 (The following dates are taken from the 2012 autumn semester). ***9.09: Introduction*** (organization of the course and assessment). Basic concepts and models. The concept of a project, examples. Life cycle of a project and of a product. The concept of project management (PM). The competency areas of PM (according PMBOK Guide), process groups, activities and artefacts. Competency framework of project managers PMCD FW. PM maturity models PMMM and OPM3. PM in European e-Competence Framework e-CF. Composition of project teams and presentation (by the teacher) of the first home assignment.

	23.09: Seminar. Presentations of project teams: Objective of the examination work (project) Needs analysis Analysis of possible donors Discussion of the home assignment. Initiation of a project. Prerequisites for initiating a project. The major risks related to the projects. Determination of the objective of a project and the necessary resources. The main financing schemes of projects, and useful sources of information. Composition of an initial plan (charter) of a project. Formation of a project team. ***7.10: Discussion of the home assignment.*** Project planning. Feasibility study. Project planning timetable, determination of sub-goals and activities, the structure of a project plan, timetable, project administration, quality assurance. Application of expected results, budget, summary of a project plan. Project framework matrix. Composition of recommendations and reviews. PR-activities. ***4.11***: Seminar. Presentations of the project teams: Activities of the project The budget Launching a project: management plan, scope management, information management, determination of duties and rights. Managing a project: reporting, quality control, resources management, staff development, role of leadership, creation of the necessary environment, devotion of team members, creativity stimulation, teamwork; conflict management. Completion of a project. ***2.12: Discussion of the home assignment.*** Related questions (portfolio management, certification of project managers, standards, leading institutions in PM theory and practice etc). Basic principles of software projects: Specifics of software projects, critical success factors, phases of software process, personnel and change management, cooperation with upper management, requirements development, quality assurance. Software design, software delivery, development cost models, management principles. ***16.12: Seminary: Project management software***. Models and methodologies: General overview, waterfall model, two-phase model, multiple phase model, RUP, XP, capability maturity model for software CMM-SW, NASA software process improvement model. Related questions: Software process assessment methodology SPICE. COCOMO cost model. Positive experience in software development. Principles of software development. Standards. Leading institutions in software development theory. ***January 2013***: Examination: presentations and discussion of examination works.

Course programme – IFI7013 ICT Strategic Management

Course code IFI7013	**ICT Strategic Management**		
ECTS credits: 5	Contact hours: 20	Semester: Spring	Exam
Course objective:	Students will acquire knowledge of IT strategy princples and skills to develop IT strategic plans.		
Brief description of course content:	The course is based on the following concepts and tools: IT governance, governance of IT value delivery, IT risk governance, the concept of strategy, IT strategy, agile IT strategy, Lean and Kanban Principles and their implementation in IT strategy, IT strategic planning process, portfolios, programs and projects as instruments for implementing IT strategy, Enterprise Architecture as a strategic tool, core principles of software engineering and importance of software engineering in implementing IT strategy, DevOps as a strategic tool. The course focuses on the following topics: Alignement of business and IT strategy. IT strategy outlines: technology, peopleware/organization, process. Strategic, tactical and operative management of IT. Development of IT strategic plan. Execution and monitoring of IT strategic plan. The role of information security in IT strategic plan. The role of budgeting/forcasting in IT strategic plan.		
Learning outcomes	A student: • Understands IT governance principles • Understands IT strategy and Agile IT strategy principles • Understands Lean and Kanban principles • Understands portfolios, programs and projects as instruments to implement IT strategy • Understands core principles of software engineering • Understands the importance of Enterprise Architecture in IT strategy and understands the basic principles of Enterprise Architecture implementation. • Has acquired the knowledge and skills for developing an IT stratetegy.		
Assessment methods	Examination		
Responsible lecturer	Paul Leis		
Title in Estonian	Infotehnoloogia strateegiline juhtimine		
Prerequisite course	IFI7003 - Project Management in Software Engineering		

Compulsory literature	Moodle pages of the course in PDF files on the following topics: • IT strategy in 10 weeks • Balanced Scorcard • PMBOK 4th edition • Scrum Guide • Scrum papers • CMMI and Scrum Mariage • Lean Thinking • Kanban – kick start • Kanban and Scrum • Scrum and XP from the trenches • Scrumban • Cobit 5 Processes • Thinking of Agile Archirecture (in Estonian) • EA as strategy • TOGAF • MDA • Enterprise project and portfolio management strategy guide for CIOs • OPM3 • What is DevOps • The rise of DevOps • Lecture slides • Video recordings of Tallinn University of Technology IT Strategy course (64 a/h)
Replacement literature	James D. McKeen, Heather A. Smith, IT Strategy, ISBN 13:978-0-13-214566-4, 2011 Jeanne W. Ross, Peter Weill, david C.Robertson, Enterprise Architecture as Strategy, ISBN; 978-1-4221-4817-4, 2006 Peter Weill, Jeanne W.Ross, IT Governance, ISBN: 978-1-5913-9253-8, 2004 Mike Cohn, Succeeding with Agile: Software Development Using Scrum, ISBN-13: 978-0-321-57936-2, 2010 James P. Womack, Daniel T. Jones, Lean Thinking: Banish Waste and Create Wealth in Your Corporation, ISBN 0-7432-4927-5, 2003 Peter W.G. Morris, Jeffrey K.Pinto, The Wiley Guide to Project, Program, and Portfolio Management, ISBN: 978-0-470-22685-8, 2007.

Subscription to the course and exam	Attending lectures is not mandatory. At a seminar: presentation/defence of the homework – attending is mandatory. A prerequisite for being eligible for taking an exam is a positive result for the homework.
Requirements for independent work	Group work: Development of IT strategy for the company. Homework will be issued at the beginning of a term, and therefore, at the lecture, an IT strategic planning process is discussed after risk management.
Assessment criteria	Examination. 10 questions covering all the study results in the course. Assessment criteria for the exam according to the following scale: A – 91 and more points; B – 81 – 90 points; C – 71 – 80 points; D – 61 – 70 points; E – 51 – 60 points; F – less than 51 points.
Information about the content of the course	Duration of each class is four academic hours. 1st contact (26 Jan, 2013) - IT governance. Governance of IT value delivery. 2nd contact (27 Jan, 2013) - IT risk governance. What is strategy? IT strategy. Agile IT strategy. Implementation of Lean and Kanban principles in IT strategy. 3rd contact (9 Feb, 2013) - IT strategic planning process. Portfolio, programs and projects as instruments for implementing IT strategy. 4th contact (10 Feb, 2013) - Enterprise Architecture as a strategic tool. Core principles of software engineering. DevOps. 5th contact (5 May, 2013) - Seminar. Defence of group works.

Course programme – IFI7021 Development of Infrastructure of Information Technology

Course code IFI7021	**Development of Infrastructure of Information Technology**		
ECTS credits: 4	Contact hours: 20	Semester: Autumn	Examination
Course objective:	The purpose of the course is to gain the necessary knowledge for planning, developing and maintaining an organization's IT infrastructure and using these skills to solve appropriate practical problems.		
Brief description of course content:	The course focuses on the following topics relevant to IT Infrastructure Development: • IT standards • IT infrastructure frameworks • Virtualization and cloud technologies • Case studies on IT infrastructure development Assignments: Written group work assignment that analyses a given IT infrastructure solution and proposes measures for improving it. Assignment will be presented and discussed with other participants of the course at the seminar.		
Learning outcomes	Course graduates: • Can name and describe different IT infrastructure frameworks, standards and methods; • Can analyze IT infrastructure solutions and the risks that these solutions involve; • Can plan an organization's IT development - including carrying out an IT audit and implementing new applications.		
Assessment methods	Examination – an open answer written examination that represents 75% of the grade. Presentation of group work is a prerequisite for the examination and represents 25% of the grade.		
Responsible lecturer	Andro Kull		
Title in Estonian	Infotehnoloogia infrastruktuuri arendamine		
Prerequisite course	-		
Compulsory literature	Lecture Notes		
Replacement			

<table>
<tr><td>literature</td><td colspan="2"></td></tr>
<tr><td>Subscription to the course and exam</td><td colspan="2">The number of participating students is not limited.
The precondition to get exam is submission of written group work. It is possible according to the Tallinn University study regulations eliminate deficiencies and take re-examination. It is not possible to pass the course using alternative study materials.</td></tr>
<tr><td>Requirements for independent work</td><td colspan="2">The written group work – analysis and proposals for correction of certain company's IT infrastructure. The form and description of work will be given by lecturer during the first lecture. The group works will be presented in seminar by the students.</td></tr>
<tr><td rowspan="2">Assessment criteria</td><td>Assessed knowledge and skills:
• The knowledge about concepts and terms
• The knowledge to name and understand IT infrastructure frameworks
• The knowledge to compare different IT infrastructure frameworks and analyze their suitability for a specific case.
• The knowledge to name and understand IT infrastructure standards
• The knowledge to analyze the impact of using certain standards
• The knowledge to analyze the technologies of virtualization and the potential use
• The knowledge to name and understand different cloud computing services
• The skills to assess and analyze the status of certain IT infrastructure and propose the improvements</td><td>Maximum score:
5 (points)
10
15
10
10
15
10
25</td></tr>
<tr><td colspan="2">100 - 91 % = grade A
90 – 81 % = grade B
80 – 71 % = grade C
70 – 61 % = grade D
60 – 51 % = grade E
50 – 0% = grade F</td></tr>
<tr><td>Information about the content of the course</td><td colspan="2">I (09.09.2012, 10:00-11:00) – introductory lecture (Andro Kull)
• Course description, objectives
• Description of group work</td></tr>
</table>

	• Passing the course, examination ***I (09.09.2012, 11:00-14:00) – (a practitioner from private sector)*** • The introduction of practical IT infrastructure development case based on certain company ***II (21.10.2012, 14:00-18:00) - IT infrastructure standardization (Taavi Valdlo)*** • Standard and standardization • IT standardization technical committee • International IT standardization • European IT standardization • The use of IT standards • Training and research ***III (18.11.2012, 14:00-18:00) – IT infrastructure frameworks, case study (Alar Krist)*** Introduction • Terms • History • Relationships • Different approaches o Enterprise Architecture Framework o Agile Enterprise Architecture o Architecture framework use case based on a private company ***IV (02.12.2012, 10:00-12:00) – Virtualization and cloud computing (a practitioner)*** • The purpose of virtualization • Methods and technologies • Cloud computing services • The analysis of use the virtualization and cloud computing ***IV (02.12.2012, 12:00-14:00) – development of state IT infrastructure (a practitioner from public sector)*** Development of IT infrastructure in state level, the case of Estonia ***V (16.12.2012, 10:00-14:00) – presentation of group works, discussion about the results (Andro Kull)*** Seminar

Course programme – IFI7022 IT Operations and Management

Course code IFI7022	**IT Operations and Management**		
ECTS credits: 5	Contact hours: 20	Semester: Spring	Examination
Course objective:	To obtain knowledge and skills for organizing IT in an enterprise; To acquire basic knowledge necessary for efective IT management; To acquire specifics of IT operations and management.		
Brief description of course content:	IT organization and management, processes, infrastructure, networks management, systems management, applications management. Monitoring and user support. Rights management. Procurements/acquisitions, IT contracts. Testing and operations continuity. IT and commercial orientation.		
Learning outcomes	The student: • - understands regulations, standards, specifications and methods applicable in IT management; • - is able to determine suitable business applications, • - is able to manage ICT resources (including licences), ICT administration and user support and the purchase of ICT tools.		
Assessment methods	Examination consists of two parts – written and oral.		
Responsible lecturer	Indrek Hiie		
Title in Estonian	Infotehnoloogia töökorraldus ja haldamine		
Prerequisite course	-		
Compulsory literature	IT juhtimise käsiraamat, Äripäev http://ksrmt.aripaev.ee/itjuhtimine		
Replacement literature	Best Practice for Service Support, OGC, 2000, ISBN 0-11-330015-8 Best Practice for Service Delivery, OGC, 2001, ISBN 0-11-330017-4		
Subscription to the course and exam	Attending lectures is mandatory. A course paper must be handed in by Friday on the week before the examination. Students taking the course who have not submitted the course paper cannot take the exam.		

Requirements for independent work	Independent work of students includes: selection of business applications in an enterprise. The amount of independent work is at least 80 hours. The assessment consists of the following components: 40% home work, 10% involvement in auditorial studies, 50% oral examination.
Assessment criteria	The examination takes place in a written form. Assessment of the exam: 40%: the course paper, 10%: the level of activity in participation in the course studies, 50%: the oral exam. Grading scale: A = 90% – 100% B = 80% – 89% C = 70% – 79% D = 60% – 69% E = 50% – 59% F = 0% – 49%
Information about the content of the course	IT infrastructure and how to uphold it, 2h Introduction to processes, 2 h Infrastructure processes, 3 h ITSM processes and models, 11 h Testing, 1h Service continuity, IT and business, summary, 1h

Course programme – IFI7115 Security and Privacy Matters

Course code IFI7115	**Security and Privacy Matters**		
ECTS credits: 3	Contact hours: 16	Semester: Spring	Examination
Course objective:	To promote the increasing role of security and privacy in today's information society, to develop skills in various fields related to security and privacy (e.g. PC security, wireless networks etc).		
Brief description of course content:	Security and privacy in the changing world. Ordinary users as a major risk factor in the Internet. Windows malware: an overview. Network scams and Internet crime. Privacy in the age of globalization. Wireless security. Network privacy versus censorship. Practical lab: Secure installation of Windows and Linux systems.		
Learning outcomes	The graduate: • Is aware of the major aspects of and current trends in computer security and privacy; • Understands the major threats to ordinary users and ways to address them; • Is aware of major types of online scams and network crime; • Understands the basics of securely installing MS Windows and Linux systems.		
Assessment methods	Examination consisting of following subtasks: • • Written paper of 5-10 pages on a relevant topic of the student's own choice (40%) • • Description of three interesting computer security cases (20%) • • Compilation of a secure installation guide for any non-trivial • application (20%) • • A short security audit of one's workplace or other suitable location (20%)		
Responsible lecturer	Kaido Kikkas		
Title in Estonian	Turvalisuse ja privaatsuse küsimused		
Prerequisite course	-		
Compulsory	Lecture Notes can be found at		

literature	http://http://akadeemia.kakupesa.net/TPK
Replacement literature	• Andrejevic, M. (2007). iSpy: Surveillance and Power in the Interactive Era. Kansas • Long, J. (2008). No Tech Hacking: A Guide to Social Engineering, Dumpster Diving, and Shoulder Surfing. Syngress • Mitnick, K. (2003) The Art of Deception: Controlling the Human Element of Security. John Wiley & Sons • Mägi, H., Vitsut, L. (2008). Infosõda: visioonid ja tegelikkus. Eesti Ekspressi Kirjastus • O'Hara, K, Shadbolt, N. (2008). The Spy in the Coffee Machine: The End of Privacy as We Know It. Oneworld • Different web sourses (references in Lecture Notes) Lecture Notes can be found at http://http://akadeemia.kakupesa.net/TPK
Subscription to the course and exam	Being present at lectures is not compulsory if the relevant skills/knowledge for practical taske is obtained previously or independently. Participation at seminars is strongly recommended.
Requirements for independent work	Independent tasks include • A 5-10 page paper (containing both referred and own research) on a freely chosen topic falling within the general field of the course – up to 40 points. • A brief introduction of three security-related incidents found to be of interest by the student - up to 20 points. • A brief (one-page) security audit of one's workplace, school or other suitable place - up to 20 points.
Assessment criteria	The overall grade is calculated based on the points total of independent tasks and the participation at seminars (up to 20 points). The standard grading system is used: A - over 90 B - 81-90 C - 71-80 D - 61-70 E - 51-60 F - under 51
Information about the content of the	Each lecture and each seminar lasts two academic hours. The classes:

course	19.02.12 at 14-18 in T-416 Introduction Lecture 1 - security in a changing world Lecture 2 – from the first virus to the malware industry 04 03.12 at 14-18 in S-303 Lecture 3 – cyberattacks and infowar Seminar 1 18 03.12 at 14-18 in S-303 Seminar 2 Seminar 3 29 04.12 at 14-18 in T-416 Lecture 4 – privacy in the networked world Lecture 5 - "There is no such thing as privacy at Facebook" (M. Zuckerberg) Conclusion

d. IMKE/HCI

Course programme – IFI7007 Research Methods

Course code IFI7007	**Research Methods**		
ECTS credits: 4	Contact hours: 27	Semester: Autumn	Examination
Course objective:	To create opportunities for acquiring theoretical knowledge about various research approaches and to support the development of the student's ability to apply different research methods as well as to evaluate the effectiveness of their use.		
Brief description of course content:	Classification and main features of research approaches and methods. Overview of research designs for empirical and design research: experiment, survey, ethnographic research, grounded theory, narrative research, case study, action research, evaluation research. The choice of methods depending on research purposes and questions. The course consists of seminars in which students are expected to be actively involved. In addition, every student must submit a home assignment, which consists of three parts and covers all methodological aspects of the research project.		
Learning outcomes	Can recognize and comparatively differentiate between different types of research designs; Can identify the main criteria for quality in academic research and can evaluate the quality of a given study according to these criteria; Can set up research questions and choose the appropriate methodology according to the set questions; Can design simple instruments for data collection; Can structure the study when writing it up and format the thesis according to the requirements.		
Assessment methods	Examination. Initial Research plan 20 %, research proposal 40 %, individual and group work in seminars 40 %.		
Responsible lecturer	Prof Tobias Ley, Dr. Terje Väljataga		
Title in Estonian	Uurimismeetodid		
Prerequisite course	-		
Compulsory literature	Reading one research article that will be assigned at the beginning of the course.		

Replacement literature	• Brewerton, Millward (2001). Organizational Research Methods, Sage • Cohen, Manion, Morrison (2007). Research Methods in Education. Routledge.
Subscription to the course and examination	Students must participate in 80% of the class sessions. Students must complete a short 2-page research plan about a research project they are planning, Students must write a more extensive 5 page research proposal as a basis for a research project they are planning and Students must participate in the in-class individual and group exercises
Requirements for independent work	Students must read and report on one research study, describe the research question, design, data collection and analysis Students must complete a 2-page research plan and an 8-page essay
Assessment criteria	A - 90-100% of the work is done - excellent: outstanding work with only a few minor errors. B - 80-90% of the work is done - very good: above average work but with some minor errors. C - 70-80% of the work is done - good: generally good work with a number of notable errors. D - 60-70% of the work is done - satisfactory: reasonable work but with significant shortcomings. E - 50-60% of the work is done - sufficient: passable performance meeting the minimum criteria. F- less than 50% of the work is done - fail: more work is required before the credit can be awarded.
Information about the content of the course	***Nov 2, 2012 at 10am to 1pm*** Session 1: Qualitative, Quantitative and Multimethod Research Strategies, How to write a research plan ***Nov 3, 2012 at 10am to 2pm*** Session 2: Correlational and Survey Research ***Nov 16, 2012 at 10am to 3pm*** Session 3: Experimental and Quasi-Experimental Research Designs ***Nov 17, 2012 at 10am to 2pm*** Session 4: Case Study Research, Conducting Interviews ***Nov 30, 2012 at 2pm to 5pm*** Session 5: Ethnographic and naturalistic research, Grounded Theory,

	Analyzing Verbal Data ***Dec 1, 2012 at 10am to 2pm*** Session 6: Design Research ***Dec 14, 2012 at 1pm to 5pm*** Session 7: Reporting Research Results, Ethical Considerations, Special issues for Organizational Settings

Course programme – IFI7137 Ethics and Law in New Media

Course code IFI7137	**Ethics and Law in New Media**		
ECTS credits: 5	Contact hours: 0/12 (weekly online meeting)	Semester: Autumn	Examination
Course objective:	Increasing the level of concern related to the uneven distribution of technology, networks and education, and the consequent problems with respect to gender, age, democracy and the economy; Promoting awareness of ethical problems and dilemmas in today's society in which media and IT are ubiquitous, thus making the consequences of questionable ethical decisions more profound; Encouraging awareness of political processes boosted by new media technologies (direct participation), empowering features of new media technologies for minority groups (e.g people with disabilities), as well as consideration of the influence of media in the new media context; Guiding the students towards new media solutions that avoid digital divides in terms of considerate design, and by taking into account the constraints of various special groups; Allowing students to obtain adequate insight into today's legal issues in new media, covering both traditional approaches (copyright, licenses, patents) and new community-based developments (Free, libre and open-source software, Creative Commons, content communities)		
Brief description of course content:	***(I) Ethical issues in the information society*** 1. Ethics in turbulent times 2. Towards the information society and networked world 3. Censors versus Cyberspace 4. Online Privacy versus the Big Brother 5.Rid the fools of their money – the online world of crime and fraud 6. The Digital Divide 7. Ubicomp – good or bad? 8. The Hacker Ethic in a Networked World 9. The Empowerment: Different People, Digital World 10. From Hacktivism to Cyberwar 11. Global networks in global politics (social movements, participatory democracy and the Net) 12. Social software, social engineering (social aspects of online manipulation)		

	(II) Legal matters and new media 1. Intro: the author vs the information society 2. The history and development of copyright 3. The proprietary world: the WIPO approach to intellectual property 4. More WIPO: Contracts and licenses 5. The hacker approach: the development of free licenses 6. The Millennium Bug in the WIPO model 7. One Microsoft Way: the world of proprietary software 8. The digital enforcement: DRM and others 9. The uneasy alliance: Free Software vs Open Source 10. The content models: Creative Commons 11. Hybrid approaches 12. What about the future? Independent tasks include reading, analysis of different materials and various types of reflection (blog, wiki, forum, Skype chat)
Learning outcomes	1. Realising the global dimension of new media as well as the social consequences of technological processes; 2. Awareness of the wide spectrum of ethical problems related to the digital world; 3. Good knowledge of legal matters both in traditional legal mechanisms (copyright, patents, trade secrets) and free/open-source culture
Assessment methods	Examination; in practice, the grade is established by the points collected throughout the course as follows: • A wiki-based written work in teams of 4-5 – up to 30 points • A review of another team's work – up to 5 points • Weekly blogging tasks – up to 48 points (up to 4 per week) • Forum discussion – up to 24 points (up to 2 per week) • Weekly chat participation – up to 12 points (1 per week) NB! The surplus of total points (119) is intentional!
Responsible lecturer	Kaido Kikkas
Title in Estonian	Uusmeedia eetilised ja juriidilised küsimused
Prerequisite	-

course	
Compulsory literature	Lecture Notes can be found at http:// http://beta.wikiversity.org/wiki/Ethics_and_Law_in_New_Media
Replacement literature	The reading list is located at http://beta.wikiversity.org/wiki/Ethics_and_Law_in_New_Media:_Reading_list
Subscription to the course and exam	Participation in weekly Skype chats is required; a passing grade in the course implies the collection of at least 51 points (See assessment)
Requirements for independent work	• A wiki-based written work in teams of 4-5 • A review of another team's work • Weekly blogging tasks • Forum discussion • Weekly chat participation Details are provided in the course guide at http://beta.wikiversity.org/wiki/Ethics_and_Law_in_New_Media:_Course_Guide
Assessment criteria	The grade is established by the total of points collected during the course (see assessment). The standard grading scale is used: A – more than 90 points B - 81-90 C - 71-80 D - 61-70 E - 51-60 F – less than 51
Information about the content of the course	The initial Skype chat session takes place on September 12, 2012 at 19:00 (7pm) Estonian summer time (EEST = UTC+3). Please establish the contact with the supervisor well ahead of this date (Skype: kakuonu; also e-mail kaido.kikkas@tlu.ee can be used). See the course website for more information: http://beta.wikiversity.org/wiki/Ethics_and_Law_in_New_Media

Course programme – IFI7155 Evaluating the User Experience

Course code IFI7155	**Evaluating the User Experience**		
ECTS credits: 5	Contact hours: 36	Semester: Spring	Examination
Course objective:	The goal of the course is to highlight the experiential, affective, meaningful and valuable aspects of human-computer interaction as a complement to pragmatic attributes such as utility, ease of use and efficiency of the system.		
Brief description of course content:	User experience: concepts and terminology User experience evaluation: methods, tools, metrics and criteria.		
Learning outcomes	Students recognize the main user experience concepts and terminology and understand their role in the context of human-computer interaction. Students are aware of the main user experience evaluation methods and are able to select them. Students know how to apply selected user experience evaluation tools and are able to interpret their results based on specific metrics and criteria.		
Assessment methods	Examination based upon: Evaluating user experience workshop, 60% of final grade; Critiqued book readings (assess over their rational, depth and reference soundness), 30% of final grade. Active Participation (assess the relevance of the comments and contributions on workshop reports and book reading concepts), 10% of final grade.		
Responsible lecturer	Sónia Sousa, PhD		
Title in Estonian	Kasutajakogemuse hindamine		
Prerequisite course	-		
Compulsory literature	• Elizabeth Goodman, Mike Kuniavsky, Andrea Moed. 2012. Observing the User Experience, Second Edition: A Practitioner's Guide to User Research. Morgan Kaufmann. • Marc Hassenzahl, User Experience and Experience Design, http://www.interaction-design.org/encyclopedia/user_experience_and_experience_design.html • Gilbert Cockton, Usability Evaluation, http://www.interaction-design.org/encyclopedia/usability_evaluation.html		

Replacement literature	• Tullis, 2008. Measuring the User Experience: Collecting, Analyzing, and Presenting Usability Metrics. Morgan Kaufmann.
Subscription to the course and examination	Students are required to: • Participate in all activities, including the online sessions; • Participate and report on a user experience evaluation workshop (group activity); and to • Elaborate two critique reading cards (individual activity).
Requirements for independent work	To elaborate two critique reading cards. The first reading essay is about user experience concepts and the second is about user experience evaluation metrics and criteria.
Assessment criteria	Grading criteria: A - 90-100%: Outstanding work with only a few minor errors. B - 80-90%: Above average work but with some minor errors. C - 70-80%: Generally good work with a number of notable errors. D - 60-70%: Reasonable work but with significant shortcomings. E - 50-60%: Passable performance meeting the minimum criteria. F- less than 50% - Fail: more work is required before the credit can be awarded. Grading criteria (reading cards): A - Excellent: the article is logically set in proper context and the depth and soundness of the reading card reflects a comprehensive understanding of all relevant issues. B - Very good: above average: the article is logically set in proper context but the depth and soundness of the reading card reflects a moderate understanding of all relevant issues. C - Good: the article is logically set in proper context and the depth and soundness of the reading card reflects a moderate understanding of all relevant issues. D - Satisfactory: the article is logically set in proper context but the depth and soundness of the reading card reflects a superficial understanding of relevant issues. E - Sufficient: the article is loosely set in its proper context and the depth and soundness of the reading card reflects a superficial understanding of the relevant issues. F- Fail: more work is required before the credit can be awarded.
Information about the content of the course	Schedule: 26.01 (2 hours) User experience: concepts and terminology. 26.01 (4 hours) User experience evaluation workshop.

	9.02 (2 hours) User experience evaluation: methods, tools, metrics and criteria. 9.02 (4 hours) User experience evaluation workshop. February/ March / April (18 hours) Online group discussions. 4.05 (2 hours) Reflection on the process and results of individual assignments. 4.05 (4 hours) Presentation and discussion of the results of the group assignments. Relevant dates: The reading cards should be submitted on 9.03 and 9.04.

Course programme – IFI7159 Foundations of Human Computer Interaction

Course code IFI7159	**Foundations of Human Computer Interaction**		
ECTS credits: 4	Contact hours: 16	Semester: Spring	Examination
Course objective:	This course introduces students to the field of human-computer interaction focusing on the human side of the equation.		
Brief description of course content:	This course comprises seven modules: 1) Visibility, Affordances, Mapping, Constraints, Conceptual models 2) Seven stages of action, Types of knowledge 3) Feedback, Errors, Forcing Functions, Gestalt laws, Responsiveness 4) The Human Processor Model, Fitts Law 5) Interface Efficiency, KLM, GOMS 6) State transition diagrams, Petri nets 7) History and vision		
Learning outcomes	After successfully attending this course, students will know how user interfaces have developed over the past decades, and what constants of human performance need to be considered when designing user interfaces.		
Assessment methods	The final grade is assigned as follows: • 10% - Participation in all online activities, including the synchronous sessions; • 20% - Book review (assignment 1); • 20% - Concept mapping (assignment 2); • 20% - Design critique based on the notions of visibility, affordances, mappings, constraints, and conceptual models (assignment 3); • 20% - Quantitative comparison of three different formulations of Fitts' Law (assignment 4); and • 10% - A reflection on the contents of a documentary in the context of this course, cooperatively written and three to four pages in length (assignment 5).		
Responsible lecturer	David Lamas, PhD		
Title in Estonian	Sissejuhatus uusmeediasse ja selle teoreetilised põhialused		

Prerequisite course	-
Compulsory literature	Donald Norman, The Design Of Everyday Things, ISBN 0465067107 (Required reading) Lecture Notes can be found at http://http://ifi7159.wordpress.com/
Replacement literature	1) Alan Dix, Janet Finlay, Gregory D. Abowd, Russell Beale, Human-Computer Interaction , ISBN 0130461091 (complementary reading, available from the Library) 2) Ben Schneiderman, Designing the User Interface: Strategies for Effective Human-Computer Interaction, ISBN 0321197860 (complementary reading, available from the Library)
Subscription to the course and exam	This course is delivered online. Online activities are organized in bi-weekly modules, each focusing on a specific set of topics. Each module runs from the Monday of the first week to the Sunday of the second week and will be kick-started by a face-to-face meeting and a post by one of the course facilitators. All comments, questions and outcomes of the required activities must be reflected in the bi-weekly posts of course webpage. In groups of three or four, students are further required to: • Critique objects surrounding them, in both the physical and the virtual world, using the visibility, affordance, mapping, constraint, and conceptual models of design principles; • Quantitatively compare three different formulations of Fitts' Law; and • Cooperatively write a reflection on the contents of a documentary in the context of this course, three to four pages in length.
Requirements for independent work	In order to successfully conclude this course, students are required to individually: • Take part in all online activities, including the synchronous sessions; • Write a book review; and • Build a concept map of the topics addressed in the course.
Assessment criteria	Grading criteria: A - 90-100%: Outstanding work with only a few minor errors. B - 80-90%: Above average work but with some minor errors. C - 70-80%: Generally good work with a number of notable errors. D - 60-70%: Reasonable work but with significant shortcomings. E - 50-60%: Passable performance meeting the minimum criteria. F- less than 50% - Fail: more work is required before the credit can be

	awarded.
Information about the content of the course	Face-to-face session on January 28th at 6pm – 8pm in A-303. Schedules: ***Weeks 1 and 2*** • Read the topic Visibility, Affordances, Mapping, Constraints, Conceptual models; • Read and start working on Assignment 1 (the book review); • Read and start working on Assignment 2 (the concept maps); • Read and start working on Assignment 3 (design critique based on the notions of visibility, affordances, mappings, constraints, and conceptual models); • Meet online, over Google Hangouts, by the end of Week 1; • Partially deliver the results of Assignment 2 (this topics' concept map); and • Deliver the results of Assignment 3 (design a critique based on the notions of visibility, affordances, mappings, constraints, and conceptual models). ***Weeks 3 and 4*** • Read the topic Seven stages of action, Types of knowledge; • Meet online, over Google Hangouts, by the end of Week 3; and • Partially deliver the results of Assignment 2 (this topics' concept map). ***Weeks 5 and 6*** • Read the topic Feedback, Errors, Forcing, Gestalt laws, Responsiveness; • Meet online, over Google Hangouts, by the end of Week 5; and • Partially deliver the results of Assignment 2 (this topics' concept map). ***Weeks 7 and 8*** • Read the topic The Human Processor Model, Fitts Law; • Read and start working on Assignment 4 (quantitative comparison of three different formulations of Fitts Law); • Meet online, over Google Hangouts, by the end of Week 7; • Partially deliver the results of Assignment 2 (this topics' concept map); and • Deliver the results of Assignment 4 (quantitative comparison of three different formulations of Fitts Law). ***Weeks 9 and 10***

	• Read the topic Interface efficiency, KLM, GOMS; • Meet online, over Google Hangouts, by the end of Week 9; and • Partially deliver the results of Assignment 2 (this topics' concept map). ***Weeks 11 and 12*** • Read the topic State transition diagrams, Petri nets; • Meet online, over Google Hangouts, by the end of Week 11; and • Partially deliver the results of Assignment 2 (this topics' concept map). ***Weeks 13 and 14*** • Read the topic History and vision; • Read and start working on Assignment 5 (a cooperatively written reflection on the contents of a documentary in the context of this course, three to four pages in length); • Meet online, over Google Hangouts, by the end of Week 13; • Deliver the results of Assignment 1 (the book review); and • Deliver the results of Assignment 2 (this topics' concept map together with the full concept map on this course); and • Deliver the results of Assignment 5 (a cooperatively written reflection on the contents of a documentary in the context of this course, three to four pages in length).

Course programme – IFI7171 Philosophy of Human-Computer Interaction

Course code IFI7171	Philosophy of Human-Computer Interaction		
ECTS credits: 4	Contact hours: 24	Semester: Autumn/Spring	Examination
Course objective:	To create opportunities for the students to develop their experience-based knowledge in dealing with concrete situations related to the effective as well as responsible use of technological artefacts.		
Brief description of course content:	During the course we will be dealing with four specific categories of situations in which technological artefacts shape our experience of: 1) Cognitive situations in which people are using technological artefacts; 2) moral situations; 3) social/political situations in which technological artefacts affect people's experience of being part of society as citizens; 4) existential situations. The leading question will be: how do technological artefacts shape people's experience in dealing with all these cognitive tasks? How do technological artefacts shape our experience to be morally concerned about other people? How do they affect our readiness to perceive others' needs and solve moral dilemmas? Existential situations are those in which people attempt to give meaning to and reflect about their life, their identity, and the vital choices they make in life. How do technological artefacts re-define certain crucial experiences like knowing oneself and/or becoming more aware of certain "facts" of life? The method that will be used is phenomenology. Phenomenology is defined as the study of meaningful experience. Phenomenology as a method involves a reflective attitude that is not related to how things are in abstract terms, but to how a person actually lives and perceives them. Phenomenological descriptions are not reports or accounts given from the observer's point of view, impersonal, unrelated, and emotionally detached, but they are given from the participant's point of view. This implies a reference to the person's beliefs, feelings, attitudes, impressions, values, reflections, prejudices, etc. Given the nature of the course, the active participation of students will play a pivotal role. Each student will be asked to try to become a phenomenologist, namely, to be reflectively engaged in his or her personal experience with technological artifacts and to discuss it with other students. In order to guide and facilitate the students in this process, the lecturer will give an introduction to interpretative phenomenological analysis and will also provide a sort of toolbox composed by a number of concepts coming from the tradition of philosophy and cognitive science such as, for instance, cognitive and moral mediator, extended agency, distributed and embodied cognition,		

	affordance, cipher, tacit knowledge, cultural and digital niche, disembodiment and re-embodiment of knowledge.
Learning outcomes	The learner has acquired the skills necessary to analyze his/her own experience with technological artefacts The learner has acquired the skills on how to describe his/her own experience with technological artefacts The learner has acquired the skills to discuss other peoples' experience with technological artefacts and to integrate it into his/her own experience. The learner has acquired the skills to combine different concepts related to philosophy and cognitive science in order to analyse and present his/her own experience with technological artefacts. The learner has acquired skills in written expression.
Assessment methods	***Essay*** The essay should be about 3000 words and cover any subject within the general limits of the course. Topic and title should be briefly discussed with the supervisor. The paper will deliver up to 80 points of the total assessment. ***Written Tasks*** There will be a written task for each lecture with a total of 4 tasks. The task should be done in written form by using a blog or by e-mailing the teacher. A task can be the discussion of a statement or the analysis of a clip by using information and knowledge acquired during the class meetings. Each task will be given at the end of each lecture and students will have approximately a week to complete it. Students should allow the teacher to keep track of their progress over newsfeed (RSS) or by email. The written task will deliver up to 20 points of thre total assessment.
Responsible lecturer	Emanuele Bardone, PhD
Title in Estonian	Inimese ja arvuti interaktsiooni filosoofilised aspektid
Prerequisite course	-
Compulsory literature	1) Bardone, E., Seeking Chances: From Biased Rationality to Distributed Cognition. Springer, Berlin, 2011: Chapter 6. 2) Bardone, E., Unintended Affordances as Violent Mediators. Maladaptive affects of Technologically Enriched Cognitive Niches, International Journal of Technoethics, 2(4), 37-52, 2011. 3) Clark, A., Soft selves and ecological control. In Ross at al. (eds),

	Distributed Cognition and the Will, MIT Press, Cambridge, 2007. 4) Dror, I.E. & Harridan S., Offloading cognition onto cognitive technology. In Dror, I.E. & S. Harridan, Cognition Distributed. How cognitive technology extends our minds, John Benjamins, New York, 2007. 5) Van Manen, M. Researching Lived Experience. State University of New York Press, New York, 1990, Chapter 1 and 2. 6) Light, A., Adding method to meaning: A technique for exploring peoples' experience with technology, Behavior and Information Technology, 25(2), 175-187, 2006.
Replacement literature	1) Smith, J.A., Flowers, P., Larkin, M., Interpretative Phenomenological Analysis. Sage, New York, 2012, Section A. 2) Bardone, E., Seeking Chances: From Biased Rationality to Distributed Cognition. Springer, Berlin, 2011: Chapter 3 and 4. 3) Perry, M., Distributed Cognition". In J.M. Carroll (Ed.) HCI Models, Theories, and Frameworks: Toward an Interdisciplinary Science, Morgan Kaufmann, 2003: 193-223. 4) McCarthy, J. and Wright, P., Technology as Experience. MIT Press, Cambridge, MA, 2007.
Subscription to the course and exam	Requirements that should be fulfilled in order for the student to be admitted to the exam: students should not miss more than 25% of their class meetings.
Requirements for independent work	A 3000-word essay and completion of the written tasks.
Assessment criteria	91 or more - "A": The learner has acquired the skills to analyse his/her own experience with technological artefacts The learner has fully acquired the skills to describe his/her own experience with technological artefacts The learner has fully acquired the skills to discuss other peoples' experience with technological artifacts and integrate it into his/her own experience. The learner has fully acquired the skills to combine different concepts related to philosophy and cognitive science in order to analyze and present his/her own experience with technological artefacts. The learner has fully acquired skills in written expression. 81-90 - "B" The learner has satisfactorily acquired the skills to analyse his/her own experience with technological artefacts The learner has satisfactorily acquired the skills to describe his/her own

	experience with technological artefacts The learner has satisfactorily acquired the skills to discussion other peoples' experience with technological artefacts and to integrate it into his/her own experience. The learner has satisfactorily acquired skills to combine different concepts related to philosophy and cognitive science in order to analyze and present his/her own experience with technological artefacts. The learner has satisfactorily acquired skills in written expression. 71-80 - "C" The learner has sufficiently acquired the skills to analyse his/her own experience with technological artefacts The learner has sufficiently acquired the skills to describe his/her own experience with technological artefacts The learner has sufficiently acquired the skills to discuss others people' experience with technological artefacts and integrate it into his/her own experience. The learner has sufficiently acquired the skills to combine different concepts related to philosophy and cognitive science in order to analyse and present his/her own experience with technological artefacts. The learner has sufficiently acquired skills in written expression. 61-70 - "D" The learner has superficially acquired the skills to analyse his/her own experience with technological artefacts. The learner has superficially acquired the skills to describe his/her own experience with technological artefacts. The learner has superficially acquired the skills to discuss other peoples' experience with technological artefacts and integrate it into his/her own experience. The learner has superficially acquired the skills to combine different concepts related to philosophy and cognitive science in order to analyse and present his/her own experience with technological artefacts. The learner has superficially acquired skills in written expression. 51-60 - "E" The learner has partly acquired the skills to analyse his/her own experience with technological artefacts. The learner has partly acquired the skills to describe his/her own experience with technological artefacts. The learner has partly acquired the skills to discuss other peoples' experience with technological artefacts and integrate it into his/her own experience. The learner has partly acquired the skills to combine different concepts related to philosophy and cognitive science in order to analyse and

	present his/her own experience with technological artefacts. The learner has partly acquired skills in written expression. 50 or less - "F" The learner has failed to acquire the skills to analyse his/her own experience with technological artefacts. The learner has failed to acquire the skills to describe his/her own experience with technological artefacts. The learner has failed to acquire the skills to discuss other peoples' experience with technological artefacts and to integrate it into his/her own. The learner has failed to acquire the skills to combine different concepts related to philosophy and cognitive science in order to analyze and present his/her own experience with technological artefacts. The learner has failed to acquire skills in written expression.
Information regarding the content of the course	Class 1 (4 hours): Introduction to the phenomenological method; Class 2 (4 hours): Technological artefacts and cognition Class 3 (4 hours): Technological artefacts and morality Class 4 (2 hours): Online discussion on home assignments Class 5 (4 hours): Technological artefacts and society Class 6 (4 hours): Technological artefacts and life Class 7 (2 hours): Online discussion on home assignments

e. Educational Technology

Course programme – IFI7051 Principles of Instructional Design

Course code IFI7051	**Principles of Instructional Design**		
ECTS credits: 4	Contact hours: 28	Semester: Autumn	Examination
Course objective:	This course aims to introduce the pedagogical and technological methods of developing multimedia-based courses, providing an integrated approach to theory and practice of instructional design, and the formation of skills needed for learning design. The course prepares participants for contributing to real-life course design projects and serves as input for the following course IFI7056 Research Trends and Evaluation in Educational Technology.		
Brief description of course content:	Independent study 2 ECTS, collaborative online activities and contact days: 2 ECTS. Participants will be engaged in practical assignments in the context of a group project which takes them through four phases of learning design: needs analysis, selection and sequencing of the learning content, design of learning environment, and formative evaluation of the course.		
Learning outcomes	Upon successful completion of the course, participants will be able to: • Analyse the needs of their target group and define the learning objectives for a course; • Apply concept mapping and task analysis techniques for domain analysis; • Select instructional strategies and tactics suitable for the target group; • Create learning design diagrams and storyboards to present their instructional strategy; • Select and adapt suitable online tools for creating an effective online learning environment; • Prepare formative evaluation plan for a course prototype.		
Assessment methods	Examination. Grade is awarded based on three components: • Participation in seminars and reflection on blogs: 20% • One group work task: 20% • Three individual tasks: 60%		
Responsible lecturer	Mart Laanpere		

Title in Estonian	Õppedisaini alused
Prerequisite course	-
Compulsory literature	Jeroen J. G. Van Merrienboer , Paul A. Kirschner (2007) Ten Steps to Complex Learning. *A Systematic Approach to Four-Component Instructional Design.* Merrill, David, First Principles of Instruction, ETR&D, Vol. 50, No. 3, 2002, pp. 43-59 ISSN 1042-1629. van Merriënboer, J. J. G., Clark, R. E., de Croock, M. B. M. (2002) Blueprints for complex learning: The 4C/ID-model. Educational Technology, Research and Development, 50 (2);39-64, DOI: 0.1007/BF02504993 Lecture Notes can be found at http:// Loengukonspekt LeMill keskkonnas; An Introduction to Educational Design Research, 2007.
Replacement literature	van Merriënboer, J. J. G. (1997). Training Complex Cognitive Skills: A Four-Component Instructional Design Model for Technical Training. Englewood Cliffs, New Jersey: Educational Technology Publications. Reigeluth (ed.) (1999). Instructional-Design Theories and Models: A New Paradigm of Instructional Theory, Vol. 2 (Instructional Design Theories & Models), Lawrence Erlbaum Associates Orey, M. (Ed.), Emerging perspectives on learning, teaching, and technology. Department of Educational Psychology and Instructional Technology, University of Georgia
Subscription to the course and exam	Limit of participants: 30 Requirements for being allowed to sit an examination: Presentation of three independent pieces of work and one completed group work assignment no later than one week before the exam.
Requirements for independent work	Individual homework: • Comparative analysis of two instructional design models • Formulating the problem/context of one lesson/module of a mini-course created as a course project, objectives and learning outcomes, compiling a sequence of study activities • Compiling the components of one lesson/module of the web-based course to be created (learning objects with info and examples) Group work: • Draft of a web-based mini course, incl. LD diagram of teaching strategies, prototype of study environment and plan of evaluation
Assessment criteria	Assessment is based on the following criteria:

	Criterion 1: completion of homework A – All completed individual and group work tasks are presented in time, completed with exemplary thoroughness and reflect command of the topic. B – Completed individual homework and group work tasks are presented in time, but there are a few shortcomings evident in content. C – One of the four homework tasks is not submitted or most submitted work includes notable shortcomings. D – One of the four homework tasks is not submitted and substantial shortcomings are present in others. E – Two of four homework tasks are not submitted and substantial shortcomings are evident in others. ***Criterion 2***: participation in practical courses, web discussions and a blog reflection. A – student has actively participated in all practical courses and web discussions, reflected weekly in the study journal B – there are a few substantial shortcomings present in the student´s practical course work or reflection (mistakes, carelessness, insufficient thoroughness) C – student has not completed one task of the practical course or 1-2 weeks of independent reflection of studies D – there are repeated substantial flaws or omissions in student´s practical course work or reflection E – half of the submitted practical course work and reflections are performed at an unsatisfactory level or not submitted.
Information about the content of the course	***8 September 2012, kell 10.00 – 14.00*** Contact Day 1. Introductory lecture and practical course. Main concepts of instructional design, relation of instructional design and learning theories. Forming groups and selection of group work topic. Introduction to web-based learning environment (LePress). Defining the topic and target group of the group work course project. 9 - 30 September 2012 – Independent work with literature on the following topic: Models of instructional design phase 1. Individual work in web environment: comparative analysis of two instructional design models. ***6 October 2012, at 10.00 – 14.00*** Contact Day 2. Lecture: Hierarchical task analysis. Classes for learning activities. Formulating learning activities. Practical course: formulating the learning activities and outcomes of one´s e-course. 7 – 18 October 2012 – Independent work with literature on the following topic: Standards of learning technology. Individual homework: planning

	receding implementation for learning activity (product- and process-centred support). 21 October – 15 November – Independent work with literature on the following topic: Teaching strategies. Individual task: Study design of a module in LD form. ***17 November 2012, at 10.00 – 14.00*** Contact Day 4. Lecture: Study materials, learning objects. Individual homework: Creating learning objects, exercises and means of assessment for one lesson of the e-course. 18 – 29 November 2012 – Independent work with literature on the topic: Developing a learning environment. Group work in web environment: developing a prototype of the e-course. ***1 December 2012, 1 at 10.00 – 14.00*** Contact Day 5. Lecture and practical course on the topic: Evaluation of the e-course. ***8 January 2013 – EXAMINATION***

Course programme – IFI7052 Learning Environments and Learning Networks

Course code IFI7052	Learning Environments and Learning Networks		
ECTS credits: 3	Contact hours: 12	Semester: Autumn	Exam
Course objective:	The objective of this course is to introduce different possibilities as well as to provide necessary theoretical knowledge and practical skills for planning, designing, implementing and managing various learning environments and networks.		
Brief description of course content:	The role of learning environments and networks. Monolithic and centralised learning management systems. Distributed and personal environments. Social media and their affordances for desgining and implementing learning environments and networks. E-portfolio implementations. Technology and specification of learning environments. RSS and information flow. Folksonomy and social bookmarking. Widgets. Identity management and open ID. Roles in different environments. Trends and future development of learning environments and networks. This course introduces different learning environments and networks, their planning, implementation and management. Special attention will be paid to various social media applications and their affordances for individual and group work. Contact days offer both theoretical knowledge and practical skills for designing learning environments and networks.		
Learning outcomes	• A student: • Acquires knowledge about the roles of learning environments and networks in a learning process; • Is able to identify differences, advantages and challenges of open distributed learning environments and closed, centralised learning management systems; • Is able to analyse affordances of different social media applications according to their own (others) learning activities and combine as well as implement them effectively; • Is able to effectively organize, design and support their own learning environments as well as that of others; • Understands the changes in learner and teacher roles in different environments; • Understands one own's role for designing and implementing personal and group learning environments; • Acquires knowledge about trends and development of learning environments and networks.		
Assessment methods	Pass/Fail assessment; based on participation in blog seminars,		

	presention of group work and a written essay.
Responsible lecturer	Terje Väljataga
Title in Estonian	Õpikeskkonnad ja õpivõrgustikud
Prerequisite course	-
Compulsory literature	• Väljataga, T. & Põldoja H. (2011). Õpikeskkonnad ja õpivõrgustikud. http://opikeskkonnad.wordpress.com • Becker, S.W. , Henriksen, R.K. (2006). In search of the next generation online learning environment. Available at: www.ectolearning.com/.../Ecto%20-%20Next%20Generation%20Learning.pdf • Pata, K. & Laanpere, M. (2009). Haridustehnoloogia käsiraamat. Tiigrihüpe. TLU Informaatika Instituut. • Hall, R. (2009). Towards fusion of formal and informal learning environments: the impact of the read/write web. Electronic Journal of e-Learning. Volume 7, Issue 1 (pp. 29 - 40) • Attwell, G. (2007). Personal Learning Environments - the future of eLearning? eLearning papers, 2(1). • Couros, A. (2003). Communities of practice: a literature review.
Replacement literature	• Dillenbourg, P., Schneider, D., Paraskevi, S. (2002). Virtual Learning Environments. In A. Dimitracopoulou (Ed.), Proceedings of the 3rd Hellenic Conference on Information & Communication Technologies in Education (pp. 3-18). Rhodes: Kastaniotis Editions. • Jonassen, D. & Land, S.M. (2008). Theoretical Foundations of Learning Environments. LEA. ASIN: B001OLRNWC • Abdelraheem, A.Y. (2003). Computerised learning environments: problems, design challenges and future promises. The journal of interactive online learning. Volume 2, Number 2. • Wilson, B. (1995). Metaphors for instruction: Why we talk about learning environments. Educational Technology, 35(5), 25-30. • Hannafin, M. J., Land, S., & Oliver, K. (1999). Open learning environments: Foundations and models. In C. M. Riegeluth (Ed.), Instructional design theories and models: A new paradigm of instructional theory (pp. 115-140). Mahwah, NJ: Erlbaum. • Johnson, M., Liber, O. (2008). The Personal Learning Environment and the human condition: from theory to teaching practice. Interactive learning environments. Volume 16, Issue 1 (pp.3-15). • Bennet, S. (2006). First questions for designing higher education

	learning spaces. The Journal of Academic Librarianship, Volume 33, Number 1, pages 14–26. • Hiemstra, R. (1991). Aspects of effective learning envionments. In R. Hiemstra (Ed.) Creating environments for effective adult learning. ISBN 1-55542-784-7 • Anderson, G., Boud, D., & Sampson, J. (1996). Learning contracts: a practical guide. New York: Routledge. • Boak, G. (1998). A complete guide to learning contracts. Hampshire: Gower Publishing, Ltd. • Motschnig-Pitrik, R., Derntl, M., & Mangler, J. (2003). Web-support for learning contracts: concept and experiences. Paper presented at the 2nd International Conference on Multimedia and Information & Communication Technologies in Education. • Harri-Augstein, S., & Thomas, L. (1991). Learning conversations: the self-organised way to personal and organisational growth. London: Routledge. • Couros, A. (2010). Developing Personal Learning Networks for Open and Social Learning. In G. Veletsianos (Ed.). Emerging Technologies in Distance Education. Athabasca University Press. • Põldoja, H., Väljataga, T. (2010). Externalization of a PLE: Conceptual Design of LeContract. In: The PLE 2010 Conference Proceedings.
Subscription to the course and exam	There are no requirements for participation in contact lessons. However, participation in contact lessons is recommended. In order to PASS an assessment a student must: a) participate in all weblog seminars (i.e. submit analytical/reflective posts on the topics treated during the course in a personal weblog in the required time); b) submit a short video on the topics of the learning environment as a group assignment.
Requirements for independent work	Independent work: Each alternative week, submit a reflective and analytical weblog post based on the topics treated during the given week; complete an individual study contract at the beginning of the course and reflect upon it during the course. Consultations take place on contact days or via social media during the time the course takes place.
Assessment criteria	Pass/Fail assessment. In order to obtain a PASS, a student must participate in all weblog seminars, present and defend group work in the due time. The weblog posts are considered completed if the participant has had the courage to post his/her work in a public environment without being embarrassed or ashamed; his/her posts include an analytical and reflective component; are in compliance with the topic of the given week; answer questions presented in the tasks; include original

	ideas of the student and demonstrate understanding of reading materials. References to research articles included in the post must be correctly presented (APA6 reference system is recommended).
Information about the content of the course	Independent work must be presented by the end of each week. ***Times of contact days:*** Saturday 06.10.2012 at 14.00 - 18.00 Room T-416 Sunday 18.11.2012 at 14.00 - 18.00 Room T-201 Saturday 15.12.2012 at 14.00 - 18.00 Room T-201/T-416 ***Course schedule:*** Topic 1 – Introduction, setting up the learning environment, self-introduction and study contract; What is a learning environment? (Deadline: 16.09) Topic 2 – Positive and negative points of study management systems (Deadline: 30.09) Topic 3 – Means of social media (Deadline: 14.10) ***I contact day*** 6.10 14.00 – 18.00 Topic 4 – Technologies and standardization related to learning environments (28.10) Topic 5 – Personal learning environments (11.11) ***II contact day*** 18.11 14.00 – 18.00 Topic 6 – Learning networks (25.11) Topic 7 – e-portfolios & competences (9.12) ***III contact day*** 15.12 at 14.00 – 18.00 Feedback and summaries

Course programme – IFI7053 Creating Digital Learning Resources

Course code IFI7053	**Creating Digital Learning Resources**		
ECTS credits: 3	Contact hours: 12	Semester: Spring	Exam
Course objective:	To obtain basic knowledge and skills for creating digital learning resources and an overview of technologies and tools used for creating digital learning resources.		
Brief description of course content:	***Topics***: Learning objects. Learning object repositories. Describing learning objects with metadata. IEEE LOM. Tools for creating learning objects and content packages. SCORM, IMS Common Cartridge. Computer-based assessment. IMS QTI. Tools for creating questions and tests. New technologies for creating learning resources: e-textbooks, interactive whiteboards, podcasting. Learning resources and copyright, open content licenses, open educational resources. Referencing. Quality of learning resources. The work volume necessary for completing the course is 78 (3×26) hours of which 12 hours take place as contact hours in seminar form. ***Independent work***: As individual work, students must set up a personal learning environment based on a weblog, get acquainted with reading materials, perform practical tasks, write weblog posts based on these, monitor and comment on the weblogs of other participants in the course and write a summary of the course. The calculated volume of independent work is 46 hours. As group work, study material introducing one means of creating study materials must be compiled and presented at the last seminar. The calculated volume of group work is 20 hours per each group member.		
Learning outcomes	The student: • Understands the main technologies and tools for creating digital learning resources • Is able to create learning objects and content packages, and describe these with metadata. • Is able to create computer-based tests. • Understands copyright and referencing principles of digital learning resources.		
Assessment methods	The examimnation grade consists of the following components: • Blog posts based on individual assignments (70%) • Learning resource created as a group assignment (30%)		

Responsible lecturer	Hans Põldoja
Title in Estonian	Digitaalsete õppematerjalide koostamine
Prerequisite course	-
Compulsory literature	Põldoja, H. (2013). Digitaalsete õppematerjalide koostamine. http://oppematerjalid.wordpress.com One article on each topic must be read as compulsory literature. The article can be chosen from the list below or a relevant article by mutual agreement with the lecturer. Links to articles are given on the course homepage: http://oppematerjalid.wordpress.com/artiklid/. ***Concept of learning object and means of distributing study materials:*** 1) Wiley, D. A. (2000). Connecting learning objects to instructional design theory: A definition, a metaphor, and a taxonomy. In D. A. Wiley (Ed.), The Instructional Use of Learning Objects: Online Version. 2) Polsani, P. R. (2003). Use and Abuse of Reusable Learning Objects. Journal of Digital Information, 3(4). 3) McGreal, R. (2004). Learning Objects: A Practical Definition. International Journal of Instructional Technology and Distance Learning (IJITDL), 9(1), 21–32. 4) McGreal, R. (2008). A Typology of Learning Object Repositories. In H.H. Adelsberger, Kinshuk, J.M. Pawlowski, & D.G. Sampson (Eds.), Handbook on Information Technologies for Education and Training (pp. 5–28). Heidelberg: Springer. 5) Barker, P., & Campbell, L. M. (2010). Metadata for Learning Materials: An Overview of Existing Standards and Current Developments. *Technology, Instruction, Cognition and Learning, 7*(3–4), 225–243. ***Means of compiling study materials:*** 1) Khademi, M., Haghshenas, M. & Kabir, H. (2011). A Review On Authoring Tools. In 5th International Conference on Distance Learning and Education (pp. 40–44). 2) Gonzalez-Barbone, V., & Anido-Rifon, L. (2010). From SCORM to Common Cartridge: A step forward. Computers & Education, 54(1), 88–102. doi:10.1016/j.compedu.2009.07.009 3) Leinonen, T., Purma, J., Põldoja, H., & Toikkanen, T. (2010). Information Architecture and Design Solutions Scaffolding Authoring of Open Educational Resources. IEEE Transactions on Learning Technologies, 3(2), 116–128. doi:10.1109/TLT.2010.2 4) Boyle, T. (2009). Generative learning objects (GLOs): design as the basis for reuse and repurposing. In First International Conference on e-Learning and Distance Learning, Riyadh, Saudi Arabia, March

16-18 2009 (pp. 1–22).

5) Ball, S., & Tenney, J. (2008). Xerte – A User-Friendly Tool for Creating Accessible Learning Objects. In K. Miesenberger, J. Klaus, W. Zagler, & A. Karshmer (Eds.), Computers Helping People with Special Needs: 11th International Conference, ICCHP 2008, Linz, Austria, July 9–11, 2008. Proceedings (pp. 291-294). Berlin / Heidelberg: Springer.

Computer-based testing:

1) Thelwall, M. (2000). Computer-based assessment: a versatile educational tool. Computers & Education, 34(1), 37–49. doi:10.1016/S0360-1315(99)00037-8

2) Arneil, S., & Holmes, M. (1999). Juggling hot potatoes: decisions and compromises in creating authoring tools for the Web. ReCALL, 11(2), 12–19.

3) AL-Smadi, M., Guetl, C., & Helic, D. (2009). Towards a standardized e-assessment system: Motivations, challenges and first findings. International Journal of Emerging Technologies in Learning, 4, 6–12.

4) Põldoja, H., Väljataga, T., Laanpere, M., & Tammets, K. (2012). Web-based self- and peer-assessment of teachers' digital competencies. World Wide Web. doi:10.1007/s11280-012-0176-2

5) Tomberg, V., Kuli, R., Laanpere, M., & Normak, P. (2010). Delivering QTI Self-tests to Personal Learning Environments Using Wookie Widgets. In X. Luo, M. Spaniol, L. Wang, Q. Li, W. Nejdl, & W. Zhang (Eds.), Advances in Web-Based Learning – ICWL 2010 9th International Conference, Shanghai, China, December 8-10, 2010. Proceedings (pp. 250–258). Berlin / Heidelberg: Springer.

New technologies for compiling study materials:

1) Higgins, S. (2010). The Impact of Interactive Whiteboards on Classroom Interaction and Learning in Primary Schools in the UK. In M. Thomas & E. C. Schmid (Eds.), Interactive Whiteboards for Education: Theory, Research and Practice (pp. 86–101). Hershey, Pa: IGI Global.

2) Maher, D., Phelps, R., Urane, N., & Lee, M. (2012). Primary school teachers' use of digital resources with interactive whiteboards: The Australian context. Australasian Journal of Educational Technology, 28(1), 138–158.

3) McFadden, C. (2012). Are Textbooks Dead? Making Sense of the Digital Transition. Publishing Research Quarterly, 28(2), 93–99. doi:10.1007/s12109-012-9266-3

4) Rockinson- Szapkiw, A. J., Courduff, J., Carter, K., & Bennett, D. (2013). Electronic versus traditional print textbooks: A comparison study on the influence of university students' learning. Computers & Education, 63(0), 259–266. doi:10.1016/j.compedu.2012.11.022

5) Kay, R. H. (2012). Exploring the use of video podcasts in

education: A comprehensive review of the literature. Computers in Human Behavior, 28(3), 820–831. doi:10.1016/j.chb.2012.01.011

6) Tabuenca, B., Drachsler, H., Ternier, S., & Specht, M. (2012). OER in the Mobile Era: Content Repositories' Features for Mobile Devices and Future Trends. eLearning Papers, 32.

Copyright of study materials:

1) Bissell, A. (2009). Permission granted: open licensing for educational resources. Open Learning: The Journal of Open and Distance Learning, 24(1), 97–106. doi:10.1080/02680510802627886
2) Keats, D. (2006). Implications of the NonCommercial (NC) Restriction for Educational Content. The African Journal of Information and Communication, 7, 74–80.
3) Schaffert, S., & Geser, G. (2008). Open Educational Resources and Practices. eLearning Papers, 7.
4) Wiley, D., & Gurrell, S. (2009). A decade of development…. Open Learning: the Journal of Open and Distance Learning, 24(1), 11–21. doi:10.1080/02680510802627746
5) Hilton, J., III, Wiley, D., Stein, J., & Johnson, A. (2010). The Four R's of Openness and ALMS Analysis: Frameworks for Open Educational Resources. Open Learning: The Journal of Open, Distance and E-Learning, 25(1), 37–44. doi:10.1080/02680510903482132

Referring to sources:

1) Kern, M. K., & Hensley, M. K. (2011). Citation Management Software. Reference & User Services Quarterly, 50(3), 204–208.
2) Zaugg, H., West, R. E., Tateishi, I., & Randall, D. L. (2011). Mendeley: Creating Communities of Scholarly Inquiry Through Research Collaboration. *TechTrends, 55*(1), 32–36. doi:10.1007/s11528-011-0467-y

Quality of study materials:

1) Leacock, T. L., & Nesbit, J. C. (2007). A Framework for Evaluating the Quality of Multimedia Learning Resources. Educational Technology & Society, 10(2), 44–59.
2) Sofos, A., & Kostas, A. (2009). Pedagogically-Oriented Evaluation Criteria for Educational Web Resources. eLearning Papers, 17.
3) Clements, K. I., & Pawlowski, J. M. (2011). User-oriented quality for OER: understanding teachers' views on re-use, quality, and trust. Journal of Computer Assisted Learning, 28(1), 4–14. doi:10.1111/j.1365-2729.2011.00450.x
4) Auvinen, A.-M. (2009). The challenge of quality in peer-produced eLearning content. eLearning Papers, 17.
5) Paulsson, F., & Naeve, A. (2007). Establishing Technical Quality Criteria for Learning Objects. In P. Cunningham & M. Cunningham

	(Eds.), *Exploiting the Knowledge Economy: Issues, Applications, Case Studies* (pp. 1431–1439). Amsterdam: IOS Press.
Replacement literature	The subject cannot be completed based solely on replacement literature.
Subscription to the course and exam	Requirement for being admitted to assessment: All individual and group work tasks must be submitted no later than one week prior to the exam.
Requirements for independent work	Independent work: • - Seven (7) weblog posts based on course tasks; • - Participation in discussions through weblog comments; • - Compilation of group work study material; Consultation takes place on contact days or through electronic means of communication.
Assessment criteria	Assessment is based on the following criteria: ***Criterion 1.*** Weblog posts on the weekly topics. Every topic is assessed on a 10-point scale based on the following criteria: A – The post is in full compliance with the given task, presents original ideas and solutions by the student, demonstrates reading of compulsory literature and refers correctly to the sources used; B –The post is in compliance with the presented task, but has minor shortcomings; C –The post is partly in compliance with the presented task or has substantial shortcomings; D – The post is partly in compliance with the presented task but does not demonstrate sufficient comprehension of the reading material and has substantial shortcomings; E –The post is in compliance with the presented task only to a minimal satisfactory level; it does not demonstrate comprehension of the reading materials and has major shortcomings in content. One point is deducted from the grade for each week that the post is overdue. ***Criterion 2.*** Study material compiled as group work in developing one specific means of creating study materials. A –The study material provides a consistent overview of the possibilities of the means; in compiling the study material, different types of multimedia have been used based on sound reason; copyright and the principles of correct reference have been pursued when using works of other authors; B –The study material provides a very good overview of the possibilities of

	the means but there are minor shortcomings in its realization; C –The study material provides a good overview of the possibilities of the means but there are several shortcomings in its realization; D –The study material provides a satisfactory overview of the possibilities of the means but there are several major shortcomings in its realization; E –The study material provides a limited overview of the possibilities of the means and there are several major shortcomings in its implementation. In cases of different input by the group members, the member of the teaching staff can raise or lower the grade depending on the student´s input in the group work. The final work can also be completed individually if agreed by the member of teaching staff.
Information about the content of the course	***Contact days*** 10.03.2013 – Seminar - "Concept of learning object and means of distributing study materials, means of compiling study materials, computer-based testing, topics of group work" 07.04.2013 – Seminar - "New technologies for compiling study materials, copyright of study materials, supervising group work" 05.05.2013 – Seminar – "Reference to sources, quality of study materials, presentations of group work" Independent work in the form of E-learning is divided into seven topics, each of which lasts for 2 weeks. These are preceded by an introductory week. The deadline for presentation of the task is the end of the second week. Introduction to course (28.01–03.02) Concept of learning object and means of distributing study materials (04.02–17.02) Means of compiling study materials (18.02–03.03) Computer-based tests (04.03–17.03) New technologies for compiling study materials (18.03–31.03) Copyright of study materials (01.04–14.04) Referring to sources (15.04–28.04) Quality of study materials (29.04–12.05) Deadline for presenting independent work: 12.05 Examination: 20.05

Course programme – IFI7056 Research trends and evaluation in Educational technology

Course code IFI7056	Research trends and evaluation in Educational technology		
ECTS credits: 4	Contact hours: 28	Semester: Autumn	Exam
Course objective:	The course gives theoretical pedagogical guidlines to create and evaluate learning design projects and educational technology situations in institutions. In particular, it aims to: a) create opportunities for using pedagogical principles of educational technology in developing actual learning designs, b) provide knowledge and competences to facilitate conducting evaluation research in educational technology when evaluating the effectiveness of learning designs and educational technology situations in institutions; c) cultivate attitudes that encourage participation in portfolio-based communities of educational technologists and involvement in developmental projects in educational technology.		
Brief description of course content:	2 ECTS - individual work; 2 ECTS - learning during contact days and using e-learning resources. During both individual and team work, the knowledge and competences of theoretical pedagogical principles and practical trends of research in educational technology will be explored. Individually, the prototypes of learning designs (developed during the Learning Design course) will be analysed, based on pedagogical principles using formative and summative methods. In the groupwork task, the educational technology istuation in the institution will be evaluated.		
Learning outcomes	The student: • Has an overview of the pedagogical principles and research trends used in educational technology studies; • Possesses basic competences in conducting different types of educational technology research; can choose appropriate methods of conducting design-based or evaluation research and is able to make suggestions on how to improve the design, learning communities or organisations with educational technology; • Recognizes the need for research-based support of learning with educational technology and of the design of knowledge environments in institutions; • Can organize an evaluation study of the educational technology situation at school.		
Assessment methods	Examination: 50 % - Individual analysis of the learning design prototype using		

	pedagogical principles, 30 % - As teamwork, evaluate the educational technology situation in an institution 20 % - Participation in discussions and seminars and in e-portfolio
Responsible lecturer	Kai Pata
Title in Estonian	Haridustehnoloogilised uuringud ja evalvatsioon
Prerequisite course	-
Compulsory literature	Pata, K. 2011 Loengukonspekt Haridustehnoloogilised uuringud ja evalvatsioon. Pata, K. & Laanpere, M. (Toim.) 2009 Tiigriõpe. Haridustehnoloogia käsiraamat koolidele. Lecture Notes can be found at http://ifi7056.wordpress.com/ the individual assignments
Replacement literature	Winn, W. 2002 Research into Practice: Current Trends in Educational Technology Research: The Study of Learning Environments. Educational Psychology Review, 14,3, 331-351(21); Merrill, M. D. 2001 First principles of Instruction. URL. http://id2.usu.edu/Papers/5FirstPrinciples.PDF; An Educator's Guide to Evaluating The Use of Technology in Schools and Classrooms (1998). URL: http://www.ed.gov/pubs/EdTechGuide/index.html; Harvey, J. (Ed.) 1998 Evaluation cookbook. URL: http://www.icbl.hw.ac.uk/ltdi/cookbook/cookbook.pdf; Mayer, R. 2005 The Cambridge Handbook of Multimedia Learning.
Subscription to the course and examination	1) The student actively participates in independent work assignments at seminars; 2) The student must compile individual assessment papers by a given deadline and improve and submit these by the end of the course; 3) The student must compile group assessment papers by a given deadline and improve and submit these by the end of the course. The examination result is based on the grades awarded for the previously mentioned tasks.
Requirements for independent work	Individual work is associated with the application of theoretical knowledge. At the end of each week, students will find the individual assignments that must be presented weekly in individual blogs from the course blog http://ifi7056.wordpress.com/

Assessment criteria	The examination consists of three components: ***Independent analysis of one learning design based on pedagogical components – 50%:*** The learning design and components used are analysed (learning activities enabled by the environment; support offered by the learning environment including cognitive and meta-cognitive support elements and support of supervisor and peers, compliance with learning theories) ***Group work evaluation of an educational establishment – 30%:*** Group work in a selected educational establishment. Evaluation is based on some elements selected by the group: such as ICT infrastructure, ICT elements integrated with the learning environment, hardware, software, ICT development plan and vision, learning activities conducted with the help of ICT, ICT in use. The following aspects form the focus: What is the ICT situation in the establishment at the moment? Are the activities supported by ICT at the moment in compliance with the potential opportunities and normative requirements of using ICT (e.g. in curriculum, teachers' professional standard)? Is it optimal? What is missing? Are the activities and the environment conducted through ICT to support the ICT vision and development, effective in the educational establishments? The input includes interviews conducted by the group, document analysis, questionnaires and a survey. Data analysis is done by SWOT analysis. ***Stage 1:*** The decision is made as to where the study will take place and who will be included. ***Stage 2:*** The group establishes the objectives and the research question, (for example: a narrower research question is selected from the following: What is the role of ICT in the school´s learning environment? What are the software needs of the school? What is the culture of ICT use in the school like? What is the ICT vision of the school personnel? Does the use of ICT correspond to national norms, etc.?) ***Stage 3:*** The group will create data collecting instruments, involve respondents from the organization, observe and interview, discuss and analyse, and present results in written form. ***Participation and discussion in seminars on the learning environment – 20%:*** For every topic of a lecture, a student reads the weekly lecture materials and a selected research article or research paper. In a discussion in the student´s study blog the student gives his/her opinions and the questions presented about lecture topics that are

	available in the course blog: http://ifi7056.wordpress.com/ and justifies this with information received from the article he/she has read or based on his/her own experience (at least 10 sentences). Also, the student reads statements presented by other students during the course and gives evaluation to statements by at least one fellow student (at least 5 sentences).
Information about the content of the course	**Contact day 1** **27.01.2013 (12.00-14.00):** The objectives, learning environment, activities and assessment criteria of the course are introduced. The following activities take place in the form of e-learning for 10 weeks: ***Week 1 (28.01-3.02):*** Concept of educational technology. Two research objectives in educational studies – theoretical discoveries and practical applications. Job description and tasks of an educational technologist. ***Week 2 (4-10.02):*** Trends in studying a learning environment. From learning theory to study and learning design theory. To what extent can the creator of a design be sure that the pedagogical functionalities planned into the learning or study designs are involved? ***Week 3 (11-17.02):*** Learning designs of educational technology that rely on the behaviouristic learning model. Drill programmes and tutorials to memorise knowledge and develop and automate skills. ***Week 4 (18-24.02):*** Learning designs of educational technology that rely on an information-processing model. Forwarding information in different presentation modes via computers and its effect. Models and learning. Mind maps and other means of structuring computer-based knowledge. ***Week 5 (25.02-3.03):*** Learning design of educational technology based on situational exploratory problem-based learning. Dynamic and static solutions of situations in educational technology. Complex learning environments *versus* collaborative learning environments, simulation environments. ***Week 6 (4-10.03):*** Implementations of the constructivist-learning model in educational technology. Communication in a group working via computers: shared cognition and meta cognition. ***Week 7 (11-17.03):*** Implementations of self-guided learning in educational technology. Practical applications of life-long learning – portfolio-based learning, learning communities. ***Week 8 (18-24.03):*** Implementations of the models of learning in educational technology in general. M-learning, options of non-formal learning in hybrid learning environments. Study-free week (25-31.03): ***Week 9 (1-7.04):*** Support systems in learning designs of educational

	technology created on the basis of different learning theories. Formative and summative evaluation of learning systems based on learning theories. Ways of evaluation of a complex learning object (e-course, simulation). ***Week 10 (8-14.04):*** Evaluation-studies in educational technology. Planning and conducting a survey. Ways of evaluating ICT use in an educational establishment. ***Week 11:*** **Contact day 2** **21.04.2013**: Analysis of learning design based on pedagogical components: discussion of the results of independent work. ***Week 12:*** **Contact day 3** **18.05.2013:** Evaluation of educational establishment: presenting and discussing the results of group work (conducted by Mart Laanpere) The final versions of written tasks must be submitted no later than 27.05.2013.

Course programme – IFI7058 Apprenticeship Practice in Educational Technology

Course code IFI7058	**Apprenticeship Practice in Educational Technology**		
ECTS credits: 10	Contact hours: 6	Semester: Autumn	Assessment
Course objective:	This practice aims at enhancing the learning design implementation and reflection skills of participants in the authentic school context with the help of e-portfolio. The participants learn practical skills through participating in a community of practice in the domain of educational technology.		
Brief description of course content:	Contact hours and online collaboration in an e-portfolio community: 5 ECTS, Independent study: 5 ECTS. Participants will work as apprentices educational technologists under guidance of experienced mentors.		
Learning outcomes	Upon successful completion of the course, participants will be able to: • Apply the principles and methods of learning design in practical settings; • Recognize the challenges and opportunities of learning design in school settings; • Lead a team of teachers in the context of designing new courses, learning materials or curricula; • Reflect in and on his/her own actions during apprenticeship, using e-portfolio; • Share his/her experiences within the virtual community of practice.		
Assessment methods	The assessment is based on the practice report and analysis in the practice seminar.		
Responsible lecturer	Kairit Tammets		
Title in Estonian	Haridustehnoloogia praktika		
Prerequisite course	IFI7051 - Õppedisaini alused (Principles of Instructional Design) IFI7052 - Õpikeskkonnad ja õpivõrgustikud (Learning Environments and Learning Networks)		
Compulsory literature	Lecture Notes can be found at http://htpraktika.wordpress.com		
Replacement literature	The subject cannot be completed only based on replacement literature.		

Subscription to the course and examination	All practice tasks must be presented in the practice blog and introducred in the seminar.
Requirements for independent work	• Weekly completion of practice blog, reflecting on practice tasks; • Completing practice tasks (creation of learning design, counselling) and presenting in practice blog.
Assessment criteria	In order to receive a pass/fail result a student during practice shell have to: a) Analyse the work and tasks of a practicing educational technologist within the preliminary practice and one's own development based on this; b) Assess or analyse a learning design in a practice establishment; c) present in the blog the process of counselling a colleague in issues of educational technology with self-analysis; d) design a learning design in the practice establishment with an educational technologist or a colleague; e) reflect the process of creating a learning design in his/her blog weekly; f) formalise a practice report; g) Defend his/her practice report in a seminar.
Information about the content of the course	9.09.2012 kell 10.00–12.00 – Introductory seminar to practice 08.10.2012 - 14.10. 2012 – Observation practice at an educational establishment 15. 10.2012 - 16.12. 2012 – Description of practice activities and analysis in the form of e-learning January 2013 – Seminar of defending practice (4 hours)

Appendix 3 – Standard Study Plans

Study plans are revised each year, and they take into account the latest revision of study programmes.

Below are the latest versions; these are applicable for admission of year 2013.

The offering of all compulsory and the most relevant elective courses is predetermined. Additional elective courses will be determined at the End of each academic year, according to the results of the poll conducted among the students.

Notations:

F13 – Fall semester 2013 (Sept 2013 – Jan 2014)

S14 – Spring semester 2014 (Feb 2014 – June 2014)

F14 – Fall semester 2014

S15 – Spring semester 2015

F15 – Fall semester 2015

S16 – Spring semester 2016

a. Applied Computer Science

Applied Computer Science

	General Courses - 16 ECTS	**ECTS**	I	II	III	IV	V	VI
	Compulsory subjects - 8 ECTS		F13	S14	F14	S15	F15	S16
MLM6106	Mathematics in Practice	4			x			
KUR6110	Introduction to Ethics	4	x					
	Elective subjects - 8 ECTS							
MLF6001	Physical Picture of the World	4						
INT6001	Information Seeking: Sources and Methods	4	x					
HKH6004	Basics of Marketing	4		x				
HIF6011	Introduction to Philosophy	4						
	TOTAL	**16**	8	4	4	0	0	0
	Core Courses – 104 ECTS							
	Compulsory subjects - 63 ECTS	**ECTS**	I	II	III	IV	V	VI
HKI5004	Web Programming	3	x					
HKI5023	Computer Hardware I	3	x					
HKI5025	Programming Fundamentals	5	x					
HKI6014	Operating Systems	3		x				
HKI5026	Operating System Administration	3				x		
HKI5013	Information Systems I	5				x		
HKI6003	Cisco Network Academy I	3		x				
HKI6009	Cisco Network Academy II	3			x			
HKI5008	Multimedia	4	x					
HKI5011	Multimedia Design	5		x				
HKI5033	Layout and Preparation for Printing	3			x			
HKI5034	Basics of Advertising Design	3				x		
HKI6001	Computer Graphics	3		x				
HKI5002	Programming I (Java)	5		x				
HKI5003	Programming II	3			x			
HKI5006	Web Scripting	3	x					
HKI5007	Design and Development of Web Applications	3		x				

IFI6009	Software Engineering	3			x			
	Core selected elective subjects - 41 ECTS							
HKI6005	Application Software	4	x					
HKI5012	Databases	3		x				
HKI6027	Practical Programming	3			x			
HKI5015	E-Commerce	3					x	
HKI5030	IT and Law	4			x			
HKI5040	3D Animation	5				x		
HKI5041	Audio Production	5						
HKI5024	Project of Speciality I	3					x	
HKI5042	Search Engine Optimization	3					x	
HKI5010	Video Designing	5					x	
HKI5017	Basics of Project Management	4					x	
HKI5020	Seminar	4				x		
HKI5028	MA Seminar I	3					x	
IFI6051	Web Frameworks	3					x	
IFI6028	Programming of Graphics and Music	3						
IFI6060	The .NET Framework	4					x	
HKI6010	Data Security	4					x	
HKI5032	Basics of Digital Photography	3			x			
IFI6030	3D Modelling	5						
HKI5059	Basics of Robotics	3						
HKI5044	Teaching and Learning in the Digital Age	3						
HKI5045	Basics of Multimedia	3						
HKI5046	Digital Literacy	3						
HKI5047	Digital Media Production	4						
HKI5048	E-society, law and security issues in e-learning	3						
HKI5049	Creating Digital Learning Resources	3						
HKI5050	Mobile Learning	3						
HKI5051	Presentation Technologies in the Classroom	3						
HKI5052	Game-Based Learning	3						
HKI5053	Web-Based Learning Environments and Networks	3						

HKI5054	Educational Video Design and Implementation in the Classroom	3						
HKI5055	Principles of Instructional Design	4						
HKI5056	Counselling in Educational Technology	3						
HKI5057	Developmental Project in Educational Technology	3						
HKI5058	Apprenticeship Practice in Educational Technology	4						
	TOTAL		11	22	22	20	32	0

Electives - 24ECTS

Placement/Practice

Compulsory subjects - 30ECTS

HKI5035	Practice of Multimedia	7			x			
HKI5036	Observation Practice	8				x		
HKI5037	Practice of Network Administration	7				x		
HKI5038	Enterprise Practice	8						x
	TOTAL		0	0	7	15	0	8
HKI5021	Research Paper	**6**						x
	TOTAL							6

b. Computer Science

Computer Science

	General courses - 16 ECTS	**ECTS**	I	II	III	IV	V	VI
	Compulsory subjects - 8 ECTS		**F13**	**S14**	**F14**	**S15**	**F15**	**S16**
IFI7041	Data Analysis: Descriptive Statistics	4				x		
EKO6005	Oral and Written Communication	4	x					
	Elective subjects 8 ECTS							
AKJ6041	Basics of Law	4						
RIM6013	Basics of Entrepreneurship	4						
INT6001	Information Seeking: Sources and Methods	4						
KOK6045	Communication and Society	4						
PSP6048	Organizational Behaviour	4						
MLM6106	Mathematics in Practice	4						
PSP6002	Social Psychology	4						
PSP6049	Theory of Management	4						
MLF6905	The Laws of Nature	4						
	Core courses - 110 ECTS **Compulsory subjects - 81 ECTS**							
IFI6074	Programming Fundamentals	4	x					
IFI6069	Basic Course in Programming	4		x				
IFI6072	Computer Hardware	3	x					
IFI6009	Software Engineering	3		x				
IFI6076	Web Programming	4	x					
IFI6083	Algorithms and Data Structures	4		x				
IFI6013	Design and Development of Databases	3	x					
IFI6014	Operating Systems	3				x		
IFI6068	Introduction to Information Systems	4			x			
IFI6018	Networks and Data Communications	4			x			
IFI6019	Theoretical Computer Science	5			x			
IFI6020	Cryptology in Data Security	4			x			
IFI6057	Intelligent Systems	4					x	
IFI6049	Intellectual Property and Data Protection	3				x		

IFI6063	Ethical, Social and Professional Aspects of Information Technology	4					x	
IFI6088	Research Paper	3				x		
IFI6038	XML Applications	3				x		
IFI6085	Research Seminar I	2			x			
IFI6086	Research Seminar II	2					x	
MLM6214	Foundations of set theory and logic	4		x				
MLM6212	Foundations of Discrete Mathematics	4			x			
MLM6206	Elementary Number Theory	4				x		
IFI6084	Software Engineering Project I	3		x				
	Elective subjects - 29 ECTS							
IFI6073	Computer Hardware Lab	3						
IFI6087	Maintenance of Computers and Networks	4						
IFI6058	Practical Work	5						
IFI6090	Database Lab	3						
IFI6033	Current Problems in IT Development	3						
IFI6062	Creating Digital Documents	3		x				
IFI6042	GLP Based Desktop Enviroments	3						
IFI6045	MS Windows Operating Systems	3	x					
IFI6046	Methods and Practices of Free/open-Source Software	4						
IFI6047	Basics of Digital Photography	3						
IFI6053	3D Models and CAM	3						
IFI6040	The Web Applications of Python and Zope	3						
IFI6055	E-marketing	3						
IFI6070	Intelligent Computer Use	4	x					
IFI6071	Object Oriented Programming in C++	3						
IFI6077	3D Modelling	4		x				
IFI6089	Software Engineering Project II	3						
IFI6091	Object-oriented Web Applications	3						
IFI6096	Data Tables and Spreadsheets	3						
IFI6067	Using Apple Software	3						
	Specialization **Software Engineering - 24 ECTS**							
IFI6059	Programming of Applications	4			x			

IFI6092	Software Foundations of Testing	3				x		
IFI6060	The .NET Framework	4			x			
IFI6093	User interfaces of web applications	3		x				
IFI6095	Web Frameworks	3					x	
IFI6052	Interface Development for Database	4					x	
IFI6054	Agile Software Development	3				x		
	Digital Media - 24 ECTS							
IFI6075	Multimedia	4		x				
IFI6056	Creating Web Pages	3	x					
IFI6022	Digital Media	4			x			
IFI6023	Computer Graphics	4		x				
IFI6094	User-Centered Design Methods	3			x			
IFI6028	Programming of Graphics and Music	3					x	
IFI6078	Media Technology	3				x		
	Electives - 24 ECTS							
	Elective	8	x					
	Elective	5	x					
	Elective	4		x				
	Elective	4			x			
	Elective	3				x		
IFI6100	**Bachelor's thesis**	9						x

c. Management of Information Technology

Management of Information Technology

	General courses - 8 ECTS	ECTS	I	II	III	IV
	Compulsory subjects - 4 ECTS		F13	S14	F14	S15
EKE7043	Estonian Writing Skills	4				x
	Elective subjects - 4 ECTS					
RIJ7021	Strategic Management	4				
MILM7204	Mathematical Modelling	4				
INT7081	Information Policy and Strategy	4				
HIF7401	Philosophy of Science	4				
IFI7044	Data Analysis: Inferential Statistics	4			x	
PSO7106	Organization Theory	4		x		
	Core Courses - 60 ECTS **Compulsory subjects - 39 ECTS**					
IFI7028	Practical Training	6			x	
PSO7014	Group Processes in Organizations	3		x		
IFI7009	Master Seminar	6				x
IFI7021	Development of Infrastructure of Information Technology	4			x	
IFI7013	ICT Strategic Management	5		x		
IFI7022	IT Operations and Management	5	x			
IFI7026	Legal Issues Related to IT-Development	4			x	
IFI7003	Project Management in Software Engineering	6	x			
	Elective subjects - 27 ECTS					
IFI7007	Research Methods	4			x	
PSO7003	Personality and Social Psychology in Organizations	5	x			
IFI7045	Information Security Management	4	x			
PSO7004	Personnel Management	5			x	
PSO7002	Theory of Management	5	x			
IFI6068	Introduction to Information Systems	4				
IFI7030	Financial Management	4				x

IFI7105	Open Source Management	4				
IFI7039	Server Side Interactive Technologies	4				
IFI7023	Information Management	4				
IFI7008	Advanced Used of Application Software	4				
PSO7037	Negotiations	4		x		
IFI7025	Maintenance of Windows Workstations	4				
IFI7115	Security and Privacy Matters	3				
IFI7038	21-st Century Concepts in Information and Meaning	4		x		
IFI6009	Software Engineering	3				
IFI7073	ICT Procurements and Contracts	4				x
IFI7027	Applied Activities in the Area of Specialization	6				
	Electives - 16 ECTS					
	Elective	5	x			
	Elective	5		x		
	Elective	6			x	
IFI7040	**Master's Thesis 30 ECTS**	30				x

d. HCI

Human-Computer Interaction

	General Courses - 8 ECTS	ECTS	I	II	III	IV
	Compulsory subjects - 4 ECTS		F13	S14	F14	S15
IFI7044	Data Analysis: Inferential Statistics	4			x	
	Elective subjects - 4 ECTS					
BFI7020	Introduction to Creative Industries	4	x			
HIF7401	Philosophy of Science	4	x			
IFI7041	Data Analysis: Descriptive Statistics	4		x		
	Core Courses - 66 ECTS					
	Compulsory subjects - 42 ECTS					
IFI7003	Project Management in Software Engineering	6	x			
IFI7007	Research Methods	4	x			
IFI7154	Developing Interactive Systems	5		x		
IFI7155	Evaluating the User Experience	5			x	
IFI7156	Interaction Design Methods	5		x		
IFI7158	Master Thesis Seminar	4	x			
IFI7159	Foundations of Human-Computer Interaction	5	x			
IFI7161	Design Theory and Methodology	4		x		
IFI7171	Philosophy of Human-Computer Interaction	4		x		
	Elective subjects - 24 ECTS					
IFI7102	Computer Skills and Programming Update	3	x			
IFI7128	User Modeling and Recommender Systems	4		x		
IFI7129	Introduction to Graphic Design	4			x	
IFI7137	Ethics and Law in New Media	5			x	
IFI7157	Practice	4				x
IFI7160	Current Topics in Human-Computer Interaction	4			x	
IFI7162	Ubiquitous Computing	4	x			
IFI7163	Game Design	5			x	
IFI7164	Mobile Devices Workshop	4	x			
IFI7165	Design for All	4	x			
IFI7166	Semantic Computing	4			x	

IFI7167	Social Computing	4		x		
IFI7168	Experimental Input and Output Workshop	4				
IFI7169	Accessibility Workshop	4		x		
IFI7170	Designing for User Engagement	4			x	
IFI/7172	Human-Centred Computing	4			x	
IFI7173	Multimedia Computing	4		x		
IFI7174	Web Workshop	4	x			
	Electives - 16 ECTS					
	Elective	5	x			
	Elective	5		x		
	Elective	6			x	
IFI7040	**Master's Thesis 30 ECTS**	30				x

e. Educational Technology

Educational Technology

	General courses - 8 ECTS	ECTS	I	II	III	IV
	Compulsory subjects - 4 ECTS		F13	S14	F14	S15
IFI7044	Data Analysis: Inferential Statistics	4			x	
	Elective subjects - 4 ECTS					
BFI7020	Introduction to Creative Industries	4				
EKE7043	Estonian Writing Skills	4				
KAK7022	Educational Sociology and Politics	4				
KAN7022	Social practice in learning and for learning	4				
KOK7058	Communication in Modern Era	4				
KUR7075	Creativity as Component of Education	4				
MLG7010	Global Ecology	4				
MLM7204	Mathematical Modelling	4				
PSP7004	Development Studies and Development Assessment	4				
RIT7012	Social and Political Theories	4				
RIT7024	Civil Society and Democracy	4				
PSO7106	Organization Theory	4				
	Core Courses - 60 ECTS **Compulsory subjects - 41 ECTS**					
IFI7065	Master Thesis Seminar I	3		x		
IFI7066	Master Thesis Seminar II	3				x
IFI7058	Apprenticeship Practice in Educational Technology	10			x	
IFI7055	Innovation Technologies	4			x	
IFI7007	Research Methods	4			x	
INT7059	Knowledge Management	3	x			
IFI7060	Learning Analytics	3				x
IFI7056	Research Trends and Evaluation in Educational Technology	4		x		
IFI7057	Councelling in Educational Technology	3	x			
IFI7053	Creating Digital Learning Resources	3		x		
IFI7051	Principles of Learning Design	4	x			

IFI7052	Learning Environments and Learning Networks	3	x			
	Elective subjects - 19 ECTS					
IFI7013	ICT Strategic Management	5		x		
IFI7115	Security and Privacy Matters	3				
IFI7064	Learning Management Systems	3	x			
IFI7026	Legal Issues Related to IT-Development	4			x	
IFI7025	Maintenance of Windows Workstations	4				
IFI7039	Server Side Interactive Technologies	4				
IFI7061	Multimedia Development	5		x		
IFI7041	Data Analysis: Descriptive Statistics	4		x		
IFI7003	Project Management in Software Engineering	6	x			
IFI7063	Implementation of Video Research	3				
IFI7059	Digital Media Production	3	x			
IFI7031	Activity Learning in School Informatics	3				
IFI7038	21st Century Concepts in Information and Meaning	4				
IFI7062	Educational Technology Infrastructure Seminar	3				
KAT7005	Teacher as Counsellor	2				
	Electives - 15 ECTS					
	Elective	5	x			
	Elective	5		x		
	Elective	5			x	
IFI7040	**Master's Thesis - 30 ECTS**	30				x

Appendix 4 – Comparison between the learning outcomes to be achieved according to the Standard of Higher Education and the learning outcomes of the curriculum, its modules and courses

The learning outcomes are taken from the Annex "Study results of stages of higher education level" of Standard of Higher Education (established by the Government of the Republic of Estonia - Regulation No 258 dated August 2002, with subsequent amendments - www.hm.ee/index.php?popup=download&id=6900).

a. Applied Computer Science

Standard	**Curriculum**
In order to be awarded a diploma of studies in professional higher education, a student shall:	A graduate in Applied Computer Science:
- Have a systematic overview of the basic concepts, theoretical principles and research methods of the field of study;	**General learning outcomes**: has a broad knowledge base in various fields of IT. **Module of Introduction to the Speciality**: possesses abilities to create, develop and manage information technology solutions (hardware, software, networks, and programming). **Programming Fundamentals**: is able to: 1) write, compile and debug simple computer programs, given the problem statements; 2) identify particular arrangements of program constructs to use as solution patterns for simple programming problems; 3) model aspects of real life problems as data objects so that they can be manipulated in a computer program; 4) predict the behaviour of programs that use selection and repetition control structures. **Computer Hardware:** understands computer hardware components, their working principles and compatibility. **Databases:** is able to express and analyse the needs of a database; can create simple normalized high-quality databases in SQL (without the help of graphical user interface); can use the query language creatively. **Operating Systems:** has general knowledge about the essence and principles of work of operating systems; understands virtual and hidden memory; is able to turn attention to different processes connected to security and fault tolerance.
- Be able to identify interdisciplinary connections in scopes of application of different fields of study;	**General learning outcomes**: understands how to integrate and implement IT in different fields. **Module of Introduction to the Speciality:** possesses abilities to create, develop and manage information technology solutions (hardware, software, networks, and programming). **IT and Law:** is conversant with the relevant legal norms regulating the IT-area, knowing the author's rights, knowing the rights of the personal data subject. **Basics of Marketing:** understands the basic concepts and specialized vocabulary of entrepreneurship and understands the general development trends in Europe;

	can analyse the environments that affects entrepreneurship; understands the basic business start-up options (including the enterprise forms); can individually draw up and defend a business plan.
- Understand the current problems and potential applications in the field of study;	**Computer Networks and Information Systems:** has basic knowledge for analyzing possibilities and the necessity for combining the organization's IT and business processes; understands computer networks, communication network administration and data defence organization; is able to solve security problems effectively.
	Cisco Network Academy I and II: understands the basics of networking and different networking technologies; can administer and configure networking devices.
	Information Systems I: understands the essence and advantages of different development methods of software; understands the usage of object-oriented methods and their connection with real projects; can use modelling (using both UML and DSL models) as an essential part in system development; understands that the development process continues also after its installation (through maintenance, technical support and feedback).
	E-Commerce: can develop different e-commerce solutions.
	Data Security: understands modern data security methods; can detect and solve security problems in different computer networks and computers.
- Be able to formulate problems relating to the field of study and to analyse and evaluate different solutions;	**General learning outcomes**: can analyse, design and test different kinds of hypermedia components.
	Multimedia: understands the concept of multimedia; understands the principles of digital audio and video recording and processing; understands the principles of 2D and 3D animation; understands the main technologies of streaming media; can choose multimedia elements appropriate for his or her aims; can independently record and edit digital audio and video; can independently create simple 2D and 3D animations.
	Multimedia Design: understands basic design principles; understands the nature and usage principles of different types of digital media; understands the concept and principles of HCI; can evaluate existing multimedia based software; can choose multimedia elements appropriate for his or her aims; can use at least one multimedia authoring tool and create multimedia-based applications.
	Basics of Advertising Design: can propose an idea to

create an advertisement for a certain target group; can design an advertisement using their knowledge about advertising psychology, text, images and colouring.

Computer Graphics: understands the principles of composition and colouring; can design with the help of CorelDraw and Adobe PhotoShop.

Layout and Preparation for Printing: can assess the suitability of material for printing; can prepare a text and raster graphics; have an overview of different fonts and can choose an appropriate one; can produce the layout of a booklet and prepare it for printing; understands how to use a PDF file.

Research Paper: is able to identify and formulate problems related to the speciality, analyze and evaluate different solutions; is able to gather and interpret information independently and critically; is able to formulate questions and analyze them verbally and in writing; can write a research paper in accordance with the requirements and present the results.

- Be able to collect information independently by using appropriate methods and means and to interpret it critically and creatively;

Module of Core Selected Subjects: is able to develop professionally in various fields of IT.

Seminar: can discuss and present IT-related issues.

MA Seminar I: can search for IT-related news and articles from the internet, magazines, databases; understands how to write a research paper; is able to identify and formulate research problems in the field of studies; is able to seek information using digital sources and to critically analyse and interpret the results; can present ideas and solutions for IT related problems, both written and orally; is able to format written papers as required.

Module of Placement: can solve specific problems by using a variety of IT tools to collect information independently and interpret it critically and creatively.

Module of Research Paper: is able to gather and interpret information independently and critically;

- Be able to select and use appropriate methods and technologies when solving problems of the field of study within given frameworks, and to model and/or assess potential results on the basis of given information;

Module of Programming: is able to solve programming tasks within given limits, select and use appropriate methods;

Practical Programming: can plan, design, test, record and present their application.

Programming I: can design and implement several application programs; knows about different possibilities, the complexity and problems connected with program design.

Programming II: understands the construction of an object-oriented application; can design and implement

	classes and interfaces; knows about program testing possibilities; can create or improve different specific application programs with the help of study material. **Module of Placement:** is able to solve IT problems with support of a supervisor; is able to participate in team work; **Module of Multimedia:** is able to analyze, plan and design hypermedia products.
- Show initiative in initiating projects as well as responsibility, leadership and team work skills in implementation thereof;	**Module of Placement:** shows initiative in initiating projects, a sense of responsibility, leadership and teamwork skills in their execution; **Practice of Multimedia:** understands the nature and usage principles of different types of digital media; understands concepts and principles of HCI; can evaluate existing multimedia based software; can choose multimedia elements appropriate for his or her aims; can use the multimedia authoring tool to create multimedia based 2D or 3D applications. **Observation Practice:** can create medium-level tools alone or within a group of students or programmers; can design an interface for a created application or can design print layout to advertise a product. **Practice of Network Administration:** is able to understand and find solutions for most common network problems, install and manage different operating systems, programs, databases and to cooperate with other students or groups. **Basics of Project Management:** understands the concepts of project management; knows how to initiate and manage IT projects.
- Have command of the communication skills and information and communication technologies necessary for work;	**General learning outcomes**: can communicate with clients and business partners **Module of Electives:** is able to explain specialty related problems orally and in writing and participate in professional discussions; **Application Software:** can use word processing, presen-tation and spreadsheet programs; can format written work.
- Be able to explain orally or in written form problems relating to the field of study in the language of instruction and in at least one foreign language, and to participate in professional discussions;	**Module of Electives:** is able to explain specialty related problems orally and in writing and participate in professional discussions; **English for Specific Purpose**: understands computer terminology; is able to discuss computer-related topics covered during the term; understands computer-related texts; can pre-sent a computer-related topic both orally and in written form.

- Be willing to actively participate in civil society and demonstrate tolerance towards diversity of attitudes and values;	**General Courses:** is ready to participate actively in society and respect different views and values; **Introduction to Ethics:** understands the main theories on ethics; is able to solve moral problems; is able to apply the ethics codex in a multicultural context.
- Be able to evaluate the role and consequences of professional activities in society, with consideration of social and ethical aspects;	**Module of General Courses:** is ready to participate actively in society and respect different views and values; **Introduction to Ethics:** understands the main theories on ethics; is able to solve moral problems; is able to apply the ethics codex in a multicultural context.
- Be able to apply the acquired knowledge and skills in work, be willing to engage as a specialist or undertaking in his or her field of profession;	**General learning outcomes of curriculum**: understands how to integrate and implement IT in different fields; can communicate with clients and business partners. **Module of placement:** is able to apply the acquired knowledge and skills in work; is able to act as a specialist or an entrepreneur in the field on computer science. **Module of placement:** is able to act as a specialist or an entrepreneur in the field on computer science. **Module of Core Selected Subjects:** is able to develop professionally in various fields of IT. **Enterprise Practice:** understands the job management and information exchange processes in a selected company; can analyse and solve the tasks assigned by their supervisor; can make proposals in order to improve information technology in the company.
- Be able to undertake continuous independent professional development;	**General learning outcomes of curriculum**: understands the need for professional development and readiness for life-long learning. **Module of placement:** is capable of independent and professional self-improvement; **Module of Electives:** is able to adapt to an interesting IT area and acquire extra knowledge based on personal learning interests.

b. Computer Science

Standard	**Curriculum**
• In order to be awarded a bachelor degree, a student shall:	***A graduate in computer science:***
• Have a systematic overview of the basic concepts, theoretical principles and research methods of the field of study;	**Curriculum**: understands basic computing concepts and principles, important computing applications and major developing trends. **Core module**: is familiar with basic computing concepts and principles. Understands simple data analysis techniques and is ready to implement them. **Algorithms and Datastructures**: understands concepts of analysis and evaluation of algorithms and complexity. **Cryptology in Data Security:** has knowledge about the theoretical basis of cryptography.
• Be able to identify interdisciplinary relationships	**General module**: has basic knowledge of other domains, a broad-based view of the world, and advanced oral and written expression. **Electives module**.
• Understand the scopes of application of different specialities of the field of study;	**Core module**: has an overview of important computing applications, both in the private and public sectors, as well as in major developing trends.
• know the theoretical schools, development trends and current problems of the field of study;	**Curriculum module, Software Engineering module**: manages the basic methods of the software development life cycle (requirements specification, design, coding, testing, documentation) including teamwork skills and has an overview of software development technologies and methods. **Theoretical Computer Science**: understands the basic concepts, results and problems of a problem area (finite automata and formal languages) of theoretical computer science. **Digital media module**: understands the nature and usage of different types of digital media and basics for their presentation in analogue and digital form. Knows the basics and standards for creating web pages.
• Be able to formulate problems relating to the field of study and to analyse and evaluate different solutions;	**Digital media module**: can conduct the design process of multimedia-based software. **Software Engineering module**: is able to assess the feasibility of implementing the software (including the

	opportunities and threats). **Introduction to Information Systems:** evaluates the quality of information provided by the information system. **Web Programming:** can plan a web site and also perform simple and mid-level programming functions.
• Be able to collect information independently by using appropriate methods and means and to interpret it critically and creatively;	**General module**: understands simple data analysis techniques and is ready to implement them. **Bachelor thesis:** is able to use local and global literature and other written materials, also electronic equipment; understands the general quality criteria for exploratory and development work and on the basis of this, is able to assess the quality of work at the same level; understands the basic research types and logic as well as their methodological structure; is able to set up appropriate research questions and development goals and to plan and carry out theoretical or development research; is able to structure a research paper, according to the requirements and present the results in a convincing manner.
• Be able to select and use appropriate technologies and methods when solving problems relating to the field of study, including being willing to participate in team work and also act as a leader;	**Curriculum**: manages the basic methods of the software development life cycle (requirements specification, design, coding, testing, documentation) including teamwork skills and has an overview of software development technologies and methods; can create and process different media types and use them in software development. **Core module:** has the skill necessary for teamwork in software development. **Software Engineering module:** is able to select and use appropriate tools, technologies and methods in software engineering; is able to create applications based on the procedure or object-oriented paradigm. **Software Engineering Project I**: has the ability to perform different roles in a development team and the skills for successful teamwork, effective communication and work procedures. Small group work can be done in different subjects.
• Have command of the communication skills and information and communication technologies necessary for work;	**Electives module**: is able to communicate in the mother tongue and another language using different communication technologies; manages the communication skills necessary for work and is ready to be an active member of civil society.
• Be able to explain orally or in written form in the language of instruction and	**Curriculum:** understands the ICT terminology in Estonian as well as in English and is able to use this in both the written and spoken form.

in at least one foreign language, problems relating to the field of study, and to participate in professional discussions;	**Electives module:** has CEFR B2 level skills in a foreign language and CEFR C1 level skills in the Estonian language for graduates of the schools in which Russian is the study language. **Bachelor thesis:** can use correct terminology both in the written and spoken form.
• Be willing to actively participate in civil society and demonstrate tolerance towards diversity of attitudes and values;	**Digital Media module:** understands the principles of usability and accessibility of application. **Electives module**: manages the communication skills necessary for work and is ready to be an active member of civil society. **Ethical, Social and Professional Aspects of Information Technology:** acknowledges the wider social contexts of IT and has developed appropriate conduct and attitudes; is aware of ethical problems related to IT.
• Be able to evaluate the role of knowledge and the role and consequences of his or her professional activities in society, with consideration of scientific, social and ethical aspects;	**Curriculum:** is ready to comply with professional, ethical and copyright requirements and to assess the opportunities and threats of software applications. **Core module:** is able to assess the feasibility of implementing the software (including the opportunities and threats). Is ready to comply with professional, ethical and copyright requirements.
• Be able to apply the acquired knowledge and skills in work, to continue studies and to undertake continuous independent professional development.	**Curriculum:** manages the techniques necessary for independent study and is able to plan their professional career and to continue their studies at the master's level. **Core module:** is able to learn new applications. **Digital Media module:** can create and process different media types (graphics, videos, audio, animations). **Software Engineering module:** is able to use different programming languages and learn new languages. **Electives module:** has professional knowledge and skill-sets developed as a result of specific interests and personalized development in the chosen field.

c. Management of Information Technology

Standard	**Study Programme**
In order to be awarded a Master's degree (including upon the completion of the integrated study programmes of Bachelor's and Master's study), a student shall:	A graduate in Management of Information Technology study programme:
• Have a systematic overview and broad knowledge of the concepts, theories and research methods of the field of study	***Core module***: understands the basic principles and approaches, research questions and methods, regulations (including standards and specifications) as well as information sources (including scientific literature) concerning IT systems. ***ICT Strategic Management***: understands the frameworks, standards, specifications and methodologies (also from a historical view), which are implemented in IT management and governance. ***IT Operations and Management***: understands regulations, standards, specifications and methods applicable in IT management. ***Development of Infrastructure of Information Technology***: can name and describe different IT infrastructure frameworks, standards and methods.
• Know the theoretical development trends, current problems and potential applications in the field of study;	***Core module***: is able to compose an IT strategy and implementation plans for an organisation, to determine suitable business solutions and to document and present them in an adequate manner. ***ICT Strategic Management***: can develop an IT strategy for the organization and develop a plan for its implementation, can acquire the information regarding changes and trends in the IT product market.
• Have an in-depth knowledge in a narrower research field within the main field of research;	**Master thesis**: has more comprehensive knowledge in the area of the Master's thesis.
• Be able to identify and create interdisciplinary connections;	***Practical Training***: is able to apply knowledge and skills acquired during Master studies. ***Development of Infrastructure of Information Technology***: Can plan an organization's IT development - including carrying out an IT audit and implementing of new applications.
• Be able to independently and creatively identify and formulate problems and /or research	***Group Processes in Organizations***: can acquire skills for implementing several group methods in problem solving; can map the problems of an actual

questions related to the field of study and be able to solve them with appropriate measures within given time frames and with limited information, using the knowledge of other fields as necessary;	organization and generate proposals for solutions, following the principles of the "quality circle". ***Project Management in Software Engineering***: understands the basic structures, models and principles of project management; has skills for development and can assess a project plan. ***Security and Privacy Matters***: is aware of major aspects and trends of computer security and privacy; understands major threats to ordinary users and ways to address them. ***IT Operations and Management***: is able to manage ICT resources (incl licences), ICT administration and user support, purchasing of ICT tools. ***Development of Infrastructure of Information Technology***: can analyze IT infrastructure solutions and the risks that these solutions involve. ***Master thesis***: is able to formulate a research problem, to chose appropriate research methods and conduct a problem analysis based on scientific literature.
• Be able to select and use appropriate methods and technologies when solving problems relating to the field of study, and to model and/or assess the potential results;	***Core module***: is able to use different methods for the analysis and development of IT processes, conduct tasks related to the development of business strategy (elaboration of development plans, increasing effectiveness of the business processes etc.) as well personnel development (build up IT staff, ensure motivation and necessary devotion, compose the tasks, work division and schedules, assess the results, arrange cooperation with other units etc). ***Master thesis***: is able to present a chosen topic in a systematic, correct and interesting manner , in accordance with the requirements for composition of academic texts. ***IT Operations and Management***: is able to determine suitable business applications.
• Be able to critically evaluate his or her activities when solving problems and/or research questions of the field of study;	***Research Methods***: undrrstands the main quality criteria for academic research and can evaluate the quality of a given study according to these criteria.
• Be prepared to work in an area of activity requiring professional qualifications, showing initiative, responsibility, leadership and teamwork skills;	***Study Programme*:** has the necessary teamwork skills required when involving different partners. ***Core module***: is able to complete tasks necessary for IT strategic management (analysing market trends, composition of IT strategy etc), for IT development (planning of development activities, preparation of projects, planning and coordination of professional development of staff, etc) and for IT maintenance (ensuring functioning of IT infrastructure, necessary

	support services, data security, licensing etc).
• Be able to impart his/her knowledge competently by teaching, instructing or by other means;	***Master Seminar***: is able to run a seminar.
• Be able to present and reason orally or in written form in the language of instruction and in a foreign language essential for his or her field of study the problems relating to the field of study, conclusions and the underlying theories, and to participate in relevant discussions of both corresponding specialists and non-specialists;	***Study Programme***: has the communication skills required. ***General module***: is able to compose academic texts. ***Master Seminar***: is able to compose a survey article in which he/she explains the actuality of the research problem (including possible applications of the results), presents an historical view of the problem, the research methods used as well as the most widely discussed problems in the area. ***21-st Century Concepts in Information and Meaning***: Can read and understand literature related to the subject field at academic level English. ***Master thesis***: Is able to present a chosen topic in a systematic, correct and interesting manner , in accordance with the requirements for composition of academic texts.
• Be willing to actively participate in civil society and to demonstrate tolerance towards diversity of attitudes and values;	***Study Programme***: tolerates different values and attitudes, actively participates in civil society.
• Be able to act ethically in complex situations, be aware of the ethical aspects, possibilities, restrictions and social role of his or her activities and be able to provide reasoned assessment in issues concerning his or her field of study;	***Legal Issues Related to IT-Development***: is able to detect and evaluate the legal risks related to IT-development processes; to evaluate the need for using additional legal advice; is able to take the author's rights and personal data subject's rights into consideration. ***Study Programme***: is ready to follow established professional, ethical and intellectual property protection principles.
• Be able to evaluate his or her need, and the need of others, of continuing education and professional development, and have command of effective methods necessary for independent study;	***Personnel Management***: is able to plan the process of personnel management on the level of strategic management. ***Study Programme***: is ready to analyse their own professional activities and plan professional growth
• Be able to continue studies or participate in research, act as a specialist or a developer in his or her field, including internationally.	***Research Methods***: can formulate research questions and choose the appropriate methodology according to the set questions. ***Study Programme***: is able to continue studies at the PhD level; is able to find innovative and adequate solutions in changing and unexpected situations.

d. HCI

Human-Computer Interaction

Standard	**Study Programme**
In order to be awarded a Master's degree (including upon the completion of the integrated study programmes of Bachelor's and Master's study), a student shall:	A graduate in Human-Computer Interaction study programme:
• Have systematic overview and broad knowledge of concepts, theories and research methods of the field of study	The Foundations of the Human-Computer Interaction course promotes the understanding of the main analytical means, concepts, theories and models and enables students to use these to define their own path within the curriculum.
• Know the theoretical development trends, current problems and potential applications in the field of study;	With the Philosophy of Human-Computer Interaction course, students will learn how to look into some of the main cognitive phenomena concerning human beings from a philosophical perspective. Furthermore, the Current Topics in Human-Computer Interaction presents the students with an understanding of both the state-of-the-art developments and also the current challenges and possibilities in the field of Human-Computer Interaction.
• Have in depth-knowledge in a narrower research field of the field of research;	The Master Thesis module provides the students with conditions that support: the development of an in-depth knowledge of a specific area; and a specialization based on an individually focused task.
• Be able to identify and create interdisciplinary connections;	The Core Courses module creates conditions for students to develop advanced transferable skills from an undergraduate base in computing or design to postgraduate knowledge in human-computer interaction. Also, by attending the Master Thesis Seminar, students are able to see the implementation possibilities of the knowledge gained from their study field in other domains.
• Be able to independently and creatively identify and formulate problems and /or research questions related to the field of study and be able to solve them with appropriate measures within given time frames and with limited information, using the knowledge of other fields as necessary;	The Core Courses module creates the conditions for students: to build a sound and comprehensive understanding of human-computer interaction, rooted in established theories and practical skills, through a shared international educational experience; to develop advanced transferable skills from an undergraduate base in computing or design to postgraduate knowledge in human-computer interaction; to integrate creative ideas and insights

	into established knowledge and practice; to expand project-oriented working methods and skills, including opportunities for monitoring, reporting and presenting progress in project work; to share results and ideas with peers.
• Be able to select and use appropriate methods and technologies when solving problems in the field of study, and to model and/or assess the potential results;	In general, the Core Subjects module enables students to gain advanced analytical skills in relation to complex published material and understanding of academic standards and conventions, including common review and evaluation practices; in the Research Methods course, students learn how to recognize and comparatively differentiate between different types of research designs.
• Be able to critically evaluate his or her activities when solving problems and/or research questions in the field of study;	In general, the Core Subjects module enables students to gain a critical understanding and an ability to make sound judgments with regard to complex ethical and accessibility issues related with human-computer interaction. In particular, after attending the Research Methods course, the students know the main quality criteria for academic research and can evaluate the quality of a given study according to these criteria.
• Be prepared to work in an area of activity requiring professional qualifications, showing initiative, responsibility, leadership and team work skills;	The Core Courses module instigates social aspects of working in individual, team-based and networked environments. It also prepares students to work in a range of typically cross-national, project and team-based technologically mediated working environments; develop a comprehensive image of the discipline as a whole, being able to position their work with respect to other knowledge areas and concepts; access, refer and use research results in their professional practices in an epistemologically and ethically defensible manner, and in accordance with different conventions.
• Be able to impart his/her knowledge competently by teaching, instructing or by other means;	The Master Thesis Seminar offers the possibility to conduct a seminar that focuses on a research question, its topicality, goals and research methods.
• Be able to present and reason orally or in written form in the language of instruction and in a foreign language essential for his or her field of study, the problems relating to the field of study, conclusions and the underlying theories, and to participate in relevant discussions of both corresponding specialists and non-specialists;	The Research Methods course prepares the student to recognize and comparatively differentiate between different types of research designs; and to understand the main quality criteria for academic research; to evaluate the quality of a given study according to these criteria. Also, the Core Courses module prepares students to engage in critical reflection and analysis of the social and economic impacts of how humans relate with and through software and technical systems in order to challenge the industry as a whole and the individual's working practice in

	particular.
• Be willing to actively participate in civil society and demonstrate tolerance towards diversity of attitudes and values;	After completion of the Core Courses module, the student should understand how to access, refer and use research results in their professional practice in an epistemologically and ethically defensible manner, and in accordance with different conventions. Also, the Master Thesis module prepares the student to express themselves in oral, written and technology-mediated ways in the style required by enterprises, organizations or the academic community.
• Be able to act ethically in complex situations, be aware of the ethical aspects, possibilities, restrictions and social role of his or her activities and be able to provide reasoned assessment in issues concerning his or her field of study;	The Ethics and Law in New Media course creates opportunities for acquiring knowledge on a wide range of topics related to the ethical and legal aspects of new media (online communities, software and content licensing, online crime, new ethical systems stemming from the Internet, etc.), to promote students' versatility to work in different online environments using different tools, to provide practical skills in choosing suitable legal frameworks for different new media situations, to raise awareness of dangers related to online environment (censorship, privacy violations, cybercrime, legal controversies etc.).
• Be able to evaluate his or her need, and the need of others, of continuing education and professional development, and have command of effective methods necessary for independent study;	The Core Courses module prepares the students to demonstrate individual orientations that allow establishing and deepening new or existing professional careers. Further, through practice the students will get a sound understanding of all facets of and interactive media and knowledge environment projects.
• Be able to continue studies or participate in research, act as a specialist or developer in his or her field, including internationally.	The Core Courses module prepares students to be independently able to gain advanced analytical skills in relation to complex published material and understanding of academic standards and conventions, including common review and evaluation practices. Further, the Research Methods course prepares the student to set up research questions; choose the appropriate methodology according to the set questions; design simple instruments for data collection; and structure the study while writing up and format-ting the thesis according to the requirements.

e. Educational Technology

Standard	Study Programme
In order to be awarded a Master's degree, a student shall:	A graduate of the Educational Technology study programme:
• Have a systematic overview and broad knowledge of concepts, theories and research methods in the field of study	**Core subjects (ICT development and knowledge management in organizations):** The knowledge of educational principles in educational technology, its theoretical research trends, actual problems and interdisciplinary solution possibilities and the competences in associating these with different aspects of learning. ***A graduate of one of the following courses,*** **IFI7051 Learning Environments and Learning Networks:** Acquires knowledge about the roles of learning environments and networks in a learning process. **IFI7055 Innovation Technologies:** Understands the basics of innovation and innovation management. **IFI7056 Research Trends and Evaluation in Educational Technology:** Has an overview of the pedagogical principles and research trends used in educational technology studies. **IFI7003 Project Management in Software Engineering:** Has knowledge about the basic structures, models and principles of project management. **IFI7041 Data Analysis (Descriptive Statistics):** Recognises and can comparatively differentiate between different types of research designs; Understands what are the main quality criteria for academic research. **IFI7061 Multimedia Development:** Understands the nature of different media types, their representations in analogue and digital form. **IFI7115 Security and Privacy Matters:** Is aware of major aspects and trends of computer security and privacy.
• Know the theoretical development trends, current problems and potential applications in the field of study;	**Core subjects (Learning design):** Knowledge of how to support the learning process with educational technology and the ability to connect them with the different aspects of the learning process. ***A graduate of one of the following courses***, **IFI7052 Learning Environments and Learning**

Networks: Is able to define the differences, advantages and challenges of open distributed learning environments and closed, centralized learning management systems; Understands the changes in the learner's and teacher's roles in different environments; Acquires knowledge about trends and development of learning environments and networks.

IFI7053 Creating Digital Learning Resources: Understands main technologies and tools for creating digital learning resources; Understands copyright and referencing principles of digital learning resources.

IFI7055 Innovation Technologies: Is able to assess the innovations.

IFI7060 Learning Analytics: Understands the concept of the learning analytics and related concepts.

IFI7062 Educational Technology Infrastructure Seminar: Has an overview of the most common education technology and digital media resources and their use in teaching.

IFI7115 Security and Privacy Matters: Understands major threats to ordinary users and ways to address them; Is aware of major types of online scams and network crime.

- Have an in depth-knowledge in a narrower research field within the field of research;

Core subjects (ICT development and knowledge management in organization):

Has the ability: to effectively organize and support the learning activities of different domains using educational technology; to develop personal and others' learning environments; to guide teachers and learners in a way that supports learning and learning motivation; to use effective methods for organizing his/her learning and counselling learners and teachers in integrating educational technology into their own learning process; to guide the institution as the community's source of research and development on educational technology

Core subjects (Learning design): Has the ability to develop the learning environment using the resources of educational technology, e.g. planning the learning process, creating digital resources and e-learning practices.

A graduate of one of the following courses,

IFI7051 Principles of Learning Design: Can analyse the needs of their target group and define learning objectives for a course; select instructional strategies and tactics suitable for a target group; select and adapt suitable online tools for creating an effective online learning environment.

	IFI7052 Learning Environments and Learning Networks: Is able to analyse affordances of different social media applications according to their own (others) learning activities and combine as well as implement them effectively; is able to effectively organize, design and support their own learning environments as well as and that of others. **IFI7053 Creating Digital Learning Resources:** Is able to create learning objects and content packages, and describe these with metadata; Is able to create computer-based tests. **IFI7055 Innovation Technologies:** Is able to plan and implement innovative solutions by applying ICT in education. **IFI7057 Counselling in Educational Technology:** Understands the need for educational technology counselling and uses effective counselling and motivational techniques to introduce educational technology. **IFI7026 Legal Issues Related to IT-Development:** Has the ability to detect and evaluate the legal risks related to IT-development processes; to take the author's rights and personal data subject's rights into consideration. **Electives:** Knowledge and competences according to student's choice.
• Be able to identify and create interdisciplinary connections;	**General Courses:** Based on accessible data students can analyze, prognostcate, make correct inferences and generalizations and evaluate the quality of solutions. ***A graduate of one of the following courses***: **IFI7058 Apprenticeship Practice in Educatio-nal Technology:** Recognizes the challenges and opportunities of learning design in school settings. **IFI7060 Learning Analytics:** Is able to evaluate different research and data-analysis methods and to implement them in the different learning analytics actions. **IFI7038 21-st Century Concepts in Information and Meaning:** Has an overview of the main components of the 21st century culture.
• Be able to independently and creative-ly identify and formulate problems and /or research questions related to the field of study and be able to solve them with appropriate measures within given	**IFI7044 Data Analysis (Inferential Statistics):** Has experience in formulating questions about data, which lead to statistical analysis with methods of inferential statistics. **IFI7007 Research Methods:** Can formulate research questions and choose the appropriate methodology

timeframes and with limited information, using knowledge from other fields as necessary;	according to the set questions.
• Be able to select and use appropriate methods and technologies when solving problems in the field of study, and to model and/or assess the potential results;	**Core subjects (ICT development and knowledge management in organization):** Competency in using educational technology in the áreas that are needed for developing the general educational technology competences in the institutions, organizing life-long learning and ability to critically assess one's actions while solving the problems of his discipline. ***A graduate of one of the following courses***, **IFI7044 Data Analysis (Inferential Statistics):** Understands the difference between descriptive and inferential statistics; can recognise different types of variables and choose appropriate statistical techniques accordingly; can use the SPSS software with the aid of the manual for simple data processing and analysis. **IFI7041 Data Analysis (Descriptive Statistics):** Recognises and can comparatively differentiate between different types of research designs; can design simple instruments for data collection; can create statistical data tables with an appropriate structure; has experience in formulating questions about data which lead to statistical analysis; understands the main concepts of descriptive statistics, underrstands the prerequisites for their correct application and can interpret the results of the analysis correctly; can recognise different types of variables and choose appropriate statistical techniques accordingly; can use the statistical software with the aid of the manual for simple data processing and analysis. **IFI7007 Research Methods:** Can design simple instruments for data collection. **IFI7051 Principles of Learning Design:** Can apply concept mapping and task analysis techniques for domain analysis; create learning design diagrams and storyboards to present their instructional strategy; prepare a formative evaluation plan for a course prototype. **IFI7052 Learning Environments and Learning Networks:** Is able to analyse affordances of different social media applications according to their own (others) learning activities and combine as well as implement them effectively. **IFI7053 Creating Digital Learning Resources:** Understands main technologies and tools for creating digital learning resources.

	IFI7055 Innovation Technologies: Is able to plan and implement innovative solutions by applying ICT in education. **IFI7056 Research Trends and Evaluation in Educational Technology:** Can choose appropriate methods to conduct design-based or evaluation research and make suggestions to improve the designs, learning communities or organizations with educational technology; can organize an evaluation study for the educational technology situation at a school. **IFI7060 Learning Analytics:** Is able to evaluate different research and data-analysis methods and to implement them in the different learning analytics actions**.** **IFI7003 Project Management in Software Engineering:** Has the skills for development of a project plan and the ability to assess the project plans. **IFI7062 Educational Technology Infrastruc-ture Seminar:** Is able to write a description of an educational technological infrastructure and the need for development; is able to plan school technology education support services.
• Be able to critically evaluate his or her activities when solving problems and/or research questions in the field of study;	**Core subjects (Learning design):** Preparedness to analyze personal professional activities and planning self-development, ability to use scientific methods for analyzing and developing the learning process. ***A graduate of one of the following courses***, **IFI7052 Learning Environments and Learning Networks:** Is able to effectively organize, design and support their own and others‘ learning environments; understands their own role in designing and implementing personal and group learning environments. **IFI7058 Apprenticeship Practice in Educational Technology:** Reflects on his/her own actions during apprenticeship, using e-portfolio; shares his/her experiences within the virtual community of practice.
• Be prepared to work in an area of activity requiring professional qualifications, showing initiative, responsibility, leadership and team work skills;	**Core subjects (ICT development and knowledge management in organization):** Competences and motivation to work in teams and networks, involving different partners, showing initiative, responsibility, the skills of teamwork and leadership. ***A graduate of one of the following courses***, **IFI7055 Innovation Technologies:** Is able to plan and implement innovative solutions by applying ICT in education. **IFI7056 Research Trends and Evaluation in**

	Educational Technology: Can organize a study for evaluating the educational technology situation at a school. **IFI7057 Councelling in Educational Technology:** Can councel and teach colleagues to use educational technology solutions for learning, teaching and assessement; can councel students in innovative educational technology projects and career choices related to educational technology; can assist the schools in finding suitable e-learning trainings, understanding e-regulations and how to monitor the situation in the institution. **IFI7058 Apprenticeship Practice in Educational Technology:** Can guide a of teachers in the context of designing new courses, learning materials or curricula. **IFI7062 Educational Technology Infrastructu-re Seminar:** Is able to plan instructive education technology and digital media management.
• Be able to impart his/her knowledge competently by teaching, instructing or by other means;	**IFI7051 Principles of Learning Design:** Is able to analyse the needs of their target group and define learning objectives for a course; select instructional strategies and tactics suitable for the target group; select and adapt suitable online tools for creating an effective online learning environment. **IFI7057 Councelling in Educational Technolo-gy:** Is able to organize and conduct training for educational technology competences for colleagues. **IFI7031 Activity Learning in School Informa-tics:** Is able to implement active learning in the context of school informatics. **Master's Thesis:** The readiness for research based teaching and counselling in the learning process by using educational technology.
• Be able to present and reason orally or in written form in the language of instruction and in a foreign language essential for his or her field of study, the problems relating to the field of study, conclusions and the underlying theories, and to participate in relevant discussions of both corresponding specialists and non-specialists;	**EKE7043 Estonian Writing Skills:** Is able to express themselves fluently and correctly in written texts; understands the main requirements of official language usage; can use sources of linguistic self-supervision. **IFI7007 Research Methods:** Can structure study while writing up and formatting the thesis according to the requirements. **Master's Thesis:** Is able to present results orally and in written format. **Electives:** Has the skills of one foreign language at the B1 level of the European Language Portfolio; Graduates of schools with Russian as the language of instruction must have skills in the Estonian language at

	the C1 level.
• Be willing to actively participate in civil society and demonstrate tolerance towards diversity of attitudes and values;	**Study Programme:** Participates in professional discussion, topic communities and international networks. **Master's Thesis:** Has the ability to professionally follow the ethical rules of society and has tolerance towards different attitudes and values in society.
• Be able to act ethically in complex situations, be aware of the ethical aspects, possibilities, restrictions and social role of his or her activities and be able to provide reasoned assessment in issues concerning his or her field of study;	**Core subjects (Learning design**): Has knowledge and ownership of professional and ethical requirements. **Master thesis:** Professionally follows ethical rules and is tolerant towards different attitudes and values in society.
• Be able to evaluate his or her need, and the need of others, of continuing education and professional development, and have command of effective methods necessary for independent study;	**Study Programme:** Analyzes personal professional activities and plans professional development both in academic and in vocational spheres, also internationally. **Core courses:** Has the ability to map and analyze personal professional activities and plan Professional Development. **Core subjects (Learning design):** Is prepared to analyze personal professional activities and plan self-development, has the ability to use scientific methods for analysing and developing the learning process. **IFI7058 Apprenticeship Practice in Educational Technology:** Is able to reflect on his/her own actions during apprenticeship, using an e-portfolio. **Master's Thesis:** Has the ability to analyze personal professional activities and plan professional development both in vocational as well as in academic spheres, also internationally.
• be able to continue studies or participate in research, act as a specialist or developer in his or her field, including internationally.	**Master's Thesis:** Has the ability to apply scientific research methods in developmental projects for creating learning designs; has the ability to apply participatory design and case study methods for evaluating the educational technology potentials, problems and/or situations in the educational institutions and to propose solutions; has the ability to compose and present a written scientific report, analyse data and research results; has the ability to analyze personal professional activities and planning Professional Development both in vocational as well as in academic spheres, also internationally.

Appendix 5 – Information About Selected Teaching Staff

Each programme manager (Head of Curriculum) nomonated five teachers for the list. As some teachers were chosen more than once, the total number of teachers in the list is less than 5•5 = 25.

Each person was given up to one page to describe his/her academic activities during the last five years. The courses that are taught in programmes that are not considered during this assessment (for example, the Information Society Technologies doctoral programmme) are not included in the list of taught courses.

More complete curriculum vitae (including, for example, the supervison of students) can be found in the Estonian Research Information System: www.etis.ee.

Academic positions are divided into teaching positions (professor, associate professor, lecturer, teacher) and researchers positions (lead researcher, senior researcher, researcher, junior researcher). However, the researchers have teaching obligations as wellthat, in the same way that teaching positions carry research obligations).

Emanuele Bardone

1. Name: Emanuele Bardone
2. Affiliation: Marie Curie Fellow, Institute of Informatics
3. Qualification: PhD in Philosophy
4. Courses taught in the study programmes of the group:
    a. IFI7153 Philosophy of Cognition
    b. IFI7131 Towards a Better Understanding of Human-Computer Interaction
    c. IFI7171 Philosophy of Human-Computer Interaction
5. Most significant publications (2008-2013):
    a. E. Bardone and I. Shmorgun (2013), Ecologies of Creativity. Multitouch Smartphones As a Case in Point, *Mind and Society*, 12(1), 125-135.
    b. E. Bardone (2011), Unintended Affordances as Violent Mediators. Maladaptive affects of Technologically Enriched Cognitive Niches, *International Journal of Technoethics*, 2(4), 37-52.
    c. L. Magnani, E. Bardone (2011), Ambient Intelligence, Cognitive Niche Enrichment, Adapting Affordances Foundational Issues. F. Mastrogiovanni and Nak-Young Chong (Eds.). *Handbook of Research on Ambient Intelligence and Smart Environments: Trends and Perspectives*. IGI Global.
    d. E. Bardone (2011), *Seeking Chances. From Biased Rationality to Distributed Cognition*, Springer, New York.
    e. E. Bardone (2010), Affordances as Abductive Anchors. in L. Magnani, W.Carnielli, C. Pizzi (eds), *Model-Based Reasoning in Science & Technology*, Springer, Heidelberg, SCI 314, pp. 135-57.
    f. L. Magnani and E. Bardone (2009), Seeking Chances through Interface Design. The Role of Abduction, in the Proceedings of the 2009 IEEE International Conference on Systems, Man, and Cybernetics, pp. 1714-1719.
    g. L. Magnani, E. Bardone (2008), Distributed Morality. Externalizing Ethical Knowledge in Technological Artifacts. *Foundations of Science*, 13(1): 99-108.
6. Most significant R&D projects:
    a. 7FP People Programme, ERMOS (Estonian Research Mobility Scheme) "The Role of Chance-seeking in learning digital ecosystems" (2011-2014).

Kaido Kikkas

1. Name: Kaido Kikkas
2. Affiliation: Associate Professor (0.25); Associate Professor at the Estonian Information Technology College (1.0)
3. Qualification: Doctor of Philosophy in Engineering
4. Courses taught in the study programmes of the group:
    a. IFI7105 Open Source Management
    b. IFI7115 Security and Privacy Matters
    c. IFI7137 Ethics and Law in New Media
5. Academic activities at foreign universities during 2008-2013:
    a. Visiting Professor at University of Economy Bydgoszcz (Poland), Spring 2012
6. Most significant publications (2008-2013):
    a. Lorenz, Birgy; Kikkas, Kaido (2012). Lessons Learned from the Safer Internet Program in Estonia. *eLearning Papers*, 28, 1 - 10.
    b. Lorenz, Birgy; Kikkas, Kaido (2012). At the Crossroads – M-Learning and Cloud Services in Estonian Schools. *eLEarningPapers*, 1 - 10.
    c. Lorenz, Birgy; Kikkas, Kaido; Laanpere, Mart (2012). Comparing Children's E-safety Strategies with Guidelines Offered by Adults. *The Electronic Journal of e-Learning*, 10(3), 326 - 338.
    d. Kikkas, Kaido (2011). Vaba kultuur. *Vikerkaar*, 10-11, 81 - 90.
7. Most significant R&D projects (2008-2013):
    a. Targeted research „Distributed learning environments, their interoperability and models of application" (2008-2013, financed by the Estonian Ministry of Education and Research).

Jaagup Kippar

1. Name: Jaagup Kippar
2. Affiliation: Lecturer of the Institute of Informatics
3. Qualification: MSc in Didactics of Informatics
4. Courses taught in the study programmes of the group:
    a. IFI6038 XML Applications
    b. IFI6069 Basic Course in Programming
    c. IFI6076 Web Programming
    d. IFI6040 The Web Applications of Python and Zope
    e. IFI6071 Object Oriented Programming in C++
    f. IFI6028 Programming of Graphics and Music
    g. IFI6059 Programming of Applications
    h. IFI6093 User Interfaces of Web Applications
5. Academic activities at foreign universities during 2008-2013:

    None
6. Most significant publications (2008-2013):
    a. Matsak, Erika; Eslon, Pille; Kippar, Jaagup (2010). Eesti keele sõnajärje vealeidja prototüübi arendamine. Pille Eslon, Katre Õim (Toim.). *Korpusuuring ja meetodid* (59 - 100). Tallinn: TLÜ EKKI
    b. E. Matsak, H. Metslang, J. Kippar (2010). The prototype of word order assessment at the Estonian Interlanguage Corpus. The 2010 International Conference on Artificial Intelligence. Las-Vegas: CSREA Press, 2010, 870 - 875.
    c. Kaipainen, M.; Normak, P.; Niglas, K.; Kippar, J.; Laanpere, M. (2008). Soft ontologies, spatial representations and multi-perspective explorability. *Expert Systems*, 25(5), 474 - 483.
    d. Niglas, K.; Kaipainen, M.; Kippar, J. (2008). Multi-perspective exploration as a tool for mixed methods research. . M.M. Bergman (Toim.). *Advances in Mixed Methods Research: Theories and Applications* (172 - 187). Sage Publications Ltd
7. Most significant R&D projects (2008-2013):
    a. Eesti Vahekeele Korpus (Estonian Interlanguage Corpus) - evkk.tlu.ee
    b. Several software design developement projects with companies and students.

Andro Kull

1. Name: Andro Kull
2. Affiliation: Lecturer in the Institute of Informatics
3. Qualification: PhD in computer sciences
4. Professional certifications: CISA, CISM, CRISC, ABCP
5. Courses taught in the study programmes of the group:
    a. IFI7021 Development of Infrastructure of Information Technology
    b. IFI7045 Information Security Management
    c. IFI7073 ICT Procurements and Contracts
6. Studies
    a. January 2005 – February 2012: University of Tampere, Computer Sciences, doctoral studies;
    b. September 2001 - June 2003: Tallinn University, IT management, master thesis „Information Systems Strategic Planning in the Estonian Public Sector“;
    c. September 1998 - June 2001: University of Tartu, Applied Informatics, „The Information Security Approach of the Labour Market Board “.
7. Most significant publications (2008-2013) and conferences:
    a. “A Method for Continuous Information Technology Supervision” The 9th Annual Security Conference (www.security-conference.org), April 7-8, 2010 in Las Vegas, NV, USA.
    b. “Regulatory Compliance to Ensure Information Security: *Financial Supervision Perspective*”, 10th European Conference on Information Warfare and Security, Tallinn University of Technology, 7-8. July 2011, Tallinn, Estonia.
    c. PhD thesis “A Method for Continuous Information Technology Supervision: *The Case of the Estonian Financial Sector*“.
8. Reviews:
    a. Birgy Lorenz, Kaido Kikkas „Challenges in Mobile Teaching and Safety – *A Case Study*“;
    b. Birgy Lorenz, Sonia Sousa, Vladimir Tomberg „Privacy Awareness of Students and It Implications in Online Learning Participation – *a Case Study*“;
    c. Mikko Ahonen, Tarmo Koppel „Mobile learning and health-risk management of pulsed microwave technologies“.
9. Most significant R&D projects (2008-2013):
    a. The project “Development of Study and Research in Digital Safety at the Institute of Informatics of Tallinn University” (2013-2016; in total € 301,363), financed by the Estonian Information Technology Foundation for Education.

Mart Laanpere

1. Name: Mart Laanpere
2. Affiliation: researcher, Head of the Centre for Educational Technology
3. Qualification: MSc in Educational & Training Systems Design, PhD applicant
4. Courses taught in the study programmes of the group:
    a. IFI7034 Didactics of Informatics
    b. IFI7051 Basics of Instructional Design
    c. IFI7031 Active Learning in Informatics Lessons
5. Academic activities at foreign universities during 2008-2013:
    a. Lecturer at MA Summer School in Dalarna University, 2009-2011
    b. Several short visits (conferences, project meetings, seminars) to Afghanistan, Austria, Belgium, Canada, France, Georgia, Greece, Germany, Hong-Kong, Finland, Latvia, Kazakhstan, Moldova, Palestine, Poland, Portugal, Romania, Serbia, Slovenia, Spain, Sweden, Turkey, UK.
    c. Link convenor (chairman) of the Network 6 of European Educational Research Association, 2009-2013.
6. Most significant publications (2008-2013):
    a. Tomberg, V., Laanpere, M., Ley, T., Normak, P. (2013). Sustaining Teacher Control in a Blog-Based Personal Learning Environment. *The International Review of Research in Open and Distance Learning*, 14(3): 109-133.
    b. Põldoja, H., Väljataga, T., Laanpere, M., Tammets, K. (2012). Web-based Self- and Peer-Assessment of Teachers' Digital Competencies. *World Wide Web Journal*, Springer.
    c. Laanpere, M., Pata, K., Normak, P., Põldoja, H. (2012). Pedagogy-Driven Design of Digital Learning Ecosystems: *The Case Study of Dippler*. *Lecture Notes in Computer Science*, Vol. 7558, 307-317.
    d. Kaipainen, M., Normak, P., Niglas, K., Kippar, J., Laanpere, M. (2008). Soft ontologies, spatial representations and multiperspective explorability. *Expert Systems* Vol 25, N5, 474-483.
7. Most significant R&D projects (2008-2013):
    a. Targeted research grant „Distributed learning environments, their interoperability and models of application" (2008-2013, financed by the Estonian Ministry of Education and Research).
    b. ERA-NET RUS project "ePortfolio for Human Resources" (2012-13).
    c. TEMPUS project INCOMING: Interdisciplinary Curricula in Computing to Meet Labor Market Needs, involving 4 Serbian universities (2012 – 15).
    d. FP7 ICT project Intelleo: Intelligent Learning in Extended Organisation (2009-2012).
    e. FP7 ICT large-scale integrated project Learning Layers: Scaling up Technologies for Informal Learning in SME Clusters (2012-16).

David Lamas

1. Name: David Lamas
2. Affiliation: Professor, Head of the Interaction Design Lab
3. Qualification: PhD in computer science
4. Courses taught in the study programmes of the group:
   a. IFI7117, IFI7118 Master Thesis Seminar I and II
   b. IFI7101 Introduction and Theoretical Foundations of New Media
   c. IFI7158 Master Thesis Seminar
   d. IFI7159 Foundations of Human-Computer Interaction
   e. IFI7160 Current Topics in Human-Computer Interaction
5. Academic activities at foreign universities during 2008-2013:
   a. 2007-2010 Project coordinator, Virtual learning environments initiative, Instituto Piaget, Portugal.
   b. 2006-2012 Supervision of doctoral thesis in the university of Santiago de Compostela, Spain.
   c. Several short visits (conferences, seminars, project meetings etc) to the universities in Belgium, Cyprus, Denmark, Finland, France, Norway, Portugal, Romania, Russia, the UK.
6. Most significant publications (2008-2013):
   a. Arakelyan Arman, Shmorgun Ilya, Lamas David (2013). Sustainable Ubiquitous Substitutions through Appropriation-Enabling Design. *IEEE Pervasive Computing*, 12(3).
   b. Sousa, Sonia; Lamas, David (2012). Trust as a leverage for supporting online learning creativity: a case study. *eLearning Papers*, 30.
   c. Lamas, David; Tomberg, Vladimir; Laanpere, Mart (2012). A Conceptual Model for Collaborative Scientific Writing. 2012 ACM Conference on Computer Supported Cooperative Work, February 11-15.
   d. Tomberg, Vladimir; Laanpere, Mart; Lamas, David; Pata, Kai; Gaevic, Dragan (2012). Enhancing Learning Analytics in Distributed Personal Learning Environments. In: Proceedings of the: 12th IEEE International Conference on Advanced Learning Technologies ICALT 2012 Los Alamitos,: Advanced Learning Technologies (ICALT), 2012 IEEE 12th International Conference. (Eds.)Werner, Bob. IEEE Computer Society, 2012, 286 - 287.
7. Most significant R&D projects (2008-2013):
   a. FP7. “IntelLeo”. 2009-2012
   b. EACEA LLP KA3. “CoCreat: enabling creative collaboration through supportive technologies”. 2011-2013
   c. Archimedes Foundation. “LearnMix: the re-conceptualization of the e-Textbook as aggregations of both professionally developed and user-contributed content accessible through a wide range of devices”. 2013-2015

Paul Leis

1. Name: Paul Leis
2. Affiliation: CTO, AS SEB Pank
3. Qualification: PhD in technical cybernetics and information technology
4. Courses taught in the study programmes of the group:
   - IFI7013 ICT strategic management
5. Courses taught in Tallinn University of Technology (0.25 Associate Professor):
   - IAG0100 Software Engineering
   - ITX8043 Foundations and Management of Cyber Security
   - IDU0040 Strategic development and Governance of Information Systems
6. Most significant publications (2008-2013):
   - Leis, Paul (2011). IT teenuse sisseostu valitsemisest (On the Governance of IT outsourcing). *Arvutitehnika ja Andmetöötlus*, 1
   - Leis, Paul (2010). Pilvtestimisest (On Cloud Testing). *Arvutitehnika ja Andmetöötlus*, 3
   - Leis, Paul (2010). Pilvraalinduse pisiülevaade (Mini Overview of Cloud Computing). *Arvutitehnika ja Andmetöötlus*, 2
   - Leis, Paul (2010). Miks on tarkvarainseneerias vaja Kanbani? (Why Software Engineering Needs Kanban). *Arvutustehnika ja Andmetöötlus*, 1
   - Leis, Paul (2009). Talitluspidevuse terminoloogiast: taastetöövoog (On the Terminology of Business Continuity: Recovery Workflow). Arvutitehnika ja Andmetöötlus, 6
   - Leis, Paul (2009). Kahest tarkvarainseneeria arengusuunast (On Two Branches of Software Engimeering). *Arvutitehnika ja Andmetöötlus*, 5
   - Leis, Paul (2009). Talitluspidevuse standardist BS 25999 (On Business Continuity Standard BS 2599). *Arvutitehnika ja Andmetöötlus*, 2
   - Leis, Paul (2008). Information Security Management Maturity Model. *Arvutitehnika ja Andmetöötlus*, 2

Tobias Ley

1. Name: Tobias Ley
2. Affiliation: Professor
3. Qualification: PhD in Psychology (2005)
4. Courses taught in the study programmes of the group:
    a. Research Methods
    b. Digital Knowledge Ecosystems
    c. Social Computing (scheduled for 2014)
5. Academic activities at foreign universities during 2008-2013:
    a. Assistant Professor, University of Graz, Austria (2008-2011): Teaching, Research and supervision of Masters and PhD students in Cognitive Psychology, Educational Technology and Knowledge Management.
    b. EU Project research collaborations in Universities and Research Institutes in Austria, Germany, UK, The Netherlands, Italy, Spain, Finland, Switzerland (since 2006).
    c. Supervision of PhD students (Vienna University of Technology, Graz University of Technology, University of Tübingen, Germany) (since 2010).
6. Most significant publications (2008-2013):
    a. Ley, T., Schweiger, S., & Seitlinger, P. (2011). Implicit and Explicit Memory in Learning from Social Software: A dual-process account. *Proceedings of the 6th European Conference on Technology Enhanced Learning, ECTEL 2011 (Lecture Notes in Computer Science, pp. 449-454)*. Heidelberg: Springer.
    b. Ley, T., Kump, B.; Albert, D. (2010). A Methodology for Eliciting, Modelling, and Evaluating Expert Knowledge for an Adaptive Work-integrated Learning System. *International Journal of Human-Computer Studies, 68*(4), 185-208.
    c. Ley, T., Kump, B.; Gerdenitsch, C. (2010). Scaffolding Self-directed Learning with Personalized Learning Goal Recommendations. In P. de Bra & A. Kobsa (Eds.), *User Modelling, Adaptation, and Personalization 18th International Conference UMAP 2010 (Lecture Notes in Computer Science, Vol. 6075, pp. 75-86)*. Heidelberg: Springer.
    d. Ley, T., Ulbrich, A., Scheir, P., Lindstaedt, S. N., Kump, B. & Albert, D. (2008). Modelling Competencies for supporting Work-integrated Learning in Knowledge Work. *Journal of Knowledge Management, 12* (6), 31-47. (Best Paper Award)
7. Most significant R&D projects (2008-2013):
    a. Learning Layers: Scaling up informal learning technologies in SME networks, EU-FP7 Large-scale integrated Project (IP), EUR 12.7m, 2012-2016, Principle Investigator
    b. MATURE: Social Learning in Knowledge Networks, EU-FP7 Large-scale integrating Project (IP), EUR 9m, 2008-2012, Work Package Leader.

Erika Matsak

1. Name: Erika Matsak
2. Affiliation: Associate Professor
3. Qualification: PhD in Computer and Systems Engineering
4. Courses taught in the study programmes of the group:
    a. IFI6020 Cryptology In Data Security
    b. IFI 6052 Interface Development for Database
    c. IFI6057 Intelligent Systems
    d. IFI6069 Basic Course in Programming
5. Academic activities at foreign universities during 2008-2013:
    a. Several short visits (conferences mainly in USA)
    b. Graduate School in Language Studies (University of Eastern Finland, lector)
6. Most significant publications (2008-2013):
    a. Matsak, E., Lorents, P. (2012). Decision-support systems for situation management and communication through the language of algebraic systems. CogSima 2012 . I.E.E.E. Press, 2012.
    b. Tuulik, K., Alas, R., Lorents, P., Matsak, E., Carneiro, J. (2011). Values in institutional context. *Problems and Perspectives in Management*, 9(2), 4 - 13.
    c. Matsak, E.; Lorents, P. (2011). Knowledge in Digital Decision Support System. In: Universal Access in Human-Computer Interaction. Applications and Services: HCI International 2011, Orlando, Florida, USA. Springer, 2011, (Lecture Notes in Computer Science), 263 - 271.
    d. Alas, R., Gao, J., Lorents, P., Übius, Ü., Matsak, E., Carneiro, J. (2011). Associations between Ethics and Cultural Dimensions: Similarities and differences concerning ethics in China, Brazil and Estonia. *Megadigma Journal*, 4(2), 153 - 162.
    e. Metslang, H., Matsak, E. (2010). Kesksete lausekomponentide järjestus õppijakeeles: arvutianalüüsi katse. Metslang, Helle; Langemets, Margit; Sepper, Maria-Maren (Toim.). Eesti Rakenduslingvistika Ühingu aastaraamat (175 - 193). Tallinn: Eesti Keele Sihtasutus
    f. Matsak, E (2010). Discovering Logical Constructs from Estonian Children Language. Germany: Lambert Academic Publishing
    g. Eslon, P., Matsak, E. (2009). Eesti keele kasutusvariandid: korpusest tulenev käändevormide võrdlev analüüs. Helle Metslang, Margit Langemets, Maria-Maren Sepper, Reili Argus (Toim.). Eesti Rakenduslingvistika Ühingu aastaraamat 5 (79 - 110). Tallinn: Eesti Keele Sihtasutus
7. Most significant R&D projects (2008-2013):
    a. VAKO - Development of language software and language technology resources for the Estonian interlanguage corpus (2008-2010), National Programme for Estonian Language Technology.

Katrin Niglas

1. Name: Katrin Niglas
2. Affiliation: Professor, Vice Rector for Research of Tallinn University
3. Qualification: PhD in Educational Sciences (Tallinn University)
4. Courses taught in the study programmes of the group:
    a. IFI7041 Data Analysis: Descriptive Statistics
    b. IFI7044 Data Analysis: Inferential Statistics
5. Most important international level academic activities 2008-2013:
    a. Awarded a scholarship to work 4.5 months at the University of Cambridge (2008).
    b. Taught a 2-week intensive course on Mixed Methods Research Designs at the International Summer School for PhD students (2010 and 2011 organized by ECPR at the University of Ljubljana and in 2012 organized by IPSA at the National University of Singapore).
    c. Member of the editorial board for *Journal of Mixed Methods Research* and *International Journal of Multiple Research Approaches*. Reviewer for Sage Publications. Member and international correspondent of IASE (International Association for Statistical Education). Member of the steering committee of MMIRA (Mixed Methods International Research Association).
    d. Numerous short visits (invited lectures, conferences, seminars, project meetings, etc) to the universities in Finland, Sweden, Spain, Italy, USA, UK, Thailand, Puerto Rico)
6. Most significant publications (2008-2013):
    a. Niglas, K. (2010). The multidimensional model of research methodology: An integrated set of continua. Tashakkori, A., Teddlie, C. (Eds.). *Sage Handbook of Mixed Methods Research* (215 - 236).Sage Publications Ltd
    e. Niglas, K. (2008). How the novice researcher can make sense of mixed methods designs. *International Journal of Multiple Research Approaches*, 1, 13 - 33.
    f. Niglas, K.; Kaipainen, M.; Kippar, J. (2008). Multi-perspective exploration as a tool for mixed methods research. . M.M. Bergman (Eds.). *Advances in Mixed Methods Research: Theories and Applications* (172 - 187). Sage Publications Ltd
7. Most significant R&D projects (2008-2013):
    a. Estonian Science Foundation financed project “The framework for supporting and analysing self-directed learning in an augmented learning environment” (2008-2010)
    b. Targeted research „Distributed learning environments, their interoperability and models of application” (2008-2013, financed by the Estonian Ministry of Education and Research).

Peeter Normak

1. Name: Peeter Normak
2. Affiliation: Professor, Director of the Institute of Informatics
3. Qualification: PhD in mathematics
4. Courses taught in the study programmes of the group:
    a. IFI6019 Theoretical Computer Science
    b. IFI7003 Project Management in Software Engineering
    c. IFI7009 Master Seminar
5. Academic activities at foreign universities during 2008-2013:
    a. Evaluation of the bachelor and master study programmes in computer science and mechatronics in Kosovo (May 2013).
    b. Evaluation of the bachelor and master study programmes in mathematics and computer science in Russia (October 2012; February 2013).
    c. Several short visits (conferences, seminars, project meetings, acting as an opponent etc) to the universities in Austria, Belgium, Finland, France, Greece, Ireland, Italy, Latvia, Russia, Spain, Sweden.
6. Most significant publications (2008-2013):
    a. Tomberg, V., Laanpere, M., Ley, T., Normak, P. (2013). Sustaining Teacher Control in a Blog-Based Personal Learning Environment. *International Review of Research in Open and Distance Learning*. 14(3): 109-133.
    b. Tammets, K., Normak, P. (2013). Learning Outcomes for Blog-Based Courses: *A Case Study*. In: Ley, T., Ruohonen, M., Laanpere, M., Tatnall, A., *Open and Social Technologies for Networked Learning*. Springer Heidelberg Dordrecht London New York, 113-120.
    c. Laanpere, M., Pata, K., Normak, P., Põldoja, H. (2012). Pedagogy-Driven Design of Digital Learning Ecosystems: The Case Study of Dippler. *Lecture Notes in Computer Science*, Vol. 7558, 307-317.
    d. Normak, P., Pata, K., Kaipainen, M. (2012). An Ecological Approach to Learning Dynamics. *Journal of Educational Technology & Society*, 15(3), 262-274.
    e. Kaipainen, M., Normak, P., Niglas, K., Kippar, J., Laanpere, M. (2008). Soft ontologies, spatial representations and multiperspective explorability. *Expert Systems* Vol 25, N5, 474-483.
7. Most significant R&D projects (2008-2013):
    a. Estonian Science Foundation financed project “The framework for supporting and analysing self-directed learning in an augmented learning environment” (2008-2010).
    b. Targeted research „Distributed learning environments, their interoperability and models of application” (2008-2013, Financed by the Estonian Ministry of Education and Research).

Kai Pata

1. Name: Kai Pata
2. Affiliation: Senior researcher, Educational Technology programme coordinator
3. Qualification: PhD in education
4. Courses taught in the study programmes of the group:
    a. IFI7056 Research and Evaluation in Educational Technology
    b. IFI7101 Introduction and Theoretical Foundations for New Media
5. Academic activities at foreign universities during 2008-2013:
    a. Several short visits (invited talks, conferences, seminars, project meetings, acting as an opponent etc) to the universities in Austria, Italy, Finland.
6. Most significant publications (2008-2013):
7. Most significant publications (2008-2013):
    a. Normak, P., Pata, K., Kaipainen, M. (2012). An Ecological Approach to Learning Dynamics. *Journal of Educational Technology & Society*, 15(3), 262-274.
    b. Siadaty, M., Gašević, D., Jovanović, J., Pata, K., Milikić, N., Holocher-Ertl, T., et al. (2012). Self-regulated Workplace Learning: A pedagogical framework and Semantic Web-based environment. *Journal of Educational Technology and Society*, 4, 75 - 88.
    c. Tammets, K.; Pata, K.; Laanpere, M. (2011). Implementing A Technology-Supported Model for Cross-Organizational Learning and Knowledge Building for Teachers. *European Journal of Teacher Education*, 35, 57 - 75.
    d. Pata, K. (2009). Modeling spaces for self-directed learning at university courses. *Journal of Educational Technology & Society*, 12, 23 - 43.
    e. Pata, K.; Fuksas, A.P. (2009). Ecology of Embodied Narratives in the Age of Locative Media and Social Networks: a Design Experiment. *Cognitive Philology*, 2, 1 - 21.
8. Most significant R&D projects (2008-2013):
    a. IntelLeo, IST 7th Framework project (2009-2012) (Estonian project leader)
    b. Science teacher education advanced methods, 7th Framework project (2009-2012) (Estonian project leader)
    c. Estonian Science Foundation financed project “The framework for supporting and analysing self-directed learning in an augmented learning environment” (2008-2010).
    d. Targeted research „Distributed learning environments, their interoperability and models of application” (2008-2013, financed by the Estonian Ministry of Education and Research).
    e. Support system for achieving and evaluating learning goals with e-Portfolio, ETF Primus project. (2011-2012)(Project leader)

Hans Põldoja

1. Name: Hans Põldoja
2. Affiliation: Researcher
3. Qualification: MSc in informatics (Multimedia and Learning Systems)
4. Courses taught in the study programmes of the group:
    a. IFI7053 Creating Digital Learning Resources
    b. IFI7156 Interaction Design Methods
    c. IFI7052 Learning Environments and Learning Networks
    d. IFI7065 Master thesis seminar I
5. Academic activities at foreign universities during 2008-2013:
    a. Doctoral studies at the Aalto University School of Arts, Design and Architecture (Finland)
    b. Teaching the course "Composing free and open online educational resources" at the University of Art and Design Helsinki (Finland, 2008)
    c. Several short visits (conferences, seminars, project meetings, etc) to universities and research institutions in Finland, Spain, Hong Kong, Slovenia, France and Sweden.
6. Most significant publications (2008-2013):
    a. Põldoja, H., Väljataga, T., Laanpere, M., & Tammets, K. (2012). Web-based self- and peer-assessment of teachers' digital competencies. *World Wide Web*. doi:10.1007/s11280-012-0176-2
    b. Leinonen, T., Purma, J., Põldoja, H., & Toikkanen, T. (2010). Information Architecture and Design Solutions Scaffolding Authoring of Open Educational Resources. *IEEE Transactions on Learning Technologies, 3*(2), 116-128. doi:10.1109/TLT.2010.2
    c. Põldoja, H. (2010). EduFeedr: following and supporting learners in open blog-based courses. In *Open ED 2010 Proceedings*. Barcelona: UOC, OU, BYU.
    d. Põldoja, H., Väljataga, T. (2010). Externalization of a PLE: Conceptual Design of LeContract. In: *The PLE 2010 Conference Proceedings.* Barcelona: Citilab.
    e. Vuorikari, R., Põldoja, H., Koper, R. (2010). Comparison of tagging in an educational context: Any chances of interplay? *International Journal of Technology Enhanced Learning, 2*(1/2), 111-131.
7. Most significant R&D projects (2008-2013):
    a. Estonian Science Foundation financed project "The framework for supporting and analysing self-directed learning in an augmented learning environment" (2008-2010).
    b. Targeted research „Distributed learning environments, their interoperability and models of application" (2008-2013, financed by Estonian Ministry of Education and Research).

Andrus Rinde

1. Name: Andrus Rinde
2. Affiliation: Lecturer of Multimedia
3. Qualification: MSc in informatics (Multimedia and Learning Systems)
4. Courses taught in the study programmes of the group:
    a. IFI6022 Digital Media
    b. IFI6056 Creating Web Pages
    c. IFI6075 Multimedia
    d. IFI7059 Digital Media Production
    e. IFI7061 Multimedia Development
5. Academic activities at foreign universities during 2008-2013:
    a. Short visits (project meetings) to the universities in Finland and Portugal.
6. Most significant publications (2008-2013):
    a. „Lähme koos internetti avastama“ (Let’s Explore the Internet Together), Tallinn 2009, ISBN 978-9985-58-656-32 (http://www.tlu.ee/~tammsaar/NS/materjal_seeniorile.pdf).
7. Most significant R&D projects (2008-2013):
    a. CIAKL – Cinema and Industry Alliance for Knowledge and Learning, EU Lifelong Learning programme project (2012-2013, principal investigator).
    b. Computer skills for the elderly - from juniors to seniors, a project supported by the Estonian Informatics Centre and European Regional Development Foundation (2009, principal investigator)
    c. A number of innovation shares (vouchers) financed by Enterprise Estonia including the following companies:
        - OK Movers OÜ
        - MindArt OÜ
        - Santallterra OÜ
        - Eesti Nukuehitus OÜ
        - AB Technology OÜ
        - Varsaaru OÜ

Sonia Sousa

1. Name: Sónia Claudia da Costa Sousa
2. Affiliation: Researcher
3. Qualification: PhD in Educational Technology
4. Courses taught in the study programmes of the group:
   a. IFI7125 Designing technology-enhanced learning
   b. IFI7155 Evaluating the User Experience
5. Academic activities at foreign universities during 2008-2013:
   a. Jury (acting as an opponent) in two doctoral dissertations, Universidade de Santiago de Compostela, Spain. (July 2008 and December 2010).
   b. Teaching and tutoring graduation students in the Informatics scientific area (4 to 5 years courses), Universidade Jean Piaget de Moçambique, Mozambique (From 2008 until 2009).
   c. Teaching at Instituto Piaget, Escola Superior de Educação de Canelas, Portugal. (Second semester 2008)
   d. Several short visits (conferences, seminars, project meetings etc), to universities in Portugal, Finland, South Africa and Spain.
6. Most significant publications (2008-2013):
   a. Akdoğan, Itır; Sousa, Sonia (2013). Immigrant Inclusion by E-Participation (IIeP). *International Journal of E-Politics* (IJEP), 4(1), i - ii.
   b. Sousa, Sonia; Lamas, David (2012). Trust as a leverage for supporting online learning creativity – a Case Study. *eLearning Papers*, 30, 1 - 10.
   c. Sousa, Sonia; Laanpere, Mart; Lamas, David; Tomberg, Vladimir (2011). Interrelation between Trust and Sharing Attitudes in Distributed Personal Learning Environments: *The Case Study of LePress PLE*. In: Advances in Web-based Learning: (Eds.)Leung, Howard; Popescu, Elvira; Cao, Yiwei; Lau, Rynson; Nejdl, Wolfgang. Springer Verlag, 2011, (*Lecture Notes in Computer Science*), 72 - 81.
   d. Sousa, Sonia; Lamas, David (2011). Emerging trust patterns in online communities. In: he 4th IEEE International Conference on Cyber, Physical and Social Computing: CPSCom 2011: The 4th IEEE International Conference on Cyber, Physical and Social Computing. (Eds.)Feng Xia, Zhikui Chen, Gang Pan, Laurence T. Yang, and Jianhua Ma. IEEE Computer Society, 2011, 313 - 317.
7. Most significant R&D projects (2008-2013):
   a. Estonian Science Foundation. "Activity patterns in informal virtual learning communities" [MOBILITAS Postdoctoral Research Grant], 2010-2012.
   b. EACEA Lifelong Learning Programme. "CIAKL - Cinema and Industry Alliance for Knowledge and Learning", 2012-2013.
   c. EU FP7. "Science teacher education advanced methods", 2009-2012.
   d. EACEA Leonardo Da Vinci Programme. "CATEL - Cultural Awareness in Vocational Training through E-Learning", 2009-2011.

Kairit Tammets

1. Name: Kairit Tammets
2. Affiliation: Coordinator of Knowledge Transfer
3. Qualification: MA in Interactive Media and Knowledge Environments, PhD applicant
4. Courses taught in the study programmes of the group:
    a. IFI7058 Apprenticeship Practice in Educational Technology
    b. IFI7065 Master Seminar
5. Academic activities at foreign universities during 2008-2013:
    a. Several short visits (conferences, seminars, project meetings) to the universities in Austria, the Netherlands, Finland, Germany, Portugal, Spain, Sweden.
6. Most significant publications (2008-2013):
    a. Tammets, K., Pata, K., & Laanpere, M. (2012). Implementing a Technology-Supported Model for Cross-Organizational Learning and Knowledge Building for Teachers. *European Journal of Teacher Education, 35*(1), 57-75.
    b. Tammets, K., Pata, K., Laanpere, M., Tomberg V., Gaševic, D., & Siadaty, M. (2011). Designing Competence-driven Teacher Accreditation, In H. Leung, E. Popescu, Y. Cao, R.W.H. Lau & W. Nejdl (eds.), *Advances in Web-based Learning*, Vol. 7048 (pp. 132 – 141). Springer Verlag.
    c. Tammets, K., & Pata, K. (2012). Implementation Model for Cross-Organizational Learning and Knowledge Building: *a Case of Teachers' Accreditation*. *Systems Research and Behavioral Science* [in press]
    d. Tammets, K., Pata. K., & Laanpere, M. (2013). Promoting Teachers' Learning and Knowledge Building in the Socio-technical System. *The International Review of Research in Open and Distance Education.* [in press]
    e. Põldoja, H., Väljataga, T., Laanpere, M., & Tammets, K. (2012). Web-based Self- and Peer-Assessment of Teachers' Digital Competencies. World Wide Web, 1-17.
7. Most significant R&D projects (2008-2013):
    a. The Estonian Science Foundation financed project "The framework for supporting and analysing self-directed learning in an augmented learning environment" (2008-2010).
    b. Targeted research „Distributed learning environments, their interoperability and models of application" (2008-2013, financed by the Estonian Ministry of Education and Research).
    c. IntelLEO – Intelligent Learning Extended Organization (2009 – 2012, financed by EU 7th FW programme STREP project).
    d. E-Portfolio for Human Resource (2012 – 2013, financed by EU 7th FW ERA-NET programme)

Terje Väljataga

1. Name: Terje Väljataga
2. Affiliation: Researcher, programme coordinator of "Teacher of computer sciences, school ICT manager"
3. Qualification: Doctor of Science in Technology
4. Courses taught:
   a. IFI7052 Learning environments and learning networks
   b. IFI7065, IFI7066 Master thesis seminar I and II
   c. IFI7007 Research methods
5. Academic activities at foreign academic institutions (2008 – 2013)
   a. Coordinator of PSST! (Personal & Shared Strategies for Teachers in Web 2.0) intensive program, (2011-2013), EU Lifelong Learning Program.
   b. A two-month research stay at the Centre for Social Innovation in Vienna, Austria (2010).
   c. Several short visits (conferences, project meetings, seminars) to Germany, Romania, Austria, Italy, Greece, Georgia, Finland, Spain, New Zealand, Australia, Portugal, Sweden, France, Poland.
6. Most significant publications (2008 – 2013)
   a. Väljataga, T. & Fiedler, S.H.D. (2012). Exploring the personal and self-directed use of weblogs. In I. Aedo, R.-M. Bottino, N.-S. Chen, C. Giovannella, D.G. Sampson, Kinshuk (Eds.), Proceedings of the 2012 12th IEEE International Conference on Advanced Learning Technologies (pp. 698 – 699). Rome: IEEE Computer Society.
   b. Fiedler, S. & Väljataga, T. (2011). Personal learning environments: concept or technology? *International Journal of Virtual and Personal Learning Environments*, 2(4), 1-11.
   c. Väljataga, T. & Laanpere, M. (2010). Learner control and personal learning environment: a challenge for instructional design. *Interactive Learning Environments*, 18(3), 277-291.
8. Most significant R&D projects (2008 – 2013)
   a. LEARNMIX - The re-conceptualization of the e-Textbook as aggregations of both professionally developed and user-contributed content accessible through a wide range of devices, 2013 – 2015, Archimedes Foundation.
   b. CoCreat – Enabling Creative Collaboration through Supportive Technologies, 2010-2013, EU Lifelong Learning Programme.
   c. The Estonian Science Foundation financed project "The framework for supporting and analysing self-directed learning in an augmented learning environment" (2008-2010).
   d. Targeted research „Distributed learning environments, their inter-operability and models of application" (2008-2013, financed by the Estonian Ministry of Education and Research).