EQANIE Accreditation Report

Bachelor's and Master's Degree Programme
Computer Science

Provided by
University of Latvia

Version: 23 October 2017

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A About the Accreditation Process

Title of the degree Programme	Previous accreditation
Bachelor Computer Science Master Computer Science	Euro- Inf: 25.05.2012 – 15.06.2017
Date of the contract: 27.01.2017 **Submission of the final version of the self-assessment report:** 06.03.2017 **Date of the onsite visit:** 24.-25.05.2017 **at:** University of Latvia, Riga	
Note: The procedure was jointly implemented with the Higher Education Quality Agency (AIKA) for the national Latvian accreditation.	
Peer panel: Prof. Fabrizio Baiardi, Università di Pisa, Italy Prof. Maria Ribera Sancho, Universitat Politècnica de Catalunya, Spain Dr. Nadežda Semjonova, Baltijas Datoru Akademija Dr. Raita Rollande, Ventspils University College Dāvis Vēveris, student, Latvia University of Agriculture	
Representative of EQANIE: Dipl.-Kulturw. Jana Möhren Representative of AIKA: Asnate Kažoka	
Responsible decision-making committee: EQANIE Accreditation Commission	
Criteria used: Euro-Inf Framework Standards and Accreditation Criteria for Informatics Degree Programmes, as of 24.10.2016	

B Characteristics of the Degree Programme

a) Name & Final Degree	b) Areas of Specialization	c) Mode of Study	d) Duration & Credit Points	e) First time of offer & Intake rhythm	f) Number of students per intake	g) Fees
Bachelor's degree programme Computer Science (dabaszinātņu bakalaurs datorzinātnēs)	• Computer Science • Software Engineering • Information Technologies • Information Systems • Computer Engineering • Mathematical and Computing Didactics	Full time, part time	8 semesters, 240 ECTS	2006, new study plans: 2018	Approx. 220/year	2000 EUR per year
Master's Degree of Natural Sciences in Computer Science (dabaszinātņu maģistra grādu datorzinātnēs)	• Computer Science • Software Engineering • Information Technologies • Information Systems • Computer Engineering • Bioinformatics	Full time	4 semesters, 120 ECTS	2006	Approx. 100/year	2000 EUR per year

For the Bachelor's degree programme Computer Science, the self-assessment report states the following **aims**:

1. Provision of basic knowledge in the field of computing in general and in the selected study direction;

2. Provision of basic knowledge in mathematics;

3. Provision of knowledge, development of skills necessary for the designing and development of complicated applications and information systems;

4. Development of initial skills in scientific research work further allowing for participation in research projects and continuation of studies in master's programme;

5. Development of skills necessary for independent continuation of education through the update of knowledge and professional improvement.

The intended learning outcomes are identical to the Euro-Inf Programme Outcomes for First Cycle Degrees.

For the Master's degree programme Computer Science, the self-assessment report states following **aims**:

1. Provision of detailed knowledge in computing sector in general and in the selected field of studies (sub-programme);

2. Provision of knowledge and development of skills, which are necessary for the modelling and analysis of large and complicated systems;

3. Provision of knowledge and development and improvement of skills, which are necessary for the designing and implementation of large and complicated systems in the selected field of studies (sub-programme);

4. Provision of knowledge and acquirement of skills, which are necessary for the management of projects and groups of specialists;

5. Development of skills in scientific research work, which will allow for participation in research projects, commencement of pedagogical work and continuation of studies in doctoral programme;

6. Development and improvement of skills, which are necessary for the independent continuation of education, renewal of knowledge and professional improvement.

The intended learning outcomes are identical to the Euro-Inf Programme Outcomes for Second Cycle Degrees.

C Panel Report

1. Programme Design and Development

Criterion 1.1 Learning Outcomes

Evidence:

- Self-assessment report for the study direction
- Learning Outcomes matrices for each sub-programme
- Discussions during onsite visit

Preliminary assessment and analysis of the peers:
The panel considered the alignment of the programmes' modules (courses) with the Euro-Inf learning outcome statements for first and second cycle graduates that the programmes adopted the learning outcomes of the Euro-Inf Framework Standards as their own. However, both the Bachelor and the Master programme are divided into distinct sub-programmes for which no specific learning outcomes at (sub-) programme level had been defined. Accordingly, the competences to be acquired by graduates of the different sub-programmes were not differentiated which made their analysis more difficult.

Furthermore, the respective matrix tables aligning the programmes, or sub-programme modules, to the learning outcomes were not considered to be very realistic by the panel as too many boxes were ticked. The panel could not, however, establish that all corresponding learning outcomes were actually part of the respective module. While the EQANIE learning outcomes were listed in an abbreviated manner (in the forms of codes such as EB11, EB21, EM 11, EM 12 etc.) in the module descriptions, the learning outcomes explicitly written down in the respective module descriptions did not cover them. In particular, the legal, social and ethical as well as personal skills were listed as being achieved but found no mention in the descriptions as these only listed technical skills. In fact, the panel understood during the discussion that teaching staff members were asked to make the alignment for their module. While the panel in principle applauded such an approach as it encouraged learning outcome based thinking, no check was made by the programme directors and consequently too many outcomes were ticked in the alignment tables.

In order to be able to determine whether the programmes actually meet the Euro-Inf learning outcomes, the panel asked for revised matrices, reflecting the reality of the respective modules and sub-programmes. Furthermore, the panel noted that the module

descriptions, particularly for the Bachelor, would also need to be revised accordingly in order to provide a more realistic picture of the intended learning outcomes also on module level (see also section 1.3, 4.2).

While the website of the faculty and the programmes contained very little information in English, the panel was able to establish that the programme aims and objectives were available on the Latvian language website and therefore accessible for the national stakeholders. The question of international students based on the availability of English language information and teaching is discussed below (section 1.3 mobility).

The panel could not verify whether the programme learning outcomes were also recorded in the Diploma Supplement as only a Latvian version was provided.

Criterion 1.2 Labour Market/Graduates/Stakeholders

Evidence:

- Self-assessment report
- Statistics of students, graduates and drop-outs
- Discussions during onsite visit with employers, graduates, students

Preliminary assessment and analysis of the peers:

The EQANIE panel discussed the involvement of the different stakeholders in both the design and the further development of the programmes. Overall, the panel found a very high level of satisfaction with the programmes from all stakeholders including students, graduates and employer representatives. They learned that the faculty contacted informatics companies in the country when re-designing the programmes. Representatives of employers are also members of the Study Council of the Faculty as the highest decision making body about the programmes on faculty level. Nevertheless, the panel also found that companies who are not members of the Council feel they are not as readily involved and have to take up initiative themselves in order to approach the faculty and discuss their needs. Graduates and employers are also regularly surveyed about their satisfaction with the programmes and the suitability of graduates' competences for the labour market.

Students confirmed that through direct contacts with the Dean, they were also able to provide input about the programme design.

The panel considered that stakeholders were thus involved but rather on a personal, informal basis through direct contacts. While this approach has worked well so far, the

panel pointed out the risk that changes in staff and leadership positions, such as at the level of the Dean, could lead to disruptions in the future. Surveys do not currently seem to replace this approach as it remains unclear how their result effectively feed into programme changes (see also section 5). Accordingly, while encouraging upholding strong personal relations with stakeholders, the faculty should consider a strategy that involves stakeholders in a systematic way, independently of individuals.

Some of the sub-programmes have a significantly smaller number of students than other, for example Computer Engineering and Information Technology have comparatively few students. Though the programmes was understood to be based on an original Computer Science programme, this sub-programme also had very few graduates while Software Engineering made up more than half of all graduates in the past six years. The panel thus questioned the reasons for offering all five directions of the ACM, particularly at Bachelor level as there seemed to be little interest in some of them and, most important, little differentiation in their learning outcomes and modules (see section 1.1 and 1.3). Reasons based on the tradition of the faculty stemming from Computer Science did not fully justify the lack of differentiation, though the panel learned that all graduates of all sub-programmes easily found employment. Employers did also express a satisfaction with the strong computer science basis of all Bachelor graduates. In particular, it was pointed out that employers aim at hiring students after their internship as by the time of graduation from the Bachelor programme, a vast majority of students already had employment contracts. The panel positively acknowledged the very high demand for graduates and consequently the very good employment prospective.

The panel also discussed the introduction of the new direction Mathematical and Computing Didactics in the Bachelor. While learning that one of the reasons is that the faculty has lecturers in the field, it was also confirmed that there is a current unmet demand for teachers in schools.

Criterion 1.3 Curriculum

Curriculum

Evidence:

- Study plans in self-assessment report
- Euro-Inf learning outcome matrix in self-assessment report
- Discussions during onsite visit
- Review of exams, projects and theses

Preliminary assessment and analysis of the peers:

Overall, the panel members considered the programmes presented to constitute a solid scientific curriculum in particular with regard to Computer Science and critical thinking and theoretical competences based on the strong history of academic tradition of the faculty. Specifically for the Bachelor programme, the programme as a whole was designed in line with the ACM CS curriculum which the faculty also considered as their main direction. The additional sub-programmes were then added as options by introducing additional courses as proposed by the ACM. The panel concurred with the finding that the programme was strongly CS based. However, from their point of view, the sub-programmes in the other directions were not sufficiently thoroughly developed as a majority of courses was shared among all of them. The panel considered that this lack of specification might also be a reason for few students choosing some of the directions, such as Computer Engineering. Furthermore, the panel noted that some courses were not sensibly assigned to the sub-programmes. For example, in Software Engineering a course on Artificial Intelligence was not included that was part of Computer Science. On the other hand, a course of software testing was included without specifications while a course of principles of assembly languages was only offered in the ninth semester. In Computer Engineering, the panel missed courses on parallelism or high performance computing. The impression of the panel that all sub-programmes contained a majority of computer science rather than specific subjects was confirmed by the review of Bachelor and Master theses during the visit. The panel gained the impression that nearly all the reviewed works were in the field of theoretical computer science and programming but not in software engineering or any of the other subdivisions.

The panel noted that the lack of differentiated learning outcomes in the six sub-programmes was echoed in the lack of courses offered. In addition, the distribution of students among the directions confirmed that only two study directions, Information Systems, IS, and Software Engineering, SE, were effectively delivered. Furthermore, the panel also learned that the teaching staff are not fully aligned to the offer of the sub-programmes with IS depending largely on one person while significantly more professors were in the field of CS as one of the smaller directions. Accordingly, the panel could not confirm that the designation of the sub-programmes at Bachelor level with regard to their specialization was justified.

At Master level, the panel considered that the sub-programmes were much better developed and considered the curricular content to be of overall good quality. Nevertheless, the panel gained the impression from discussions with students and graduates that some issues existed concerning the overlap of courses with those of the Bachelor programmes.

Practical Elements

Evidence:

- Self-assessment report
- Discussions during onsite visit

Preliminary assessment and analysis of the peers:

Another specific feature of the Bachelor programme was the opportunity to acquire both a professional level degree and a Bachelor level degree within one programme. As all students were automatically enrolled in the professional (first level professional higher education) programme during the first two years of the Bachelor, they participated in the practical training related to this degree. More specifically, all students have to complete a one-semester internship in the second year that was considered to be essential in order to gain practical skills and to link the theoretical and practical elements.

The panel gained the impression that the supervision of the internships generally worked well and that the supervisors had to meet qualitative requirements. Students pointed out that a list of accepted and checked companies would be useful, a suggestion that the panel supported in order to ensure that the internship is systematically linked to the programme, though such a list should not exclude suitable other companies. The supervision of the internship by the faculty staff members could thus also be facilitated, ideally also by providing guidelines for the practical placement.

At Master level, possibilities to participate in research projects, including joint projects between the faculty and companies, was sufficiently developed and lauded by students and employers. The panel positively acknowledged these opportunities for students.

Mobility

Evidence:

- Self-assessment report
- Presentation and discussion during onsite visit
- Website: https://www.lu.lv/eng/istudents/degree/study/bachelor-computer/: https://www.lu.lv/eng/istudents/exchange/; http://www.df.lu.lv/for-international-students/
- Statistics of student mobility

Preliminary assessment and analysis of the peers:

With regard to student mobility, the panel noted that international mobility of both students and staff members was rather low. With regard to the outbound mobility of stu-

dents, this was found to be mainly due to economic reasons. The level of English spoken among the students that have been met was very positively noted. Students also confirmed that ample information about international study possibilities was made available to them. Learning agreements also existed, though students expressed a concern about the high number of mandatory courses that they would not be able to complete abroad. The panel pointed out that information in this regard could be made more transparent for students, for example with regard to recognition of externally obtained credits (see also section 4.1).

For incoming students, however, the panel noted that this was made difficult by lack of information available in English. The website suggested that only in the Bachelor programme were any courses offered in English while at the same time pointing out that the main language of instruction was Latvian. Information about courses in English was very much hidden on the website of the university and of the faculty. The panel acknowledge that the institution could not disregard national regulations that require international students to obtain Latvian language qualifications to receive a degree but also the information provided for exchange students emphasized that the main language of instruction was Latvian.

Some staff members pointed out their positive experiences with international stays for teaching or research which they considered to be very useful. The panel also learned that some international guest lecturers were invited in order to foster international immersion. However, the panel could not ascertain a systematic internationalization policy on the side of the university or the faculty that would include encouragement of international staff mobility.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 1:

The panel fully concurred with the comment of the institution that typically a single course (module) contributes to several learning outcomes. The panel also reiterated their support of the practice that each staff member responsible for a particular course is also responsible for reflecting on and defining which learning outcomes that course should aim at. The revision of *all* course descriptions by a single responsible staff member is also commendable.

The panel positively acknowledged the revised learning outcome matrices provided by the institution, differentiating whether a specific course contributed significantly or partly touched a particular learning outcome. However, the overall number of expected contribution to an EQANIE learning outcome by a majority of the courses as well as the mis-

match between the learning outcomes mentioned in the form of codes referring to the Euro-Inf Framework Standards (EB11, EB12 etc) and the actual learning outcomes stated in the course descriptions were not revised. As a random example, course Datz1170 (Computer networks I and insight into industry) mentions five learning outcomes of theoretical understanding and skills in networking and the use of remote learning materials but also claims to contribute to 17 Euro-Inf learning outcome statements which are not covered in the course plan or assessment.

With regard to the legal and ethical context competences, in particular, the panel took positive note of the module mentioned by the institution (Internet, Netiquette and the Legal Regulation). However, the stated course descriptions did not fully encompass all of the expected learning outcomes as stated in the Euro-Inf Framework Standards as the course only focused on issues regarding legal and ethical aspects in cyberspace but not of the informatics profession. Furthermore, the development of social and personal skills during the whole study process was not sufficiently documented in the course descriptions in order to determine where their acquisition was actually specifically checked.

The panel took note of the explanation of the university regarding the sub-programmes. Independent of whether these are called sub-programmes or specializations, the institution as well as the students identified them as necessitating a selection of one such sub-programme by the students which was also understood to be indicated on the Diploma Supplement. This would mean in consequence that the learning outcomes for each sub-programme justified this emphasis and that the modules of each sub-programme supported these learning outcomes. The panel concurred with the institution that not all modules need to be different and that there is reason for overlap between the sub-programmes. However, in order to transparently make clear to all stakeholders to what extent a sub-progamme was achieved, the panel did not find any new or additional evidence in terms of the mandatory courses for these sub-programmes to justify such a designation. The information about the approximate attribution of the Bachelor thesis with a large majority to only two sub-programmes supported this concern.

The panel concluded that the intended learning outcomes for each sub-division must be clearly stipulated, that the learning outcomes matrix must be aligned with the the learning outcomes and the actual learning outcomes of the courses. In this way, the course descriptions thus had to be fully revised in order to clearly demonstrate how and where all of the intended learning outcomes were taught and assessed. The panel pointed out that the institution had not been expected to do this in the timeframe foreseen for submitting a comment about the report but during the timeframe determined by the Accreditation Commission (see section G).

With regard to the overlap of course content between the Bachelor and the Master programme, the panel did not gain the impression that those responsible for the programme shared the concern explicitly and voluntarily mentioned by the students. To this extent, the panel acknowledged that the satisfaction surveys mentioned a problem only in one course – and that the institution was ready to improve that course. However, as the students mentioned the issue independently and unasked during the interview, the panel felt that the institution should consider this as a means of quality input as well. For the sake of transparency for the students, further explanations for them might also be helpful where the view of the students diverged from that of the teaching staff. Therefore, the panel considered it necessary that the university took into account input from outside the satisfaction surveys in order to at least address this issue together with the students in addition to the one course mentioned.

Concerning stakeholder involvement in the programme design and continuous improvement, the comment from the institution reinforced the panel's understanding that a specific council (Council of Programmes of Computer Science) was responsible for these tasks and that stakeholder including employer representatives and students were members of this council. However, the institution did not react to the concern mentioned during the onsite visit by those employers who were not members of this council that their needs were less likely to be heard. Therefore, the panel felt that the institution should address this concern.

Overall, the panel concluded that criterion 1 was not yet fulfilled.

2. Programme Management and Implementation

Criterion 2.1 Admission and enrolment

Evidence:

- Self-assessment report
- Discussions during onsite visit
- Admission rules website: https://www.lu.lv/eng/istudents/degree/admission/ (international students); http://www.lu.lv/par/dokumenti/noteikumiunkartibas/; http://www.lu.lv/gribustudet/katalogs/programmu- mekletajs/?user_phpfileexecutor_pi1[program_id]=22303

Preliminary assessment and analysis of the peers:

The admission rules for the Bachelor programme are stipulated by national regulations based on national centralized exams in Latvian and mathematics. The panel considered the rules to be adequate and sufficiently transparent for prospective students. Information for international degree or exchange students was also available on the website.

Concerning the Master programme, the admission requirements were also aligned with national regulations. The requirement included a Bachelor level degree in any of the fields of computer science, natural sciences, engineering, mathematics or management sciences. An interview is also foreseen. These very broad requirements were found to be of concern as the panel learned during several discussions that the level of competences of new Master students was very different. In particular, it was not clear to what extent the faculty ensured that all students had adequate computer science competences. During the discussion with both students and graduates, the panel learned that students, in particular those who had obtained their Bachelor elsewhere, had to catch up competences at the beginning of the Master. This let to both concerns about lower expectations in some Master courses as well as about a significant amount of repetition of content from the Bachelor in order to align the different levels of competences. This was particularly felt to be the case in the sub-programmes with higher student numbers such as Software Engineering. The panel concurred with the view of the students that low attendance in some courses also could be due to the overlap in the content. They encouraged exploring this more deeply.

The high drop-out rate in the Master might also be an indication of this issue. During the discussion, the panel received the impression that teaching staff and programme directors did not share the notion of students and graduates about overlaps. The panel felt that issue raised by students could be taken more earnestly. Nevertheless, subsequently the programme indicated that newly admitted students would be more thoroughly tested with regard to their computing competences and would be offered Bachelor courses without charges in order to make up their lack of skills.

Criterion 2.2 Workload and ECTS

Evidence:

- Self-assessment report
- Regulations on Accreditation of Institutions of Higher Education, Colleges and Study Directions (Cabinet Regulations No. 407, 2015)

- Website: http://www.lu.lv/gribustudet/katalogs/katalogi-anglu-valoda/course-catalog/?user_phpfileexecutor_pi1[filter][0]=fakultate_eng%3AFaculty of Computing&user_phpfileexecutor_pi1[filter][1]=prog_nosauk_eng%3AComputer Science
- Discussions during onsite visit

Preliminary assessment and analysis of the peers:
The panel learned that higher education institutions in Latvia follow cabinet regulations about the use of credits. These stipulate that one credit is awarded for 40 hours of student workload. The Bachelor programmes are awarded a total of 160 credits. The course descriptions also indicated the corresponding ECTS credits per course in line with the ECTS Users' Guide[1]. Furthermore, the panel gained the impression that the overall workload was adequate and feasible at both Bachelor and Master level. They took note that up to half of courses were mandatory to attend but that students reported largely differing levels of attendance among courses. The discussions with students and graduates led to no indications of workload issues.

Criterion 2.3 Teaching Methods / Didactic Concept

Evidence:
- Self-assessment report
- Discussions during onsite visit

Preliminary assessment and analysis of the peers:

The panel found a variety of different teaching methods in use for the programmes, including lectures, practical classes and laboratories. An emphasis was made on group work in order to prepare students for the work life. Teaching material was made available through Moodle though the programmes did not intend to change to more electronic forms of delivery. Overall, the panel considered the teaching methodology to be classic but adequate.

Criterion 2.4 Assessment

Evidence:
- Self-assessment report
- Review of exams, thesis, project works during onsite visit
- Discussions during onsite visit

[1] European Union (2015) *ECTS Users' Guide*, Luxembourg: Publications Office of the European Union, Available at: http://ec.europa.eu/education/ects/users-guide/index_en.htm

Preliminary assessment and analysis of the peers:

The exam system and methods in use suited the assessment of whether students achieve the intended learning outcomes in the modules as well as in the programme as a whole. Different exam methods were used, typically including tests, homework and projects during the semester and a final exam at the end. While these were not particularly innovative, the panel considered them suitable. Students pointed out that exams were fair and expectations were made transparent beforehand. The exams and their weight are stipulated in the course descriptions and therefore transparent to the stakeholders.

The exams and final reports presented during the onsite visit were found to be of adequate quality. However, the theses reviewed were all in the field of theoretical computer science or programming and thus did not reflect the sub-programmes to which they belonged. The panel thus could not confirm that the theses in all cases would allow the institution to verify whether the students had acquired the overall competences of their chosen discipline (see above, section 1.3).

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 2:

The panel positively acknowledged that the university had taken steps to address the issue of admitting students to the Master who did not have the same previous competences in computer science as their own Bachelor graduates. The proposed steps to be taken to address this concern, interviews as well as free bridging courses was considered a right way forward. The panel expected a formal implementation of this process and an analysis of the first results, including students input, once the first cohort had been admitted accordingly.

No further issues were addressed concerning this criterion. The panel considered all other aspects of this criterion to be fully complied with.

3. Resources

Criterion 3.1 Staff

Evidence:

- List and CVs of teaching staff
- List of publications and research activities of teaching staff
- Discussions during onsite visit

Preliminary assessment and analysis of the peers:

Teaching in the programmes is delivered by around 50 professors, associated professors and so-called docents who all have at least a doctoral degree. In general, the panel considered their qualifications to be in line with the programmes' objectives and therefore suited to deliver the programmes according to plan. In particular, the panel positively noted the move of the faculty during the past years to have only teachers with a doctoral level degree and at the same time encouraging their own PhD graduates to teach. There are formal competitions for each position opening up though the panel learned that usually only one ore few candidates apply. This was explained by the draw from the local and national industry for informatics graduates, offering better salaries. Some subject areas essential for some sub-programmes have at least during some semesters depended on only one professor. Though the faculty reacts to the shortage of teacher candidates with a more flexible approach to staff working time, i.e. by allowing them to work limited hours in teaching in order to pursue research or industry positions, the decisions in this regard were left to the respective study programme directors. Thus, the panel understood that there is no real future-looking policy about staff development in order to deal with the issues at hand in a systematic and sustainable manner. The fact that the lack of candidates also means that practically every person that applies will be selected could also lead to quality issues in the future. While the panel points out that no such issue exists at present, it felt that the institution should take it into account in its policies.

With regard to the research activities relevant for the programmes, the panel positively notes the good research projects that are carried out jointly with companies. Furthermore, staff members are involved in a number of research projects aligned to the strategic priorities of the university, particularly on national level. On Faculty level, staff members are encouraged to pursue research activities for up to 40% of their working hours and receive funding for participating in international conferences if their papers have been accepted. The number of publications in international journals is nevertheless low. The panel also understood that new and younger staff members do not systematically receive initial training but rather informal advice and opportunities. At the same time, they were expected to fulfil publication obligations. The panel supported staff members' wish for more systematic support also with regard to developing their didactic competences.

The support from technical and administrative staff was deemed suitable by all stakeholders. Nevertheless, in relation to the low number of candidates, teaching staff pointed out that it was hard to fill lower level teaching position as only those graduates with the aim of pursuing a PhD applied. One possible solution discussed was the re-introduction of

teaching assistant positions which were felt would encourage more suitable young persons to pursue this route.

Criterion 3.2 Student Support

Evidence:

- Self-assessment report, results from surveys
- Discussions during onsite visit

Preliminary assessment and analysis of the peers:
Students and graduates expressed a high level of satisfaction with the support from teachers. This includes some support available for students to participate in scientific conferences. Information is available electronically through the institution's information system which contains information for students about their programmes and links to the virtual learning environment (Moodle).

Support for international mobility has been discussed above (section 1.3). The panel gained the impression that the counselling and support available were adequate, noting particularly positively the engagement of the Dean to run and manage the programmes.

Criterion 3.3 Facilities

Facilities

Evidence:

- Self-assessment report
- Visit of laboratories, lecture rooms, study facilities, library
- Discussions with teaching staff and students during onsite visit

Preliminary assessment and analysis of the peers:
The panel gained an overall positive impression of the facilities. This included the availability of the necessary software for students to carry out their study-related task with access also possible from home. Some concern was found regarding the library and the lack of availability of resources about new, creative topics. Furthermore, not all subscriptions for periodicals were made due to their high costs. However, the panel did not conclude that this was a general issue as electronic resources about such topics were found to be available, including through open access and online. Staff members confirmed that they were regularly included in the sourcing process and could make requests for new books or electronic resources at several times during the year. The panel understood that improvement of the infrastructure was part of the strategic plan for 2016-2020 with an

expected increase in the number of laboratories and seminar rooms, particularly for the use of programmes and research in technical fields, though no plan was presented on how to achieve these goals.

Financial Resources

Evidence:

- Self-assessment report
- Presentation during onsite visit
- Discussions during onsite visit

Preliminary assessment and analysis of the peers:

The budget of the Faculty stems mainly from the state budget, distributed through the university management. Past drops in public spending have thus had an influence on the availability of resources and consequently on the spending in particular for salaries. As a consequence, the university has adopted a financial strategy that includes the diversification of incomes, from tuition fees, real estate and research services. Indicators for the period 2016-2020 expect a major increase specifically in private sector funded research. While expected results and indicators were made transparent, the panel was not able to establish the road map to achieve these aims. Not least with regard to the expected significant increase in research activities and research output, the panel pointed out that this was closely linked to supporting young researchers and teachers, thus re-confirming the need for a clear policy in this regard. The panel concluded that the financial resources currently available were sufficient but would need to be increased with a view to the stated development goals.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 3:

The panel acknowledged the additional information of the institution that rather than appointing teaching assistants for six years, the institution appointed graduates as teachers on a semester-basis. While using a different terminology for the position, the panel supported this initiative and encouraged the institution to revise its success together with the teaching staff in order to assess whether it alleviated their concerns and was suitable to motivate graduates to take up academic careers.

As no further comments had been made regarding this criterion, the panel felt that their concern regarding forward-looking staff planning was still valid and should be addressed by the institution. Therefore, they did not find this criterion completely fulfilled in this

regard. All other elements of the criterion were, however, considered to be fully compliant.

4. Programme Information and Transparency

Criterion 4.1 Rules and Regulations

Concerning the student life-cycle

Evidence:

- Self-evaluation report
- Discussions during the onsite visit

Preliminary assessment and analysis of the peers:
The panel took note rules and regulations for the student-life cycle existed and can be accessed on the UL portal in Latvian language. Admission rules and matriculation rules were approved by the Senate in line with national laws. Students can also receive information by the Student Service or on the internal study management system (University of Latvia Information System, LUIS) which provides information about students' progress. Rules and regulations about study progress, registration and graduation requirements are also provided in this portal. The panel took note that students were satisfied with the information available about the applicable rules and regulations.

Academic Integrity

Evidence:

- Self-evaluation report
- Discussions during onsite visit

Preliminary assessment and analysis of the peers:
The panel took note that a UL Code of Academic Ethics and UL Rules of Academic Integrity were in place. These were also part of the study agreements made with students as well as guidelines for staff members. The panel had no indication that issues in this regard occurred.

Recognition

Evidence:

- Self-evaluation report

- Statistical information about international mobility
- Discussions with graduates during onsite visit

Preliminary assessment and analysis of the peers:
The panel noted that rules for the recognition of courses outside of the institution, previous experience and studies aboard were in place. The university also confirmed the compliance of their procedures with the Lisbon Convention. The corresponding procedures had been approved by the university senate. No indications were given that any problems occurred in this regard though students were not fully informed about the recognition possibilities.

4.2 Certification and Documentation

Module Descriptions

Evidence:

- Bachelor Programme catalogue on website
- Master Programme Catalogue on website
- Website: http://www.lu.lv/gribustudet/katalogs/katalogi-anglu-valoda/course-catalog/?user_phpfileexecutor_pi1[filter][0]=fakultate_eng%3AFaculty of Computing&user_phpfileexecutor_pi1[filter][1]=prog_nosauk_eng%3AComputer Science
- Discussions during onsite visit

Preliminary assessment and analysis of the peers:
The panel generally considered the module descriptions to be informative and complete. They are also made available to stakeholders on the institution's website. Each description contains the course or module learning outcomes and links them to the programme level learning outcomes. Nevertheless, the panel noted that not all of the intended learning outcomes on programme level were effectively substantiated by the course learning outcomes and content (see section 1.1). While the university affirmed that a quality check at several levels was carried out when new course descriptions were written, the panel found them to be lacking in regard to the learning outcomes and their conformity with what was actually taught and assessed in the Bachelor programme.

Documentation of Qualification gained

Evidence:

- Diploma Supplement samples in self-assessment report

Preliminary assessment and analysis of the peers:

The panel gained the impression that the Diploma Supplements provided for both the Bachelor and the Master programme were aligned with the template provided by the European Commission and therefore provided comprehensive information about the respective programmes, the national education system as well as the individual qualifications gained. However, only a Latvian sample was provided so that this could not be confirmed for the English version.

Public Information

Evidence:

- Websites: www.lu.lv; http://www.df.lu.lv/
- Discussions during onsite visit

Preliminary assessment and analysis of the peers:

The panel gained the impression that the information available in Latvian language was much more extensive than the information available in English. This applies both to the institution's website as to the website of the Computer Science faculty. The panel did note, however, that the self-assessment reports from the previous accreditation were available, though not the external experts report. On the institutional website, information for international students was provided, also regarding rules and regulations. But as discussed above (section 1.3), the information in English was particularly hidden on the Faculty website. Furthermore, no information about actual teaching and learning or assessment practices, pass rates or other statistical information, for example about graduates, was available in English. It remained unclear whether such information was provided in Latvian.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 4:

The English language versions of the Diploma Supplement provided conformed to the template provided by the European Commission.

No further issues regarding this criterion were addressed. The panel considered the programmes to be fully compliant.

5. Quality Management

Criterion 5.1 Quality Management Policy

Evidence:

- Self-assessment report
- Access to QM database during onsite visit
- Website: http://www.lu.lv/eng/general/quality/
- Discussion during onsite visit

Preliminary assessment and analysis of the peers:

The quality management policy and system of the university are part of the strategic management. It is based on the EQMF model and has been adapted to the needs of the institution with the main focus on the achievement of excellence in research, studies and relations with society. The system is gradually implemented. Core processes and responsibilities have been defined and stipulated in a quality management handbook. The details of the system are published on the website and thus accessible for all stakeholders. While the panel positively acknowledges the quality management system in place, they note that the majority of stakeholders are not aware of the quality management system, its processes and results. For example, students, graduates and employers participate in surveys about their courses but are not informed about the results. Similarly, teaching staff members did not seem aware of the data available from the quality management system (see further below, section 5.2). The panel thus noted that an overarching quality assurance policy was in place in the university with corresponding responsibilities and activities but that this was not fully communicated to all relevant stakeholders and that the feedback loops were not fully closed.

With regard to quality and programme management, the panel also considered that the division of responsibilities between the Dean and the Study Programme Directors was not fully clear as the panel did not find any evidence that the latter were involved in the quality assessment of staff members but were responsible for staff planning and hiring. Furthermore, the panel was not able to determine to what extent quality expectations and issues such as the overlap of course content were part of the informal discussions among teaching staff members within the programmes.

Criterion 5.2 Programme Monitoring and Review

Monitoring and update of programmes

Evidence:

- Self-assessment report
- Access to QM database during onsite visit
- Sample surveys, statistical data
- Discussion during onsite visit

Preliminary assessment and analysis of the peers:

Evaluations are a main feature of the quality management system, for research institutes, courses and staff members. Evaluations of new courses are organized by the Study Council of the Faculty at least once per year or upon the results of the student questionnaires at the end of the semester. All courses are subject to a mandatory student evaluation at the end of the semester. The results, however, are not made public, not even in aggregated form and students are not informed about the results, except in cases of individual teachers. In these cases, teaching staff pointed out the usefulness of the student feedback and presented them at the beginning of the next semester. The panel considered this to be an example of good practice. The results of the surveys are maintained in a register at the Dean's office but stakeholders were not aware of this. Teachers only receive their individual results. If the result is lower than the expected level, the Dean has a meeting with teacher concerned and might arrange improvement measures such as hospitation by a colleague.

The panel gained the impression that some elements of the quality management system with regard to regular programme enhancement were in place. However, the panel perceived a gap between the written and published policy of the university and the effective implementation in the Faculty. While the panel found evidence that improvements and changes to the programmes had been made on personal discussions among the Dean, teaching staff, employers and students, it was not evident how this was done in a systematic manner and how links to the overarching quality expectations of the university were made. Furthermore, not all stakeholders were aware of or considered themselves to be responsible for quality management related tasks. Teaching staff members accordingly did not fully participate in the review and update of programmes in a systematic manner. The panel noted this as an area of improvement for the programmes.

Data Collection

Evidence:

- Self-assessment report
- Access to QM database during onsite visit
- Sample surveys, statistical data
- Discussion during onsite visit

Preliminary assessment and analysis of the peers:

Data for quality enhancements of the programme is collected through the use of questionnaires for different stakeholders. Additionally, programmes and study directions carry out annual self-assessments. Statistical data about students' progress, success and drop-out rates is also provided. Overall, the panel acknowledged that a suitable basis of data was available to make quality enhancement related decisions. However, as the system was in the process of being fully implemented, not all activities were found to be aligned yet.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 5:

The initiative of the faculty to send an update once per semester to all staff members and students about the status of quality assurance activities, in particular about how concerns and problems were addressed, was positively noted by the panel. It was also understood that due to legal restrictions, the institution was not allowed to publish personalized evaluation results. However, it remained unclear why aggregated results could not be published in order to ensure the closing of feedback loops also with regard to this part of the quality assurance activities. The panel therefore considered it desirable to review the quality management procedures in this regard, including the consolidation of the above-mentioned email. Furthermore, the additional explanation about the Council of Programmes of Computer Science did not fully alleviate the concerns that not all staff members seemed to be engaged in the design and improvement of the programmes in the frame of its quality assurance. Therefore, the panel did not consider this criterion to be fully compliant.

D Additional Documents

1. English sample of Diploma Supplement

2. Possibly, revised, realistic module-outcome-matrix tables

E Comment of the Higher Education Institution (03.10.2017)

Prof. Fabrizio Baiardi and Ms. Asnāte Kažoka were panel members in 2012, thus being able to evaluate our progress.

Although we have implemented all feasible recommendations made by EQANIE experts panel during first accreditation (see http://www.df.lu.lv/darbiniekiem/kvalitates-izvertesana/uzlabojumu-priekslikumu-registrs/ , rows 19-30, or our self-assessment report, pp. 1035-1038), the current panel have found new issues to be improved. We perceive it natural – always should be place for improvement.

So, we thank the panel for great work.

Having hard schedule (experts panel report received September 20th, our comments due October 4th) we was not in position to make deep analysis of all issues covered in the report. Moreover, there are particular issues that can be resolved between semesters only. E.g., changes in course description are forbidden until the end of course final exam.

The national accreditation agency AIKA have demanded a plan to implement recommendations made by joint experts panel by November 30th. We consider reasonable to prepare a plan combining improvements suggested in both reports.

So, we'll comment only few issues.

Criterion 1.1 Learning Outcomes

General Comment

1) We rely on assumption (as far as we know – accepted by EQANIE Accreditation Committe) that any study course (and, consequently, 3-6 Learning Outcomes (LO) comprised in description of this study course) <u>contributes</u> to reaching of one or several EQANIE LOs. Only sometimes course LO fully cover EQANIE LO. Course author him/herself denotes relationship between LO in course description and EQANIE LOs.

2) Relationship between LO in description in a study course and one or more EQANIE LOs are checked by a staff member responsible for the course (person other than course author). This staff member for particular course is appointed by the staff member responsible for the study direction.

3) Description of a study course in full is checked and approved by the staff member responsible for the study direction (in case of Faculty of Computing – all study programmes). This person is appointed by rector.

In principle, experts were in position to perform similar checking. Of course, due to time constraint - only for some randomly shosen study courses.

Responding to the experts position – too much EQANIE LOs in a course descriptions - we decided to divide EQANIE LOs mentioned in study course into two categories: . "significantly covered" - X, "partly touched" - *.

Annex 1 contains revised matrices.

Citation

"… both the Bachelor and the Master programme are divided into distinct sub-programmes for which no specific learning outcomes at (sub-) programme level had been defined"

Comment

We started our sub-programmes in 2006-2007 as study directions (or, specialisations). The term "sub-programmes" was introduced only recently in order to conform to the new regulations. However, we still treat sub-programmes as specialisations.

Our definitions of specialisations are based on specific lists of mandatory courses. For example, students of the master's sub-programme "Information systems", being prepared as "leading database and information system specialists and project managers, have (in addition to the total of 24 cr courses mandatory for all sub-programmes) the following total of 16 cr courses mandatory:

DatZ5057 Data processing systems

DatZ5038 Enterprise Information Systems

DatZ6054 Selected Topics about Data Warehouses

DatZ5010 System Design

Students of other sub-programmes may take these courses freely as electives.

Citation

"…legal, social and ethical as well as personal skills were listed as being achieved but found no mention in the descriptions as these only listed technical skills."

Comment

Legal and ethical issues are treated in the study course SDSK1067 Internet, Netiquette and the Legal Regulation . Social and personal skills are developed during whole study process.

Citation

"… panel asked for revised matrices, reflecting the reality of the respective modules and sub-programmes."

Comment

Annex 1 contains revised matrices.

Citation

"…while encouraging upholding strong personal relations with stakeholders, the faculty should consider a strategy that involves stakeholders in a systematic way, independently of individuals."

Comment

The main body to review and update programmes is the Council of Programmes of Computer Science (Datorzinātņu studiju programme padome) , consisting of 12 professors, 7 representatives of employers, and 4 representatives of students (see http://www.df.lu.lv/par/dome-un-padomes/datorzinatnu-studiju-programmu-padome/). The Council reviews and recommends the Faculty Council (fakultātes dome) annual self-assessment report and every change of programme (usually twice a study year).

Citation

"The panel could not verify whether the programme learning outcomes were also recorded in the Diploma Supplement as only a Latvian version was provided."

Comment

Appendix 2 contains Diploma Supplements in English.

Criterion 1.2 Labour Market/Graduates/Stakeholders

Citation

"… while encouraging upholding strong personal relations with stakeholders, the faculty should consider a strategy that involves stakeholders in a systematic way, independently of individuals"

Comment

The main body to review and update programmes is the Council of Programmes of Computer Science (Datorzinātņu studiju programme padome) consisting of 12 professors, 7 representatives of employers, and 4 representatives of students (see http://www.df.lu.lv/par/dome-un-padomes/datorzinatnu-studiju-programmu-padome/). The Council reviews and recommends the Faculty Council (fakultātes dome) annual self-assessment report and every change of programme (usually twice a study year).

Criterion 1.3 Curriculum

Citation

"The panel gained the impression that nearly all the reviewed works were in the field of theoretical computer science and programming but not in software engineering or any of the other subdivisions"

Comment

It is not our intention to mandatory bind theses with chosen sub-programme because all diplomas are in computer science anyway.

We showed the experts panel more than 100 bachelor and master theses defended in 2016. Obviously, due to severe time constraint the experts were able neither to review all theses nor to attribute them to particular sub-programmes. Moreover, significant number of theses were attributable to more than one sub-programme. However, roughly made attribution of theses to sub-programmes shows the following distribution.

CS (i.e. theoretical computer science)	SE (programming at large)	IS	IT	CE
5	56	21	15	8

Citation

“ ... the panel could not confirm that the designation of the sub-programmes at Bachelor level with regard to their specialization was justified.”

Comment

This could be a misunderstanding caused by the introduction of the sixth sub-programme “Mathematical and Computing Didactics” for which the following courses are not mandatory:

DatZ3050 Theory of Algorithms
DatZ3123 Modeling basics
DatZ3055 Course Paper in Computer Science
DatZ2035 Seminar I
DatZ4022 Operating System Concepts

As before, these courses remain mandatory for all the other 5 sub-programmes, this is the sense in which they are listed in the “sub-programme specific” parts of study plans.

If we would drop these courses from the sub-programme specific lists, then we would obtain precise characteristics of the respective sub-programmes justifying their designations. For example, of the sub-programme “Information technologies”:

DatZ2076 Computer Networks Administration
DatZ2159 Computer Architecture and computer engineering fundamentals II
DatZ2161 RouterOS fundamental technologies

DatZ1039 Computer Networks II

DatZ3057 Computer Networks III

DatZ3058 Computer Networks IV

DatZ3037 Information Systems Security

DatZ4033 Coding Theory

Citation

“… the panel gained the impression from discussions with students and graduates that some issues existed concerning the overlap of courses with those of the Bachelor programmes”

Comment

None of the Master's courses is a complete, or mainly repetition of a Bachelor's course. Some of Master's courses are, indeed, advanced extensions of the corresponding Bachelor's courses, and their beginning parts contain some repetitions – in the interests of students having bad or no preliminary knowledge. Sometimes students complain, indeed, about the amount of repetition in particular courses.

The real situation is *far less dramatic* – as reflected in student surveys that are full-filled (mandatory!) at the end of each course. The Question 2 (Q2) of the course questionnaire sounds as follows:

"*Do you agree that the contents of the course did not duplicate unnecessarily the contents of other course?*" (possible answers: 0 – do not know, 1 – disagree completely, …, 7 – agree completely).

The average of answers to Q2 can serve as an approximate assessment of the "degree of non-duplication" in a particular course.

In the academic year of 2016/2017, only 7 of Master courses received the "non-duplication assessment" lower than 6 (of the maximum 7):

DatZ6006: UML based software development, Q2=5.54

This course extends in a specific direction (software development) student's knowledge of UML from Bachelor's courses. The role of UML in the industry has changed. This course needs modernization. The new version is planned for Spring semester of 2018, first of all, by including of more advanced material from the course *DatZ5036: MDA and model transformations*. **This is the only problem to be solved.**

DatZ6111: IT project management, Q2=5.55

This course extends considerably the corresponding Bachelor's course, and contains repetitions from it – exactly in the interests of students having bad or no preliminary knowledge. However, we insist on retaining the course in its existing shape. Task N4 of the programme is formulated as "*Provision of knowledge and acquirement of skills, which are necessary for the management of projects and groups of specialists*", so we do not wish people graduating without the necessary project management knowledge and skills.

DatZ5021 System modeling Q2=5.81

This course extends the corresponding Bachelor's course. We were not satisfied with its quality, but the modernization ideas failed, so we decided to drop this course from the programme.

DatZ5032: Modern programming technologies, Q2=5.85

This course covers modern programming topics in *Java*. In the beginning part, programming basics are considered – in the interests of students having bad preliminary (*Java* specific, or general) programming knowledge and skills. However, we insist on retaining the course in its existing shape. We do not wish people (even, IT project managers) graduating without good knowledge of programming.

DatZ5013: Software testing Q2=5.89

This course extends considerably the corresponding Bachelor's course. The teacher is one of the leading personalities in software engineering in Latvia, prof. Jānis Bičevskis. Students regard the teacher as an extra-ordinary personality. About this course, of the 29 respondents, 26 responded positively (7 respondents marked 5, 12 – 6, 7 – 7).

DatZ6009: Software quality, Q2=5.93

No real problems with this course. Of the 28 respondents, 25 responded positively (3 respondents marked 5, 15 – 6, 7 – 7).

DatZ6008: Component based software development, Q2=5.94

No real problems with this course. Of the 20 respondents, 14 responded positively (3 respondents marked 5, 5 – 6, 6 – 7).

Criterion 2.1 Admission and enrolment

Citation

"Concerning the Master programme… it was not clear to what extent the faculty ensured that all students had adequate computer science competences"

Comment

To solve the problem, the following formulation of the admission rules of master's programme was prepared:

Persons with Bachelor's Degree or Secondary Level Professional Higher Education in the Natural Sciences, Computer Science, Mathematics, Engineering, Management Science or equivalent higher education, are admitted to the programme on the basis of the diploma of higher education, in view of the weighted average mark and total (or average) mark of the final examinations in the undergraduate studies. Persons are interviewed to determine, whether their previous education and work experience ensure successful studies in the programme.

Persons with identified deficiencies in their computer science knowledge and skills are proposed to take free of charge the necessary Bachelor level courses, either in parallel with Master's studies, or by taking one year leave of Master's studies.

This version is accepted for the intake of 2018 (as reported before, a preliminary version of it was used for the intake of 2017).

Criterion 2.4 Assessment

Citation

"… the theses reviewed were all in the field of theoretical computer science or programming and thus did not reflect the sub-programmes to which they belonged."

Comment

CS (i.e. theoretical computer science)	SE (programming at large)	IS	IT	CE
5	56	21	15	8

Criterion 3.1 Staff

Citation

"One possible solution discussed was the re-introduction of teaching assistant positions which were felt would encourage more suitable young persons to pursue this route."

Comment

Instead of elected teaching assistants (for 6 years) we appoint teachers (pasniedzējs) for semester. Usually they are young masters or graduates. Currently we have 6 such teachers. Extremely tight budget does not allow for more.

Criterion 5.1 Quality Management Policy

Citation

"The panel thus noted that an overarching quality assurance policy was in place in the university with corresponding responsibilities and activities but that this was not fully communicated to all relevant stakeholders and that the feedback loops were not fully closed."

Comment

1) Once in semester, we will send reminder to every staff member and student regarding status of implementation of requests foe improvement and possibility to propose improvements (already done this semester).
2) The law on protection of personal data forbids to publish personalized information on evaluation of teaching staff (e.g., due to the law we even are forbidden to publish even marks of tests and final exams).

Criterion 5.2 Programme Monitoring and Review

Citation

"Teaching staff members accordingly did not fully participate in the review and update of programmes in a systematic manner."

Comment

The main body to review and update programmes is the Council of Programmes of Computer Science (Datorzinātņu studiju programme padome) consisting of 12 professors, 7 representatives of employers, and 4 representatives of students (see http://www.df.lu.lv/par/dome-un-padomes/datorzinatnu-studiju-programmu-padome/). The Council reviews and recommends the Faculty Council (fakultātes dome) annual self-assessment report and every change of programme (usually twice a study year).

3) H Appendix: Programme Learning Outcomes and Curricula

Citation

"The programme learning outcomes of both programmes are stated in the self-assessment report to be those of the Euro-Inf Framework Standard. They are not published."

Comment

Self-Assessment Report is published at http://www.df.lu.lv/nacstudet/programmas/pasnovertejuma-zinojumi-un-ekspertu-atzinumi/ .

F Summary: Panel recommendations (18.10.2017)

Taking into account the additional information and the comments given by the university, the panel summarized their analysis and **final assessment** for the accreditation as follows:

Degree Programme	Institution	Awarded Label	Current duration of accreditation	Maximum Duration of accreditation (after fulfilment of requirements)
Bachelor Computer Science	University of Latvia	Euro-Inf Bachelor	31.10.2018	30.09.2023
Master Computer Science	University of Latvia	Euro-Inf Master	31.10.2018	30.09.2023

Requirements

For both programmes

1. (criteria 1.1, 1.3) Demonstrate in a realistic manner how the programme learning outcomes and courses are aligned and how each course contributes to the achievement of the overall learning outcomes. Update the course descriptions to support this alignment.
2. (criterion 1.2) Demonstrate how all stakeholders, including teaching staff and the labour market, are involved in the curriculum design and continuous, further development in a systematic manner.
3. (criterion 3.1) Demonstrate how staff planning is implemented with a view to sustainability and the quality expectations for teaching staff. Ensure that teaching of specific subject areas does not depend on only one person.
4. (criterion 5.1) Demonstrate that mandatory feedback loops to all relevant stakeholders are consistently implemented within the quality management system.

For the Bachelor

5. (criteria 1.1, 1.3) Ensure that there is an alignment in all sub-programmes between the objectives, learning outcomes and content.

For the Master

6. (criterion 2.1) Ensure that the planned procedures for the admission of students with different backgrounds are formally implemented into the rules and regulation and made transparent to all stakeholders.

Recommendations

1. (criterion 3.1) It is recommended to assess whether the use of semester teachers is suitable to ensure its intended goals
2. (criterion 3.1) It is recommended to provide systematic support for new teaching staff in didactic competences and research support

For the Bachelor

3. (criterion 1.3) It is recommended to improve the supervision during and provision of opportunities for the practical phase.

G Decision of the Accreditation Committee (23.10.2017)

Assessment and analysis for the award of the Euro-Inf® Label:

The EQANIE Accreditation Committee discussed the procedure and the findings and assessment by the panel. The Committee fully agreed with the conclusions and recommendations of the panel. It clarified that the programmes would be accredited for one year with requirements. In case of fulfilment of the requirements by the end of one year, the accreditation would be extended to the maximum duration.

The EQANIE Accreditation Committee decided to accredit the programmes as follows:

Degree Programme	**Institution**	**Awarded Label**	**Current duration of accreditation**	**Maximum duration of accreditation (after fulfilment of requirements)**
Bachelor Computer Science	University of Latvia	Euro-Inf Bachelor	31.10.2018	30.09.2023
Master Computer Science	University of Latvia	Euro-Inf Master	31.10.2018	30.09.2023

Requirements

For both programmes

1. (criteria 1.1, 1.3) Demonstrate in a realistic manner how the programme learning outcomes and courses are aligned and how each course contributes to the achievement of the overall learning outcomes. Update the course descriptions to support this alignment.
2. (criterion 1.2) Demonstrate how all stakeholders, including teaching staff and the labour market, are involved in the curriculum design and continuous, further development in a systematic manner.

3. (criterion 3.1) Demonstrate how staff planning is implemented with a view to sustainability and the quality expectations for teaching staff. Ensure that teaching of specific subject areas does not depend on only one person.
4. (criterion 5.1) Demonstrate that mandatory feedback loops to all relevant stakeholders are consistently implemented within the quality management system.

For the Bachelor

5. (criteria 1.1, 1.3) Ensure that there is an alignment in all sub-programmes between the objectives, learning outcomes and content.

For the Master

6. (criterion 2.1) Ensure that the planned procedures for the admission of students with different backgrounds are formally implemented into the rules and regulation and made transparent to all stakeholders.

Recommendations

1. (criterion 3.1) It is recommended to assess whether the use of semester teachers is suitable to ensure its intended goals
2. (criterion 3.1) It is recommended to provide systematic support for new teaching staff in didactic competences and research support

For the Bachelor

3. (criterion 1.3) It is recommended to improve the supervision during and provision of opportunities for the practical phase.

H Appendix: Programme Learning Outcomes and Curricula

The programme learning outcomes of both programmes are stated in the self-assessment report to be those of the Euro-Inf Framework Standard. They are published as part of the self-evaluation report on the faculty website:

http://www.df.lu.lv/nacstudet/programmas/pasnovertejuma-zinojumi-un-ekspertu-atzinumi/

The following **curricula** are presented:

For the Bachelor's degree programme, a list of courses and course descriptions are available in English on the website: Programme catalogue

Detailed study plans for each sub-programme are part of the self-assessment report as well as the following list of available courses:

Mandatory courses
Final study projects and internship
1. DatZN008 Bachelor paper in Computer Science (12 crp.)
2. DatZR002 Practice I [DAT6] (6 crp.)
3. DatZR001 Practice II [DAT12] (12 crp.)
Study projects and seminars
4. DatZ3169 Qualification Project (8 crp.)
Classic programming
5. DatZ1165 Algorithms and programming (6 crp.)
6. DatZ1166 Software development fundamentals (5 crp.)
Special programming
7. DatZ1031 Web Technologies I (2 crp.)
8. DatZ2019 Web Technologies II (2 crp.)
Software development
9. DatZ2072 Software Engineering (6 crp.)
Project management
10. DatZ4023 Information Technology Project Management (2 crp.)
Computer hardware
11. DatZ1164 Computer Architecture and computer engineering fundamentals I (3 crp.)
Computer networks

12. DatZ1170 Computer networks I and insight into industry (3 crp.)

Operating systems

13. DatZ1053 Operating System (2 crp.)

Databases and information systems

14. DatZ1139 Databases and Information Systems Fundamentals (3 crp.)

Classical mathematics

15. Mate1009 Algebra (2 crp.)
16. Mate2005 Analytical geometry (2 crp.)
17. Mate1014 Calculus I (2 crp.)
18. Mate1007 Discrete mathematics I (2 crp.)
19. Mate1008 Discrete Mathematics II (2 crp.)
20. Mate2012 Probability Theory and Statistics (2 crp.)

Mathematical fundamentals of computer science

21. DatZ1037 Automata Theory (2 crp.)
22. DatZ2029 Formal Grammars (2 crp.)
23. Mate3044 Mathematical Logic (2 crp.)

General courses

24. Ķīmi1059 Civil protection (1 crp.)
25. KomZ3120 Communication and Cognitive Sciences (2 crp.)
26. VadZ1022 Entrepreneurship (4 crp.)
27. VidZ1032 Environment protection (1 crp.)
28. SDSK1067 Internet, Netiquette And The Legal Regulation (2 crp.)
29. Ekon1006 Principles of Economics (2 crp.)

Elective courses*

Study projects and seminars

39. DatZ3055 Course Paper in Computer Science (CE, CS, SE, IT, IS) (4 crp.)
40. DatZ2035 Seminar I (CE, CS, SE, IT, IS) (2 crp.)
41. DatZ2036 Seminar II (2 crp.)
42. DatZ3056 Seminar III (2 crp.)
43. DatZ4034 Seminar IV (2 crp.)

Classic programming

44. DatZ2030 Declarative Programming (2 crp.)
45. DatZ4019 Object-oriented programming (SE) (4 crp.)
46. DatZ4017 Principles of Assembly Languages (CE, SE) (4 crp.)
47. DatZ4002 Programming Languages (CS, SE) (2 crp.)

Special programming

48. DatZ3065 AB Suite Programming Environment (4 crp.)
49. DatZ3068 Semantic Web (2 crp.)

50. DatZ1091 Software development using .NET (2 crp.)

Algorithms

51. DatZ4020 Applied Algorithms (2 crp.)
52. DatZ3168 Data structures and algorithms [DF] (CS, SE) (4 crp.)
53. DatZ3050 Theory of Algorithms (CE, CS, SE, IT, IS) (2 crp.)

Software development

54. DatZ3025 Software Requirement Analysis (SE, IS) (4 crp.)
55. DatZ3038 Software Testing (SE, IS) (2 crp.)

Data processing

56. DatZ3167 Concepts of machine learning (2 crp.)
57. DatZ3151 Internet search techniques (2 crp.)
58. DatZ1131 Introduction to Natural Language Processing (2 crp.)

Computer hardware

59. DatZ2159 Computer Architecture and computer engineering fundamentals II (CE, IT) (2 crp.)
60. DatZ3072 Digital Signal Processing (CE) (2 crp.)
61. DatZ3074 Introduction to Digital Design (CE) (4 crp.)

Computer networks

62. DatZ2076 Computer Networks Administration (IT) (2 crp.)
63. DatZ1039 Computer Networks II (IT) (2 crp.)
64. DatZ3057 Computer Networks III (IT) (2 crp.)
65. DatZ3058 Computer Networks IV (IT) (2 crp.)
66. DatZ3037 Information Systems Security (IT, IS) (2 crp.)
67. DatZ3070 Wireless Sensor Networks (CE) (4 crp.)

Operating systems

68. DatZ4022 Operating System Concepts (CE, CS, SE, IT, IS) (2 crp.)
69. DatZ2161 RouterOS fundamental technologies (IT) (2 crp.)

Databases and information systems

70. DatZ3047 Data Warehouses (IS) (4 crp.)
71. DatZ3045 Databases II (SE, IS) (2 crp.)
72. DatZ2024 Office Information Systems (2 crp.)
73. DatZ3036 Oracle Design Tools (IS) (2 crp.)
74. DatZ4024 RDBMS Oracle (4 crp.)

Modelling and specification

75. DatZ1052 Foundations of Specification Languages (2 crp.)
76. DatZ3123 Modeling basics (CE, CS, SE, IT, IS) (2 crp.)
77. DatZ2055 Syntax and Semantics of Programming Languages (CS) (2 crp.)

Classical mathematics

78. Mate1017 An Introduction to Number Theory (2 crp.)
79. Mate2004 Calculus II (CE, CS) (2 crp.)
80. Mate3003 Combinatorics (CS) (2 crp.)
81. Mate1015 Linear Algebra I (CS) (2 crp.)
82. Mate2006 Linear Algebra II (2 crp.)
83. Mate4005 Main Notions of Mathematics (CS) (4 crp.)
84. Mate3028 Theory of Probability and Mathematical Statistics selected topics (CS) (2 crp.)

Mathematical fundamentals of computer science

85. DatZ3150 Applied cryptograpfy [B] (CS) (2 crp.)
86. DatZ4033 Coding Theory (CE, IT) (2 crp.)
87. DatZ4026 Complexity of Computation (CS) (2 crp.)
88. Mate1005 Elements of graph theory (2 crp.)
89. DatZ4028 Quantum Computation (CS) (2 crp.)

Processing of visual information

90. DatZ3073 Basics of Computer Graphics and Image Processing (2 crp.)
91. DatZ1109 Graphic Design for User Interface (4 crp.)
92. DatZ1000 Introduction to Web Design (4 crp.)

General courses

93. Valo2335 English for Computing (2 crp.)
94. DatZ3029 Human - computer interaction (IS) (2 crp.)
95. Fizi3021 Natural Sciences (4 crp.)
96. Valo1465 Practical Latvian for International Students I (4 crp.)

Mathematical and Computing Didactics

Sub-programme Mathematical and Computing Didactics contains a specific set of available courses, which are not specified herein.

* Sub-programmes, for which the course is compulsory, are given in brackets: CE – Computer Engineering, CS – Computer Science, SE – Software Engineering, IT – Information Technologies, and IS – Information Systems.

For the Master's degree programme, a list of courses and course descriptions in English are available on the website: Programme Catalogue

Detailed study plans for each sub-programme are part of the self-assessment report as well as the following list of available courses:

Mandatory courses

Final study projects and internship

1. DatZ6017 Master's paper in Computer Science (20 crp.)

Study projects and seminars

2. DatZ6016 Course Paper in Computer Science (4 crp.)

Special programming

3. DatZ5032 Advanced Programming Technologies (4 crp.)

Project management

4. DatZ6111 IT project management (4 crp.)

Computer networks

5. DatZ5009 Computer Networks I (4 crp.)
6. DatZ5011 Computer Networks II (4 crp.)

Modelling and specification

7. DatZ5022 Knowledge Engineering (4 crp.)
8. DatZ5021 System modelling (4 crp.)

Elective courses*

Special programming

9. DatZ6008 Component based software development (4 crp.)
10. DatZ5036 MDA and model transformations /honors-option course/ (4 crp.)
11. DatZ5008 Programming Web Applications (IT) (4 crp.)
12. DatZ6006 UML based software development (4 crp.)

Algorithms

13. DatZ7036 Algorithms for Hard Problems (2) /honors-option course/ (2 crp.)
14. DatZ6026 Bioinformatics /honors-option course/ (2 crp.)
15. DatZ6056 Deep Learning (CS) (4 crp.)
16. DatZ5006 Design and analysis of efficient algorithms (CS, SE) (4 crp.)
17. DatZ5056 Parallel algorithms /honors-option course/ (2 crp.)
18. DatZ5041 Randomized algorithms (CS) /honors-option course/ (2 crp.)

Software development

19. DatZ6009 Software Quality (SE) (2 crp.)
20. DatZ5013 Software Testing (SE) (4 crp.)
21. DatZ5010 System Design (SE, IS) (4 crp.)

Project management

22. DatZ7000 Research Methods in Computing /honors-option course/ (4 crp.)

Computer hardware

23. DatZ7034 Digital Design (CE) /honors-option course/ (4 crp.)
24. DatZ7032 Wireless Sensor Networks (CE) /honors-option course/ (4 crp.)

Operating systems

25. DatZ6007 Operating System UNIX (CE, IT) (4 crp.)
26. DatZ5048 Operating Systems Engineering /honors-option course/ (4 crp.)
27. DatZ7031 Virtual Environments (IT) (2 crp.)

Databases and information systems

28. DatZ6051 Data mining (4 crp.)
29. DatZ5057 Data processing systems (IS) (4 crp.)
30. DatZ5061 E-commerce and ICT Infrastructure (4 crp.)
31. DatZ5038 Enterprise Information Systems (IS) (4 crp.)
32. DatZ6054 Selected Topics about Data Warehouses (IS) (4 crp.)

Modelling and specification

33. DatZ7021 Modeling and Logic /honors-option course/ (4 crp.)
34. DatZ6013 Specification Languages /honors-option course/ (4 crp.)

Mathematical fundamentals of computer science

35. DatZ6015 Applied cryptography (IT) (2 crp.)
36. Mate5033 Combinatorics (CS) /honors-option course/ (2 crp.)
37. DatZ7025 Computational Complexity /honors-option course/ (2 crp.)
38. DatZ5059 Game theory /honors-option course/ (2 crp.)
39. DatZ5031 Graph Theory (CS) (2 crp.)
40. Mate7000 Gödel's Theorem /honors-option course/ (2 crp.)
41. DatZ5037 Mathematical Methods of Cryptography /honors-option course/ (2 crp.)
42. DatZ5045 Number Theory [M] (CS) /honors-option course/ (2 crp.)
43. DatZ7020 Quantum algorithms /honors-option course/ (4 crp.)
44. DatZ5034 Quantum Computers /honors-option course/ (2 crp.)
45. DatZ6057 Selected topics in mathematical statistics /honors-option course/ (4crp.)

Processing of visual information

46. DatZ5023 Image processing and analysis (2 crp.)
47. Kogn6000 Language, Spatial Cognition and Communication (4 crp.)
48. DatZ5109 Selected Topics of Visual Communication Design (2 crp.)
49. Kogn5011 Visual Perception: Methodologies, Frameworks (4 crp.)

Bioinformatics

Elective courses in the bioinformatics subprogramme can be chosen also from the courses of Biology master study programme.

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