

**Accreditation Report**

Programme Accreditation of

**University of Luxembourg**

**“Bachelor in Applied Information Technology” (BINFO)**

**“Bachelor in Applied Information Technology – Continuing Education Programme”  
(BINFO-CEP)**

**“Master in Information and Computer Science” (MICS)**

**I Procedure**

**Date of contract:** 28 August 2019

**Date of the submission of self-assessment report:** June 30, 2020

**Date of site visit:** 25 January 2021

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**Accreditation decision:** 27 September 2021

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## **II Introduction**

The experts would like to thank the representatives of the HEI as well as students that they have taken part in the discussions and willingly shared information and their views during the site visit. The discussions are valuable not only for the assessment of the institution, but also for a better understanding of the legal and sociocultural context of the local higher education system.

Evaluation basis for the peer-review experts is the self-assessment report of the HEI as well as intensive discussions during the site visit with the HEI management, deans and/or heads of the departments, head(s) of the study programme(s), study programme(s) coordinators, teachers, lecturers, administrative staff, students, and graduates.

Main objective of the accreditation procedure is to assess the quality of the study programmes and compliance with the "Standards and Guidelines for Quality Assurance in the European Higher Education Area" (ESG). The ESG standards are applied as main assessment criteria in the international accreditation procedure.

A group of experts was set up, which ensured that all areas relevant to the accreditation procedure (e.g. legal, structural, social etc. aspects) as well as the ESG were considered. The peer-review experts include professors, representatives of the professional practice and the student representative. A certificate with the ACQUIN seal is awarded upon accreditation of the study programme(s).

### **1 *The Higher Education System in Luxembourg***

The University of Luxembourg (UL) is the only university in the country and was established by law in 2003. Previously, university students attended one of the UL's predecessor institutions, where they could obtain professional qualifications or study the first and sometimes the second year of a university programme in various subjects in the humanities, economics, law or natural sciences before going abroad to complete their studies, usually at a nearby university in France, Belgium or Germany. Many Luxembourg students completed their entire course of studies abroad before returning to Luxembourg. The creation of the UL was intended to offer students the opportunity to complete a full university course in Luxembourg. In addition, students from other countries should be given the opportunity to attend university in Luxembourg.

The aim of the UL is to meet the growing demand for qualified professionals in Luxembourg. Closely related to this is the ambition to provide young Luxembourgers with access to a first-class and complete higher education, while at the same time providing them with specific qualifications that meet the demand of the national labour market in particular.

The UL original 2003 legal framework, the Law of 2003, was abrogated and replaced by the Law dated 27 June 2018 on the organisation of the University of Luxembourg (Law of 2018). On 21 May 2019, the Ministry of Higher Education and Research (MESR) approved the UL's current Internal Regulations, which spell out how to implement the Law of 2018 as well as specify the functioning of the UL faculties. On the same date, the MESR also approved the UL Study Regulations. The Law of 2018 sets out a new governance structure for the UL, providing operational rules regarding the governance of the faculties.

Most importantly, the Law of 2018 foresees a departmental organisation within each of the three faculties, in which teaching, and research are united. Each department is gathering educational programmes and activities, representing all its related disciplines under one umbrella. The Law of 2018 makes clear that each department is competent to develop and implement its own Research Programmes as well as propose and manage its Study Programmes. Since January 2020, FSTM comprises 5 departments: the Department of Computer Science, the Department of Engineering, the Department of Mathematics, the Department of Physics and Materials Science and the Department of Life Sciences and Medicine.

UL has grown rapidly since its foundation, with over 6 700 students enrolled by the academic year 2019-20, and over 2.090 members of staff including professors, doctoral candidates and external experts. UL consists of three Faculties (Faculty of Law, Economics and Finance - FDEF; Faculty of Humanities, Education and Social Sciences - FHES; Faculty of Science, Technology and Medicine - FSTM), and three Interdisciplinary Research Centres (Centre for Security, Reliability and Trust - SnT; Luxembourg Centre for Systems Biomedicine - LCSB; Centre for Contemporary and Digital History - C2DH).

The Faculty of Science, Technology and Medicine (FSTM) hosts 6 bachelor, 13 master and 5 vocational study programmes in the fields of mathematics, physics, engineering, computer science, and life sciences and medicine. Over 2.064 students are mentored by a team of 80 international and renowned professors and senior lecturers. FSTM aims at conducting internationally recognized research and offering quality teaching programmes relevant to Luxembourg in the areas of Computer Science, Engineering, Life Sciences and Medicine, Mathematics, and Physics. FSTM offers different types of programmes suited to the needs of different groups of students: a) Academically-oriented programmes b) More professionally-oriented programmes and c) Lifelong learning programmes. Those different types of programmes correspond to the different roles that the University of Luxembourg, being the only university in the country, has to play – in other countries they might be taken by different types of higher education institutions.

The Department of Computer Science (DCS) consists of a staff of more than 100 full-time equivalent members, involved in both teaching and research activities, including 23 professors with their respective research groups, half of which have secondary affiliation to the Interdisciplinary Centre for Security, Reliability and Trust (SnT). Our ambition is to perform fundamental and applied research in computer science, commonly inspired by industrial and societal challenges. The DCS is active in various research areas: Communicative Systems, Information Security, Intelligent and Adaptive Systems, Software and Systems. In order to cater for the societal needs for academic and professional education in computer science, the DCS has developed a wide teaching portfolio at Bachelor, Master and PhD level, aiming at various target populations and different goals. We also hire academics with a strong fundamental research background and excellent teaching skills, thus building an agile community with complementary competencies that can quickly pick up new academic, societal and educational challenges.

## **2 Short profile of HEI**

### **Bachelor in Applied Information Technology**

After the initiation of the University of Luxembourg in 2003, two bachelor programmes related with computer science and information technology existed in two different faculties. The bachelor programme within the FSTM offered a more science oriented and technical education, whereas the programme at the FDEF focused more on business IT and applied aspects of computer science. Obviously, there was quite some redundancy between both programmes.

In 2007, UL's management decided to merge both programmes into a single bachelor programme within the FSTM: the Bachelor professionnelle en informatique. The name of the programme was changed in 2018 in English to better reflect the main teaching language used in the programme. The programme is now named: Bachelor in Applied Information Technology.

The Bachelor in Applied Information Technology (BINFO) offers a generalist education in Information Technology (IT), whose objectives are to give students operational skills that are relevant and desirable to potential employers and so allow a quick integration into the professional world, in either the private or the public sector. BINFO provides students with the basic theoretical and applied knowledge in core IT areas like algorithms and data structures, databases, networks, software engineering, mobile and web application programming, but also the practical thinking to apply these technologies in industry. This focus on an applied qualification combines theoretical components of a traditional study in computer science with a focused approach giving students real-world skills and applicable concepts geared toward their chosen career path.

Beyond technical learning, BINFO also prepares its graduates for the European labour market with various theoretical and applied training on soft skills like entrepreneurship, psychological aspects of teamwork, practical team projects, and finally a one-semester internship in an IT department of a Luxembourg-based professional partner. The bilingual structure of the programme realized with using French typically for soft skill courses and English for technical courses provides the students with competences which are very relevant for the Luxembourgish labour market. Due to the favourable economic situation in Luxembourg in the last few years, there is a large demand for IT experts on junior level on the local labour market. Almost all BINFO graduates heading for a professional career are hired within maximally 1-2 months after their last examination. Feedback from company representatives responsible for BINFO internship students confirm that generally BINFO graduates have achieved a high technical IT background in their study that matches the expectations from most involved companies.

### **Bachelor in Applied Information Technology-Continuing Education Programme**

There is a strong demand for qualified IT specialists on the Luxembourg labour market. While already providing initial training in applied information technology with the creation in 2008 of the Bachelor in Applied Information Technology (BINFO), there was also a growing need to meet the expectations of employees with existing experience in information technology willing to reinforce their computer skills and to validate their professional experience.

In partnership with the Chambre des Salariés du Luxembourg (CSL), we created in 2016 this continuing education programme, which is designed as a specific track of the BINFO with similar learning objectives and a few adaptations necessary for individuals already employed. The Bachelor in Applied Information Technology – Continuing Education (BINFO-CEP) is a part-time programme taking place on evenings and weekends in Kirchberg campus, which is close to the city centre, whereas the other computer science programmes are located on Belval campus, which is off-site from the city.

The Bachelor in Applied Information Technology - Continuing Education Programme (BINFO-CEP) is a part-time study programme leading to an academic Bachelor degree which offers to employees the possibility to extend their knowledge on the core elements and on current trends of information technology. Similar to its full-time equivalent programme, the BINFO, BINFO-CEP focuses on applied techniques and tools that are important for professional activities in the IT domain. BINFO-CEP is organized in cooperation with the Lifelong-Learning Center of the Chambre des Salaries (CSL) to satisfy the growing demands of the Luxembourgish market for continuous education offered to its employees.

The objective of the programme, which lasts over 2 years is to provide to the students a renewed and extended view on different core aspects of IT together with explanations on current



trends and hot topics in computer science. A typical student in the programme has some background in information technology, either through some previous study, or based on professional experience. The programme builds upon this expertise and extends it with additional information about recent developments in information technology. For an easier combination of the professional life with this educational activity, all courses are organized on evenings, but additional homework and project work are expected from all students. Most of the courses are highly depending on either individual or group projects to strengthen the practical experience gained in the courses.

### **Master in Information and Computer Sciences**

The Master in Information and Computer Science (MICS) was created in 2005 and was one of the first master programmes of the University of Luxembourg. The programme was certified by the accreditation agency AQAS until 2011.

MICS mirrors the research priorities of the DCS in the areas of “Advanced Software Systems, Communicative Systems, Intelligent and Adaptive Systems, Information Security”. MICS was initially created to meet the needs for PhD students, preparing master students for research in specific domains.

The needs from the market for well-educated specialists in information technology evolved and increased. Of particular interest are those areas relevant for the local finance and media industry or the large European administrations, as well as those reinforcing existing research strengths within the university.

MICS provides knowledge in computer science by understanding its abstract and interdisciplinary foundations, focusing on problem solving and developing lifelong learning skills. This programme is a continuation of the academic *Bachelor in Computer Science* and equips students with skills for project-oriented, interdisciplinary work within a research or high-level industry-oriented environment as well as laying the groundwork for PhD studies. The multilingual and intercultural environment empowers the students to work both individually and in multinational teams.

### 3 General information on the study programmes

Location	Bachelor in Applied Information Technology (BINFO), Campus Belval (Esch-sur-Alzette, Luxembourg)
Date of introduction	09/2008
Faculty/ department	Faculty of Science, Technology and Medicine / Department of Computer Science
Standard period of study (semesters)	6 semesters
Number of ECTS credits	180 ECTS
Number of study places	75 students
Number of students currently enrolled	2019/2020: 157 students enrolled all semesters included
Average number of graduates per year	24 graduates per year on average from 2016 – 2019
Admission requirements	English – level B2 French – level B1
Form of study	Full-time
Tuition fee	400€/semester for semester 1 & 2 200€/semester for semester 3 to 6

Location	Bachelor in Applied Information Technology – Continuing Education Programme (BINFO-CEP), Campus Kirchberg (Luxembourg)
Date of introduction	09/2016
Faculty/ department	Faculty of Science, Technology and Medicine / Department of Computer Science
Standard period of study (semesters)	4 semesters
Number of ECTS credits	180 ECTS
Number of study places	25 students
Number of students currently enrolled	2019/2020: 27 students enrolled all semesters included
Average number of graduates per year	2018: 10 graduates 2019: 10 graduates
Admission requirements	English – level B2

	French – level B1
Form of study	Part-time (evening and weekend courses)
Tuition fee	6500€

Location	Master in Information and Computer Sciences (MICS), Campus Belval (Esch-sur-Alzette, Luxembourg)
Date of introduction	09/2005
Faculty/ department	Faculty of Science, Technology and Medicine / Department of Computer Science
Standard period of study (semesters)	4 semesters
Number of ECTS credits	120 ECTS
Number of study places	60 students
Number of students currently enrolled	2019/2020: 92 students enrolled all semesters included
Average number of graduates per year	2018: 24 graduates 2019: 20 graduates
Admission requirements	English – level B2
Form of study	Full-time
Tuition fee	200€/semester

#### **4 Results of the previous accreditation (if applicable)**

The study program “Master in Information and Computer Sciences (MICS)” was examined and accredited by the AQAS for the first time in 2005 resulting in the following conditions:

1. The documents describing the profile of the programme must clearly state that the programme is research oriented.
2. The entry requirements must be more transparent, especially in terms of student competences. This is especially important for applicants who already hold a degree, but from a programme outside the field of computer science.
3. The profile of the core areas and the competences that students acquire by successfully completing these core areas must be specified.
4. The module handbook needs to be enhanced with regard to course contents, student competences, and the logic of the curriculum (entry requirements for modules).

The conditions were fulfilled. The accreditation was issued by September 30, 2006.

For further development of the study programme, the following recommendations were formulated:

1. A diploma supplement should be issued.
2. It is recommended that the result of a standardised English test (e.g. TOEFL) is used as to determine whether a student's language skills qualify for entry to the programme.
3. Decisions on what specialisations can be offered should be made known at the earliest possible date (otherwise student expectations might be disappointed).
4. Documents relating to the Master's programme should be available in English.
5. A quality management concept is under development at university level and is expected to be in place within the next year. It is recommended that a catalogue is drawn up defining responsibilities (and competences), quality objectives, quality indicators, and areas of quality measurement (e.g. external evaluation, alumni).
6. The accreditation commission wishes to stress that access to electronic libraries should be provided at an early stage.
7. The accreditation commission wishes to stress the importance of maintaining a website for the programme and creating an intranet, as suggested by the department.



### III Implementation and assessment of the criteria

#### 1 ESG Standard 1.1: Policy for quality assurance

**Institutions should have a policy for quality assurance that is made public and forms part of their strategic management. Internal stakeholders should develop and implement this policy through appropriate structures and processes, while involving external stakeholders.**

##### 1.1 Implementation

###### Aspects that apply to all courses of study

The need for the institutionalisation of quality assurance processes at university-level has been pointed out repeatedly in previous external evaluations. That commitment was subsequently anchored in the current Four-Year Plan in the Law of 27 June 2018: In 2018, the new Law created the legal foundations for institutional quality assurance. In order to carry out its missions, the University is called upon to ensure the quality of higher education and research and to set up a quality assurance system. The Rector shall propose to the Governing Board the creation of a study programme in accordance with the guidelines established by the University Council. The proposal shall be accompanied by an internal evaluation, which shall analyse, in the framework of the quality assurance system the quality, feasibility and appropriateness of the proposed study programme. The internal evaluation of the University shall cover new study programmes pursuant to Article 35(4). On a proposal from the Rector, the Governing Board shall decide on the programme of the internal evaluation and the procedures governing it, as well as on the action to be taken.

The first step towards institutionalising quality assurance was to hire Quality Officers. By 2017, all faculties and the Rectorate had one Quality Officer. At the faculty level, their mandates were closely aligned with the different quality cultures and differed accordingly. Better communication and coordination were thus identified as critical conditions for further progress. In the holistic approach to educational quality, quality managers must be able to move across levels and connect information and processes across a variety of contexts. This has to be reflected in the way quality management is organised and institutionalised. The fragmented and bottom-up emergence of quality initiatives at the University in the past has, in this respect, been a great advantage. It acts as an effective guarantee that quality development processes remain in the hands of those who have the requisite expertise.

Today, Quality Officers form a group that assumes responsibility for the design, development and implementation of the University's policies for quality assurance, for the provision and

maintenance of the internal quality assurance framework and its key instruments, and for providing support to the University's academic community. Institutionally, they belong to different organisational units at the level of the faculties and in the Rectorate.

An important step towards the institutionalisation of the Quality Officers has been made with the formation of a steering group charged with the monitoring and review of the University's quality assurance policies. An informal working group at the level of Deans/Vice-Deans and the Vice-Rector for Academic Affairs has existed for a few years. The constellation of this group has proven effective. The missing element are external peers – academic leadership in charge of educational development and quality assurance at other universities. A small group of them could either be joined to the steering group at regular intervals or brought together in an advisory committee on educational quality attached to the group.

This rather loose organisational constellation and the fact that Quality Officers have fulfilled a variety of functions within the respective Dean's or Vice-Rector's office have had the consequence that development of quality assurance has mostly followed demands and problems where they were most pressing. Since the Law singles out programme creation as the central focus for internal quality assurance in education, the procedure for programme creation was one of the first elements of the framework to be defined at the central level. The new procedure is now in place. Considerable investments were also made in the review and (re-)definition of academic (administrative) processes and process infrastructures for student management (ACME). The same applies to the consolidation of surveys for student feedback at programme and university level.

In parallel, the quality group began in 2018 to develop a methodology for study programme review and enhancement processes. This methodology will be incorporated into the University's future Quality Assurance Framework for Education.

This methodology is at the heart of a programme review procedure that, together with the procedure for programme creation, organises quality assurance and enhancement processes in education. They form the foundation for the other elements of our future quality assurance framework. In identifying and aligning these elements, the framework follows experiences, ambitions or possible directions for future development, and relates them to the Standards and Guidelines for Quality Assurance in the European Higher Education Area.

## **1.2 Assessment**

### **1.2.1 Strengths and need for development for all study programmes**

The University of Luxembourg has successfully implemented a policy for quality assurance, the QAFE. Since quality assurance policy is an issue that plays on the higher levels and the

forthcoming QAFE applies to all programmes, no extensive assessment for the separate programmes will be made.

The University of Luxembourg has a publicly available and very good as well as well thought-out strategy for quality assurance, which is part of its strategic management. With the help of appropriate structures and processes, this strategy is always developed by internal stakeholders and continuously implemented appropriately, involving external stakeholders. The University of Luxembourg has made it its central task to develop a quality culture that continuously applies at all university levels, is accepted by all university members and is constantly checked and further developed. From the point of view of the expert group, the university has a very good formal quality assurance policy, in which all control loops are closed, mesh very well and work together.

The first step towards institutionalising quality assurance at the University of Luxembourg was to recruit quality officers both at the level of the university's central administration and in the faculties. The role of the quality officers is particularly relevant and worth highlighting here. The expert group considers therefore the institutionalisation and implementation of the QAFE to be successful. On a cross-faculty level, the University's quality officers form a joint working group that develops and implements the university's quality assurance framework and its key instruments. Since the quality officers institutionally belong to different organizational units, their cooperation was not formally organized at first. An important step such institutionalization was taken by the formation of a Quality Assurance Steering Committee, which further develops towards the University's quality policy and monitors its implementation. In the future, this steering committee will be expanded to include some external peers. This is fully endorsed by the expert group. All relevant committees are also appropriately involved in the process of further developing quality assurance and the coordination processes of the various committees were explained in the discussion groups.

Overall, the quality structure of the University of Luxembourg provides for a relatively high autonomy of the faculties and study programs, which can develop their own implementations of the jointly defined principles and approaches. This is to ensure that quality assurance remains part of a living quality culture that combines top-down with bottom-up processes. Overall, the quality structure of the UL provides for a relatively high autonomy of the faculties and study programmes, which can develop their own implementations of the jointly defined principles and approaches. This is to ensure that quality assurance remains part of a living quality culture that combines top-down with bottom-up processes. In this context, the review panel would like to recommend that the analysis of relevant data be exploited to an even greater extent across faculties in order to be able to adequately enable an even broader and more detailed basis for decision-making for the further strategic planning of the next phase of higher



education development. In addition, the impression arose that the development of the quality management system is strongly driven in the faculties. Since the processes for quality improvement are thus strongly carried out in the faculties, care should be taken to anchor them even more institutionally.

Against this background, the instruments of internal quality assurance are publicly accessible and known to all staff and students. Nevertheless, the expert group would like to give a hint here, as in the discussion rounds the impression sometimes was that the teacher staff at faculty level were very familiar with the quality mechanisms due to the very good communication work and coordination function of the quality officers but could not fully reflect the institutional contexts. This could still be optimised.

The underlying documents and the discussion rounds show very clear that further development is being continued at the university. Within the scope of its possibilities, this contributes to identifying potential topics in which the university can systematically improve. The internal QA-measures are also continuously developed. In conclusion a high level of quality awareness was noted at the university, which would like to constantly improve its quality management.

### 1.3 Conclusion

The criterion is **fulfilled**.

## 2 ESG Standard 1.2: Design and approval of programmes

**Institutions should have processes for the design and approval of their programmes. The programmes should be designed so that they meet the objectives set for them, including the intended learning outcomes. The qualification resulting from a programme should be clearly specified and communicated and refer to the correct level of the national qualifications framework for higher education and, consequently, to the Framework for Qualifications of the European Higher Education Area.**

### 2.1 Implementation

#### 2.1.1 Aspects that apply to all courses of study

Quality assurance for the creation of new study programmes is part of the University's legal obligation for 'internal evaluation' (article 50 of the Law). New programmes are proposed by Deans to the Rector, who submit them for approval to the Board of Governors. Before the Board can receive a proposal, the University Council must have confirmed the new programme's general 'orientation'. The revised procedure for programme creation is a significant step towards the institutionalisation of quality assurance, as it creates a regulatory foundation for standards and assessment criteria that guide quality management processes also outside of the programme creation context. Criteria for the assessment of new curricula focus on the

stated purpose and learning objectives of the programme, its target audience and pedagogical approach, the way the programme is situated in the educational offer of the University, its research activities and the wider educational landscape, and how it gains relevance vis-à-vis expectations from students, academics, professionals and in the social, economic and political context. As part of the creation process, programmes are now assessed with respect to alignment of learning outcomes with the Luxembourg Qualifications Framework, curricular coherence and practicality, workload, and graduate prospects. The procedure also guarantees the comprehensive documentation of the curriculum, curricular rules, and resource needs, and entails a concise risk assessment for the programme.

The procedure is new, and the first requests for new programmes are only now being prepared under its framework. Its principal purpose is to assure the University the programme's educational merit and quality. This includes re-assuring programme initiators that the new programme has the full institutional support it needs to succeed. It also means that decision makers can trust that they are deciding on the basis of reliable and pertinent information, in awareness of the potential benefits and risks associated with the new programme. These are the principal objectives to which the procedure has to measure up.

#### Institutional strategy

The design of new programmes is following the University's strategy, which is defined by a series of Four-Year plans published on the University's website. The University's strategy in the field of computer science is to support the Luxembourg's society with collaborative research programmes in strategic areas and to attract highly talented and skilled professionals to meet the increasing HR demands of the country's expanding ICT intensive industry.

Both, the Bachelor in Applied Information Technology (hereafter BINFO) and the Bachelor in Applied Information Technology – Continuing Education Programme (hereafter BINFO-CEP) actively contribute to the knowledge transfer in the IT domain. The student internship in the 6th semester provides a direct transfer from the educational knowledge acquisition in the bachelor and its practical usage in the professional world. Student internships can be done in large multi-national or financial institutions, as well as SMEs, start-ups, or even NGOs. This activity is therefore not only important for future programme developments, but also provides small impulses about latest IT developments into businesses all over Luxembourg. In addition, graduates of the two programmes enter the labour market in Luxembourg, satisfying a part of the huge demand for IT experts in Luxembourg.

The Master in Information and Computer Sciences (hereafter MICS) has been designed to be research-oriented since its inception in 2005. The directions of the profiles (communication

systems, information security, artificial intelligence, reliable software systems) and their evolution since then reflect the strategy of the University. Many MICS graduates stay at a university either within the SnT, the University of Luxembourg or another university for a doctorate or in a research related position.

### Involvement of stakeholders

Reflections on curriculum design take place in different contexts and involve internal as well as external stakeholders through bilateral or collective meetings for course planning between teachers and Programme Directors<sup>3</sup>, Programme Steering Committees<sup>4</sup>, departmental and faculty-level teaching or Programme Directors' committees, or high-level strategic working groups.

Although it remains the Faculty Dean's prerogative to formally initiate the necessary process for the creation of new programmes, in practice, such initiatives emanate from the faculty's departments. The Department of Computer Science (DCS) organises monthly meetings with the Educational Management Board<sup>5</sup> (EMC) to share information or raise issues that are relevant beyond individual programmes. EMC has no official function, but it addresses transversal aspects, common to several programmes in the same discipline.

Further guidance in curriculum design and development is provided through Programme Steering Committees, which assist Programme Directors in an advisory role on strategic questions of curricular development, student recruitment, employability, or staff development. They bring together programme management with student representatives, teaching staff, alumni and external stakeholders, and must meet at least once per year. To further support its teaching staff in curriculum design, the faculty foresees to hire a specialist in curriculum design to ensure that the programmes are competitive on the European market and aligned with our teaching strategy.

The Faculty of Science, Technology and Medicine (FSTM) undertook a wide-ranging reflection in 2017 to establish learning outcomes common to all qualifications at bachelor and master level. For this purpose, we adapted generic learning outcomes defined in the European and Luxembourg Qualifications Frameworks and added elements specific to the University and its strategy. This effort contributed to a shared vision of the qualifications of a FSTM graduate, it also brought more clarity and visibility to the range of programmes we offer to prospective students.

Bachelor graduates are fluent in the fundamental knowledge in their discipline, can apply basic methods, and have the skills necessary to successfully contribute to their field in familiar situations. They are capable of critically analysing familiar problems, including identifying, gathering, and interpreting standard data to inform reflection and decision making; they are capable

of recognising and establishing bridges between different topics of their field and capable of clearly communicating ideas to diverse audiences. They are culturally open and multilingual citizens able to work in international team environments and are able to work with increasing autonomy. They are responsible actors in society who, in particular, understand the social and ethical consequences linked to their field and its application and understand what leadership entails and are willing to start taking on leadership roles in their field. They are aware of the need for and are committed to continuously developing skills and knowledge, either in formal educational settings or semi-autonomously as well as able to assess uncertainty and risk and to constructively handle failure if and when it occurs.

Master graduates are fluent in both basic and more specialised knowledge in their discipline, can apply increasingly complex methods, and have the skills necessary to successfully contribute to their field in new or unfamiliar environments. They are capable of critically analysing challenging problems, including identifying, gathering, and interpreting relevant data – even when incomplete – from various areas to inform reflection, formulate hypotheses, and drive decision making; they are capable of recognising and establishing bridges between different fields and are capable of clearly, unambiguously, and exhaustively communicating conclusions and the rationale driving them to diverse audiences. They are culturally open and multilingual citizens able to work in international team environments as well as able to work with a high degree of autonomy. They are responsible actors in society who understand the social and ethical consequences linked to their field and its application. They have the requisite mindset and are especially willing to take on leadership roles in their field. They are aware of the need for and are committed to continuously developing their own and others' skills and knowledge, including by means of self-directed learning. They can constructively manage uncertainty, risk, and failure if and when they occur.

The University is required by law to document essential information on the objectives, learning outcomes and design of our bachelor and master programmes in an annex to the Study Regulations. Even if the Ministry for Higher Education and Research has not yet published these annexes, the University continues to update them. They are a useful resource and act as an important legal foundation for the operation of our study programmes.

Detailed information on the study programme (including the programme objectives, learning outcomes, course description and learning outcomes, number of ECTS, assessment tasks and weighting) are published in the study programme annexes, as well as on the UL webpage.

### **2.1.2 Bachelor in Applied Information Technology**

The “Bachelor in Applied Information Technology” (BINFO) is an academic programme in information technology, aiming to prepare students for a professional career in Luxembourg or

the Greater Region. This requires a strong focus on applied techniques and practical training in IT technologies which are relevant for the professional world. The programme includes a number of background courses on more theoretical and fundamental aspects of computer science to support students who want to pursue their studies with a master.

BINFO offers a bilingual programme (25% in French, 75% in English). Students come from various countries with different cultural backgrounds, with however a clear majority from Luxembourg. To benefit from this diversity, a significant number of courses mandate student activity in mixed group work. A mandatory mobility semester abroad in the second study year equips students with additional practical experiences, as they are living in a different culture and a new environment. All these activities complement dedicated courses on soft skills, teamwork, and other qualities required for a successful professional career. The last semester consists of a mandatory internship during at least twelve weeks within a professional partner institution in Luxembourg. In this internship, students contribute as junior members to the work of a team and realize a project related to the business activities of the partner institution. This experience enforces the application of learned technologies, individual extension of IT expertise, but also introduces for the first-time common business practices “in real life situations”. It provides an excellent preparation for a smooth transition into the professional world after graduation, which is demonstrated by the fact that BINFO graduates find their first employment quite fast (1-2 months at most) after graduation; a significant proportion of BINFO graduates even directly start their professional career within the internship partner institution.

BINFO is close to the professional world in Luxembourg and feedback loops from the internship partner institutions and Programme Steering Committee meetings help the programme to evolve. Indeed, the programme is updated on a regular basis and adapts/reviews courses with technologies more relevant to the Luxembourgish market.

### **2.1.3 Bachelor in Applied Information Technology – Continuing Education Programme**

The Bachelor in Applied Information Technology – Continuing Programme Education (BINFO-CEP) is the sister programme of the BINFO. It offers a life-long learning training in information technology for professionals working in the IT domain in cooperation with the CSL (“Chambre des salaires”, the official workers chamber in Luxembourg). CSL identified a real need for life-long learning in IT in Luxembourg and was thus willing to develop the programme in cooperation with the University.

Students in the BINFO-CEP must have at least 3 to 6 years of professional experience in the IT domain to be admitted to the programme. Studying in the BINFO-CEP enables these students to learn and develop their expertise in important areas of applied computer science and to acquire an academic bachelor degree.

BINFO-CEP is based on the courses defined in the BINFO with a stronger focus on technical and applied courses (since students are already working, a preparation for the job market is no longer necessary). Courses in the BINFO-CEP are given in evening classes after working hours, which implies that the respective BINFO courses had to be adapted. In particular, many courses consist of a regular class session extended with practical (individual or group) projects that should be done in homework.

BINFO-CEP is a bilingual programme (French and English). It encourages students to use the group projects to share practical experiences from their daily work and to foster their professional relationship with other employees in the IT field in Luxembourg.

#### **2.1.4 Master in Information and Computer Sciences**

The “Master in information and Computer Sciences” (MICS) is designed to equip students with a sound foundation in information and computer sciences, allowing them to continue doctoral studies or to endorse a high-level position in the economy.

Besides programme-level learning outcomes, the learning outcomes are those of the profiles that the student realizes. Learning outcomes are defined at level 7 of the European Qualification Framework.

MICS reflects research performed in the Department of Computer Science (DCS) in the area of computer, communication and information sciences. The goal is to push forward the scientific frontiers of these fields. DCS provides the possibility to supervise academic master theses and hire possibly locally educated doctoral candidates. Similarly, MICS students have the possibility to learn research-related subjects. Many MICS students are employed at the University of Luxembourg in research-related jobs, preparing them for the master thesis. This is further demonstrated by a high percentage of students (39%) continuing their studies at a university as researchers or in a research institute.

As MICS is a research performed programme, the prevailing group of stakeholders involved in the curriculum design and development include students and teachers from the DCS. Students are involved in the Programme Steering Committee where issues, strengths and opportunities are discussed and possibly implemented accordingly.

For instance, proposals to merge profiles in the MICS have been discussed during the last Steering Committee. Similarly, the structure of the third semester is meanwhile adapted to

meet students' needs and lighten their workload. This change has been initiated by the students during the course evaluations, then proposed to the DCS meeting and voted for.

In general, by design of the programme, students have a large choice of courses as electives and thus, have a major impact on the curriculum and its evolution. Teachers propose new courses in their field of expertise, which are discussed and agreed during DCS meetings. To ensure the link between teaching and research, the master thesis has to be supervised by a professor.

MICS offers profiles, which have evolved from specialisations providing the added benefit that multiple profiles (or career pathways) can be realized, thus accommodating diverse interests: Communication systems, Information security, Artificial intelligence and Reliable software systems. To ensure a smooth student progression, the first semester consists of a "review" semester with fixed and mandatory courses that level diverse students' background and prepares for the choice of the profile in the subsequent semester. This is especially relevant in a context where most MICS students come from various nationalities and cultural backgrounds (over 80% international students). Students can choose during the second and the third semester one or two profiles representing one third of the total number of ECTS, the remaining two thirds are to be taken from optional courses, which is enriching the profile they have chosen. During the last semester, students perform their master thesis and need to have collected at least 60 ECTS to start the thesis.

A meeting with students from upper semesters was organized at the beginning of the first semester. Most of the students had the opportunity to discuss about choosing their profile with senior students. Unfortunately, this initiative was not continued. At the start of the second semester, the Programme Director proposed a meeting with all students and explained the profiles, the required and mandatory courses and the possibility to have two profiles.

The curriculum is structured to allow well-defined and similar number of ECTS, which makes it easier for the students to choose options. This simple structure also allows to easily integrate new emerging fields in computer science and to compare the student workload between courses.

The workload is well planned through the courses with weekly lectures with assignment and practical sessions through-out the whole duration of the semester. However, for some courses, the workload does not match the number of credits and since the remote(online) studying due to the COVID-19 lockdown, the workload for larger courses became heavier and light courses became lighter.

Additionally, profiles or elective modules also allow to adapt the curriculum to rapid market changes and technological innovations without drastically changing the curriculum. This often

implies a rather broad catalogue of electives to choose from. Students are guided by the Programme Director in their choice depending on their preferred career path.

## **2.2 Assessment**

### **2.2.1 Strengths and need for development for both study programmes**

The development of new degree programmes at the University of Luxembourg is fundamentally guided by the strategic goals of the university, which are set out in a series of four-year plans. Proposals for new degree programmes are submitted to the Rector by the Deans of the three faculties of the University. If the Rectorate approves the proposal, the new programme is submitted to the Conseil Universitaire (CU), the University Council, and the Conseil de Gouvernance (CG), the University's governing body, for consideration and final decision.

The amended procedure ensures comprehensive documentation of the study plan, study regulations and resource requirements and includes an assessment of the programme's quality management. However, the procedure is still new and the first applications for new degree programmes are currently being negotiated according to the guidelines.

The Faculty of Science Technology and Communication is also legally obliged to document and continuously update the essential information on objectives, learning outcomes, application requirements, language requirements, tuition fees and other design features of all currently offered Bachelor's and Master's degree programmes in an annex to the study regulations.

All degree programmes are under the responsibility of programme directors who are appointed by the dean. The programme directors are responsible for the academic organisation and administration of their programme. They represent the teaching staff, administrative staff and students of the degree programmes at faculty and rectorate level and coordinate the design and implementation of the degree programmes. The programme directors are supported by administrative staff.

Further support is provided by the programme steering committees, which advise the directors on strategic issues of student recruitment, employability, curricula and staff development. They are composed of representatives of students, faculty, alumni and external stakeholders. The steering committees must meet at least once a year. Within the framework of the university's new quality structure, these committees have a central function in quality assurance.

Another important quality assurance mechanism at programme level is the examination committee, which is responsible for confirming grades and assessing students' progress. The committees serve as a forum for feedback from teaching staff to programme directors and are a venue for deliberation on the appropriateness of assessment tools in relation to course and programme objectives. The directors of the various programmes at the university also meet



regularly at faculty and university level. The meetings at university level serve as a central forum for the Vice-Rector for Teaching to provide information on strategic initiatives, regulatory changes and other relevant developments. In the meetings at faculty level, common problems and desiderata regarding the general organisation of studies and the infrastructure are collected, which the Dean's Office forwards to the Rectorate or to the responsible heads of central organisational units (Student Secretariat, IT, HR, International Office, etc.).

Basically, the students were very satisfied with the courses offered in both degree programmes, feel well advised in case of questions and problems and know all the relevant contact persons. From the conversations with the students and lecturers, the evaluation team gained the impression of very attractive study programmes. In the course of their studies, the students are very well prepared for their future professional field and for their professional tasks.

The curriculum of the "Bachelor in Applied Information Technology" (BINFO), the "Bachelor in Applied Information Technology - Continuing Education Programme" (BINFO-CEP) and "Master in Information and Computer Sciences" (MICS) has a coherent programme concept to adequately achieve the defined qualification goals and learning outcomes. The study programme objectives are very well described so that the acquired competences can be well achieved.

Participation in evaluation procedures could be even higher. However, the still too low participation may also be due to the partially negative attitude of students towards evaluation processes. Students see less benefit in written evaluations and evaluable data. The university should therefore strongly encourage students to evaluate in writing and explain its benefits even more. Evaluation should be communicated to students as a quality-assuring opportunity rather than an obligation, enabling them to actively participate in quality assurance.

### **2.2.2 Bachelor in Applied Information Technology**

The bilingual degree programme offers a solid education in the field of information technology with very good theoretical and practical training in IT technologies, which are indispensable for entering professional life. In addition, group work promotes the students' intercultural skills. The compulsory mobility semester and the compulsory internship in the last semester provide very good practical experience and offer a seamless transition into professional life. This sounds quite useful for students who are leaving university after their Bachelor's degree to work in industry. It alternative option would therefore be to offer a bachelor thesis for the students who want to continue their studies in a master programme.

The involvement of the practice partners is currently dependent on the person and should be carried out in a more structured way, also in order to use synergy effects. The establishment

of a committee is therefore recommended in order to strengthen the coordination and involvement of the practice partners in the long term and to bind companies from the region even more strongly to the university.

The success rate of students within three years is only about 20 % (and 40 % after four years). It is assumed that only a small proportion of students continue their studies after four years. It is therefore suggested to further investigate why such a large proportion of students take one year longer to complete their studies.

### **2.2.3. Bachelor in Applied Information Technology – Continuing Education Programme**

The study programme "Bachelor in Applied Information Technology - Continuing Programme Education (BINFO-CEP)", which is also bilingual, is contemporary and future-oriented and offers lifelong education in information technology for professionals working in the IT sector. The review panel found a well-designed and challenging programme in terms of the qualification objectives. The contents are well chosen and are conveyed to the students in appealing teaching formats. The teaching and learning formats are also very sensibly chosen. The modules are very well coordinated and have a sensible structure and module sequence. The contents of the degree programme are designed in such a way that students can continue their education in areas of applied computer science very well in evening courses. The university fully takes into account the special challenges between everyday professional life and studying.

There are already established mechanisms for aligning students' knowledge. In the discussions with the students, it became clear that they would like to have even more opportunities to align the level of knowledge. The expert group therefore sees a need for optimisation in this area. Further possibilities for aligning the level of knowledge of students should be developed.

### **2.2.4. Master in Information and Computer Sciences (MICS)**

The study programme "Master in Information and Computer Sciences" (MICS) prepares students very well for the work and professional fields of communication systems, information security, artificial intelligence and reliable software systems. The structure of the research-oriented Master's programme is stringent and logical in itself. The contents of the modules build on each other well, so that the level increases constantly from semester to semester, which is why the learning outcomes fully correspond to level 7 of the European Qualifications Framework. The credit points awarded map the requirements for the students in a comprehensible way, which means that the workload for the students is appropriate. According to the evaluation of the expert group, the curriculum is very well designed with regard to the qualification objectives. Current subject developments are very well taken up, optimally prepare students for possible doctoral studies and reflect the research results of the DCS. The review panel very much welcomes the fact that, in addition to the DCS teaching staff, students are

also intensively involved in the design and development of the research-oriented curriculum and that students are also represented in the programme steering committee.

### 2.3 Conclusion

The criterion is **fulfilled**.

## 3 ESG Standard 1.3: Student-centred learning, teaching, and assessment

**Institutions should ensure that the programmes are delivered in a way that encourages students to take an active role in creating the learning process, and that the assessment of students reflects this approach**

### 3.1 Implementation

#### 3.1.1 Aspects that apply to all courses of study

The most important effort to discuss and consolidate the variety of local commitments on developing a student-centred learning pedagogy and sense of purpose at an institutional level took place between 2016-17 in the context of a high-level working group tasked with drafting a “pedagogical charter” for the whole University. The “Charter” is published on the University’s website. The group, composed of teaching staff and Programme Directors from all three faculties, interpreted its mandate to pin down common pedagogical values with a certain traction in existing educational practice and the potential to serve as ingredients for establishing a unique educational profile for the whole University.

The Charter highlights the following pedagogical aspects, which our teaching staff tend to implement to the best of their abilities to encourage students to take an active role in creating their learning process: Learning at the University of Luxembourg is interactive; is based on research; fosters student autonomy; is enhanced by feedback and dialogue and multilingual and international.

Small professor – student ratio. We aim at limiting the number of students per class, i.e. small groups, to allow for a more student-centred approach to teaching with interactive lectures and hands-on experience. Students report that learning in small groups encourages them to participate more in class and allows them to better understand more complex problems as they can ask questions. Instructors also often have an open-door policy outside teaching hours, which students can benefit from by, e.g., asking for more guidance.

The university pursues Interactive lectures. Their teaching methods focus on “learning by doing”, offering interactive lectures organised with practical training, flipped classrooms, lab tutorials, project work, and supervised sessions. The project-based approach is seen as increasing

students' motivation, integration of knowledge as well as soft skills linked to the ability to collaborate and use theoretical knowledge in a project.

Moreover, the University offer hands-on experience to our students through formats such as internships, seminars, industrial related lectures, and experiments.

Transversal skills are also taught. Special attention is systematically given in all our programmes to provide our graduates not only with the skills necessary for their first job, but with skills useful throughout their entire professional career. Soft skills like entrepreneurship, psychological aspects of teamwork and practical team projects contribute to this purpose.

Research-enhanced learning is equally of fundamental importance. The university aims at attracting motivated students through special initiatives that provide opportunities for students to engage in research. These initiatives are organised and coordinated at programme-level.

The design of assessment instruments that reflect and adequately evaluate course objectives, learning outcomes and course content is the responsibility of the academic staff at the level of each course. Assessment takes place under common academic regulations and the supervision of the Board of Examiners of each study programme.

The Board of Examiners is an important instrument for quality control, as they deliberate and confirm all grades attributed to students within the respective study programme. This allows them to appraise students' assessments across individual teachers and courses, as well as over time, which permits the identification and clarification of outlying grades or discrepancies in grading patterns. Board meetings are also an important source of feedback for the further development of adequate assessment formats. The inclusion of assessment-related questions in surveys for student feedback on courses has been repeatedly discussed and is now on the agenda for one of the next versions of the surveys and could provide additional information for assessment design.

One area of concern are the relatively lower levels of student satisfaction with the quality of the feedback received on assessments and with the documentation of assessment tasks and grading procedures. The latter has been taken up by a clarification of the necessary elements required to inform students about assessment tasks in the reform of the University's assessment procedure. Improving the quality of feedback will require a more sustained effort, however. There are currently initial discussions about the possible creation of a central examinations office that could assume responsibility for assessment-related quality assurance. However, no decisions have yet been taken.

Programme rules and regulations, including assessment modalities for each course, are updated each year and published on each programme's webpage before the start of the semester, as well as on Moodle to make sure that students have the latest information on each course.

### **3.1.2 Bachelor in Applied Information Technology**

Due to its focus on applied practices in information technology, BINFO applies for many learning activities a combination of regular course meetings with individual or group-based exercises (in the first year typically individual projects, in later semesters more often group-based projects), especially for courses related with practical activities like programming or software engineering. These learning activities can be graded or ungraded, but an evaluation shall always be done by the lecturer to provide feedback for improvement to students. In addition, starting the second year, several courses require students to train their presentation and writing skills in English (as preparation, the programme offers two language courses on technical English during the first year).

The general structure of the BINFO programme distinguishes three different phases: the first year, the necessary preliminaries are covered, typically in standard computer science courses with guided exercises (introduction to programming, mathematics courses). The second year, the learning activity, aside from regular course meetings, shifts to more active student participation, which can be realised with either (group) presentations or technical reports. These activities serve as first preparation for the final internship project.

Whereas the defined course list for the first two years is mandatory for all students (except students which are in mobility), the fifth semester gives the freedom to students to choose two third of their programme based on their personal interest (from 10 optional advanced courses on certain topics, students have to choose 5). The list of optional courses is updated every year and provides some flexibility to offer new "hot topics" to the curriculum in a very dynamic way. For the final internship project in the sixth semester, students have to find and discuss an appropriate project together with a partner institution (this first contact often includes a job application and interview). The Programme Director validates the project specification for appropriateness, but a lot of freedom is given to students and partners.

Assessment methods vary and depend on the pedagogical approaches. Practice-oriented courses often assess the learning progress of the students with continuous assessment, i.e. graded exercises or homework including feedback from the lecturer. Other teaching approaches involve students in their learning process, i.e. project presentations and/or flipped classroom. Most course evaluations include a "traditional" final written exam.

Programme adaptations are also carried out regularly. BINFO regularly evaluates and adjusts the modes of delivery and pedagogical methods. The University organises course evaluations at the end of each semester. The collected information is included into internal discussions on programme optimization. Moreover, the BINFO Programme Director organizes after 4-5 weeks for each semester, a programme-specific “mid-semester student evaluation”, where students can express their feedback on running courses and detected issues. This student feedback is instantly discussed with the respective course instructor with the intention to find a quick remediation of the situation even for the running semester; students are informed about decided changes accordingly.

For instance, the results of the last mid-semester evaluation involved the following adaptations to the programme: Students complained about the English of a Post-doc replacing a teacher for a few courses. The professor agreed to “peer tutor” the Post-doc and provide some advice on how to improve the pedagogical quality. Students complained that not enough exercises were given for a specific mathematics’ course. The lecturer was informed about that feedback and changed his course to add more exercises and details on the blackboard. Students complained that handouts were not made available before a course. The lecturer was informed and changed this, such that students can now use the handouts during the class. Students complained that a course in semester 5 is not really “useful” and “mostly redundant” with a course in semester 4. Possible solutions for this issue were then discussed during the Programme Steering Committee.

The last Programme Steering Committee meetings of the BINFO and BINFO-CEP involved the following adaptations to the programme: Removal of module compensation for all courses in the 5th semester, planned for extension to other semesters in academic year 20-21 (now delayed due to COVID-19 lockdown). Re-Definition of “consecutive courses” “Programming 1” and “Programming 3”. Addition of new courses “Cloud computing” (academic year 19-20), similarly “Mobile apps” (academic year 20-21). Replacement of course “Analyse et conception 1” with “Introduction to graphics” in the 2nd semester. Replacement of the course “Banking IT” with “Introduction to Blockchains” for BINFO-CEP (proposed by students, discussed and validated by the Programme Steering Committee in 2019).

### **3.1.3. Bachelor in Applied Information Technology – Continuing Education Programme**

Since BINFO-CEP is the sister programme of BINFO, the same pedagogical ideas apply. The main difference between both programmes is an increased maturity of students in BINFO-CEP, such that active student participation in practical (individual and group) projects and theoretical homework is required right from the start of the study. Special attention is put on cooperative group reflections on the practices used in different professional institutions and the sharing and comparison of practical experiences made by students as employees in these

institutions. These reflections proved quite helpful in the past for creating a better connection between recommended best practices from academia and techniques used in the professional world – potentially even leading to improvements within the partner institutions.

Programme adaptations are also carried out regularly. BINFO-CEP doesn't perform mid-semester evaluations, as the cohort are very small. Students contact the Programme Director and/or the instructor directly to discuss any issues or concerns.

#### **3.1.4. Master in Information and Computer Sciences**

MICS has partly adopted a project-based learning pedagogical approach, strongly connected with research and development, in order to increase retention of content and student's attitude towards learning.

The first semester is structured with mandatory courses to ensure a levelling up of students' knowledge mainly with traditional lecture courses and practical sessions. Some classes have additional exercise sessions (i.e. Basic Algebraic Structure). The second semester is more project-oriented, including seminars due to further specialisation of the subject. The third semester offers further projects and seminars. Each professor is free to choose the teaching format, provided that the subject is published prior to the start of the semester. The last semester is dedicated to the master thesis.

Students like the seminar/project-based learning when they have a supervisor who tracks their progress and provides feedback. They like lectures that involve students, encourage discussions or propose a question to trigger the curiosity and encourage to find the answer by themselves. Students are introduced to research through their master thesis but also through other courses earlier on.

The course "Optimisation for computer science" in the second semester involves a project in teamwork under the supervision of a doctoral candidate. Students report the results in the form of a scientific paper in addition to the oral presentation.

Students are autonomous in choosing their path through the programme subject to a small number of constraints by the profiles and they are guided by the Programme Director through profile meetings.

Most courses offer combined methods of assessment with end-of-course assessment and continuous assessment ensuring regular feedback loops. Before the exams, it's a common practice to provide exam samples to students with solutions. After the exams, students have the right to consult their exam copy and to meet the instructor to receive more feedback, if needed.

The level of the evaluation matches the lectures content and assignments. The grading for assignments, final exam and project work in the total grade is clear. Among all courses, those

which offer practical sessions after each assignment really help students to track their progress during the semester. Students also have the opportunity to learn from other students mistakes and have a better performance at final evaluations. Some courses are assessed only with exams or assignments, with no practical sessions to discuss the course. Students report that the only feedback they receive is a grade with sometimes the correction, but they don't have the opportunity to discuss or improve their understanding.

Programme adaptations are also carried out regularly. The programme regularly evaluates and adjusts the modes of delivery and pedagogical methods with the main stakeholders during the Programme Steering Committee meetings, the Department of Computer Science meetings, the Board of Examiners and also with students in the classroom, as we benefit from small cohorts. There is no mid-semester evaluation performed at programme level in the MICS, but each professor is responsible to take concerns of students into account. Most of the students feel comfortable to discuss with the Programme Director and usually receive an answer immediately, explaining the limitations/possibilities to make changes.

## **3.2 Assessment**

### **3.2.1 Strengths and need for development for all study programmes**

The pedagogical goals of the Charter (2016-17) have been deeply and comprehensively embraced at all faculty levels and promote student-centred learning. Thus, students have an active role in shaping the learning processes. The very good supervision ratio through small student groups also promotes a student-centred teaching approach. The planning of the study programs allows for a reliable course of study for the students. Students particularly praise the communication with the lecturers. The students feel well advised. There is a high level of satisfaction among students with their study programs. The individual support, advice and assistance provided to students certainly contributes to this. Overall, sufficient resources are available for individual student support, advising and assistance. In the event of complaints, both teachers and students know who to contact.

Modern and progressive teaching and learning methods are very well suited to this, and the development of the students' personalities through interdisciplinary competences is also given a broad and important scope.

The university therefore ensures that the study programmes offered are conducted in such a way that students take an active role in shaping the learning process, and that this approach is also considered in the assessment of students as well as in examinations. The diversity of students and their needs is always focused on flexibly and pedagogical methods are used flexibly. Regular evaluations and adjustments of delivery modes and pedagogical methods are appropriately implemented, and students are encouraged to learn independently.



In addition, the University of Luxembourg has a transparent and good complaints management system and students know all the relevant contact persons.

The examination board meets regularly to discuss the design of the degree programmes and the student workload. In addition, the Examinations Office and the heads of the degree programmes provide advice on overarching content-related questions concerning the planning of the degree programme. Study plans and module descriptions are published on the homepage. The review panel was positively struck by the broad spectrum of examination forms used in the degree programmes to be reviewed here. According to the assessment of the review panel, the examination formats used in the degree programmes allow a good examination of the different competences of the students, and the reviewers were able to convince themselves that the examinations are module-related and competence-oriented. Sufficiently different examination formats are used that adequately cover the different competences. The examinations not only include the testing of specialised knowledge, but also the practical application of acquired knowledge and competences, alone or in a team. Information on the examination modalities (such as registration/deregistration, type of examination, etc.) is announced to the students in good time and on schedule.

In addition to the formal evaluations, the examination load and acceptance of the examination forms is again checked here via the good communication culture and the close supervisory relationship between teachers and students.

The students also confirmed a balanced ratio of examination forms, and the examination load is also assessed by them as feasible. The formal appeals procedure for students is also appropriately regulated. The expert group fully welcomes the establishment of a central examination office, which ensures the quality assurance of the examinations.

### **3.3 Conclusion**

The criterion is **fulfilled**.

## **4 ESG Standard 1.4: Student admission, progression, recognition, and certification**

**Institutions should consistently apply pre-defined and published regulations covering all phases of the student “life cycle”, e.g. student admission, progression, recognition and certification.**

### **4.1 Implementation**

#### **4.1.1 Aspects that apply to all courses of study**

Admission requirements and procedures are described in articles 32 to 34 of the Law. It regulates the access to studies at the University (article 32), the validation of prior experience (article 33), and the admission to study programmes (article 34).

To apply to any programme at any level at the University, a prospective student must comply to the general admission requirements, which are published on the University's website.

Eligibility criteria – before applying to a programme, prospective students first need to check whether they are eligible to enter the programme. Eligibility criteria concern requirements related to prior secondary education to enter a bachelor programme or prior bachelor degree to enter a master programme applicants willing to access studies through the validation of prior experience.

A third eligibility criterion on linguistic admission requirements has been added to the already existing two criteria imposed by law. The University has decided that, for the principal language of a study programme, all programmes must require a level B2 according to the Common European Framework of Reference for Languages.

Specific eligibility criteria for non-EU applicants are also described in the Study Regulations, Chapter 1, article 5 and published on the University's website.

Submitting the application online - Every application is first made online and then followed with a paper version, as well as all the necessary supporting documents, to the University's Student's Service Office/Service des Études et de la Vie Étudiante ('SEVE') before a defined deadline.

During the COVID-19 health crisis, a paperless applications system has been set up to ensure a continuation of the applications processing. This will possibly lead to more digital solutions to handle applications and improve our application system. Failure to submit the online application or to provide the required hard copies of the documents needed by the deadline disqualifies the potential student's application. The potential student is, of course, free to apply again for the next academic year.

The procedure for the validation of prior experience applies as part of the admission process for candidates to a bachelor or master programme of the University of Luxembourg who are citizens of the European Union, the European Economic Area or Switzerland; or concerning the progression of students at the level of bachelor and master programmes of the University. Both educational and professional experience are eligible for recognition. In special cases, the recognition of prior professional or educational experience is a statutory component of the admission procedure of a study programme. This concerns programmes with study plans that foresee a number of ECTS credits to be acquired through courses offered at the University that is lower than the number of ECTS credits certified with the diploma upon graduation. For

instance, the Bachelor in Applied Information Technology – Continuing Education Programme is requesting the validation of 100 ECTS for professional experience to enter the programme.

#### Admission to study programmes

The University Admissions Office/Service des Études et de la Vie Étudiante (SEVE) handles applications, enrolment, payments, and prepares diploma. It shares responsibility for managing the student lifecycle with faculties and study programme staff, insofar as the selection of candidates, progression of students, grade management and recognition of prior experience are a competence of faculty-level actors, chief among which are the Boards of Examiners of each programme and the Programme Directors.

SEVE checks the eligibility of the application and if eligible, transfers it to the relevant Programme Director for an academic evaluation.

The Law, article 34 (1) and the Study Regulations, article 3, define the admission procedure that involves an assessment of the knowledge and competences of applicants. The Programme Director defines selection criteria. An application not meeting the determined selection criteria will not be conserved for admission.

The University has decided to professionalise the admission process and to provide applicants with more comparable information on the selection process. This will also ensure more consistent justification in case their application is not selected for admission. There is now a set of predefined selection criteria, which can be found in the programme rules and regulations

#### Progression rules

Student progression is regulated by academic regulations. The Boards of Examiners is responsible for deciding on the progression of bachelor and master students from one study year to the next. Article 36 (2) fails permanently and is excluded from the study programme in which he or she is enrolled: a student who, at the end of the first year of studies, has not obtained at least 50 per cent of the ECTS credits allocated to all courses included in the first year's study plan of the programme in question. A student who has acquired at least 50 percent of the ECTS credits awarded to all the course that is part of the plan of study for a grade is permitted to be enrolled in the next study year is defined in Article 36 (3): [...] A student who has acquired between 50 and 70 per cent of the ECTS credits allocated to all the courses in a year's study plan must have its registrations for the following year's courses validated by the Programme Director. A student who has acquired less than 50 percent of the ECTS credits allocated to all the courses from any year after the first year is required to re-enroll in the same study year".

The Board of Examiners is also responsible for deciding whether a student should be transferred to the next year or, if applicable, whether a student should be excluded from the programme. For these purposes, the Board of Examiners verifies and evaluates the student's progression through the programme as well as his or her complete transcript of marks, also considering justified absences" (Article 43 (3)).

Guidelines for interpretation and implementation of progression rules address a number of frequently raised concerns and questions. The first part addresses the case of full-time, regular students. The second part concerns students who, for different legitimate reasons, did not participate in all study activities foreseen for regular students. The regulatory basis for such non-regular cases is article 19 of the Study regulations.

### Examination Board

The Study and Programme Administrator (SPA) enters the grades into ACME (the student management system) based on the final marks communicated by the instructors. Grade transcripts are automatically generated by the system and sent to the Examination Board at least 4 days before the Board meeting. These transcripts contain all required information to evaluate the student progression. The Programme Director also prepares a list of topics to be discussed, especially concerning the rules on exclusion of students from the programme (i.e. the 50% of credits threshold from the first to the second year) and the graduation of eligible students. All decisions taken during the Examination Board meeting are documented. Students then receive their complete grade transcripts in electronic form via their Guichet étudiant.

### Student progression

At University-level, retention of students from the first to the second study year was, on average over the past cohorts, 65 per cent in bachelor programmes and 78 per cent in master programmes. From the second to the third study year of bachelor programmes, this rate increases to 90 per cent. First-year students must currently acquire a minimum of 50 per cent of credits foreseen for the first study year (for full-time students: 30 credits) in order to be able to continue their studies. The share of first-year bachelor students who come short of this threshold was, in 2018/19, 24 per cent (master: 16 per cent). This share thus accounts for almost 70 per cent of first-year bachelor attrition (master: 75 per cent). One quarter of these students drops out of their programme without having acquired any credit. These numbers indicate that attrition includes a considerable share of students who cannot keep up with academic expectations or have never taken up their studies. This points to the need for better screening during admission.

The faculty has recognised the need to improve retention and has adapted its selection procedures accordingly. Our efforts have also included a better communication of programme objectives and expectations in the context of recruitment, and the intensification of learning support for students.

### Recognition and Certification

The University is awarding national diploma for bachelor, master, doctoral and medical studies. The issuance of the diplomas takes place during the graduation week ceremony: “The diploma shall include at least, in one of the administrative languages of the Grand Duchy of Luxembourg, the name of the study programme completed and, where appropriate, the track, and the name of the degree awarded. The diploma shall be signed by the rector and the dean. [...] Diplomas awarded for the completion of a study programme with partner institutions shall also bear the names of the partner institutions” (Article 59(2)).

Study Regulations provides information contained in the Diploma Supplement in Article 62: Each graduate of a programme shall receive a Diploma Supplement. The Diploma Supplement identifies the holder of the diploma and contains at least the following information: “(1) The information on the study plan, the learning outcomes and the language(s) of instruction of the programme; (2) the level of qualification and, where applicable, access to a regulated profession (3) the graduate's transcript, including, where applicable, a list of optional courses taken outside the programme; (4) the level of qualification and, where applicable, access to a regulated profession; and programme curriculum; (4) a table showing the distribution of marks in the program; (5) the statement referred to in section 36, paragraph 10, of the Law with which the degree is awarded; (6) standardised information on the national higher education system in Luxembourg” (Study regulations of 5th of May 2020).

From the academic year 20/21, and in consultation with the Luxembourg Ministry of Higher Education and Research, the Diploma Supplement template will be adapted to the Europass requirements. This will improve the international ‘transparency’ and fair academic and professional recognition of qualifications (diplomas, degrees, certificates, etc.), especially for our students/graduates who are mobile within and across higher education systems.

#### **4.1.2 Bachelor in Applied Information Technology**

BINFO envisions to provide an education in applied information technologies open to all high-school graduates in Luxembourg. Therefore, there are no specific requirements on technical background in computer science. Indeed, the approach is to offer access to studies in computer sciences to all candidates who are motivated to pursue university studies, which would otherwise not be possible. The University of Luxembourg is the sole university in the country and the only other computer science programme is the Bachelor in Computer Science (BICS),

which is very selective. Nonetheless, applicants are informed by the Programme Director about the potential difficulties/challenges they may face, but it remains their own decision whether to start studies in BINFO. This implies that the selection actually happens after the first study year.

Language prerequisites for entering the BINFO programme are a) at least level B2 in English language and b) at least level B1 in French language. The number of accepted students cannot exceed 75, with the consequence that the selection process is split into two parts: Very good candidates (based on the application documents) are directly accepted. All other candidates are ranked on a waiting list, based on their school grades in computer science and/or mathematics for the last 2 years, their motivation letter, and the provided CV. It should be noted that in past years, the number of eligible applicants never exceeded this threshold.

Progression of BINFO students from the first to the second year is on average 50 per cent, which is due to the fact that the programme doesn't perform a pre-selection of candidates. The selection thus happens after the first study year. In the academic year 2019/20, the rate has increased to 61 per cent with students who have already passed the 50 per cent threshold rule.

Retention of students from the second to the third year is increasing to 95 per cent. 20 per cent of students graduate within the normal study duration of 6 semesters, while 40 per cent on average graduate within 8 semesters.

#### **4.1.3. Bachelor in Applied Information Technology – Continuing Education Programme**

BINFO-CEP provides a continuous education in relevant applied information technologies for employees in the IT domain. A fundamental prerequisite to enter the programme is the validation of professional experience of at least 6 years (or 3 years with an existing Bac+2 degree) in the IT field according to the procedure described above. Language requirements are: At least level B2 in English language and at least level B1 in French language.

The selection process for BINFO-CEP students is split into two parts: The Programme Director performs a pre-selection of all candidates based on the application file. This leads to a list of "potentially suitable" candidates, who have a reasonable chance to validate 100 ECTS through the validation of professional experience. An individual interview is then organised with the selected candidate, the Programme Director and at least one representative of the CSL (Chambre de salariés) to assess the language competences and cover any other remaining questions. After the interview, the Interview Board decides whether the applicant will be accepted under the condition of a successful validation of prior professional experience. The application file of the selected candidates will then be transferred to the "Commission for the validation of prior professional experience" for final decision.

For clarification purposes, the first semester of BINFO-CEP is equivalent to the third semester of BINFO, which implies that retention of students from the first to the second year should consider this specificity. Similarly, retention of students from the second to the third year actually concerns students in the last year of study for BINFO-CEP.

Progression of BINFO-CEP students from the first to the second year is quite high with 93 per cent, which is reflected by a selective admission process involving individual interviews of pre-selected candidates, based on their application file. Retention of students from the second to the third year is 67 per cent. In other words, two thirds of students pass all courses and prepare for graduation within the defined study period.

#### **4.1.4. Master in Information and Computer Sciences**

MICS is completely taught in English with at least a B2 level. There is no entry examination since the first semester acts as an orientation semester where students have to demonstrate their competences. The applications are assessed by the Programme Director and the Deputy Director.

Applications are evaluated individually and in relation to other qualified candidates for selection, after the deadline for submission of applications, according to the following selection criteria: Decisive is the relevance of the applicant's educational background and quality/level of academic or university performance (including mathematics and computer science, degree field/subjects), as assessed on the basis of transcripts [in the last three (3) years of high school and at the secondary school leaving examination] and the applicant's ranking in the top half of the bachelor's programme grade distribution table.

Motivations put forward by the candidate, attesting to his or her intellectual curiosity, initiative, willingness to learn, and level of understanding, reflection and foreseeable commitment to the University's program of studies and academic community, as assessed on the basis of the admission essay or letter of motivation.

Adequacy between the candidate's expectations and the programme's educational offer, assessed on the basis of the admission essay or cover letter.

Professional experience in the field of information technology, where appropriate, assessed on the basis of the CV.

Previous extracurricular activities of interest to the programme, showing initiative, responsibility, and intellectual and professional curiosity, assessed on the basis of the CV as well as References.

MICS accepts applications from excellent BINFO students, Bachelor in Computer Science (BICS) graduates and bachelor graduates from comparable university programmes abroad.

As of next academic year, BICS graduates will be automatically accepted in the MICS. Candidates are selected considering the level achieved on the above criteria, but also in relation to other candidates selected. Retention of MICS students from the first to the second study year is, on average over the past cohorts, 86 per cent, which is reflected by selective selection criteria to access the programme. 40 per cent of students graduate within the normal study duration of 4 semesters, while 50 per cent on average, graduate within 6 semesters.

## **4.2 Assessment**

### **4.2.1 Strengths and need for development for all study programmes**

The university has regulations for all phases of the "student life cycle", e.g. admission to studies, course of study, recognition and degree, which have been defined and published in advance. At the beginning of their studies, students are sufficiently informed about the course of studies and all the possibilities to participate in university life, e.g., Welcome Guide. Upon completion of their studies, graduates therefore receive meaningful and transparent documents detailing the qualifications and learning outcomes they have acquired. Also, the University of Luxembourg has sufficient processes in place to collect information on student progress. Further, appropriate recognition procedures are in place that are in compliance with the Lisbon Convention. In preparation for studying abroad, students receive the Mobility Guide in advance. Here, students should acquire intercultural competencies and deal with psychology studies in depth. By means of a Learning Agreement, the crediting of the study contents is already arranged before the study abroad.

The study requirements are clearly defined by the University of Luxembourg and can also be accessed and viewed transparently by applicants on the university's website. The website in question is easy to find and very clearly laid out. The university also has suitable processes in place to record relevant information on study progress and to take action where necessary.

Admission to the three courses is subject to individual, course-specific regulations. The expert group has the impression that these processes, even if they are clearly defined, could be communicated more transparently. In particular, it is unclear whether the admission decision is made by an individual (program director) or by a committee. In order to make the process more comprehensible and to decouple it from individuals, a committee should be set up for these topics if possible. Student documents will not be kept if their application for admission has not been granted. A comprehensible strategy from a data protection point of view, but the lack of institutional memory opens up the problem of inconsistent decisions in follow-up applications. Study success is mainly monitored with regard to the transition from one year to the next (and the corresponding drop-out rate). It can be advantageous to provide this information in a finer



granularity (at the course level) in order to take corrective action if necessary. The documents that students receive after graduation appear adequate. With the planned new diploma supplements, even more detailed documents will be made available.

The expert group rates the admission procedure as essentially described as transparent and well thought out, but also sees some potential for improvement: For example, the students should be informed more transparently about the criteria for the evaluation of theses (Bachelor, Master).

#### **4.2.2 Bachelor in Applied Information Technology**

The provided data indicates that the BINFO programme has a dropout ratio after the first year up to 50%. It was argued that the reason is that no pre-selection of candidates is done because law prohibits this. Maybe this can be changed by more actively informing children in high school on what the requisites to study computer science are. Also, it is recommended to offer pre-enrolment self-assessment to judge about the own capabilities to study successfully. Also a pre-selection as in the BINFO-CEP programme seems to be useful would be recommended.

The evaluation board acknowledges the challenges that arise when selecting the most promising candidates for the BINFO programme given the political expectation that the programme should be open to all interested Luxembourgish students. So far, this challenge has been addressed by a selection after the first year of studies. In order to alleviate this situation for both the teaching staff and the students that drop out after the first year, the evaluation board suggests offering either preparatory courses and/or (online) entry level tests that help students to better assess their proficiency. Admission to the BINFO programme requires the following language prerequisites: at least B2 in English and at least B1 in French. The documents provided do not further detail how these requirements are implemented, in particular whether Luxembourgish high school graduates have to provide the corresponding English language certificates or whether this is only required for external applicants. Given the expectation that all Luxembourgish high school graduates should be able to enter the BINFO programme, this information should be provided more transparently.

#### **4.2.3. Bachelor in Applied Information Technology – Continuing Education Programme**

The admission process for the BINFO-CEP programme is well established and closely aligned with the Chambre de salaries. In order to be admitted, practical knowledge in ICT equivalent to 100 ECTS needs to be proven. However, this knowledge is not further analysed and does not have any consequence on the remaining study programme, which might lead to redundancies. The expert proposes to implement a more individualized admissions process in which each student's prior experience can be better considered when selecting the courses to be taken, especially in the first year of the programme.

#### 4.2.4. Master in Information and Computer Sciences

The statistics show that MICS has a very high drop-out rate for a master's degree or a very low proportion of students who complete the degree within three years: 40% finish their degree in two years, 10% more in the third year. The expert group therefore suggests evaluating what will happen to the remaining 50% of students in order to adjust the admission criteria if necessary.

The MICS program has its own research focus and is the continuation of the BICS program (and not the BINFO or BINFO-CEP program). A large number of international students are enrolled in this program. A decision about the admission of applicants is made sur-dossier. However, the selection criteria (and the reference qualification for admission) are not communicated transparently. This question was already addressed during the previous accreditation and should therefore be taken up again as a recommendation: The entry requirements must be made more transparent, especially with regard to the competencies of the students. This is particularly important for applicants who already have a degree but from a course outside of computer science.

#### 4.3 Conclusion

The criterion is **fulfilled**.

### 5 ESG Standard 1.5: Teaching staff

**Institutions should assure themselves of the competence of their teachers. They should apply fair and transparent processes for the recruitment and development of the staff**

#### 5.1 Implementation

##### 5.1.1. Aspects that apply to all courses of study

The University has a well-defined procedure for the recruitment of academic staff aiming to apply fair and transparent processes: Academic recruitment equal to this task must be built upon a clearly documented, merit-based selection process ensuring consistent and fair appraisal of all applications and weighting of criteria consistent with the different missions of our institution and the exigencies of the individual post. It must be accompanied by evaluators with the highest qualifications and expertise and unquestionable motives to rigorously assess candidates and advise the institution in its ultimate strategic choice.

The recruitment of professorial staff is conducted by a selection committee composed of minimum three internal and three external experts, and respects gender balance. Shortlists require approval by the Board of Governors, that also appoints. The Rector nominates the members

of the selection committee and leads negotiations with shortlisted candidates. Profiles are usually defined jointly by Heads of Departments and Deans and/or Directors of Interdisciplinary Centres. The creation of new or the re-allocation of existing chairs has predominantly followed research priorities. In selecting, the educational profile of candidates is considered, and the capacity of candidates to contribute to or build up a given curricular offer can play a role where the respective offer is considered of strategic importance. They do not, however, take precedence over re-search record and capacity. These limitations can be a concern, especially in the context of the creation of new programmes that follow external demands, or when professors with an essential role for a given study programme have to be replaced.

The Department of Computer Science (DCS) requires teaching statements from all applicants, which are considered in the selection process. Furthermore, the shortlisted candidates are requested to give a short lecture at undergraduate level, whose assessment by the Academic Recruitment Committee is a key evaluation criterion in the final ranking. All professors newly recruited at DCS today have a solid teaching record and were able to demonstrate that they value the importance of teaching.

Teaching is also a primary evaluation criterion in the recruitment of temporary researchers, as they also play a crucial role in preparing and facilitating teaching. Professors are responsible for assessing the pedagogical qualities of the temporary researchers that they hire in their research groups. Whenever the department issues a call for "teaching Post-Docs" (i.e. Post-Docs with an additional teaching duty), their experience in and motivation for teaching will be the most important selection criterion. They are not asked to give a lecture though.

Programme Directors are responsible for ensuring the teaching quality in their programmes, i.e. by acting based on the results of the course evaluations. Courses identified as "warning" courses are required to be improved by the instructor in charge. It is the role of a Programme Director to help Instructors diagnose the causes of the problems, plan potential solutions, and monitor the improvements made. The experience over the last five years with this process, conceived and promoted at the faculty-level, has been first that it is well accepted by the instructional staff and, second, that it actually helps to improve the course quality.

Although there is no formal process in place, junior teaching staff (i.e. doctoral and Post-Docs) are provided with mentoring at several levels. First, this is done by the professor responsible for the course, then Programme Directors are also available to provide guidance to junior instructors. This is done upon their requests or based on the analysis of the course evaluations by students.

Furthermore, junior instructors, like any members of the instructional staff, are encouraged to participate in the continuing professional development activities. It should be noted that trainings taken by doctoral candidates are accounted in the ECTS credits they must obtain to be allowed to defend their doctorate, as part of the Doctoral Education programme.

The University's policy for internal promotion includes criteria for the assessment of the teaching record of candidates. In particular for candidates with a similar track record in research, teaching experience and prior management of study programmes can become important factors for promotion.

Teaching is central in the application file that is submitted before the Internal Promotion Review Committees: applicants need to provide the list of their teaching activities (i.e. courses taught with course descriptions, bachelor/master/doctoral students supervised, continuing professional development activities, etc), a "teaching portfolio" with course syllabi, evidence of innovative teaching and learning activities, assessment practices, teaching peer review reports, experience evaluating study programmes at the University of Luxembourg or elsewhere, list of publications in relation to teaching and learning in higher education, course evaluations or other evidence of feedback from students.

The Department of Computer Science (DCS) includes a staff of more than 184 full-time equivalent members, involved in both teaching and research activities. DCS comprises 25 professors and assistant professors. The recruitment strategy of DCS aims at hiring academics with a strong fundamental research background and excellent teaching skills, thus building an agile community with diverse and complementary competencies that can quickly pick up new academic, societal and educational challenges.

To overcome issues on age average and gender balance among professors, DCS is now hiring preferably at assistant/assistant professor level. Reaching a gender balance is challenging, as female candidates are by far less numerous among all the applications received.

To support the University's digital strategy, DCS is in the process of hiring two new professors: An Assistant Professor with specialisation in Human-Computer Interaction and Interfaces as well as an Assistant Professor with specialisation in applied and/or foundational aspects of Machine Learning.

These two positions are crucial for teaching courses in various programmes, including the MICS and the Bachelor in Computer Science (BICS). Machine learning and Human-Computer Interaction and Interfaces are also interdisciplinary topics that are relevant for other departments as well as the doctoral schools.

The predominant discussion with respect to the management of human resources in education concerns teaching needs and allocations. The assessment of the former is a responsibility of

the faculties and – since 2020 – departments. Teaching quota for professorial staff are defined by Deans, respecting individual contractual agreements (lower limits are often defined in professorial profiles). Heads of Department are responsible for teaching allocations in line with defined quotas. The volume of teaching duties is currently defined in terms of teaching units attributed to teaching activities of a defined duration (45 minutes). The volume expected from an individual is defined as part of contractual negotiations upon entry into the University and is currently confidential – only the Rector and Deans have this information. According to institutional and survey data, the effective volume taught fluctuates for most professors between 120 and 180 teaching units. Faculties define for which activities teaching units can be attributed.

Deans and the Rectorate agree that the current system for teaching allocations needs improvement. To prepare a reform, a survey among all internal teaching staff on teaching activities was conducted yet in 2019. Following this survey, the Vice-Rector for Academic Affairs has recently launched a project for the creation of a university-wide policy for teaching allocations and measurement. Preparations will take time, however, as they touch upon questions of the definition of teaching duties as part of recruitment, the use of external teaching staff, and the University's position vis-à-vis different types of teaching activities.

Academic services for staff, curriculum development and pedagogical facilitation, and the support of technology-enhanced learning are, to date, and with few exceptions, not institutionalised. Quality officers and support staff for Moodle provide some of these services in addition to their regular functions. Investments would be needed, however, to move the service offer and quality closer to expressed ambitions and commitments. To support its teaching staff, the faculty has elaborated a strategy comprising several proposals to meet the need for a clear teaching support structure, which is further detailed hereafter.

The Dean's Office has elaborated a strategy comprising several proposals to meet the need for a clear teaching support structure for our Study Programme Directors with the recruitment of the following profiles (by the writing of this report, only the recruitment of a Project Manager in Curriculum Design has been approved due to budget constraints): The Head of Faculty Administration (HFA) acts as the key interface between the Faculty and a wide range of academic and administrative staff across the University, participates in intra-university working groups on key organisational and administrative processes, and proactively seeks to optimise conditions for teaching and research. The HFA's scope of action has grown in the course of recent years, due to the creation of new programmes and the growth of the faculty. The direct supervision load of the HFA is now too high to ensure an effective leading of their Study Programme Administrators (SPAs).

The SPA team counts ten members. Difficulties with the University's student management tool ACME, diversity in students' teaching plans, adjunct staff handling including the enforcement

of legal obligations and overall workload may also benefit from more standardised processes and the implementation of “how-to” procedures.

The University has become aware that the curricula need to be more closely monitored and informed by a consistent teaching strategy. The “Project Manager in Curriculum Design” (PMCD) would assess processes to be implemented for a better functioning of our programmes and provide support to Programme Directors to design curricula and adapt it to the needs of the Luxembourg job market. By collecting information about similar programmes in the Greater Region or in Europe, the University is able to refine the teaching strategy and develop a more competitive profile in teaching. This helps to better promote the teaching programmes and increase student applications, allowing the university in turn to select the best students for our programmes. Together with a new position of team coordinator for our SPAs, the PMCD will aim to streamline the procedures in order to optimise the use of their resources.

The Quality and Process Officer (QPO) would then be able to focus more on quality monitoring.

The SPA team coordinator, in strong collaboration with the PMCD and the QPO, would participate in the implementation of the teaching strategy. As some new teaching programmes are scheduled to be implemented in the coming months/year, the SPA Team Coordinator would ensure that the overall workload remains manageable.

The new position of “e-learning specialist” supports the teaching staff in implementing more digital solutions in teaching, such as Yactul (developed at uni.lu), the creation of MOOCs, etc. It also helps students to learn at their own pace and rhythm as well as to monitor their progression with the support of, i.e. online quizzes. The e-learning specialist helps to implement the University’s digital strategy, search for digital solutions on the market or within our own Department of Computer Science, assess the implementation possibilities, and then helps the teaching staff in implementing the solutions/new tools in their courses.

The faculty sponsors continuing professional development activities The Faculty of Science Technology and Communication to enable teachers to enhance their teaching and generally improve the learning environment. We promote these aims through: Exchanges on teaching practices, through facilitator-led workshops presented by external experts and teaching show-cases to allow the sharing of existing good practices among our teachers; recognition for teaching excellence and promotion of innovation in the form of innovation grants, professional recognition certification and teaching award. These continuous professional development activities are offered on a voluntary basis to both junior and more senior teachers. They are financed by the faculty.

Facilitator-led workshops are presented by renowned specialists in higher education pedagogy on topics such as Ph.D. supervision, interactive pedagogies, assessment and feedback, curriculum design as well as engaging students in research. This initiative started in 2013 and the faculty has, since then, organised 48 workshops. Overall, 169 distinct participants have attended these workshops, 44 of which have attended more than one. 91 per cent of the participants have reported that these workshops matched their needs.

However, the participation rate of our academic staff has remained low. Informal discussions with the teaching staff indicate that several factors contribute to this low participation rate: the distribution of our staff over three campuses and a heavy workload of colleagues that comes with a university still in an early development phase. To foster internal collaboration and exchange regarding teaching practices, the faculty has offered teaching showcases involving teachers from the Faculty of Science, Technology and Medicine (FSTM) and the Faculty of Humanities, Education and Social Sciences (The Faculty of Science Technology and Communication), whose teachers have valuable experience in didactics and pedagogy. Teaching showcases provide a forum in which faculty members share ideas for and experiences with innovative teaching and learning support activities that they are carrying out in their classrooms. Speakers briefly share their experience, including the setting and pedagogical reasoning for the activity. There is great potential in creating such synergies in-house, allowing the participants to directly contact the facilitator for further questions or the implementation of similar activities. Teaching showcases are complementary to workshops presented by external experts, which are predefined on a sequence of interrelated topics (curriculum design, assessment, Ph.D. supervision). Teaching showcases do not necessarily follow a specific scheme. They depend on the field of expertise of the teacher and his/her willingness to contribute.

Since 2017, the faculty has offered six workshops presented by FSTM members and two workshops presented by the The Faculty of Science Technology and Communication, which were more focused on didactics and behaviour management. Participants reported that those workshops matched their needs at 89 per cent. They most appreciate when the facilitator provides hand-on tools and examples for a rapid and easy implementation in the course. The continuation of facilitator-led workshops as well as teaching showcases would require a dedicated position and budget to implement a full training catalogue, and even more to implement and develop the means and tools presented during the workshops. For the most part, participants appreciate these workshops, but they lack the concrete steps and support to implement best practices in teaching and learning.

To address the problem of rather low attendance at workshops as well as the lack of implementation of shared teaching practices and investment in teaching, the University plans to

increase the value given to teaching and increase motivation and interaction among the teaching staff through promoting “best practices in teaching” on the webpages, using examples of successful implementation and showcases or methods that can be used in courses. Furthermore, the experience with the COVID-19 lockdown has shown that the use of webinars has worked quite well and could possibly be extended to share practices in teaching and learning.

In 2015, the faculty offered teachers the possibility to receive professional recognition from the UK Higher Education Academy Fellowship for their experience in teaching and learning. FSTM sees recognition under an established framework as formal acknowledgement of the professionalism and knowledge an individual brings to the practice of teaching and learning support in higher education. Participants need to prove accountability of professional practice in teaching and learning through the preparation of an essay. To facilitate this process, FSTM hosted a special workshop session led by an expert from the Higher Education Academy. This process requires a high level of involvement and time from the participants, which is often underestimated, leading some participants to drop out of the process.

Up to now, 11 FSTM members have been recognised for their commitment and professionalism in teaching and learning support in higher education under the United Kingdom Professional Standards Framework (UKPSF) and have thus joined the UK Higher Education Academy Fellowship. Participants reported that this exercise enabled them to reflect on their teaching practices and to assess how they have improved and where they can develop further. It stimulated the implementation of new teaching ideas in their courses. However, they reported that they underestimated the preparation time to write the essay and to cover the related literature.

The University offers teaching support to doctoral candidates in the form of courses on the fundamentals of teaching within its transferable skills training programme. The doctoral school of the FSTM additionally offers advanced courses for professional recognition in teaching. Furthermore, the majority of the doctoral programmes have laid down in their statutes that doctoral candidates can validate ECTS credit points for their teaching activities, which can be recognised as applied training in teaching. Prerequisite for validating ECTS is the prior completion of a teaching course and a reflective report subsequent to the teaching activity. In addition to training junior staff, this measure should also increase the quality of teaching by doctoral candidates. These courses are an integral part of the training provided to Ph.D. students, which is important for those willing to pursue an academic path.

Continuous professional development activities and feedback from participants are promoted in the faculty’s internal newsletter in order to show recognition and appreciation for staff who develop teaching and learning beyond their regular mission. The faculty will further promote these activities among our teaching staff and to external stakeholders in order to recognise the



value of our teaching staff and to attract prospective students. In order to create a quickly accessible database which collects teaching methods used at the University's in one location, the faculty is planning to establish a compendium of teaching methods (with support material such as guidelines and tutorials) on a website dedicated to teaching and highlighting staff who are dedicated to excellence in teaching.

Continuous professional development activities are currently coordinated by the Faculty Quality and Process Officer. However, the scope of activities to develop would require an additional person to coordinate the organisation, implementation, follow-up and promotion of these activities. Teaching support activities should also be reviewed and expanded. In addition to the proposed activities, an introductory workshop for new academic staff including Ph.D. supervision, legal and financial aspects, as well as teaching duties would be beneficial. Peer evaluation of teaching could also be encouraged and developed through appropriate training.

To promote innovation in teaching and learning, the faculty is offering a Teaching and Learning Innovation Grant, providing funding to faculty members who engage in innovative activities that enhance the quality of student learning.

The grant provides up to €3,000 to support faculty members who have proposed innovative courses or are initiating small innovative projects outside the main curriculum to improve student learning. Such projects are discussed in the Dean's Office and selected according to a set of criteria: project holders have to explain how they intend to enhance the student learning experience; initiatives should also be continued beyond the project's funded duration and include bachelor or master students in the design and/or implementation of the project.

Since 2016, the faculty has promoted ten projects on topics such as interactive learning, problem-based learning, a game-based student response platform, and an online mathematics course for prospective and incoming students, to name but a few examples.

To ensure a follow-up for these initiatives, the grant winners are invited to present the outcome of their project during a teaching showcase. Some grant winners have invited students involved in the project to share their experience, which the audience appreciated.

### **5.1.2 Bachelor in Applied Information Technology**

A balance always needs to be found between the teaching performed by external lecturers and the teaching performed in-house. BINFO benefits from a real support from professional partners in Luxembourg teaching in the programme and offering internships to students. The risk for the BINFO is the growing demand from outside and inside the University to offer more programmes or globally shared courses in information technology (at bachelor or master level). This increase in teaching demand might lead to a situation where the number of professors or post-Docs willing to support the BINFO will decrease, with the consequence that academic

aspects of the BINFO might be gradually re-placed by a purely professional orientation. The unique mix of academic courses taught by researchers in DCS and applied education provided by external professionals in the BINFO would disappear.

### **5.1.3. Bachelor in Applied Information Technology – Continuing Education Programme**

Teaching activities in the BINFO-CEP are done during evenings, which may lead to problems finding interested lecturers, especially in combination with the many teaching activities already given in regular academic programmes.

### **5.1.4. Master in Information and Computer Sciences**

MICS is mainly taught internally by DCS professors. This is a strategy of the programme to keep the teaching in-house, as research directions within DCS feed in the programme's profiles. There is a very small proportion of external teaching staff in MICS, who mainly contributes to prepare students for their master thesis with courses on intellectual property and advanced project management.

## **5.2 Assessment**

### **5.2.1 Strengths and need for development for all study programmes**

The appointment, selection and recruitment processes as well as the personnel development concepts are appropriately and systemically defined and described transparently. The course directors are responsible for ensuring the quality of teaching in their courses and act on the basis of the results of the course evaluations.

Basic components of the quality management system to ensure the competencies of the lecturers and thus the quality of teaching are, in addition to the transparent procedures for new appointments and further education, the position of the head of the faculty administration (HFA) as the central interface between the faculty and the broad academic and administrative departments University staff as well as the course administrators (SPAS), project managers in curriculum design (PMCD) and the quality and process officer (QPO) to develop an even more competitive profile of the university.

The promotion of the digital strategy and the associated hiring of two new professors in this field are also rated positively.

Measured against the defined admission capacities of the courses, the staffing is sufficient. During the online visit inspection it became clear that adequate teaching capacities are available for the implementation of the courses and that the workload of the teaching staff is within the usual framework. An overload of the lecturers could not be determined.

The supervisory relationship between lecturers and students is very favorable. In general, the students are well looked after, and this is also ensured during their stays in non-university research institutes. There is a central contact person for this.

In the discussion with those responsible for the program, the reviewers were able to determine that there is obviously good contact between teachers and students, which the students confirmed again. They appreciate very good personal support from the teachers.

The connection between theory and practice is guaranteed by a sufficient number of full-time professors and external lecturers. The professional teaching is secured. Newly appointed professors receive a comprehensive range of didactic training and, in addition to subject-specific skills, pedagogical skills are expected. It is positive that this advice can also be used by lecturers. When choosing them, attention is paid to having a correspondingly good professional qualification. The students rate the teaching skills of the teachers very well. The expert group considers the personnel development measures to be appropriate, as they include relevant and meaningful further training offers for improving teaching. Also has the

Further qualification of teachers through traditional active participation in global research and didactic training has proven its worth.

The university is committed to indiscriminate equal treatment according to gender, ethnicity, religion or belief, age, sexual orientation or disability and to the creation of non-discriminatory working and study conditions. She sees these concerns as a common task for all university members. Equality and the advancement of women are adequately taken into account in personnel policy, research and teaching as well as in the target agreements. The university is trying to achieve a better gender ratio, but this has so far proven to be expandable. Women are clearly underrepresented in the computer science department (0% of all professors are women). The expert group admits that the underrepresentation of women is unfortunately a widespread problem in computer science. However, there is yet development potential of a clear commitment and a clearly visible path to a better gender distribution in computer science. The panel of experts suggests defining and implementing sustainable strategies. This could be an opportunity for the DCE to position itself as a modern, family-friendly department. An informal mentoring program has already been set up. The evaluation committee appreciates these initiatives and suggests expanding and institutionalizing the mentoring program so that every young scientist can be provided with an experienced mentor; The same applies to new appointments at assistant professorship level, who should also be assigned an experienced mentor. The expert group also appreciates the initiative of the university management to make the teaching assignment more transparent. In addition, the planned positions for teaching staff and curriculum development are intended to improve the quality of teaching significantly and sustainably. The DCE and the university management are advised to implement these plans

as soon as possible. The university is also encouraged to set up its own cross-faculty program for university didactics to complement existing programs and initiatives.

The expert group also sees a need for optimization in ensuring that students are taught IT skills. The human resources should be taken into account in this regard and increased if necessary.

### **5.2.2 Bachelor in Applied Information Technology and Bachelor in Applied Information Technology – Continuing Education Programme**

Both courses, the "Bachelor Applied Information Technology" and the "Bachelor Applied Information Technology - Further Education Program" are largely supported by external lecturers. The expert committee suggests defining and implementing criteria for the quality assessment of these external teachers and including this group in the university didactic program to be developed.

### **5.2.3 Master in Information and Computer Sciences**

In addition, professional partners take on teaching in MICS. This may be a good way of aligning the training with the needs of the industry, but it should be avoided that people without sufficient teaching competence take on such a role or that the quality of this "external" teaching is regularly evaluated and monitored.

## **5.3 Conclusion**

The criterion is **fulfilled**.

## **6 ESG Standard 1.6: Learning resources and student support**

**Institutions should have appropriate funding for learning and teaching activities and ensure that adequate and readily accessible learning resources and student support are provided.**

### **6.1 Implementation**

#### **6.2.1 Aspects that apply to all courses of study**

As the University is a public institution, educational activities, study programmes and academic services are funded by the University's budget, three-quarters of which are direct public contributions. State funding has been generous and reliable, and the University has been successful in generating additional competitive and collaborative public and private funds.

Budgets covering operational (non-HR) costs of study programmes are allocated at faculty-level. Registration fees for most bachelor and master programmes are low in comparison and comprise only a small share of the overall university budget. Allocation of programme funds is

not output-based, and its development tends to be characterised by a relatively strong path-dependency (with previous budgets determining new ones).

Budgetary allocations to the Luxembourg Learning Centre have attracted more attention, and there is some concern that its current funds will not suffice to meet expectations regarding electronic resources, pedagogical support for technology-enhanced learning, but also more classical library/information resources and services.

The Student Department (SEVE) is similarly struggling with a growing demand for new services and the professionalisation of existing ones, as a result of efforts to modernise the University's student administration and to bring our portfolio of dedicated student services up to a par with comparable universities. The University is currently investing in new posts for psychological support and inclusion-related services, funded by means made available through the current multiannual contract.

In 2015, the University moved a major part of its activities from Luxembourg City to its new campus at Belval (Esch-sur-Alzette). While a few programmes with the faculty have not yet moved to Belval campus (i.e. engineering programmes are on Kirchberg campus, a part of life sciences programmes and BINFO-CEP), almost all teaching takes place at Belval. BINFO and MICS are taught at Belval campus, while BINFO-CEP is taught at Kirchberg campus, which is closer to the City Centre.

Today, there is widespread agreement that Belval provides a well-equipped, modern infrastructure for teaching and learning. The opening of the Luxembourg Learning Centre (LLC) in 2018 has contributed significantly to this perception. Our programmes in Computer Sciences, for instance, use the LLC for group-based learning and electronic retrieval of resources. The LLC has become a focal point for student learning on campus Belval, and there are some indications – above all in the high occupation rates of its smaller collaborative learning spaces that student can book online or on the spot – that it is also having an impact on the way students learn. Its open access policy also reinforces the University's commitment to its third mission and service to the local community. To use the LLC's potential further now requires, in its second phase of development, educational concepts that can guide students and staff to use its setting and resources more effectively for digitally enhanced, on-site, collaborative learning and teaching, and the corresponding investment in resources and measures to anchor these concepts in curricula and courses.

Beyond the LLC and the general quality of the infrastructure it provides, there is a widespread sense among members of the community that Belval has not yet developed the sense of a living community that some hoped to find on the new campus. Students in particular, while being generally satisfied with the material infrastructure report missing a sense of ownership

and belonging. To change this, the work for enhancing student life on campus described in the next section will continue to remain a priority.

Students have access to relevant literature through the University's Library, which offers many tools and services to facilitate access to its entire collection. The library is located at the Luxembourg Learning Centre (LLC) in campus Belval. The University inaugurated its new LLC building in September 2018; it offers more than 1,000 seats; 558 individual working spaces, of which 152 have a PC; 408 seats in group work areas; and 5 conference rooms providing an additional 85 workplaces. Thus, computers, book scanners, and coin-operated photocopy machines are available at the LLC.

In addition, a Convention between the University and the Bibliothèque Nationale du Luxembourg ('BNL') ensures that students have access to a full collection of relevant material and literature. It opened its doors in September 2019 and hosts a comprehensive collection of books, including those pertaining to the University. This allows students to have access not only to the full collection of books and supports available at national level, but also to the specific course literature.

One of the missions of the LLC is to ensure its users are able to work autonomously not only while searching for information but also in the use of the information research tools put at their disposal. Specific training sessions are regularly organized with student cohorts to ensure this. The library also provides the Book a Librarian service, a personalized appointment with a librarian to obtain assistance in document research. From October 2018, the library offers online courses (MOOC) for training users on information competences. The Ask a librarian service enables communication with the LLC librarians to get answers to questions about the library services and collections.

Besides the collections available at the LLC premises in Belval (more than 214,000 books and 642 journals), students and staff have access to 390 bibliographical or content databases, 77,800 electronic journals and 625,419 e-books available online and 24/7 through the a-z.lu catalogue. This tool also allows the users to follow-up on loans, renew them, and reserve documents.

Lastly, it should be noted that the BNL, in collaboration with the University of Liège, actively participates in the Open Access initiative, a worldwide movement aiming to make scholarly publications freely and openly available to anyone via the Internet through ORBilu (Open Repository and Bibliography).

The University has a dedicated Career Centre intended to benefit both our students and their potential employers. It offers support throughout the year, which gives our students the oppor-

tunity to a) seek advice on how to conduct a job search; b) to participate in workshops, sometimes with external professionals, which aim to improve CVs, cover letters, job search techniques, and/or interpersonal and social skills and c) to access to hard copies of relevant documents (e.g., books and periodicals), as well as statistics on the economic and financial marketplace, other information like internship agreements or student jobs, and latest news on employment topics; seek jobs or internships via a common platform.

The Career Centre also organizes a number of interactive activities and events that are intended to help students gain the interpersonal skills they need to get a job, be it a summer job, an internship, a part-time job, or full-time employment after graduation) in fun, interactive, and motivating ways. In addition, the University organizes its annual 'Unicareers.lu' day, a recruitment fair that gives all of its students a chance to meet, all in one-day, Luxembourg's major employers (more than 100 recruiters, including a number of Luxembourg Economic and Financial Marketplace employers) and assist in various conferences.

The invigoration of student life – on and off campus – is an ongoing effort that includes the opening of the Maison des Arts et des Étudiants and the Student Lounge at Belval in 2019; the extension and better communication of the University's extracurricular offer through central services such as Campus Art, Campus Sport, Campus Well-Being, and espace cultures; the support of student associations (16 are currently recognised, each receives 600 euros per year in funding); and the stimulation of new initiatives.

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This report is a summary of responses that were gathered across a period of six months through a diverse profile of students studying at the University. While drawing on comprehensive input, it cannot, however, claim to represent the opinion of all students and student groups at the University. Several interviews, surveys and in-person meetings were conducted to compile this report.

The report focusses on the aspects of Accessibility, Internationality, Campus Life and Student Integration. These topics emerged as priorities for many students and have an impact on all students at the University.

Canteen and Student Lounge - Meals, coffee, refreshments and cakes at affordable prices are served at student cafeterias and restaurants for both students and staff at the University of Luxembourg. Services and offerings may vary due to the different sizes of the restaurants at the two campuses Belval and Kirchberg. University restaurants are an important place for student socialization and interaction during the day. Students use them to connect and socialise with their colleagues, and in some cases, they help them to better get to know their professor who are often willing to talk and share their professional knowledge in a more relaxed atmosphere.

Luxembourg is known for its very high standard of living, which includes housing prices. The University offers affordable student housing at different locations throughout Luxembourg. This offer is, however, not enough to account for the increasing number of students desiring a university residence, as indicated by the Student Satisfaction Survey.

A new student can easily navigate through all the new processes thanks to a rather direct and approachable administration that is willing to help students with their problems. Due to comparably small departments and study programmes, their staff can be easily reached and can solve most issues within a convenient time frame. This response, however, varies and not all services have uniform administrative processes, which is a cause of concern among some students.

In September 2019 a group of about 40 student representatives, members of student associations and other interested students came together to address the concerns around student representation at the University as well as the lack of coordination between the various student associations and the university administration. The group came together for three workshops, with smaller teams meeting in between to work on specific projects. Participants agreed that many students engage in associations or as representatives and make significant efforts to initiate activities. They often lack visibility on campus, however. The group therefore decided to develop three projects, each addressing a crucial aspect of student life – personal (civic) development, diversity and sports – with the purpose of scaling up and increasing the visibility of the respective activities. The projects aimed at the creation of a university-wide debating club, the organisation of a 'Global Village' day, and the formation of uni.lu competition sports teams. We hope to resume these projects as soon as the situation permits it again.

An attractive feature of the University of Luxembourg for its student population is the international environment it offers.



Various study programmes at the University offer a diverse range of options across the world for the mobility semester. These exchange programmes, mandatory for every bachelor student, are partially funded by the University for all students. An exchange offers the opportunity to broaden the horizon of a student's knowledge, lifelong friendships and a growth mindset.

A variety of extra-curricular activities offered at the University create a unique multicultural experience for students. To name two examples: Campus Sports, Career Centre services for students entering the job market and external lecture series are offered in multiple languages. An active chapter of the Erasmus Student Network, a not-for-profit international student organisation, frequently engages in student activation on campus (pub crawls, quizzes), and organises student gatherings on different topics of social relevance. It also provides a platform for incoming exchange students to explore Luxembourg as a country. The University is a place where students from different cultural and national backgrounds meet during courses, seminars and other social gatherings. The University connects students who come not only from very different parts of the

One common theme that encompasses all activities at the University is, multilingualism. Multilingualism offers the opportunity to learn new languages and gives comfort to non-native speakers of many different languages. Having multiple languages to choose from makes the arrival and integration of international students seamless and helps them connect to local students from different parts of the country. A multilingual course offering also makes the subjects taught far more accessible.

The University of Luxembourg is spread over three campuses: Limpertsberg, Kirchberg, and Belval. However, most of the classes, events, and administration are located on Belval campus, which also suits most of the students. This, unfortunately, isolates the students of Limpertsberg and Kirchberg from all that is happening, not to mention that their campus does not grant them the same student services as the ones offered in Belval, such as: enough learning and relaxing spaces, high-quality classrooms, and modern personal hygiene spaces; extracurricular activities like sports, parties, and cultural events; and administration offices and personnel.

Belval Campus is characterized by its modern and new, but also industrial surroundings. While its modern infrastructure is seen favourably by many students (as evidenced in the student survey), its industrial flair remains a disappointing aspect. A possible solution would be the decoration of buildings, and more plantation and greenery around the campus.

There are many gastro options on campus that vary from coffee houses to bars and restaurants and are favourable places for study. However, student discounts are not offered by every res-

restaurant on campus, which, given the Luxembourgish cost of living, renders these places inaccessible to some students. An additional source of entertainment on campus, which is a part of University services to students, are Campus Sports, Art, and Well-being. While classes are highly popular among students, there is a massive competition for them, since the classrooms are small and available sports are limited. Also, sports classes are intended for leisure rather than competition. The University lacks initiatives that promote competitive sports, which the student project mentioned above intends to change.

The University is a place where students from different cultural and national backgrounds meet during courses, seminars, and other social gatherings. The University connects students who come not only from very different parts of the world, but also from different parts of Luxembourg and the surrounding regions.

Student integration is a topic that is at its core a cross-over between student life and academic involvement. It describes how students from different backgrounds come together in different settings linked to the University, but it also reflects how students are represented as a central body of the University.

Luxembourg is in a rather unique situation, where its multicultural setting allows for the mixture of many different perspectives. Unfortunately, it is not rare for national students to keep to themselves. They often know each other before entering the University and thus come in with pre-existing bonds – a social luxury many foreign students do not enjoy. Even though it would seem easy for Luxemburgish students, who speak at least three foreign languages (German, French and English), to connect with international students, too many do not. The comparatively small size of cohorts and courses (on average 40-50 students at bachelor level and 10-20 students at master level) provide an ideal setting for a well-connected student body. But the fact that local students come from a small country for which the phrase “everybody knows everyone” is surprisingly accurate, the student body as a whole often remains separated between those who have a pre-existing social network (and who are not forced to join/create one) and those who do not. Mixed groups seem to function well in a formal setting. In less formal settings, however, people with different native languages seem to have difficulties overcoming language and cultural barriers. An annual event celebrating diversity, as our ‘Global Village’ project proposes, could help to bring the different groups at the University together.

Our student body brings together individuals from varying social backgrounds and with diverse educational careers. This makes a polyvalent approach to inclusion, which keeps the multidimensionality of diversity in view, all the more important – not just as a service conducive to the personal well-being of individuals and as a contribution to their academic progression, but as a pre-condition for the success of the University as an educational institution. This recognition has now been widely accepted, not in small part thanks to the efforts of the Inclusion Office.

Demand from both students and staff remains high. More could be done to raise further awareness for the major challenges arising from diversity and to better reflect issues related to diversity in academic policies, procedures and official communication.

This discrepancy is magnified with respect to student finances. Whereas for local students Luxembourg is largely affordable, this is less the case for students from further afield. Non-Europeans find it often difficult to join regular trips to a café or bar, as it may just be too expensive for them, which can be an alienating experience. Student-run initiatives like the Student Lounge, open air cinemas in the summer, raffle tickets, or a second-hand market are potential ways to solve this (pointed out also in the student survey).

When it comes to student representation, the University has taken steps to increase involvement. The election of an official student delegation, but also the sought exchange with representatives of different programmes has improved communication between students and university administration. However, despite these efforts, only a small part of students (ca. 30 per cent) feels sufficiently represented and only 40 per cent claim that they feel part of the student community.

This is also reflected in a perceived lack of support for student associations (financial, organisational, advertisement, information), and a mere 28 per cent of students feeling sufficiently motivated to assume a representative role. Additionally, only half of all students know where to receive help in case of problems, and only a quarter know where to begin if they wanted to start a student initiative. These figures show why it is so difficult to lay the groundwork for a healthy and thriving student community.

Teaching and learning should be at the core of a university, but sometimes students are more preoccupied with non-academic needs. The demand for more trees on campus may seem bizarre, but it reflects the importance of recreational settings for student well-being. Addressing also these demands could be a strong signal that the University takes student needs seriously. The real challenge that lies ahead for the University, as far as student engagement is concerned, is to create an environment that encourages students to actively engage in student life and their studies, for it is an active student community that reflects an attitude of academic excellence.

Learning support is adapted to student needs. At bachelor level, the University is organizing a Welcome Day at the start of the academic year. The Faculty is also organizing several activities to help students to catch up in core sciences with preparatory courses in mathematics, where most weaknesses are observed, and peer tutoring activities. At master level, the student profile

is much more international with very different cultural and scientific background. MICS organizes a Welcome Week to integrate students. Cohorts at master level ensure a good student-professor ratio, enabling individualized counselling where necessary.

For students, integration in the University and programme community is of primary importance. At the institutional level, the Welcome Day at the start of the academic year is widely appreciated. We consider the early phase of studies of critical importance for a student's acculturation and future learning success, particularly given the variety of cultural backgrounds with which our students arrive at the University. A smooth induction can also create a stronger sense of community among students, and attachment to the campus. Further institutional investments in a more sustained induction period have been considered, but their discussion is still in an early stage. Students report that they had the opportunity to become familiar with different student associations, faculties, the language centre, the well-being campus, learn about banks and insurance companies, meeting new people and face the multilingual and multi-cultural, international face of the University of Luxembourg.

Students transitioning from secondary school to university often lack some knowledge in sciences, especially in mathematics. Most Programme Directors report that there has been a decrease in prior knowledge in mathematics for first year students, which is demonstrated by an increasing number of students who do not pass the first year.

The Department of Mathematics organises and offers upgrading courses in mathematics in the week before the start of the semester to all university's bachelor students, recommending that students enrolling in one of our more academic programmes participate. As this is a fundamental issue that many bachelor programmes are facing, the faculty will extend this offer to two weeks as of the academic year 2020/21. The concept of the Math camp is the following: the first week is a quick refresher/get in math: students work in small groups, using a hands-on based approach to high-school level mathematics under the supervision of specially trained math teachers. The aim is to review or familiarize students with concepts and techniques, focusing on those that will be used throughout their university curriculum. The second week serves as both a refresher on high-school level mathematics, from the perspective of a university curriculum, and an introduction to concepts that students will be using throughout their bachelor studies.

In continuation of such upgrading courses, the Department of Mathematics offers additional support sessions in mathematics twice a week to all UL students. This initiative was launched in 2019 and has attracted up to ten students per session. These sessions take place in the LLC in an informal setting where students can seek help, ask questions and improve their analytic thinking, possibly opening up to new perspectives in mathematics. Students attending these sessions mostly come from our bachelor programmes in mathematics, computer science

and engineering; a few students also come from bachelors in economics and management from the Faculty of Law, Economics and Finance.

More personalised study support for students who lack appropriate study skills is coordinated at Faculty-level. Peer-tutoring sessions were introduced in two pilot programmes in 2015: the Bachelor en Ingénierie and the Bachelor in Applied Information Technology (BINFO). Well-performing students of higher semesters are selected by the Programme Director to assist first year peers who struggle with important courses and concepts. Tutors receive training and preparation with supervision from the Programme Director, if needed. Students report that peer-tutoring sessions increase their confidence and are helpful. Tutors report that this activity is an interesting addition to their normal study life. However, attendance to these sessions is limited, because of a lack of interest from their peers, with on average three participants per session. However, Programme Directors advise that it is important to maintain this activity, even though the participation rate remains low.

The concept of peer tutoring may evolve in the future, as the university plans to implement a more coordinated range of preparatory courses in hard sciences, especially in mathematics, which is the area in which students face most difficulties. However, the goal to support students may also be reached by providing good online content allowing them to revise some topics at their own convenience and pace. As students additionally do not have to adapt to specific schedules, this approach may be able to reach more students.

### **6.2.2 Bachelor in Applied Information Technology**

BINFO programme with its very applied nature requires high flexibility concerning the attribution of classrooms. The same holds for MICS with its large diversity of teaching styles and project-oriented work. Since lecture halls are shared with all other programmes and the available capacity is already almost fully used, lecture halls with specific equipment (video recordings, blackboards) that would be helpful for certain courses are not always available. In addition, the project-based nature of the programme requires the availability of a sufficient number of rooms for self-study or project work. The situation has significantly improved with the opening of the Luxembourg Learning Centre, which offers exactly this type of venue for students. Although some progress has been achieved in recent years, an increased flexibility of the IT service of the university for easier and more rapid software and hardware installation in computer labs and the easier provision of virtualised servers (including a virtualise infrastructure) would be helpful, especially for the setup of specialised labs for dedicated topics (networking lab, robotics lab, etc.).

### **6.2.3. Bachelor in Applied Information Technology – Continuing Education Programme**

BINFO-CEP courses are held on campus Kirchberg, since this campus is in the Centre of one of the main business areas in Luxembourg City. However, the infrastructure of campus Kirchberg is no longer up to date, but lecturers offer alternatives with the provision of virtualized working environments that students can also use on private computers at home. Campus Kirchberg will be renovated but it's not clear up to now, how and where courses will be taught during the renovations. In contrast to regular BINFO students, students of BINFO-CEP use campus facilities only during courses; all other academic activities are done outside campus.

#### **6.2.4. Master in Information and Computer Sciences**

MICS was created without an existing bachelor and student intake was thus from various countries with very different cultural and scientific backgrounds (i.e. some are more mathematically trained, others have more applied computer science knowledge).

In order to respect and attend the diversity of students and their needs, a “Welcome Week” is organised by the programme at the start of semester. The main intention is to get to know professors, other students, and the infrastructure. A city tour is organised and a general programming class is offered as a warm up.

The first semester is a “review” with mandatory courses aiming at levelling up students in core subjects and students are guided in their career path through the choice of profiles. Students can ask questions during the lectures and furthermore individual appointments can be arranged where professors, post-docs or doctoral candidates, answer questions concerning the lectures and supervise the students' progress in homework.

Interviews take place if the student does not show the expected performance in terms of ECTS or any kind of social conflicts. An interview can also be asked by the student.

## **6.2 Assessment**

### **6.2.1 Strengths and need for development for all study programmes**

In 2015, the university moved most of its activities from Luxembourg City to its new campus in Belval (Esch-sur-Alzette). The campus has a modern infrastructure for teaching and learning. In particular, the Luxembourg Learning Center (LLC), which is also the university library, offers a wide range.

Learning events take place on the Belval campus While some degree programs with the faculty have not yet moved to the Belval campus (e.g. engineering courses are on the Kirchberg campus, part of the life sciences courses and BINFO-CEP), almost all of the teaching takes place in Belval . BINFO and MICS are taught on the Belval campus, while BINFO-CEP is taught on the Kirchberg campus, which is closer to the city center.

All lecture halls and seminar rooms on the Belval campus are equipped with modern technology.

The resources of the courses can be rated as very good. The modern and technically excellent equipment is suitable to enable the students to receive a sound education.

To enable students to receive a sound education. From the point of view of the panel of experts, the overall availability of resources is very well suited for the implementation of the course. Buildings, rooms and technical equipment are to be described as exemplary. The library offers students extensive support in obtaining information and using the available technology. The numerous laboratories and their technical equipment for various areas of psychology are particularly impressive. The University of Luxembourg is also ideally equipped for digital teaching.

The courses are taught according to the latest international research-based standards.

As a public university, the University of Luxembourg is very well equipped in the general areas of spatial and technical facilities. This includes both, the technical equipment of the PC pools (IT infrastructure) and the publicly accessible library. The general infrastructure at the respective campus is also rated (by the students) as well connected and accessible for students with physical disabilities. The teaching rooms themselves are equipped with modern teaching materials such as beamers and media boards, which enable students to use the available resources individually and in a study-centered manner. For group work, students have access to additional spaces and retreats that allow flexible teamwork. In addition, the responsible authorities of the university are interested in solving already addressed problems quickly and unbureaucratically in the interest of the students, so that a smooth study progress can be guaranteed.

The university has its own career center, which from the point of view of the expert group is of elementary importance for students to find information.

Of course, the living situation of the students is not yet optimal. However, the university's ability to influence this is limited and the university should continue to strongly support students in finding accommodation.

However, the students complained that there was little to do at the university outside of class. Because of the multilingual nature of the university, students want more intensive exchange and intercultural dialogue with one another. Therefore, infrastructural offers should be created that enable regular encounters between the students. In this context, reference should also be made to the influence of the Belval Fund, which is intended to support this in order to make

the campus more attractive and affordable. On the other hand, the university should also support student initiatives that are not registered in the “Régistre des commerces”, since the administrative effort and costs for the students represent a significant hurdle here.

The scope and qualifications of the non-academic administrative staff can be described as very good. Sufficient further training opportunities are available. The needs of a heterogeneous student body are also adequately taken into account. Internal quality assurance takes physical resources into account in its evaluation culture and regularly collects feedback from students. The evaluation group assesses all material, financial and human resources as completely sufficient to achieve the qualification goals of the degree programs.

### 6.3 Conclusion

The criterion is **fulfilled**.

## 7 ESG Standard 1.7: Information management

**Institutions should ensure that they collect, analyse and use relevant information for the effective management of their programmes and other activities.**

### 7.1 Implementation

#### 7.1.1 Aspects that apply to all courses of study

The university believes that effective monitoring must rely on a ‘triangulation’ of different sources of evidence, including educational data, student, graduate and staff feedback, and direct observation or analysis of primary documents. With the creation of the Office of Statistics and Institutional Research (OSIR) in 2018, which is attached directly to the Rector, the University now has a professional service that continuously provides data for strategic reporting. Regarding education, the foundation for a regular and pertinent feed of data has been laid with the commitment of the current multiannual contract to develop an educational monitoring system. The system builds on the existing enrolment statistics and has been gradually expanded over the last two years to include indicators on student assessment, progression (based on cohort data), and mobility, teaching investments, and curriculum and course related aspects. In parallel, OSIR has been exploring options for a common dashboard through which educational data can be continuously made available to the University community.

OSIR is also in charge of implementing annual university-wide surveys, of which there are, since 2019, three: a student satisfaction, staff satisfaction, and graduate survey. At the institutional level, these surveys provide a rich source of evidence, even if participation rates often prevent the reporting of reliable data at programme level, at least for smaller master programmes.



Graduate feedback is an area that requires further efforts. The current graduate survey is the latest in a series of attempts to design a reliable instrument that is accepted and used by the graduates. It has improved over previous surveys above all methodologically and in view of the analysis of results. Further improvements are planned. They include the addition of a longitudinal element through a second wave administered after two to three years from graduation. Participation remains a concern and is likely to improve only once an effective alumni relations management has been put in place.

The student satisfaction survey is new and data have become available for the first time in spring 2020. They are first reported to the Rectorate and Board of Governors, before being released more widely. That also applies to results of the graduate survey. The Vice- Rector for Academic Affairs (VRA) and quality management will use these data to inform decision-making processes and in the exchange with student representatives. Workshops with students for this purpose have recently been initiated by the VRA. Before results can feed into quality assurance processes at programme level, their validity at that level needs to be further assessed.

The university also take student feedback seriously as a source for the ‘monitoring’ of learning processes by students themselves. Students need to learn how to assess their own learning process, its efficiency, and the extent to which it is conducive to the various objectives that they pursue with their learning. Besides feedback from staff and their grades, feedback of their peers can help students understand what others value and where they find learning to be effective. To inform the monitoring of educational processes, feedback should thus be seen as flowing in several directions. Such an understanding of feedback requires settings in which formal, anonymous feedback can be discussed in an open dialogue, and complemented with direct feedback and suggestions for interpretation. For now, this happens informally in programmes. Further efforts are needed to anchor it more firmly in all programmes.

A further source of evidence for educational monitoring is the University’s Internal Audit. It maintains an audit plan approved by the Board of Governors that can extend to matters of relevance to educational policy. The audit on the University’s use of external teaching staff, which was on-going at the time of writing of this report, serves as a case in point. External audits commissioned by the Board or Rectorate can equally provide information pertinent for assessing the quality and impact of strategic decision-making. A recent example is an external audit of the Luxembourg Learning Centre.

The University benefits from small cohorts, which enables a close dialogue between students and teachers. This feedback is an informal, continuous process that takes place during all our teaching activities. Relevant feedback on the course content, way of teaching, and difficulties faced by students is shared in the classroom.

This kind of feedback is not only beneficial at the level of the teacher; Programme Directors also play an important role in student orientation throughout the curriculum. They report that supervising and guiding the students on questions related to the mobility semester, bachelor and master thesis or career opportunities allows them to get important insights into the strengths and weaknesses of the programme, as perceived by the students. This works very well based on the substantial investment of time and effort on part of the Programme Directors.

Students are regularly informed of new developments during the lectures, by email or via Moodle. First year students in particular are made aware of crucial rules in dedicated, programme-specific information sessions. For instance, the MICS Programme Director has posted on Moodle a summary of important rules described in the Law and Study Regulations that students should be aware of.

In the absence of a University-wide evaluation system, the Faculty launched in 2014 an initiative to develop an accessible and easy-to-use tool, LISTORES, for course evaluations. LISTORES is a local, purpose-built tool developed in collaboration with a student from the faculty. Course evaluations are filled in by students on a voluntary basis, but results are not communicated in any official form to the students. Similarly, teachers only see the evaluation of their courses but cannot compare these with other teachers' evaluations. Only the Programme Director has access to the course evaluation of the entire programme. Each teacher is free to discuss the feedback given by the students in class. For instance, in BINFO and BINFO-CEP, student feedback is shared with students and lecturers in the programme. Issues are discussed between the Programme Director and the respective lecturers and solution proposals are shared with the students. Improvement measures are evaluated in the BINFO Steering Committee. The student representatives sitting in that board are allowed to share this information with all students from the programme. The same applies for MICS. For instance, the course "basic algebraic structures" was identified as a "warning course". The Programme Director discussed the issue with the teacher concerned and the students. As a result, it was decided to add exercise sessions, which effectively strongly improved the upcoming evaluations.

However, students often complain that the evaluation system is not transparent and that they do not see any measures based on their feedback. Consequently, the participation rate at Faculty-level is rather low (between 5 and 10 per cent). While individual comments can contain precious feedback to the teacher, feedback would have to reach statistical relevance to inform decisions.

Programme Directors also complain that feedback from course evaluation lacks relevant data related to the programme itself and would like to have the possibility to add programme specific questions. As already mentioned above, the University is now consolidating course evaluations

at university-level since the summer semester 2019/20, thus replacing the Faculty tool, LIS-TORES. The University hopes to be able to add programme specific questions to the future iterations of the new course evaluation system.

To solve the problem of low participation in course evaluations, they have started to adapt their communication strategy towards students by recommending that all teaching staff reserve time in each semester's last lecture to allow students to complete the online feedback in class. In addition, we encourage teaching staff to give direct feedback to students based on their course feedback (either the same students and/or the students of the following year). Some Programme Directors distribute additional feedback forms at the end of the lectures in order to receive additional feedback. For example, based on such an additional feedback form after each block lecture, MICS informs each teacher about the ranking of his/her course in the student feedback and indicates the best-ranking courses to all teachers. Poorly performing courses are discussed with the respective teacher. The programme reports a very high participation rate for this form of feedback.

Although the Faculty is organising course evaluations that provide overall feedback at course-level, Programme Directors also need to be able to access feedback at programme-level, allowing them to address specific questions.

Programme Directors are free to organise mid-semester and final evaluations. Mid-semester evaluations are especially relevant for new programmes during the first years of their existence and for existing programmes that have undergone a deep review in terms of content and/or pedagogy.

Programme evaluations therefore have a dual purpose: they provide a snapshot of the quality of current teaching, and they establish a basis for how to develop the programme in the future – both in the short and long term. For instance, the BINFO Programme Director has initiated a mid-semester evaluation with programme specific questions to overcome the lack of useful and relevant data from course evaluations.

In 2015, the Faculty initiated programme evaluations with recent graduates. These use the model of the National Student Survey (NSS) in the UK. The survey comprises a set of 27 questions covering teaching, learning opportunities, assessment and feedback, academic support, programme organisation and management, learning resources, learning community, student voice as well as open questions. The Faculty Quality and Process Officer compiles the data and analyses the results for the entire Faculty, degree levels, and individual programmes. Results are shared within the Faculty with Programme Directors and Study Programme Administrators. Participation remains an area of deep concern, as participation rates are insufficient to derive relevant information from the results (we were unable to provide statistics in

2017). The Faculty will no longer perform these graduate surveys, as the University statistics department (OSIR) is professionalising the collection

Employability of graduates is an essential objective of all study programmes, even if the degree to which programmes target specific career trajectories varies, and with it the meaning of employability in the context of a given study programme. A key asset in this respect are the close ties that many programmes and their academic staff maintain with the professional world in Luxembourg and beyond. These networks receive considerable attention and significant efforts are made to maintain or expand them. This is especially the case for the BINFO and BINFO-CEP programmes.

For the purpose of this accreditation exercise and in the absence of available data on employability, the University has collected data from MICS graduates with the support of OSIR, the University's statistics office. By the drafting of their report, they hired a student to collect additional data on the future of our BINFO and BINFO-CEP graduates and they hope that statistics will be available for the onsite visit.

## **7.2 Assessment**

### **7.2.1 Strengths and need for development for all study programmes**

The University of Luxembourg has a very good information management system. Due to the thorough, broad and very careful data collection systems and possibilities, the university has an up-to-date and complete data structure, the usability of which is excellent for the internal quality management system. The evaluation of the data is always accompanied by quality assurance measures and the planning of follow-up activities.

The existing information management system is comprehensive and state-of-the-art: on university level there is a dedicated department in charge of statistics and data management. The faculty is utilizing the university existing infrastructure to collect students' feedback on individual courses and lectures as well as on the environment at the university in general. The informal feedback processes in all study programmes seem to be running quite well, the students report that they feel encouraged to give feedback to the lecturers and their feedback is well received by the teachers.

However, as already described in Chapter 1.2.1, a broader and more specifically defined handling of statistical data could take place. The expert group therefore recommends defining and using selected available data in order to control (only a few) quality items in a clearly defined process. This requires a very intensive dialogue between the university management and the faculty.

Nevertheless, the expert group had the impression that informal feedback from the students to the lecturers was perceived as being more important than written evaluations. Although this promotes the personal dialogue between lecturers and students very well, it steers the eye away from systematic monitoring. In some cases, students have expressed the wish for more documentation and the derivation of recommendations for action through a written evaluation system in order to guarantee the transparency of the evaluation system. The panel of experts therefore advises that the value of the evaluation participation rate should be viewed as a quality measure and sensible target values should be set for future evaluations. The teachers could also contact the faculty members of the The FSTM (there student satisfaction ratings are significantly higher) in order to increase participation in evaluation surveys.

### 7.3 Conclusion

The criterion is **fulfilled**.

## 8 ESG Standard 1.8: Public information

**Institutions should publish information about their activities, including programmes, which is clear, accurate, objective, up-to date and readily accessible.**

### 8.1 Implementation

#### 8.1.1 Aspects that apply to all courses of study

The University publishes on its website, information about its activities every year in the form of Annual Reports, including the list of the study programmes offered, Study Regulations and requirements imposed by the Law.

The faculty will draft a faculty activity report in 2021. Up to now, the faculty activities were gathered in the annual report of the University.

To attract prospective students, the faculty publishes on the University's website detailed information on each programme: brochures, curricula, admission requirements, selection criteria, intended learning outcomes, teaching staff, testimonials, news, qualifications awarded, links to graduate employment information or further studies at UL eventually research. Information for each of the programmes concerned by this accreditation exercise can be found at the specific websites.

The faculty is developing marketing campaigns and participates to events to promote our programmes. The use of brochures and testimonials is very useful to explain and present our programmes and study opportunities. Information and videos provided on the MICS webpage were helpful for students to choose their profiles.

We previously used to present each of our study programme with a single brochure/flyer. In order to present a more coherent and complete educational offer, we have recently developed a brochure per discipline (mathematics, physics, engineering, computer science and life sciences) for bachelor, master and doctoral studies.

Furthermore, the Faculty is also very active in engaging learners to spark their interest in science through public outreach and engagement with schools mainly in Luxembourg and the Greater Region.

Our participation in the Science festival and Chercheurs à l'école is an opportunity for our researchers to present and explain their activities in a playful way to raise interest in scientific vocations. In 2019, we first presented our research activities and equipment in Physics and Engineering during the Portes Ouvertes. This was a great success and involved 400 participants. We also participate in the organisation of the Olympiades in Biology, Physics and Chemistry for high school pupils at the national level as well as in training sessions for the pupils selected for the European competitions. We offer Math challenges through elementary approaches to high school and bachelor students once a week throughout the semester. The approach is to present concepts from mathematics that are not based on an advanced understanding of mathematics and to challenge students on more complex and reflective exercises. This constitutes an excellent preparation for the mathematics competition. The University generally attract around seven high school students each year in the Math challenges.

We also attend charity events such as Relais pour la vie and the Let's go gold, where we present our research activities in life sciences and, more specifically, in cancer research. The target audience for these is the general public rather than high school students.

Furthermore, we organise events to involve high school students in research at an early stage of their learning path. The idea is to present different perspectives on science and to involve young students in science and research. The Faculty is actively involved in the Scienseens lab in biology, *mathematics and physics*. It is the first research lab for high school students in Luxembourg, offering workshops designed to spark interest in science. We will extend this initiative to Computer Science and Engineering disciplines.

*Math.en.Jeans* proposes research projects in Mathematics to high school students. Students spend several months working on a problem defined by a researcher and are guided through the whole process by a researcher. They present the results of their research during a congress, bringing together all participants (200 participants in 2020). In 2019, the Doctoral School in Science and Engineering (DSSE), in the context of the Fonds National de la Recherche-funded project *DESCOM*, started to create science comics with the participation of 22 doctoral students. The comics address various aspects of Mathematics, Computer Science, Physics

and Biology. The idea is to use a visual medium to stimulate the interest of high school students in science. In addition, the aim is to familiarise pupils with the local research environment, the life of scientists, and the job markets that are accessible for different disciplines. This project was very successful and widely shared on social media and various events, including the distribution of 7,000 comics by the end of 2019.

The Ministère de l'Éducation nationale, de l'Enfance et de la Jeunesse and schoolteachers even contacted us to discuss using the comics as educational material. In its next iteration, the DSSE will open participation in this project to all doctoral candidates of the University. Finally, FSTM staff is regularly involved in juries of science competitions for high school students (e.g., Goodyear STEM challenge, European Schools' Science Symposia).

## **8.2 Assessment**

### **8.2.1 Strengths and need for development for all study programmes**

The University of Luxembourg informs its own students (especially freshmen) as well as prospective students and the general public about relevant information about the university itself, as well as insights about scientific topics. The university also generally invites interested parties to public information events, for example to address pupils as future students. In this public event, general questions about the structure, content and goals of all study pro-grams at the UL are given. Further information is published publicly on numerous online channels, so that a good mix of different communication channels is used to address all target groups in an appropriate manner. In addition to the central student's information center, the university's own publications provide information about the characteristics of all offered degree programs and the respective admission requirements. The University of Luxembourg is an established university where active communication is already integrated into the general daily routine. As a further positive aspect, the expert's see is that the University of Luxembourg is already very well networked in the respective region. This leads to various cooperations with external partners, which brings further attention to the university.

The decision-making processes are transparent and appropriate in terms of concept and target achievement. The university provides detailed information about studying and teaching as well as about the main research areas of the University. The relevant organizational documents, such as the respective examination regulations are available and published. Organizational study documents are made easily accessible on the website. All committees contact persons and contact points are clearly and transparently named. All relevant information for students and prospective students, for graduates and other interest groups are open to the public.

Overall, the public information is satisfactory. There are many opportunities for prospective students to find out more about the university, faculty and degree programmes.

### 8.3 Conclusion

The criterion is **fulfilled**.

## 9 ESG Standard 1.9: On-going monitoring and periodic review of programmes

**Institutions should monitor and periodically review their programmes to ensure that they achieve the objectives set for them and respond to the needs of students and society. These reviews should lead to continuous improvement of the programme. Any action planned or taken as a result should be communicated to all those concerned.**

### 9.1 Implementation

#### 9.1.1 Aspects that apply to all courses of study

The Law gives the Board of Governors the competence to approve the continuation of study programmes. This competence creates the legal basis for a policy for programme development and review, which, at the time of writing of this report, is in the making. In practice, major changes to the programme (i.e. direction of the programme, change in the name of the programme, creation of a new track, programme reform, change in the tuition fees, etc.) need to be validated by the University Council and the Board of Governors, as stated in the Law (article 5 and 12). For instance, in the process of renewing the accreditation of the MICS the decision has been taken to reform in 2010 the current system of specializations and to replace it by a more flexible system based on profiles. This reform of the MICS needed to be validated in the last instance by the Board of Governors.

Although there is no formal procedure for programme review at University-level yet, faculties have developed their own approach to programme review.

Review cycles are initiated with an agreement between programme management and Quality Management (QM) on the specific method for Reflection. Commitment to objectives for improvement will be formally approved at faculty-level by the Dean and/or the Head of Department. Agreements also include commitments on the side of QM, the Faculty, the Central Administration and the Rectorate. Central-level quality management is responsible for confirming adherence to procedural standards and for monitoring review cycles in the three faculties. It reports annually on compliance and results to the Rectorate, the University Council, and the Board of Governors. It also assists programmes and faculty Quality Officers in organising services for development and in monitoring progress towards programme commitments.

Common standards for review include: The use of the “QM survey” to structure and document the reflection process and commitments. The participation of students in all phases of the review process. This includes student feedback during Development that is used as one basis for Monitoring. The involvement of external stakeholders at least in the Reflection phase. The



involvement of external peers in the Reflection and Monitoring phases. This can take on different forms (to be approved by QM), including the regular participation of peers at programme Steering Committee meetings, the establishment of a peer review panel, or peer review as part of the external accreditation of the programme under terms that respect QAFE methodology. For multiannual review cycles, an annual appraisal of progress towards commitments. Review cycles are adapted to the scope of the objectives and actions defined as part of the review agreement. They should always be between a minimum of one and a maximum of four years. For new programmes, the first review cycle must, at the latest, be completed at the end of the regular study duration of the first cohort.

At faculty-level, we organise annual programme stocktakings, which enable a reflection and discussion-based process, taking place each year in the form of an interview between the Programme Director, the Dean, Vice-Dean and Quality and Process Officer.

The purpose of annual stocktaking is to analyse and use relevant information from various feedback mechanisms for the effective management of programmes and activities. In preparation of the stocktaking meeting, the Programme Director consults various stakeholders (the instructional team, the student representatives, the Study Programme Administrator and any other stakeholder, if necessary) as well as the Programme Steering Committee and compiles a programme-level report including an executive summary with an interpretation of the respective programme's statistics on student satisfaction, progression and feedback. The annual stocktaking is also the opportunity to identify faculty-wide issues and best practices, and to share them with other programmes.

The results of the interview are compiled in a report by the Quality and Process Officer and reviewed by the Programme Director and the Dean. The Programme Director then shares the validated report with the Programme Instructional Team, the Programme Steering Committee, the Study Programme Administrator and student representatives. The action plan is defined in the report and updates on those actions are regularly discussed either individually with the Programme Director or at faculty-level, depending on the scope of the adaptations needed.

These stocktaking meetings may be reviewed or even replaced in the future and integrated into a larger reflection on programme review at university-level. Stocktaking meetings have been suspended in 2019-2020 due to the focus on the external evaluation in teaching and learning mandated by the Luxembourg Ministry of Higher Education and Research. The preparation of the external evaluation involved the self-assessment of all the programmes, and although the exercise was different from a programme review, it allowed us to assess our strengths and weaknesses and to identify areas for reflection at faculty level.

The ongoing monitoring of the quality of the programme is under the responsibility of the Programme Director. The Programme Director shares information and changes on the programme with all academic staff on a regular basis.

At department-level, monthly meetings with the “DCS Educational Management Board” are organised to share information or raise issues that cross the borders of individual programmes (i.e. programmes orientations, teaching budget and teaching allocation).

At programme-level, the Programme Director is supported by the “Programme Steering Committee” to develop and improve the quality of the programme. The Steering Committee addresses in particular quality issues (the design of the programme, the renewal of the list of courses, the content of a lecture, the way a lecture is given, etc.) and defines measures to implement.

### **9.1.2 Bachelor in Applied Information Technology and Bachelor in Applied Information Technology – Continuing Education Programme**

BINFO and BINFO-CEP are regularly updated to adapt to the fast developments in information technology and meet the needs of the Luxembourg economy. BINFO-CEP is in close cooperation with external stakeholders and with the “Chambre des salariés”, which plays an important role in identifying employees needs in life-long learning, being in close contact with the professional world in Luxembourg. A regular sharing between the two institutions is done in an informal way.

The Programme Director shares information on changes in the programme with all academic staff on a regular basis and also during “DCS Educational Management Board” meetings.

Adaptations/changes to the programme are also discussed during the “Programme Steering Committee” meetings. For instance, adaptations to the programme are possible in the 5th semester, where two thirds of the courses are optional and can be changed on a yearly basis. This allows the easy inclusion of new courses on modern relevant topics and the removal of outdated topics. Discussions have been initiated to offer a larger portfolio of optional courses with the Bachelor in Engineering with courses on robotics. A summary of the decisions taken by the Steering Committee is shared with the students. In addition, students are regularly informed per email by the Programme Director about new developments.

Feedback information from students and alumni is lacking and remains an issue for the management of the programme. Therefore, the Programme Director has initiated two years ago, a mid-semester programme evaluation with programme specific questions to students. Feedback is shared with students and lecturers, issues are discussed between the Programme Director and the respective lecturers, and proposals are shared with students. The effect of

these improvements is evaluated in the BINFO Steering Committee and conclusions are shared with all students.

Additional feedback is provided by the jury of the internship defence, which is involved in the evolution of the content of the programmes. Internship partners provide insight on the market needs and possible improvements on the programme. Up to now, this feedback is informal, but will be better formalized in the future.

#### **9.1.4. Master in Information and Computer Sciences**

MICS is also regularly updated during “Programme Steering Committee” meetings, as well as during the “Educational Management Board” meetings to discuss changing needs of the society in computer sciences. For instance, discussion on the profiles with the inclusion of new courses on modern relevant topics resulted in the offer of a larger portfolio of optional courses with courses on robotics.

Adaptations to the programme’s structure and profiles are shared with students during profile meetings. In addition, students are regularly informed per email by the Programme Director about new developments.

## **9.2 Assessment**

### **9.2.1 Strengths and need for development for all study programmes**

The study programs have different procedures for internal quality assurance, e.g. in the form of the use of surveys of students on individual courses. Characteristic is the very formalized structure on the one hand and the emphasis on the importance of informal exchange between students and teachers on the other. The evaluations that take place as well as regular feedback rounds ensure a regulated exchange of information between the students and the lecturers, which enables a quick implementation of any necessary or useful adjustments in the following semester.

The University of Luxembourg has developed a quality framework that provides for the cyclical review of all study programs based on a detailed survey instrument. The specific objectives of this review are initiated by an agreement between the program management and the university's quality management. Quality Management at the Rectorate level is responsible for confirming compliance with procedural standards and for monitoring the review cycles in the three faculties. It reports annually to the Rectorate, the University Council and the University Supervisory Board on compliance and results. In addition, it assists the quality officers of the faculties in organizing the review.

The continuous monitoring of the study programs is the responsibility of the program directors, who are supported by the steering committees of the programs. All study programs are required to establish appropriate steering committees with the participation of students, which meet at least once a year. The committee is free to decide on the form, objectives and agenda of each meeting, but as a rule it deals in particular with quality issues (for example, concerning the design of the program, module plan and courses, content of a course or teaching and assessment methods). The extent to which this involves issues of linking teaching and research, adapting course content to societal demands, and the workload for modules and examinations is not evident from the documents.

Common standards for review include: The use of the survey instrument to structure and document the reflection process and commitments. The participation of students in all phases of the review process. The involvement of external stakeholders in at least the reflection phase. The involvement of external peers in the reflection and review phases. Review can take a variety of forms, including regular peer participation in steering committee meetings, establishment of a peer review panel, or external accreditation of the program. For multi-year review cycles, an annual assessment of progress.

The University of Luxembourg has a central evaluation office that is responsible for university-wide quality management and supports the various departments in continuing their regular evaluation activities. The three study programs at the University of Luxembourg under review are also discussed and evaluated in regular meetings with various stakeholders with regard to their topicality and future viability. In some cases, these meetings are also held publicly with students and external parties in order to get a better view from the outside and to exchange ideas about short- and medium-term improvements to the existing concept of the degree programs. In the internal evaluation phase, the results of the course evaluations are also taken into account in order to obtain a more precise picture of the respective course development. Overall, this ensures that the students have a legitimate say in the development of internal processes and can thus contribute to the quality assurance of the degree program.

According to the university management, the results of the module evaluation carried out at the end of the semester should be discussed with the students immediately after the evaluation so that an improvement is still possible. The students did not reflect on this in this form, which is why the expert group still sees room for improvement and recommends that the feedback of the evaluation results be continuously fed back to the students.

### **9.3 Conclusion**

The criterion is **fulfilled**.

## 10 ESG Standard 1.10: Cyclical external quality assurance

**Institutions should undergo external quality assurance in line with the ESG on a cyclical basis**

### 10.1 Implementation

#### 10.1.1 Aspects that apply to all courses of study

According to article 50 of the Law, the University is subject to external evaluation every 4 years (alternating between research and teaching). The Luxembourg Ministry of Higher Education and Research acts as the ordering party and client of these evaluations. The last external evaluation performed in 2016, covered the research performance of the University, as well as institutional aspects, including a section on teaching and learning. In 2020, the external evaluation is covering teaching and learning. This is the first comprehensive peer review in the young history of the University of Luxembourg created in 2003, to focus exclusively on its educational mission at bachelor and master level. Onsite visits of the panel of experts will take place in October 2020, so conclusions are not available yet.

Quality assurance is an ongoing process that doesn't end with the external feedback or report. The University ensures that the progress made since the last external evaluation is taken into consideration when preparing for the next one. In its article 51, the Law of 27 June 2018 (amended) on the organisation of the University of Luxembourg foresees a multiannual planning process involving the University of Luxembourg and the national government. The basis for this process is the so-called Four-Year Plan. It defines disciplinary or cross-disciplinary thematic priorities for research within and across Faculties and Interdisciplinary Centres, as well as transversal strategic commitments in research, education, and for the administration.

The Four-Year Plan forms the basis for a multiannual framework contract – the Contrat d'établissement pluriannuel – between the University and the Ministry for Higher Education and Research.

One of the Key Performance Indicators (KPI) listed in the “Contrat d'établissement pluriannuel 2018-2021” is to accredit by an external EQAR-registered agency at least one bachelor and one master programme per faculty by the end of this agreement in 2021. This KPI can be considered as an external evaluation leading to the review of our processes for defined programmes. BINFO, BINFO-CEP and MICS have been selected by the faculty in collaboration with the respective Programme Directors, to start the accreditation process in line with the ESG.

MICS has already been through an accreditation process just after its inception in 2005 and was accredited by AQAS from 2005 until 2009. The programme underwent a mid-term review in 2007 to assess its advances since its inception.

## **10.2 Assessment**

### **10.2.1 Strengths and need for development for all study programmes**

The university fulfils all obligatory aspects of external quality assurance: the various organisational bodies and levels are adequately in place and were explained in detail in the discussions with the university. Internal as well as external quality assurance measures take into account all legal requirements and benefit from each other in order to advance the quality development of the study programmes and of the university as a whole and always.

The quality management ensures very well a permanent current and transparent presentation of the general quality assurance measures and instruments of the University of Luxembourg. These are also easily visible on the homepage.

The University of Luxembourg undergoes an external evaluation every four years, alternating between research and teaching. The client is the Luxembourg Ministry of Higher Education and Research.

The implementation of changes made as a result of such external evaluations are included in a multi-year planning process involving the University of Luxembourg and the national government. The basis for this process is the four-year plan. It defines disciplinary or cross-disciplinary thematic priorities for research within and between faculties and Interdisciplinary Centers, as well as over-arching strategic commitments in research, teaching and administration. The four-year plan forms the basis for a multi-year framework agreement between the University and the Department of Higher Education and Research.

External quality evaluations have not been regularly performed until now. There are four programmes related to computer science: BICS, BINFO, BINFO-CEP, and MICS. From those, MICS have been assessed in 2005 and an intermediate evaluation in 2007 with an accreditation valid until 2009. BINFO and BINFO-CEP are part of the 2020/2021 assessment, whereas for BICS no assessment plans are available. Since BICS students are potential candidates for the MICS program, it would be beneficial to have an assessment for BICS too. This could allow to assess whether BICS students meet the requirements of MICS and to assess how both programs match each other.

### **10.2.3. Master in Information and Computer Sciences**

The higher education institution has provided information on the development of the recommendations of the previous accreditation. Not all of them were implemented. However, the students have not identified any deficiencies in this regard, which is why the expert group suggests that the recommendations that have not yet been implemented be discussed further.

### 10.3 Conclusion

The criterion is **fulfilled**.

#### IV Recommendation to the Accreditation Commission of ACQUIN

##### 1 **Assessment of compliance the Standards and Guidelines in the Higher European Area (ESG) in the actual official version and the German Council of Science and Humanities (WR)**

The study programmes „Bachelor in Applied Information Technology (BINFO)“, „Bachelor in Applied Information Technology – Continuing Education Programme (BINFO-CEP)“, „Master in Information and Computer Sciences (MICS)“ were assessed on the basis of the "Standards and Guidelines for Quality Assurance in the European Higher Education Area" (ESG).

The expert group concludes that the **ESG standards** 1.1 (Policy for quality assurance), 1.2 (Design and approval of programmes), 1.3 (Student-centred learning, teaching and assessment), 1.4 (Student admission, progression, recognition and certification), 1.5 (Teaching staff), 1.6 (Learning resources and student support), 1.7 (Information management), 1.8 (Public information), 1.9 (On-going monitoring and periodic review of programmes) and 1.10 (Cyclical external quality assurance) are fulfilled.

The assessment criteria are as follows:

**Standard 1.1 Policy for quality assurance:** Universities have a publicly accessible quality assurance strategy, which is part of their strategic management. This strategy is developed and implemented by internal stakeholder representatives through appropriate structures and processes, involving external stakeholders.

The criterion is **fulfilled**.

**Standard 1.2 Design and approval of programmes:** Universities have procedures for the design and approval of their courses. The courses are designed in such a way that their objectives, including the desired learning outcomes, can be achieved. The qualification obtained during a degree program is clearly defined and communicated; it refers to the corresponding level of the national qualifications framework for higher education and, consequently, the qualifications framework for the European Higher Education Area.

The criterion is **fulfilled**.

**Standard 1.3 Student-centred learning, teaching and assessment:** Universities ensure that the courses offered are carried out in such a way as to encourage students to play an active role in the design of the learning process and that this approach is also taken into account when assessing students / examinations.

The criterion is **fulfilled**.



**Standard 1.4 Student admission, progression, recognition and certification:** Universities ensure that the courses offered are carried out in such a way as to encourage students to play an active role in the design of the learning process and that this approach is also taken into account when assessing students / examinations.

The criterion is **fulfilled**.

**Standard 1.5 Teaching staff:** Universities ensure the competence of their teachers. They use fair and transparent procedures for the recruitment and further training of their employees.

The criterion is **fulfilled**.

**Standard 1.6 Learning resources and student support:** The university has adequate funding to finance study and teaching and ensure that there is always a sufficient and readily available range of learning and support available for their studies.

The criterion is **fulfilled**.

**Standard 1.7 Information management:** Universities ensure that they collect, analyze and use the relevant data relevant to the successful conduct of studies and other activities.

The criterion is **fulfilled**.

**Standard 1.8 Public information:** Universities publish easily understandable, correct, objective, up-to-date and well-accessible information about their activities and courses of study.

The criterion is **fulfilled**.

**Standard 1.9 On-going monitoring and periodic review of programmes:** Universities are constantly monitoring their courses and regularly reviewing them to ensure that they achieve the goals set and meet the needs of students and society. The tests lead to a continuous improvement of the courses. All affected parties will be informed about any measures planned or resulting from this.

The criterion is **fulfilled**.

**Standard 1.10 Cyclical external quality assurance:** Universities regularly undergo external quality assurance procedures in accordance with the ESG.

The criterion is **fulfilled**.

## 2 Accreditation Recommendation

The peer-review experts recommend unconditional accreditation of „Bachelor in Applied Information Technology (BINFO)“, „Bachelor in Applied Information Technology – Continuing Education Programme (BINFO-CEP)“, „Master in Information and Computer Sciences (MICS)“:

The peer-review experts recommend the following **recommendations**:

### **General recommendations**

1. The analysis of relevant data for strategic university development and quality improvement should be used even more across faculties and become even more institutionally embedded in order to be able to present a more meaningful basis for decision making for further planning of the next phase of university development in the future.
2. Since the processes for quality improvement are thus strongly carried out in the faculties, care should be taken to anchor them even more institutionally.
3. The results of the courses should be fed back to the students.
4. Evaluation should be communicated to students as a quality-assuring opportunity rather than an obligation, enabling them to actively participate in quality assurance.
5. The expert group sees a need for optimization in ensuring that students are taught IT skills. The human resources should be taken into account in this regard and increased if necessary.
6. The proportion of female professors and lecturers should be increased. Incentives should be provided to increase the proportion of female faculty, e.g., childcare.
7. Students should be informed transparently about the assessment criteria for Bachelor's and Master theses and, consequently, about the entire grading process.

### **Recommendations for study programme „Bachelor in Applied Information Technology (BINFO)“**

1. In order to reduce the drop-out rate, students should be given the opportunity to check their suitability for the degree program, e.g. through a free-will online test (Self-assessment).
2. The establishment of a committee is therefore recommended in order to strengthen the coordination and involvement of the practice partners in the long term and to bind companies from the region even more strongly to the university.

### **Recommendations for study programme „Bachelor in Applied Information Technology – Continuing Education Programme (BINFO-CEP)“:**

1. Further opportunities should be developed to equalize the knowledge of the students.

**Recommendations for study programme „Master in Information and Computer Sciences (MICS)“:**

1. An entry level test should be introduced to check students' programming skills.
2. The entry requirements must be more transparent, especially in terms of student competences. This is especially important for applicants who already hold a degree, but from a programme outside the field of computer science.

## V Decisions of the Accreditation Commission of ACQUIN

Based on the peer report, the statement of the university and the statement of the standing expert committees the accreditation commission took on 27 September 2021 the following decisions:

### General recommendations for all study programmes:

- The analysis of relevant data for strategic university development and quality improvement should be used even more across faculties and become even more institutionally embedded in order to be able to present a more meaningful basis for decision making for further planning of the next phase of university development in the future.
- Since the processes for quality improvement are thus strongly carried out in the faculties, care should be taken to anchor them even more institutionally.
- The results of the courses should be fed back to the students.
- Evaluation should be communicated to students as a quality-assuring opportunity rather than an obligation, enabling them to actively participate in quality assurance.
- The expert group sees a need for optimization in ensuring that students are taught IT skills. The human resources should be taken into account in this regard and increased if necessary.
- The proportion of female professors and lecturers should be increased. Incentives should be provided to increase the proportion of female faculty, e.g., childcare.
- Students should be informed transparently about the assessment criteria for Bachelor's and Master theses and, consequently, about the entire grading process.

### Bachelor in Applied Information Technology (BINFO):

**The study programme “Bachelor in Applied Information Technology (BINFO)” is accredited without any conditions.**

**The accreditation is valid until 30 September 2028.**

The following recommendations are given for the further development of the study programme:

- In order to reduce the drop-out rate, students should be given the opportunity to check their suitability for the degree program, e.g. through a free-will online test (Self-assessment).
- The establishment of a committee is therefore recommended in order to strengthen the coordination and involvement of the practice partners in the long term and to bind companies from the region even more strongly to the university.

**Bachelor in Applied Information Technology –Continuing Education Programme (BINFO-CEP)**

The study programme “Bachelor in Applied Information Technology –Continuing Education Programme (BINFO-CEP)” is accredited without any conditions.

The accreditation is valid until 30 September 2028.

The following recommendation is given for the further development of the study programme:

- Further opportunities should be developed to equalize the knowledge of the students.

**Master in Computer Science (MICS)**

The study programme “Master in Computer Science (MICS)” is accredited without any conditions.

The accreditation is valid until 30 September 2028.

The following recommendations are given for the further development of the study programme:

- An entry level test should be introduced to check students' programming skills.
- The entry requirements must be more transparent, especially in terms of student competences. This is especially important for applicants who already hold a degree, but from a programme outside the field of computer science.