

Professional master study programme

Computer Systems (47483)

Study field "Information Technology, Computer Hardware,
Electronics, Telecommunications, Computer Management, and
Computer Science"

Self-evaluation report

2018-2024

ISMA University College

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Computer Systems (47483)

Study field	<i>Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science</i>
ProcedureStudyProgram.Name	<i>Computer Systems</i>
Education classification code	<i>47483</i>
Type of the study programme	<i>Professional master study programme</i>
Name of the study programme director	<i>Viktors</i>
Surname of the study programme director	<i>Gopejenko</i>
E-mail of the study programme director	<i>viktors.gopejenko@isma.lv</i>
Title of the study programme director	<i>Zinātnes doktora grāds (Ph.D.)</i>
Phone of the study programme director	<i>29713956</i>
Goal of the study programme	<i>To prepare innovative and systemically thinking, lifelong learning-oriented system analysts who are competitive in the global labour market, who are oriented in the field of computer science, understand the basic principles of business processes analysis and IT system functionality, are able to plan and implement IT solutions, coordinate and supervise team work demonstrating leadership and cooperation skills.</i>
Tasks of the study programme	<ol style="list-style-type: none"> <i>1. Provide competitive higher education according to the seventh-level professional qualification "System Analyst" and prepare specialists with high productivity potential in the global labour market.</i> <i>2. Provide students with knowledge and developed skills in the analysing of business processes, the development of a functional and effective business requirements model, the creation of new IT solutions and the re-planning of existing ones, as well as the creation and management of project teams.</i> <i>3. To create and constantly improve a study environment that provides a multidimensional view of computer system design, a complex approach to solving customer problems and promotes students' understanding of the importance of lifelong learning, including encouraging them to study for a doctoral degree.</i> <i>4. Organize and constantly develop cooperation with other Latvian and foreign educational institutions, professional organizations and employers in attracting highly qualified specialists for the implementation of the study process and its improvement.</i> <i>5. Participate in actualizing the problematic issues of the industry and developing solutions, supporting the scientific research creativity of academic staff and students.</i>

Results of the study programme	<ol style="list-style-type: none"> 1. To manage the development, implementation and maintenance of the processes of ICT solutions in accordance with the standards of the ICT industry, the approved plan and the technical documentation of the specific solution, as well as take responsibility for the results of own work and that of the team. 2. To ensure the design, specification, implementation and maintenance of a wide range of ICT solutions in accordance with customer requirements and the ICT industry standards, to develop the necessary technical documentation for the proposed solutions, as well as to introduce the results of the latest scientific research in the industry to fulfil these tasks. 3. To develop and implement innovative work methods that would ensure high-quality and efficient execution of various tasks related to ICT solutions, as well as to identify and understand the risks associated with the execution of the above-mentioned tasks; to be able to determine and choose the most appropriate risk mitigation measures and to control the risk management process at various stages of task performance. 4. To choose the tools, methods, programmes, software development tools, and software language that best meet the needs of the customers, as well as to provide the necessary communicative processes to explain the validity of the choice made to all interested parties. 5. To formulate the current problems of the ICT sector, which have been observed during the systematic monitoring of problematic issues in the sector, as well as to actively engage in scientific research activity.
Final examination upon the completion of the study programme	Master's thesis.

Study programme forms

Full time studies - 1 years, 5 months - latvian

Study type and form	<i>Full time studies</i>
Duration in full years	<i>1</i>
Duration in month	<i>5</i>
Language	<i>latvian</i>
Amount (CP)	<i>90</i>
Admission requirements (in English)	<i>- First-cycle higher education and sixth-level professional qualification in the field of electrical engineering, electronics, information and communication technologies or - 2nd-level professional higher education acquired until the 11th of October, 2022 or - Master's degree in the field of electrical engineering, electronics, information and communication technologies.</i>
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	<i>Professional Master's degree in Computer and Information Science</i>
Qualification to be obtained (in english)	<i>Systems Analyst</i>

Places of implementation

Place name	City	Address
ISMA University College	RĪGA	VALĒRIJAS SEILES IELA 1 k-6, RĪGA, LV-1019

Part time extramural studies distance education - 2 years - english

Study type and form	<i>Part time extramural studies distance education</i>
Duration in full years	<i>2</i>
Duration in month	<i>0</i>
Language	<i>english</i>
Amount (CP)	<i>90</i>
Admission requirements (in English)	<i>- first-cycle higher education and sixth-level professional qualification in the field of electrical engineering, electronics, information and communication technologies; - second-level higher professional education in the field of electrical engineering, electronics, information and communication technologies until October 1, 2022; - Master's degree in the field of electrical engineering, electronics, information and communication technologies. At least level B2 of the English language proficiency.</i>
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	<i>Professional Master's degree in Computer and Information Science</i>
Qualification to be obtained (in english)	<i>Systems Analyst</i>

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Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	<i>Professional Master's degree in Computer and Information Science</i>
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Part time extramural studies distance education - 2 years, 5 months - english

Study type and form	<i>Part time extramural studies distance education</i>
Duration in full years	<i>2</i>
Duration in month	<i>5</i>
Language	<i>english</i>
Amount (CP)	<i>120</i>
Admission requirements (in English)	<i>- First-cycle higher education in the field of electrical engineering, electronics, information and communication technologies without professional qualification; - Bachelor's or Master's degree and / or sixth- level professional qualification in a specialisation in other fields of engineering and technology science. Entrance examination is mandatory to take; - second-level higher professional education and/or fifth-level professional qualification in other fields of engineering and technology science until October 1, 2022; - Bachelor's or Master's degree and / or a sixth-level professional qualification in a specialisation in other fields of science and at least 2 years of work experience in the field of electrical engineering, electronics, information and communication technologies. Entrance examination is mandatory to take. - Bachelor's or Master's degree and / or a fifth-level professional qualification in a specialisation in other fields of science and have at least 2 years of work experience in the field of electrical engineering, electronics, information and communication technologies until October 11, 2022. Entrance examination is mandatory to take. At least level B2 of the English language proficiency.</i>

Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	<i>Professional Master's degree in Computer and Information Science</i>
Qualification to be obtained (in english)	<i>Systems Analyst</i>

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Full time studies - 2 years - english

Study type and form	<i>Full time studies</i>
Duration in full years	<i>2</i>
Duration in month	<i>0</i>
Language	<i>english</i>
Amount (CP)	<i>120</i>
Admission requirements (in English)	<i>- First-cycle higher education in the field of electrical engineering, electronics, information and communication technologies without professional qualification; - Bachelor's or Master's degree and / or sixth- level professional qualification in a specialisation in other fields of engineering and technology science. Entrance examination is mandatory to take; - second-level higher professional education and/or fifth-level professional qualification in other fields of engineering and technology science until October 1, 2022; - Bachelor's or Master's degree and / or a sixth-level professional qualification in a specialisation in other fields of science and at least 2 years of work experience in the field of electrical engineering, electronics, information and communication technologies. Entrance examination is mandatory to take. - Bachelor's or Master's degree and / or a fifth-level professional qualification in a specialisation in other fields of science and have at least 2 years of work experience in the field of electrical engineering, electronics, information and communication technologies until October 11, 2022. Entrance examination is mandatory to take. At least level B2 of the English language proficiency.</i>
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	<i>Professional Master's degree in Computer and Information Science</i>
Qualification to be obtained (in english)	<i>Systems Analyst</i>

Places of implementation

Place name	City	Address
ISMA University College	RĪGA	VALĒRIJAS SEILES IELA 1 k-6, RĪGA, LV-1019

Part time studies - 2 years, 5 months - english

Study type and form	<i>Part time studies</i>
Duration in full years	<i>2</i>
Duration in month	<i>5</i>
Language	<i>english</i>
Amount (CP)	<i>120</i>

Admission requirements (in English)	<p>- <i>First-cycle higher education in the field of electrical engineering, electronics, information and communication technologies without professional qualification;</i></p> <p>- <i>Bachelor's or Master's degree and / or sixth- level professional qualification in a specialisation in other fields of engineering and technology science. Entrance examination is mandatory to take;</i></p> <p>- <i>second-level higher professional education and/or fifth-level professional qualification in other fields of engineering and technology science until October 1, 2022;</i></p> <p>- <i>Bachelor's or Master's degree and / or a sixth-level professional qualification in a specialisation in other fields of science and at least 2 years of work experience in the field of electrical engineering, electronics, information and communication technologies. Entrance examination is mandatory to take.</i></p> <p>- <i>Bachelor's or Master's degree and / or a fifth-level professional qualification in a specialisation in other fields of science and have at least 2 years of work experience in the field of electrical engineering, electronics, information and communication technologies until October 11, 2022. Entrance examination is mandatory to take. At least level B2 of the English language proficiency.</i></p>
Degree to be acquired or professional qualification, or degree to be acquired and professional qualification (in english)	<i>Professional Master's degree in Computer and Information Science</i>
Qualification to be obtained (in english)	<i>Systems Analyst</i>

3.1 Indicators Describing the Study Programme

3.1.1. Description and analysis of changes in the parameters of the study programme made since the issuance of the previous accreditation form of the study field or issuance of the study programme license, if the study programme is not included on the accreditation form of the study field, including changes planned within the evaluation procedure of the study field evaluation procedure.

The following changes in the indicators describing the study programme have occurred since the issuance of the previous accreditation in the Master's study programme "Computer Systems", taking into account the comments and recommendations provided by the accreditation experts during the previous accreditation of the study direction, changes in the demand structure, by updating the study programme according to the needs of the labour market and trends of scientific development, namely, the aim and objectives of the study programme are corrected, the awarded degree, the programme code, the forms of implementation, the amount and duration of the study programme are specified. The name, awarded qualification and final examinations remain unchanged. The changes made and their analysis is presented in the table below.

The changes made in the Indicators describing the Master's study programme "Computer Systems"

Indicators describing the study programme	Changes made and their analysis
Amount of the study programme (ECTS)	In accordance with the requirements of the labour market and to ensure the competitiveness of the programme, it was decided to reduce the amount of the programme. The study programme will be implemented in the amount of 90 ECTS, if a qualification or 2nd level higher professional education in the field of electronics, information and communication technologies has been previously obtained, while in the amount of 120 ECTS - for students who have obtained a Bachelor's education or professional qualification in other branches of science (see admission requirements for details).
Form, type, and duration of the study programme	Due to the reasons mentioned in the previous paragraph, the study duration of 2.5 years (in full-time studies), which applied to the study programme in the amount of 180 ECTS, is no longer relevant. According to the changes in the Law on Higher Education Institutions studies are not conducted in Russian starting from January 1, 2019, only in Latvian and English. Studies are planned in the following forms and types:

Full-time intramural	Clarified admission requirements in different variants of the study programme. Admission requirements for the second cycle higher education Master's programme "Computer Systems" with study duration of 1.5 ac.years. (full-time studies) or 2 ac.years. (part-time studies):
Full-time intramural	2 years and 5 months (120 ECTS) or 2 years (90 ECTS) or 2 years and 5 months (120 ECTS)
Part-time intramural	- First-cycle higher education and sixth-level professional qualification in the field of electrical engineering, electronics, information and communication technologies or
Part-time distance	- 2nd-level professional higher education acquired until the 11th of October, 2022 or Master's degree in the field of electrical engineering, electronics, information and communication technologies. And
Admission requirements	for the studies implemented in English: at least level B2 of the English language proficiency.

Admission requirements for second-level higher education programme "Computer Systems" with the duration of studies 2 ac. yrs. (full-time studies) and 2,5 ac.years. (part- time studies) is for persons:

- First-cycle higher education and sixth-level professional qualification in the field of electrical engineering, electronics, information and communication technologies without professional qualification.
- Bachelor's or Master's degree and/or a sixth-level professional qualification in other engineering and technology sectors. The entrance examination is mandatory to pass;
- Bachelor's or Master's degree and/or a sixth-level professional qualification in other engineering and technology sectors acquired until the 11th of October, 2022. The entrance examination is mandatory to pass;
- Bachelor's or Master's degree and/or a sixth-level professional qualification in other engineering and technology sectors and at least 2-year working experience in the field of electrical engineering, electronics, information and communication technologies. The entrance examination is mandatory to pass;
- persons who have acquired Bachelor's or Master's degree and/or a fifth-level professional qualification in other fields of science until the 11th of October, 2022 and at least 2- year working experience in the field of electrical engineering, electronics, information and communication technologies. The entrance examination is mandatory to pass.

And for the studies implemented in English: at least level B2 of the English language proficiency.

Degree, professional qualification to be awarded	The awarded degree has changed – upon the completion of the study programme, a Master's degree in computer science and informatics will be awarded. The qualification to be awarded has not changed – System Analyst.
Code of the study programme	In accordance with the regulations of the Cabinet of Ministers of June 13, 2017 No. 322 “Noteikumi par Latvijas izglītības klasifikāciju” (Regulations on Latvian education classification), the code of the study programme "Computer Systems" according to the group of educational programmes “Datorsistēmas, datubāzes un datortīkli” (Computer systems, databases and computer networks) has been changed to 47483 (or 0612 according to ISCED-F 2013).

The aim, objectives and learning outcomes of the study programme have been adjusted according to the comments and recommendations of accreditation experts, the structure of qualifications developed by NEP (Councils of industry experts), the Latvian National Development Plan for 2021-2027 (LNAP 2021-2027), as well as the needs of the labour market and science development trends, harmonizing them with ISMA strategy and the goal of the study direction.

3.1.2. Analysis and assessment of the study programme compliance with the study field. Analysis of the interrelation between the code of the study programme, the degree, professional qualification/professional qualification requirements or the degree and professional qualification to be acquired, the aims, objectives, learning outcomes, and the admission requirements. Description of the duration and scope of the implementation of the study programme (including different options of the study programme implementation) and evaluation of its usefulness.

The Master's study programme "Computer Systems" fully corresponds to the study direction "Information Technology, Computer Hardware, Electronics, Telecommunications, Computer Management, and Computer Science", including the acquisition of such skills and competencies as business process analysis, creation and re-planning of IT solutions, preparation of technical documentation according to ICT industry standards etc., while promoting the development of leadership skills, as well as the understanding of the importance of cooperation and lifelong learning in one's profession, which is fully in line with the aim of the study direction to prepare competent, self-improvement-oriented and innovative-thinking professionals in the field of computer science and informatics who are competitive in the global market.

The name of the study programme is the Master's study programme "Computer Systems", which combines the key words of the degree to be obtained - Master's degree in computer science and informatics and the qualification to be obtained - System Analyst. The study programme is coordinated with the requirements of the corresponding Occupational Standard "System Analyst" and the qualification structure of the Electronic and Optical Equipment Production, Information and Communication Technology sector agreed at the December 15, 2021 meeting of the Professional Education and Employment Tripartite Cooperation Sub-Council (PINTSA). In accordance with this

Standard and the labour market situation, the aim of the study programme has been formulated, emphasizing professionalism, systemic thinking, orientation to lifelong learning, as well as innovative approach to solving problems. The objectives of the programme are set to achieve the aim of the study programme and are oriented towards the coherence of such elements of the study process as curriculum, learning environment, cooperation with external partners and scientific research. The planned learning outcomes are aligned with the professional standards and the requirements of knowledge, skills and competencies corresponding to the 7th level of the Latvian Qualifications Framework (LKI), as well as reflect the fulfilment of the programme's aims and objectives.

In accordance with the regulations of the Cabinet of Ministers of June 13, 2017 No. 322 "Noteikumi par Latvijas izglītības klasifikāciju" (Regulations on Latvian education classification), the code of the study programme "Computer Systems" according to the group of educational programmes "Datorsistēmas, datubāzes un datortīkli" (Computer systems, databases and computer networks) has been changed to 47483 (or 0612 according to ISCED-F 2013).

The study programme has two implementation options - 90 ECTS and 120 ECTS. The 90 ECTS option allows one to learn the requirements mentioned in the Occupational Standard of System Analyst profession in the shortest possible time and to acquire the competencies which ensure the specialist's competitiveness in the labour market, provided the relevant higher education and professional qualification have been previously obtained. However, the programme option in the amount of 120 ECTS is offered taking into account the rapid development of the IT field and its impact on the most diverse spheres of activity, the demand for IT education is also increasing from the representatives of other industries.

In order to ensure the admission of students to the most appropriate option of the study programme to obtain the professional qualification and degree, which is 120 ECTS or 90 ECTS, different admission requirements have been formulated, which clearly define the requirements to previous education of students to be admitted to each option of the study programme. Only those persons who have obtained a higher education or a Master's degree and a professional qualification in the field of electrical engineering, electronics, information and communication technologies can be admitted to the programme with the amount of 90 ECTS, because this means that they have acquired basic knowledge in the essential areas of the industry and practical skills during the traineeship. On the other hand, if a Bachelor's degree was obtained in other branches of science and there is at least 2 years of work experience in the field of electrical engineering, electronics, information and communication technologies, a student is admitted to the 120 ECTS programme (with the duration of 2 years of full-time studies) and masters study courses that provide basic knowledge in the fields in theory and/or practice according to the Master's degree and professional qualification.

Those who have obtained an academic education can be admitted to the programme with the amount of 120 ECTS, which includes traineeship of 30 ECTS to acquire the practical skills necessary for obtaining the professional qualification.

Mastering the 90 ECTS option of the full-time study programme is offered in Latvian or English, the other forms and types of implementation in both programme options - in English only. This is based on the fact that the demand for studies in this programme in Latvian has always been lower, as well as Latvian residents speak English more and more fluently and want to improve their chances in the labour market, and thus they choose to study in English, especially in the IT field, where the working language is mostly English. Full-time studies are the only opportunity for students from third countries to obtain a residence permit in Latvia in order to get education here.

Part-time intramural studies are implemented for working people who want to use the opportunity

to communicate with lecturers in person, but classes can only be attended in the evenings and on weekends. It should be noted that this form has not been implemented yet due to the small number of interested parties, but it has been decided to keep it and offer it in the future.

So far, part-time studies have been implemented only in the form of extramural studies, but now the decision has been made to switch to part-time distance learning offer in English, creating the distance learning materials, based on documents developed in ISMA - Regulations on Distance Learning (https://www.isma.lv/images/2024/documents_en/ISMA_Tlmcbas_tudiju_nolikums_2023_ENG.pdf), as well as Methodological Guidelines for Lecturers on Distance Learning Studies (<https://beta.moodle.isma.lv/course/view.php?id=816>). The materials will allow one to fully acquire all the necessary skills and competences of System Analyst, and at the same time help students by maintaining of closer contacts in the distance learning environment as well as ensure the control of study works due to the growing risks of unfair use of artificial intelligence. In addition, only distance learning studies are available to the citizens of Ukraine, but the number of students at ISMA from this country is relatively large, especially in recent years.

The duration of studies in each of the programme's implementation options allows you to optimally learn in compliance with all the requirements of the programme. In accordance with the requirements of the Law on Higher Education Institutions, the full-time studies 90 ECTS programme option is implemented within 1 year and 5 months, or 3 full semesters, the 120 ECTS programme option – within 2 years (4 semesters), which provides for the acquisition of 30 ECTS in each study semester. On the other hand, in part-time studies, 2 years or 4 semesters are allocated for the implementation of 90 ECTS, and 2 years and 5 months, or 5 semesters, for 120 ECTS, arranging the number of credits to be acquired by semesters as evenly as possible. In all the options and methods of implementation of the programme the last study semester is dedicated to only to completion of qualification traineeship and Master's thesis.

3.1.3. Economic and/ or social substantiation of the study programme, analysis of graduates' employment.

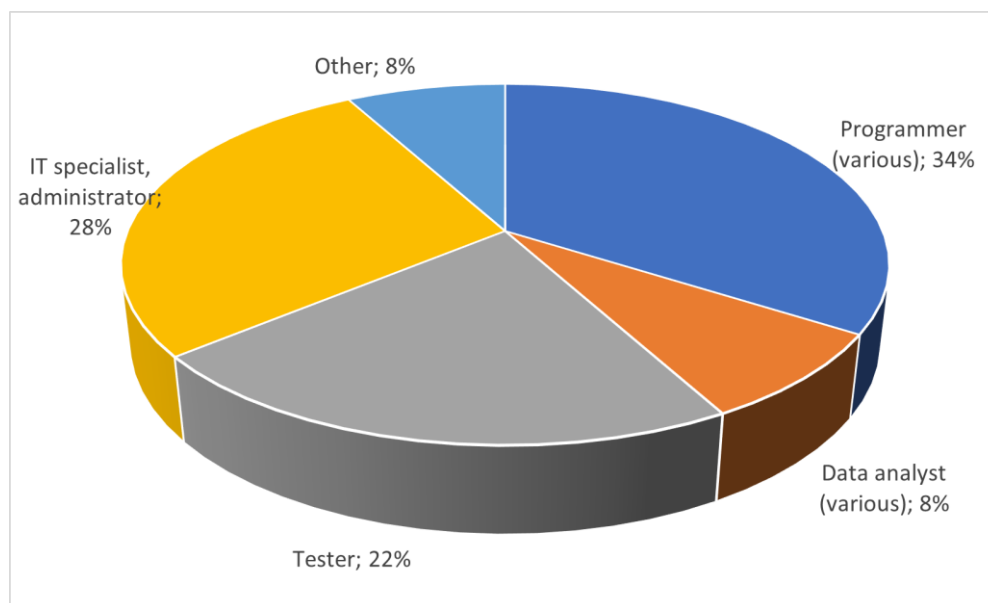
The study programme "Computer Systems" is relevant and important for the development of the national economy of Latvia. In accordance with the goals and directions of action defined in Latvia's National Development Plan for 2021-2027, the study programme prepares specialists who understand the importance of a rationally managed organizational and technological ecosystem and are able to create and implement it, as well as are oriented towards offering knowledge-intensive products and services. Specialists trained by ISMA are ready to not only purposefully realize their competences and accept the challenges of the modern labour market, but also to be responsible in their professional activities. In addition, the implementation of the programme is aimed at international cooperation and involvement in the world science and innovation developments, which "ir priekšnosacījums Latvijas zinātnes izcilībai, piekuivei jaunām zināšanām un resursiem, kā arī Latvijas reputācijai kā valstij ar attīstītu ekonomiku un uzticamām, spējīgām pētniecības organizācijām un uzņēmumiem" ("is a prerequisite for the excellence of Latvian science, access to new knowledge and resources, as well as Latvia's reputation as a country with a developed economy and reliable, capable research organizations and companies") (LNDP 2021-2027).

The study programme is designed in such a way that, after its graduation, students are oriented towards independent lifelong learning and are able to continue learning in doctoral studies.

ISMA regularly conducts graduate surveys so as to find out the progress of former students after graduation, including employment indicators, places of work and further studies. Since the surveys are conducted electronically, using the ISMA alumni database, those graduates went abroad from Latvia also participate in them.

Of the graduates who responded to the request to participate in the survey, all noted that they work successfully both in Latvia and abroad. Latvia, India, Czech Republic, United Kingdom, Nepal are mentioned as countries of employment.

The positions indicated by the graduates are mainly related to the education acquired in the field of IT - data analyst, system administrator, software tester, programmer in companies of various fields (see Fig.).



Graduates' employment by positions

Some of the respondents, and this is especially noticeable among the foreigners who have chosen to stay in Latvia after completing their studies, indicate that they are employed in a field not directly related to the profession they have acquired, taking a position such as travel expert, restaurant manager, but there are less than 10% of all graduates who have provided information about themselves.

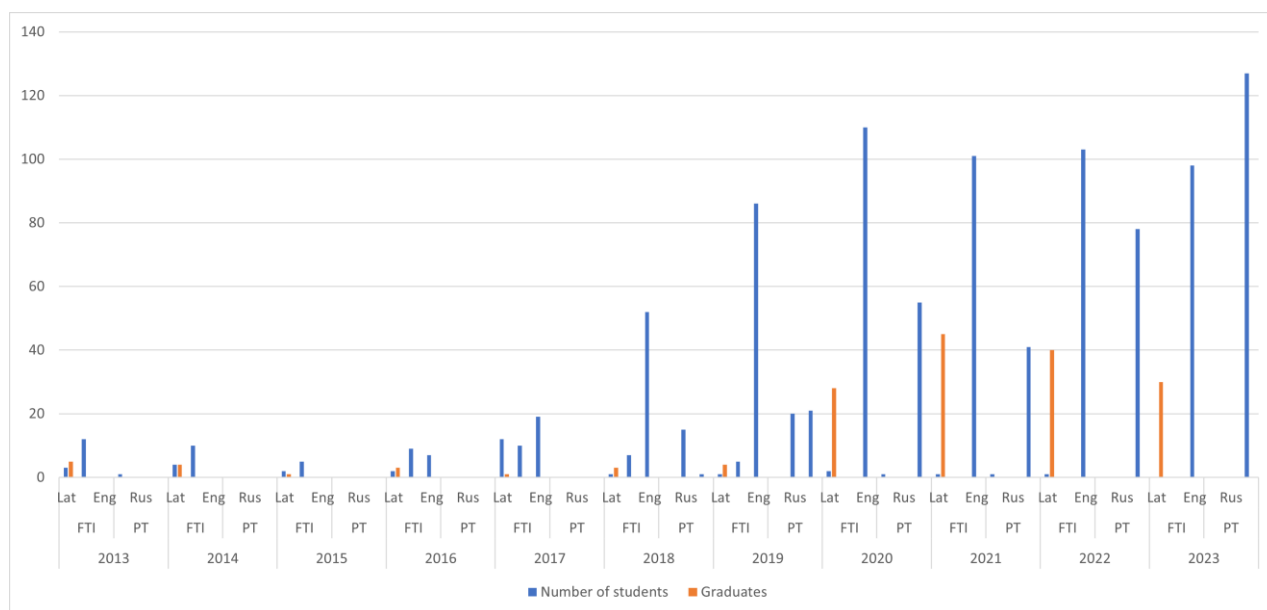
3.1.4. Statistical data on the students of the respective study programme, the dynamics of the number of the students, and the factors affecting the changes to the number of the students. The analysis shall be broken down into different study forms, types, and languages.

Evaluating the number of students in the Master's study programme "Computer Systems" since the previous accreditation of the study direction, it can be seen that the number of students in the programme continues to increase every year. In 2013 the total number of students was only 16 students, but in 2022 this number increased more than 10 times to 182 students and there are already 225 students in 2023, mostly due to the increase in the number of foreign students.

Obviously, the university's decision to develop cooperation with student agents from third countries and to take promotion measures to these markets was a correct and timely solution, which helped to maintain competitive positions both on the domestic and international markets. Logically, the largest increase in the number of students can be observed in studies in English.

All students in the study programme pay tuition fees by themselves, there are no state budget places in the programme. The graphic representation of the number of students is presented below, the tables show the number of students and graduates by year, years of studies, forms of studies, languages, and the distribution of full-time students by countries are attached in Annex 4.1.2.

Statistics on the students in the reporting period.



Distribution of the number of students by study forms and languages in 2013-2023.

The statistical data show that the demand for the programme has started to grow significantly since 2018, and in 2022, when the impact of the pandemic has reduced the demand in other fields of study, the number of students in the IT field has continued to grow, although more slowly. This means that the programme is becoming known both on the Latvian and international markets, and it is positively evaluated by both university graduates and employers. Since the 2016/2017 academic year, the number of foreign students has started to increase significantly. One of the reasons for the programme's popularity in Uzbekistan is the low level of IT development and the high demand for specialists in this field. Additionally, the already established cooperation with companies in this region allows students to do traineeships in their home country, which increases their chances to successfully find a job after obtaining a diploma. On the other hand, those who spend the entire study period in Riga or use the Erasmus internship offer note the employers' assessment of the experience gained in European companies, which is highly appreciated in Uzbekistan and neighbouring countries.

The increase in the demand for the studies in English is related both to the fact that, according to the changes in the Law on Higher Education Institutions, since 2019 studies in Russian are no longer offered, and to the growing number of students from English-speaking countries (for example, India, Pakistan) and other countries. Also, along with the interest of the Uzbek government in the establishment of the ISMA Branch in Fergana and the support provided to it, information about the quality of studies offered by ISMA has spread both in Uzbekistan and in neighbouring countries, thus a rapid increase in the number of students from this region can be observed. Along with the active operation of the representative office in Ukraine, the number of students from this country has also increased significantly. In addition, existing ISMA students are happy to share their feedback with their relatives and friends, who also choose to study in Riga under the influence of this information. Most foreigners, especially from countries outside the European Union, study full-time, which is related to obtaining a residence permit in Latvia, otherwise they would not be able to study here.

In the case of part-time studies, only the form of extramural studies has been implemented so far, however, as the interest in distance learning studies has increased, it is planned to start implementing the study programme also in this form from the next academic year.

Analysing the reasons for dropping out, it should be noted that many foreign students are not ready for the study process and requirements set by ISMA. Not being able to complete the tasks assigned within the study courses on time, some students decide to leave their studies on their own will, some are exmatriculated due to academic or financial debts.

3.2 The Content of Studies and Implementation Thereof

3.2.1. Analysis of the content of the study programme. Assessment of the interrelation between the information included in the study courses/ modules, the intended learning outcomes, the set aims and other indicators with the aims of the study course/ module and the aims and intended outcomes of the study programme. Assessment of the relevance of the content of the study courses/ modules and compliance with the needs of the relevant industry, labour market and with the trends in science on how and whether the content of the study courses/ modules is updated in line with the development trends of the relevant industry, labour market, and science.

The content of the Master's study programme "Computer Systems" is designed to ensure the preparation of a professional who, by understanding the principles and models of business process analytics, is able to independently plan and implement IT solutions, as well as to build and supervise an effective team work. Therefore the programme includes the courses which develop knowledge, skills and competences in business process analysis, computer systems design, IT solution development and redesign (e.g., *Data Analysis, Business Intelligence, High-level analytics and knowledge technologies, System Approach to Computer System Design*, etc.), management of software projects (*Project Quality Management, Software Risk Analysis*, etc.) and information security topics (*Computer Security Principles and Technologies, Security of Computer Networks, Security and Privacy Compliance, Secure Development and DevSecOps* etc.), and the study courses in the field of entrepreneurship and management (*Business Management*), and for the development of general attitudes and competences (*Philosophy of Science Development and Approaches to Research, Environment, labour and civil protection*). In addition, the academic staff involved in the implementation of the study courses are professionals with considerable practical experience: data analysts, programmers, database developers and other highly-qualified specialists, so they introduce students to up-to-date latest developments, findings and methods in the field.

The study programme has been elaborated and updated based on the laws and regulations (the Law on Higher Education Institutions, education standard and Occupational Standard), instructions of the accreditation experts during the previous assessment of the study direction, results of student and graduate surveys, results of final theses, topical scientific research, including the research conducted by ISMA academic staff, recommendations of employers expressed in the references from traineeship placements, meetings at conferences, consulting on the development of Master's Theses, reviewing of Master's Theses, and participation in the state examination commissions (Master's Theses defence). Such a comprehensive and diverse approach to the improvement of the study content and process ensures that the content of the study programme corresponds to the requirements of the labour market and the development trends of the relevant industry.

In the development and implementation of the study programme, a logical sequence is followed: in compliance with the requirements defined in the Occupational Standard, labour market demand and the overall aim of the field of study, the aim of the programme and the tasks resulting from it are formulated. The content of the programme (distribution of the study courses) is based on the achievement of the aim and learning outcomes and the criteria defined in the educational standard; accordingly, the content of study courses is designed to implement the acquisition of knowledge, skills, and competences defined in the Occupational Standard, thus ensuring the implementation of the aim of the study programme.

The content of the study courses is discussed and approved cooperatively by the teaching staff involved in the study programme and the members of the Study Direction Council, thus ensuring cross-curricular coherence and harmonisation of common requirements for the achievement of learning outcomes, as well as eliminating unnecessary duplication of content.

According to ISMA internal regulations, a Council of respective study direction supervises the topicality of the study programme by making corrections to the study plan, the content of the study courses, traineeship assignments, etc. when necessary. The descriptions of the study courses are updated and

reviewed in the respective departments at least once a year, usually before the beginning of academic year or more frequently if necessary. ISMA Senate approves the study plan at least once a year.

In the reporting period the most significant changes were made in accordance with the Senate Decision No 1-22 of 18 January 2022 to reduce the amount of the study programme in order to ensure its relevance to the demand and trends of the labour market, thereby increasing the competitiveness of the study programme. The revised programme has been adjusted to exclude narrowly specialised courses or the study courses which are no longer relevant in their current form (e.g. *Nanodevices for Computer Systems, Solid State Electronics Computational Methods and Software, Personal Wireless Communication Systems, E-Business Technologies Models and Efficiency* etc.); the content of some study courses has been recognised as more appropriate for undergraduate level, for example, *Operation Systems Conceptions, Programming for Data Science, Information Society*.

So as to improve the study programme, several study courses were merged, for example *Programming for Data Science* includes the previous courses *C++ and Java Object-Oriented Programming, WEB programming, 'Client-Server' Programming, Object-Oriented Analysis and Modelling*, in turn the study course *System Approach to Computer System Design* includes highlights of the courses *System Approach to Computer System Design, Computer Systems Projecting and Diagnostics, Computer Systems Special Applications*.

Important study courses were introduced in accordance with the requirements of the labour market and current trends in the industry, mainly related to data processing, information and data security, machine learning. In order to offer students in-depth specialisation in the field of their interest, the study courses are divided into blocks in the elective courses section, which provides for the possibility of specialisation in information security management, data engineering or machine learning, so that after acquiring the basic knowledge, the future specialist can focus in depth on what he plans to do in the future. This gives the opportunity to acquire exactly those skills and competences on the final stage of the studies during qualification practice and Master's thesis development, thus being able to find and prove your place on the labour market.

Both options of the programme – 90 ECTS or 120 ECTS – provide for obtaining the qualification of System Analyst. As only those persons who have obtained a higher education or a Master's degree and a professional qualification in the field of electrical engineering, electronics, information and communication technologies can be admitted in the shortest version, it means that the basic knowledge, skills and competences in the essential areas of the industry have been acquired.

Therefore, the requirements of the Occupational Standard of the System Analyst profession are met by studying in the study programme in the amount of 90 ECTS. On the other hand, if the Bachelor's degree was obtained in other branches of science, a student is enrolled in the 120 ECTS programme option and takes study courses in the amount of 30 ECTS, which provide basic knowledge and skills in the branch. Those who have obtained an academic education can be admitted to 120 ECTS programme, which includes traineeship in the amount of 30 ECTS in order to learn the practical skills necessary for obtaining professional qualification. Thus, students of all options of the programme have the opportunity to acquire all the necessary knowledge, skills and competences in the amount corresponding to the Occupational Standard of the profession and the requirements of the labour market.

3.2.2. In the case of master's and doctoral study programmes, specify and provide the justification as to whether the degrees are awarded in view of the developments and findings in the field of science or artistic creation. In the case of a doctoral study programme, provide a description of the main research roadmaps and the impact of the study programme on research and other education levels (if applicable).

By mastering the Master's study programme, a student both consolidates and improves the knowledge

and qualifications of the previous education cycle (Bachelor's or professional higher education) and also prepares for a higher education cycle such as doctoral studies. Therefore, a Master student should demonstrate not only their abilities and competence to develop and plan practical IT solutions, but also to conduct theoretical research and apply the latest achievements and knowledge of computer science and informatics in a Master's thesis, which is an integral part of the study programme and one of the main forms of controlling the learning outcomes. As emphasised in the methodological guidelines for the development of Master's thesis, the most important feature of Master's thesis is that it is a scientifically practical study. The basic requirements for this type of work are as follows:

- it must be a study of a current problem of scientific practicality;
- one must base on the study of theoretical and specialised literature, evaluate and use the latest scientific research and publications on the particular problem;
- one must process published and unpublished data and information sources, materials, personal experiments, surveys, and observed facts by applying modern research and data processing techniques.
- it is recommended to review technological developments, new engineering and software solutions, market requirements, professional requirements in the field of information technology, existing standards, economic evaluations of technologies, potential risks of proposed solutions and implementation problems in the subject area.

In order to demonstrate their scientific research skills, Master students are invited to present their publications and speeches at conferences and workshops related to those studies in their Master's theses and to add expert reviews that have a significant impact on the assessment of the Master's thesis and the award of the Master's degree. When the student submits the completed Master's thesis, the supervisor verifies that it meets the above requirements and only then accepts the Thesis and promotes it for defence, approving that with a personal signature on the title page of the Master's thesis.

3.2.3. Assessment of the study programme including the study course/ module implementation methods by indicating what the methods are, and how they contribute to the achievement of the learning outcomes of the study courses and the aims of the study programme. In the case of a joint study programme, or in case the study programme is implemented in a foreign language or in the form of distance learning, describe in detail the methods used to deliver such a study programme. Provide an explanation of how the student-centred principles are taken into account in the implementation of the study process.

In the process of implementation of the Master's study programme "Computer Systems" various and diverse study methods and forms are used - lectures, seminars, analysis of practical situations, discussions, presentations, independent works individually and in groups, on-line lectures, video lectures, online tests, using various innovative tools and applications such as sli.do, Kahoot!, Socrative.com, etc. In addition to the contact hours, students carry out independent work as planned in the course. For example, the *Introduction to Quantum Computing* course uses Maxima Algebra, a computer algebra system written in Lisp with an emphasis on symbolic computing, while the Secure Software Development and DevSecOps course uses Hardened VM, SonarQube's open source platform for continuous code quality analysis and measurement. In the professional study courses, specific equipment and software are used to consolidate knowledge and complement theoretical material, such as Vensim PLE software (*"Computer Experiments and Modelling Technologies"*), PostgreSQL database and PgAdmin (*"Databases and SQL"*), thus turning the theoretical material into practical.

Academic staff share their experience in using new and modern teaching methods, acquiring e-environment opportunities, development of creative thinking, and so on regularly, including the framework of annual conference "Open Learning and Distance Education" organised in January 2023

for the 21st time already.

In order to ensure the topicality of the study content, there are professionals of the specific industry also involved as guest lecturers in the implementation of the study process, who introduce the topicalities of the sector, discuss and analyse particular examples in practical work, as well as consult students during their practical research (see also 3.4. Teaching Staff).

According to the ISMA Rector's order, 80 academic hours are provided for every 3 ECTS, of which in the Master's study programme for full-time intramural studies there are 24 contact hours in the audience, for part-time intramural studies 16 contact hours in the audience; for part-time distance learning or extramural studies – 1 consultation hour per week for each study course, remotely or in person, on a student's choice.

Lecturers motivate and support students to use various possibilities in planning and organising their independent learning, for example, to use study materials prepared by the lecturers of the respective study course in the electronic training system MOODLE

ISMA uses the Moodle automated testing tool for all types of student assessment, which enables objective and rapid assessment of the level of competence, set in the standards and greatly simplifies the assessment process. This is due to the reform of the education system and the need to improve the quality of student learning by using modern forms, technologies and teaching methods, as well as by introducing a competency-based approach to education.

Moodle was chosen for the testing of full-time and distance learning students because it organises an electronic learning environment. Moodle's technical capabilities allow for the development of tests comprising eleven question types, including open and closed questions, nested, computed, matching, etc.

An unlimited number of tests can be created from the test banks for all modules and topics of a study course. Depending on the discipline, it is possible to construct self-tests, intermediate tests per module and a final examination. LMS Moodle test settings are made according to their purpose. They allow you to use the assessment system not only to assess the level of mastery of the material, but also for self-study and self-monitoring. The Moodle system allows you to configure the testing period and time, number of attempts, assessment method, location, question properties, view, appearance, additional restrictions on attempts, final feedback in the form of a text description depending on the score, general module settings and access restrictions.

The Moodle e-learning system is used for the implementation of the study programme in the form of distance learning, which provides both convenient and visible uploading of materials and opportunities for self-monitoring and assessment of students' achievements. The organisation of distance learning studies, including the preparation of materials, the specifics of testing and practical work, etc., are described in the documents "ISMA Regulations on Distance Learning"

(https://www.isma.lv/images/2024/documents_en/ISMA_Tlmcbas_tudiju_nolikums_2023_ENG.pdf) and

"ISMA Methodological Guidelines for Lecturers on Distance Learning Studies"

(<https://beta.moodle.isma.lv/course/view.php?id=816>), which are developed and operate in accordance with the ISMA Regulations on Studies.

The specifics of the Latvian and English language streams are of minor importance because, firstly, the Latvian stream is still in relatively low demand and, secondly, the working language in the IT field is English, so the reference materials, terminology and the platforms and tools used are mainly available and used in English.

The teaching staff choose study methods and forms in accordance with the specificity of their study course and its role in the study programme, practical activities within the study process, as well as the principles of student-centred education, the observance of which at the higher education institution gives students additional powers and imposes additional duties and responsibilities. By supporting students to influence

their own study process, ISMA's faculty embraces the challenge of creating a modern, open and supportive study process.

When starting work with a particular group of students, a lecturer introduces the planned learning outcomes to the students and discusses the topicality of the study course. Then, taking into account the interests and needs of the students as well as the specifics of the study course, the lecturer agrees with the students on a possible adaptation of the learning process and the assessment system. Before starting the mastering of the study course, students are informed about the conditions to be met during the course of study, how knowledge is assessed and how the final assessment is formed. This set of requirements is also included in the description of each study course.

3.2.4. If the study programme envisages an internship, describe the internship opportunities offered to students, provision and work organization, including whether the higher education institution/ college helps students to find an internship place. If the study programme is implemented in a foreign language, provide information on how internship opportunities are provided in a foreign language, including for foreign students. To provide analysis and evaluation of the connection of the tasks set for students during the internship included in the study programme with the learning outcomes of the study programme (if applicable).

The 90ECTS version of the Master's study programme "Computer Systems" provides for traineeship of 9 ECTS, while the 120ECTS version of the study programme provides for additional 30 ECTS traineeship (39 ECTS in total) for those students who come to the Master's study programme after completing an academic Bachelor's programme. The tasks, course and reporting requirements for each traineeship are reflected in the descriptions, they are the same for all forms and types of studies (see Annex 4.2.5. Descriptions of study courses). In mutual cooperation between a student and a supervisor of the Master's thesis, the tasks of the qualification traineeship may be supplemented or adjusted according to the topic of the Master's thesis, which is also defined in the description of the traineeship.

When developing and updating traineeship objectives, one calls for ISMA administrative staff and academic staff (Directors of study programmes, leading lecturers, representatives of the Career Centre, representatives of the International Relations Department, etc.), and local and foreign employers to collaborate to ensure the training of the professionals ready to enter the labour market. For example, N.Križna, Associate Data Scientist at CTCO and I.Babičs, Member of the Board at DEVNRISE, regularly participate in the discussions of traineeship tasks within the Computer Systems programme. Members of ISMA Students Self-government Body are also invited to cooperate, and they are also conducting a continuous survey among students about their wishes and opportunities for traineeships in different companies.

All traineeship objectives are related to the learning outcomes to be achieved within the study programme based on the knowledge, skills, and competences defined in the professional standard and acquired during the study courses. This interrelation and requirements are clearly defined in the descriptions of traineeships (annex No.4.2.5. Descriptions of study courses).

The professional traineeship, which is to be carried out only for academic Bachelor degree holders, should include the application of basic theoretical knowledge of ICT in practice, for example, the ability to evaluate the methods of designing, implementing and maintaining ICT solutions in accordance with customer requirements and ICT industry standards, to study and analyse the processes of receiving and processing information obtained through information systems at an

enterprise, to evaluate the procedures for testing software and information systems developed at an enterprise, etc. On the other hand, the qualification traineeship should consolidate and demonstrate the practical skills, which have been acquired during the studies, in the development of specific ICT solutions, such as formulating a problem specification and selecting the tools, methods, programmes, software development tools and software language that best meet the needs of the customer.

Before going to traineeship, traineeship workshops – meetings are organised for all the students, where the process of the traineeship, the necessity of traineeship objectives, and preparation of traineeship documents are explained. Students are informed about cooperation partners from Latvia and abroad with whom ISMA cooperates within the traineeship and employment. Students are introduced with the Traineeship section in Moodle, where they can find the information they need about the traineeship, and find information on current vacancies.

Every year at the end of November, ISMA organises the international conference “Internship and Employment”, where students get acquainted with potential employers from Latvia and abroad, gain additional knowledge in the field of IT solutions, programming and other latest technologies, the development trends and demand on the Latvian and foreign labour market. At the end of the conference, each student has the opportunity to talk to company representatives, ask any questions they might have, and apply for traineeship. Experience has shown that this conference is very useful as many students gain traineeships in Latvia (in companies like Accenture Latvia, Telus International, Evolution Gaming Latvia, etc.) and in foreign companies (JobTrust in Greece, Aysel- Invest in Uzbekistan, and Clio in Bulgaria).

There is a wide range of traineeship opportunities offered to the students of the Master’s study programme “Computer Systems”. Traineeship objectives are sent out to companies so they can understand exactly what a student must do during the traineeship. Regular surveys of the companies are conducted, student demand is determined during the traineeship workshops, and relevant interrelation is ensured. Companies also offer permanent jobs to final-year students if they can demonstrate their skills during the traineeship, which proves that students have sufficient theoretical and practical training for the labour market

Due to the significant support of the Uzbek state to promote the education offered by ISMA, close and successful cooperation with employers in Uzbekistan, such as Fergana Golden Valley Service, Aysel-Invest, Shoirabegim Adras, Matxalikov Abdunabi Fayzi, etc., has been established, which allows students from Uzbekistan and from nearby countries to undertake traineeships closer to their home country. It should be noted that Uzbekistan's state policy is largely focused on attracting foreign capital, introducing European standards in various areas, and therefore companies often already have a well-established international environment and communication in English.

When concluding agreements for the provision of traineeships in the English language stream, the placement site is informed of the need to provide the internship in English, which does not pose any particular problems given the specific nature of the programme in the ICT field, where English is the main language of communication and work. During the internship, the representatives of the Career Centre follow up and communicate with the representative of the traineeship placement and the trainee, solve the situations that arise. There have been cases when a new traineeship placement is sought during traineeship, to offer all the conditions for the full and successful completion of the traineeship tasks and for the full benefit of the student.

ISMA is continuously developing career opportunities for its students and is looking for new traineeship placements to enable all students to enter the Latvian labour market. For example, in 2022-2023 new cooperation agreements were signed with SIA “Devnrise”, SIA “Komlain” etc., have started cooperation with TELUS International, Apollo Group, SEB Group, AirBaltic. The Head of the

Career Centre meets with representatives of local and foreign employers regularly by encouraging them to offer paid traineeships as well. Students are invited to meetings where representatives of the Career Centre and the International Relations Department report on traineeship opportunities regularly, and this information is disseminated through the website, social media, and informative boards on campus premises. The representatives of Students' Self-government Body are also involved in the dissemination of information.

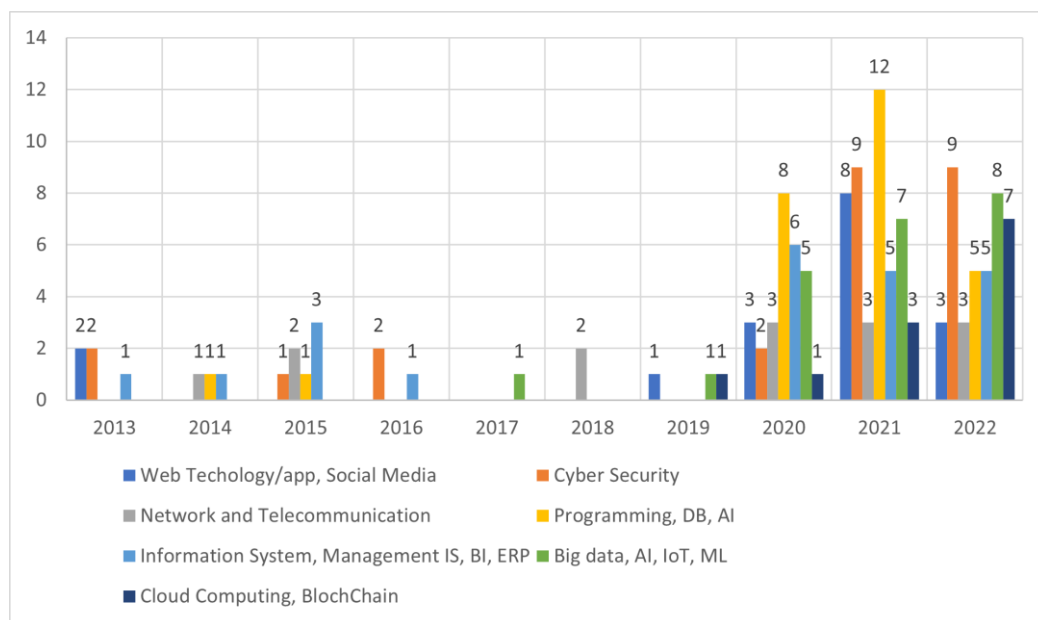
3.2.5. Analysis and assessment of the topics of the final theses of the students, their relevance in the respective field, including the labour market, and the marks of the final theses.

At the end of the Master's study programme "Computer Systems", in order to obtain the Master's degree and professional qualification, students develop and defend Master's theses. Evaluating the themes of the students' final theses 2013-2022 and their relevance to the labour market, it should be noted that all defended theses are related to topical issues of information technologies, for example:

- Development of a security and authentication system for a wireless local area network;
- Development of an efficient data flow distribution system in the information computer system of the heating company "AAA" Ltd. based on Mikrotik router;
- Corporate computer network security solution based on "freezing" of the operating system kernel;
- Development of a security system based on pattern recognition;
- Improved machine learning algorithms for automated security/vulnerability assessment analysis;

Estimating the labour intensity of software development.

By dividing the Master's thesis topics into blocks, we can follow the trends in students' interests over time (see Figure).



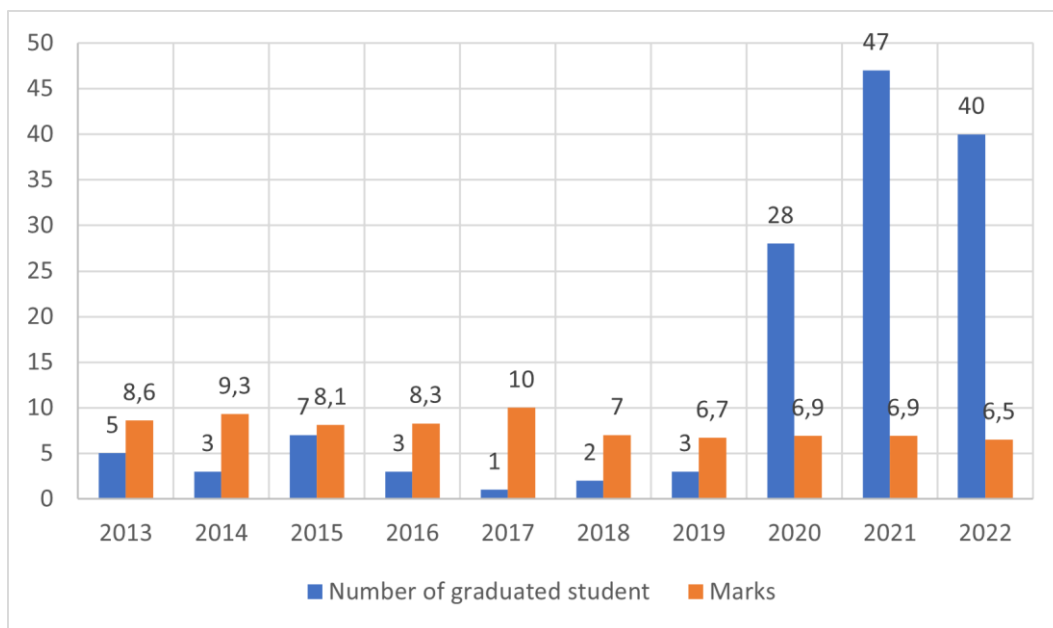
Master's thesis topics by blocks 2013-2022

As it can be seen, topics related to big data technologies and cloud computing are becoming more and more popular, while software development and information security issues have always caused students' interest.

A large part of the research carried out within the Master's theses and the resulting recommendations are appreciated and actually used in the activities of specific companies, as evidenced by the feedback provided by employers, which is attached to the submitted final theses. Therefore, it is possible to state that ISMA students, choosing the final topic and research objects, are based not only on theoretical

knowledge acquired during their studies, but also on practical skills, and are competent to formulate current problems of the ICT industry and to choose the most appropriate tools, methods, programs, software development tools and software language to meet the needs of customers.

In most cases, the interrelation between the chosen topics of the final theses and a current employer or the chosen traineeship placement is assured, however, a student does not always have the opportunity to draft a Master's thesis based on the company where the undergraduate traineeship was completed. This problem is urgent, and ISMA Career Centre tries to assist students in solving this issue by addressing employers to enable students to complete traineeships and meet the objectives set by the supervisor to draft the Master's thesis. Unfortunately, employers are not always forthcoming and willing to provide the necessary information or to allow trainees to work independently, making it difficult for students to see the big picture, which can even lead to changing the topic of the Master's thesis.



Dynamics of average Master's thesis grades in 2013-2022.

Analysing the Master's thesis average evaluations in the period of 2013-2022, it should be noted that all final theses were successfully defended during this period and the majority of theses were evaluated with grades above 6 (out of 10 maximum possible points), which is considered to be a relatively good indicator.

3.3 Resources and Provision of the Study Programme

3.3.1. Assessment of the compliance of the resources and provision (study provision, scientific support (if applicable), informative provision (including libraries), material and technical provision, and financial provision) with the conditions for the implementation of the study programme and the learning outcomes to be achieved by providing the respective examples.

The "Computer Systems" study programme is implemented in modernly equipped premises in Lomonosova Street 1, where the building has been completely renovated with comfortable, bright, heated and ventilated auditoriums, a library and a cafe. The lecture rooms are equipped with everything necessary for the implementation of modern learning process - computers, projectors, televisions, interactive whiteboards, specialized software, constructors and platforms (for example, Keyestudio constructor, Raspberry-pi, Keyestudio designer kits, Arduino platform, etc.) - which are useful both as aids in conducting lectures and also for evaluating of the learning outcomes. For example, students' presentation skills are trained and tested by presenting group and individual works in many study courses, where projectors and appropriate presentation software are used, as well as specific tools or software, such as the online platform Google Collab or Jupyter Notebooks / Jupyter Lab, etc. On the other hand, to supplement the theoretical material of the professional study courses, specific equipment and software are used to consolidate knowledge, such as Vensim PLE software ("Computer Experiments and Modeling Technologies"), PostgreSQL database and PgAdmin ("Databases and SQL"). Therefore, the theoretical material turns into practical.

In order to provide students with a suitable environment for achieving high study results, appropriate lecture rooms are used for different lecture, for example, in several auditoriums there are easily movable chairs with attached small tables for notes, thus, if necessary, it is easy to organize pair work, larger or smaller groups; there are 4 available lecture rooms with a total of 73 computers, each student has access to a computer during a lecture.

ISMA lecturers and students have the opportunity to use the following resources:

- An ISMA library in a total area of 286 m² with a wide range of books and scientific articles which is regularly updated;
 - International Monetary Fund publications;
 - EBSCO – leading provider of research databases, e-magazines, magazine subscriptions, e- book services for libraries of all kinds;
 - www.scopus.com – ISMA computers in the library •
- Open Access scientific databases and platforms:

• arxiv.org	• Google Scholar	• NBER: National Bureau of Economic Research
• ASCE Library	• HCI Bibliography	• OAIster
• CiteSeerx	• Index Copernicus	• Open Research Library
• Civil Engineering Database	• Information Bridge: Department of Energy Scientific and Technical Information	• Paperity
• CogPrints	• JSTOR Open Content	• Research Papers in Economics
• Collection of Computer Science Bibliographies	• Mendeley	• Russian Science Citation Index
• Dimensions	• Microsoft Academic	• Science.gov
• The Directory of Open Access Journals (DOAJ)	• MyScienceWork	• WorldWideScience
• EconBiz		

ISMA is the official partner of the publishing house "Baltija Publishing" <http://www.baltijapublishing.lv/>

4 times a year ISMA publishes the International Scientific Journal "Economics & Education", which is indexed in Copernicus, as well as in other popular scientific databases (see <http://www.baltijapublishing.lv/index.php/econedu/indexed>).

The range of literature available in the university library, which most directly relates to the needs of the "Computer Systems" study programme, is presented in the table below.

Available literature for the study programme "Computer Systems"

Field	Name	Number of items	By languages Latvian	English	Other
Computers. Computing systems. Informatics. Cryptography	66	145	11	58	76
Computer architecture and operating systems	18	34	14	0	20
Programming	142	258	36	11	211
Databases. Data structures and algorithms	58	127	7	0	120
Networks and systems	61	107	15	9	83
Artificial Intelligence	28	42	0	1	41
Mathematics and statistics	117	186	32	11	143
Management science	538	688	135	95	458
Business	304	406	190	28	188
Law	284	519	127	12	380
Social Sciences	417	564	195	42	327
Scientific research	27	33	2	5	26
Total:	2060	3109	764	272	2073

More information about the infrastructure and material and technical provision can be found in 2.3. Resources and Provision of the Study Field.

3.3.2. Indicate data on the available funding for the corresponding study programme, its funding sources and their use for the development of the study programme. Provide information on the costs per one student within this study programme, indicating the items included in the cost calculation and the percentage distribution of funding between the specified items. The minimum number of students in the study programme in order to ensure the profitability of the study programme (indicating separately the information on each language, type and form of the study programme implementation).

ISMA is a private HEI founded by a legal entity; therefore the tuition fees paid by students are the main source of funding for the implementation of the study process. As a private higher education institution, ISMA does not receive state funding for its activities, and study programmes are financed from the obtained tuition fees. Funding from projects, including international ones, and funding from promoting mobility within the Erasmus+ programme can be mentioned as additional activity-promoting assets. Also,

the academic staff and students, who are involved in ISMA activities, carry out research commissioned by the private business sector, provide consultations, and organize trainings within the framework of informal education, including international ones; the ISMA Career Centre offers various study courses apart from formal studies. The obtained savings are used to ensure the operation of the university, including the implementation of study programmes.

Permanent sources of own revenue of the university are:

- revenues from tuition fees (75%);
- revenues from training courses (6%);
- revenues from contract research (5%);
- revenues from other scientific activity (11%);
- revenues from renting premises, utilities and other services (3%).

On the other hand, the tuition fee is covered from the funds of natural and/or legal entities, it consists of: personal funds of the student, funds of the student's employer, study loan with a guarantee provided on behalf of the state, commercial credit, funds of sponsors.

When planning the distribution of funding for study programmes, the ISMA Board takes into account certain parameters: ensuring administrative-economic activity, the functionality of the used premises; ensuring the study process with teaching aids; ensuring the social life of the university (student events, student involvement, Freshman party, traineeship conferences, ISMA festival, etc.); social benefits for students (discounts, budget places, etc.), renewal and replenishment of teaching equipment (computer security, computer software, etc.), promotion measures (promotion of study programmes, including in social networks, Olympiads, laboratory days, etc.), the necessary funds are planned in the accounting department in accordance with study directions, study programmes and ensuring the operation of the university in general; and financial support is distributed according to the order of the Rector.

Analysing the distribution approach to calculations and planning, it can be said that a mixed approach is applied when savings are planned based on planned income, on the number of students and the projected number of enrolled freshmen before the start of enrolment. Later, these data are compared with the actual number of students in the program, and the distributed funding for the study direction and the programmes is adjusted. Taking into account the strategic development plans, savings are made, amounting to 10% of the total revenue

Information about the costs in the study programme, indicating the items included in the cost calculation, is summarized in the Tables

Costs for a full-time student group (7 students) for the 90 ECTS study programme

Type of costs		Units	Amount	Payment per unit		
Total costs % (EUR)Permanent	Contact hours (51 ECTS)	ac.hour.	408	20 EUR/ac.h	8160	32,2
	Methodological work	piece	14	4 ac.h. per 1 study course	1120	4,4
	Administration and infrastructure costs	piece	7	1125,2 EUR per year per 1 stud.	11814,6	46,6
Variables	Testing of study courses	piece	14	0,25 ac.h. per 1 stud.	700	2,8

Traineeship assessment	piece	7	0,5 ac.h. per 1 stud.	70	0,3
Master's thesis supervision, reviewing, defence	piece	7	25 ac.h. per 1 stud.	3500	13,8
Total for a group of 7 students for the entire study period				25364,6	100,0
Per 1 student per 1 semester				1207,84	

Costs for a full-time student group (7 students) for the 120 ECTS study programme

Type of costs		Units	Amount	Payment per unit	Total costs (EUR)	%
Permanent	Contact hours (81 ECTS)	ac.hour.	648	20 EUR/ac.h	12960	37,4
	Methodological work	piece	18	4 ac.h. per 1 study course	1440	4,2
	Administration and infrastructure costs	piece	7	1125,2 EUR per year per 1 stud.	15752,8	45,5
Variables	Testing of study courses	piece	18	0,25 ac.h. per 1 stud.	900	2,6
	Traineeship assessment	piece	7	0,5 ac.h. per 1 stud.	70	0,2
	Master's thesis supervision, reviewing, defence	piece	7	25 ac.h. per 1 stud.	3500	10,1
Total for a group of 7 students for the entire study period					34622,8	100,0
Per 1 student per 1 semester					1236,53	

Costs for a group of part-time distance learning students (3 students) for the 90 ECTS study programme

Type of costs	Units	Amount	Payment per unit	Total costs (EUR)	%
Updating of study materials	ECTS	51	20 EUR/ak.st.	2040	16,3
Administration and infrastructure costs	EUR	3	Depending on the ISMA stud. number, based on the results of the previous	3600	28,8

academic year					
Consultations	piece	14	1 academic hour per week	4480	35,9
<i>Total permanent costs</i>				10120	81,0
Testing of study courses	piece	56	0,25 ac.h. per 1 stud.	840	6,7
Traineeship assessment	piece	3	0,5 ac.h. per 1 stud.	30	0,2
Master's thesis supervision, reviewing, defence	piece	3	25 ac.h. per 1 stud.	1500	12,0
<i>Total variable costs</i>				2370	19,0
Total for a group of 3 students				12490	

Per 1 student per 1 semester

1040,83

Costs for a group of part-time distance learning students (3 students) for the 120 ECTS study programme

Type of costs	Units	Amount	Payment per unit	Total costs (EUR)	%
Updating of study materials	ECTS	81	20 EUR/ac.h.	3240	21,3
Administration and infrastructure costs	EUR	3	Depending on the ISMA stud. number, based on the results of the previous academic year	3600	23,7
Consultations	piece	18	1 academic hour per week	5760	37,9
<i>Total permanent costs</i>				12600	82,8
Testing of study courses	piece	72	0,25 ac.h. per 1 stud.	1080	7,1
Traineeship assessment	piece	3	0,5 ac.h. per 1 stud.	30	0,2

Master's thesis supervision, reviewing, defence	piece	3	25 ac.h. per 1 stud.	1500	9,9
<i>Total variable costs</i>				2610	17,2
Total for a group of 3 students				15210	

Per 1 student per 1 semester

1014,00

To ensure the profitability of the programme the minimum number of students in the study programme, regardless of the language of studies, is 7 students in full-time studies and 3 students in distance learning studies.

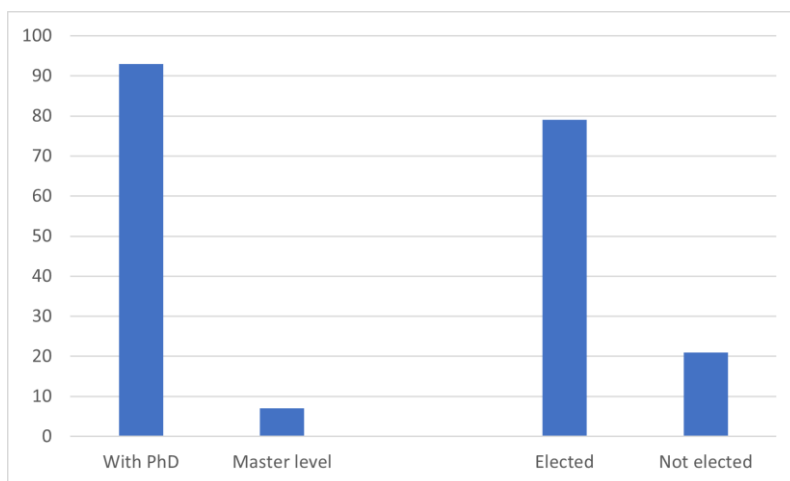
3.4 Teaching Staff

3.4.1. Assessment of the compliance of the qualification of the teaching staff members (academic staff members, visiting professors, visiting associate professors, visiting docents, visiting lecturers, and visiting assistants) involved in the implementation of the study programme with the conditions for the implementation of the study programme and the provisions set out in the respective regulatory enactments. Provide information on how the qualification of the teaching staff members contributes to the achievement of the learning outcomes.

In accordance with Article 27 of the “Law on Higher Education Institutions”, the academic staff of ISMA is composed of: professors, associate professors, docents, senior researchers, lecturers, researchers, assistants. ISMA academic positions are filled in accordance with the legislation of the Republic of Latvia, through the election procedure stipulated by ISMA’s “Regulations on election into academic positions”. The Regulations include the qualification and eligibility criteria for the teaching staff in accordance with Articles 28, 30, 32, 36, 37, 38, and 40 of the “Law on Higher Education Institutions”.

14 lecturers are involved in the implementation of the study programme, of which elected are 10 with Ph.D. and 1 with a Master's degree. 3 lecturers with a Ph.D. are not elected.

The ratio of lecturers with doctoral degrees is appropriate for the implementation of the Master’s study programme; only lecturers with doctoral degrees are involved in the implementation of professional study courses. Only experienced and highly qualified lecturers who teach language courses have a Master's degree. The overall percentage distribution of the teaching staff involved in the implementation of the programme can be seen in Figure below.



Percentage distribution of the teaching staff in the Master's study programme 2023

3 experts of the LCS – V.Gopejenko, A.Bondarenko and V.Riashchenko are also involved in the implementation of the study programme.

As it can be seen from the CVs of the teaching staff in Annex 2.3.2, the teaching staff involved in the study programme read those courses in which they have significant practical experience. For example, A. Bondarenko is a data scientist and a leading Java developer; A. Berezhnojs is an experienced security testing engineer and Security/Privacy manager at the corporate level; R. Kopitov has been the Head of the analysis department in a manufacturing company. J.Chaiko regularly participates in and leads ICT research projects, such as "Future communications with higher-symmetric engineered artificial materials" (2019-2023), etc.

Involving practitioners in the learning process is one of the priorities of the study programme, as it is a significant competitive advantage that ISMA students appreciate. Therefore, guest lecturers are regularly

invited, not only for learning a full study course, but also for discussing individual topics. Some of such lectures and seminars are organized for specific groups of students within a certain study course; some are widely available to anyone interested at ISMA. Important examples of the Master's study programme "Computer Systems" can be mentioned:

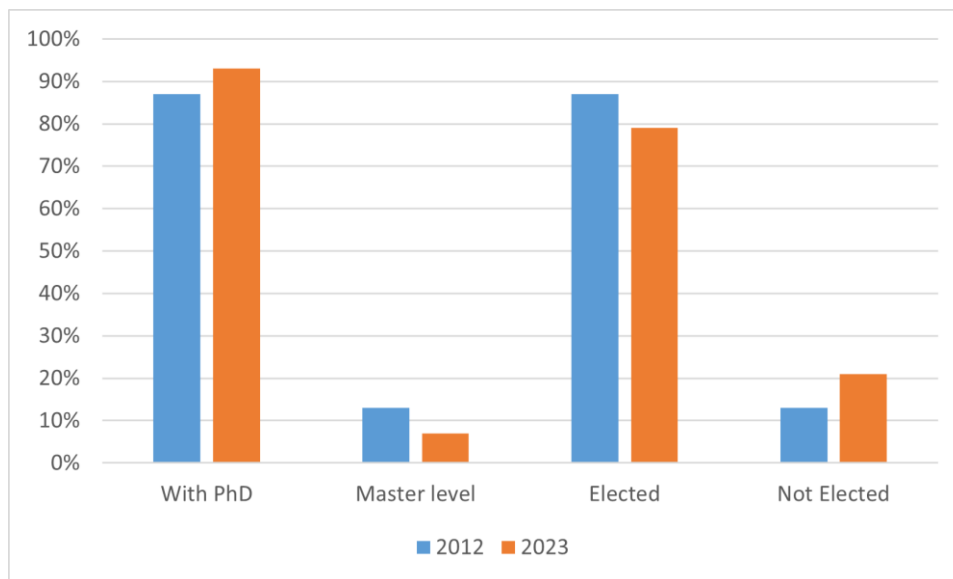
- N. Kņiga (Associated data scientist of SIA CTCO) "Neural network models for risk assessment of financial operations";
- I.Babičs (member of the board of SIA "DEVNRIZE") "Custom WEB Development";
- M.Aleksandrovs (Cyberadviser OŪ Banking, Security consultant and Penetration Tester) regularly informs about news in the security of computers, data, computer networks and applications;
- Regular seminars in collaboration with the machine learning excellence centre on big data processing, ML model development, Business rule processing for customer segmentation (DWH, R- studio, Power BI, SAP HANA).

The teaching staff takes an active role in the improvement of the study programme and the updating of study courses and methodological work, and are also continuing their own self- improvement through further education courses, seminars, further studies, participation in scientific research, conferences, and projects.

The results of scientific activity are incorporated into the study courses, introducing students to the latest trends in the industry (see also chapters 2.4.2 and 4.4.5). ISMA offers support for raising the qualification of the teaching staff, for example by providing financial support for participation in conferences and doctoral studies.

3.4.2. Analysis and assessment of the changes to the composition of the teaching staff over the reporting period and their impact on the study quality.

The composition of the teaching staff involved in the implementation of the study programme "Computer Systems" is generally relatively stable, but since the previous accreditation of the study direction, of course there have been changes in both the composition of the teaching staff and in the numerical indicators (see Figure below and the study plan in Annex 4.2.4.). In 2012, 15 lecturers were involved in the implementation of the study programme, 13 or 87% of them with a Ph.D. and 2 or 13% with a Master's degree, while in 2023 there are involved 14 lecturers, 13 of whom are with a Ph.D. The increase in the proportion of unelected teaching staff (from 2 or 13% in 2012 to 3 or 21% in 2023) is due to the involvement of professionals in the implementation of the programme, which has been repeatedly pointed out by students and graduates. It should be underlined that all non-elected teaching staff are with a Ph.D.



Percentage distribution of the teaching staff in the Master's study programme in the reporting period

Several ISMA academic staff members continue to work in the study programme for many years, for example, V.Gopejenko, J.Čaiko, R.Kopitovs, A.Mrochko. However, a number of teaching staff members with considerable experience in teaching and practical work have also been involved, for example, A.Bondarenko, A.Berežnojs, J.R.Kalniņš, O.Pozdņakova.

Compared to 2012, the number of professors involved in the implementation of the programme has increased:

	Professors	Associated Professors	Assistant Professors
2012/2013	2	6	7
2023/2024	7	1	4

In order to ensure the highest possible quality of the study process and emphasize the students' orientation towards scientific research activities, only academic staff with a doctoral degree are involved in the implementation of the professional study courses of the study programme. This promotes the joint research of students and the teaching staff, as well as allows integrating the results of important research as quickly as possible into the content of the study programme, which is especially relevant in the field of IT, where changes and new discoveries take place constantly and rapidly.

3.4.3. Assessment of the cooperation between the teaching staff members by specifying the mechanisms used to promote the cooperation and ensure the interrelation between the study programme and study courses/ modules. Specify also the proportion of the number of the students and the teaching staff within the study programme (at the moment of the submission of the Self-Assessment Report).

Completely understanding the importance of teaching staff cooperation, ISMA implements this collaboration in three blocks:

1. Cooperation of the teaching staff in the development and updating of study programmes and study course descriptions.
2. Cooperation of the teaching staff in the improvement of methodological work.

3. Collaboration of the teaching staff in scientific research creativity.

To ensure interdisciplinary relation and harmonisation of common requirements for the achievement of learning outcomes, as well as to eliminate an unnecessary overlapping of the study content, the content of the study courses is regularly discussed and approved by the lecturers and the Study Direction Council members involved in the study programme. This is done at Council meetings, departmental meetings, and also during individual informal meetings of the teaching staff where lecturers share information and coordinate their work and study courses.

Teaching staff regularly shares their experience in using new, modern teaching methods, developing e-environment opportunities, developing creative thinking, and similar issues during the annual "Open Learning and Distance Education" conference, which was held for the 21st time in January 2023. During the conference one can learn about the latest research and discoveries from the presentations of the speakers, as well as meet in-person with colleagues from different Latvian and foreign educational institutions and other organizations.

Starting in April 2019, ISMA has launched a new initiative, which is also aimed at promoting the collaboration of lecturers in their pedagogical and methodological work. The first *Erasmus+ Staff Teaching and Training Week at ISMA University* took place in 2019. In an informal setting, participants had an opportunity to discuss current issues in higher education, develop recommendations for student mobility, and share their experience on the specificities of implementation of the study process in Ukraine, Lithuania, Portugal, and other countries. The ISMA initiative has received great response from the teaching staff. Unfortunately, the pandemic and the war in Ukraine temporarily forced exchange programs to be implemented remotely, but in 2023 this initiative is continued by inviting guest lecturers to Riga to conduct seminars and lectures for students and teachers on current topics in various sectors.

The cooperation of the academic staff in the field of scientific creativity is implemented in accordance with the relation of ISMA study programmes implemented in the study direction "Information technologies, computer engineering, electronics, telecommunications, computer management and computer science". Joint scientific research covers such areas as machine learning, big data technologies, cloud computing and cloud computing, ICT security, as well as other research related to the specifics of the study programmes implemented within the direction. Full information on the research conducted by the teaching staff can be found in the biographies of the lecturers (Annex 2.3.2) and in Annex 2.4.2, where information on the scientific research of the teaching staff is collected.

At the time of submission of the self-evaluation, in 2023 there are 225 students in the Master's study programme "Computer Systems" and 14 teaching staff members are involved in the implementation of the programme, therefore, there are 16 students for 1 lecturer, excluding the invited guest lecturers.