ASIIN Seal & EUR-ACE® Label

Accreditation Report

Bachelor's Degree Programmes
Computer Engineering
Information Technologies
Process Automation Engineering

Provided by
Sumgayit State University

Version: 22 March 2024

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A About the Accreditation Process

Name of the degree programme (in original language)	(Official) English translation of the name	Labels applied for [1]	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC)[2]
Kompüter Mühəndisliyi	Computer Engineering	ASIIN, Euro-Inf® Label		02, 04
İnformasiya Texnologiyaları	Information Technologies	ASIIN, Euro-Inf® Label		02, 04
Proseslərin Avtomatlaşdırılması Mühəndisliyi	Process Automation Engineering	ASIIN, EUR-ACE® Label		01, 02
Date of the contract: 23.09.2022 **Submission of the final version of the self-assessment report:** 18.05.2023 **Date of the onsite visit:** 10 – 12.10.2023 **at:** Sumgayit State University				
Expert panel: Prof. Dr. Madhukar Chandra, Chemnitz University of Technology Prof. Dr. Wolfgang Renz, Hamburg University of Applied Sciences Dr. rer. nat. Alfred Schulte, Robert Bosch GmbH Ilhama Novruzova, student at ADA University				
Representative of the ASIIN headquarter: Paulina Petracenko				
Responsible decision-making committee: Accreditation Commission for Degree Programmes				
Criteria used:				

[1] ASIIN Seal for degree programmes; EUR-ACE® Label: European Label for Engineering Programmes

[2] TC: Technical Committee for the following subject areas: TC 02 - Electrical Engineering/Information Technology; TC 05 - Materials Science, Physical Technologies.

European Standards and Guidelines as of May 15, 2015 ASIIN General Criteria, as of December 07, 2021 Subject-Specific Criteria Technical Committee 02 – Electrical Engineering/Information Technology as of September 23, 2022 Subject-Specific Criteria of Technical Committee 05 – Materials Science, Physical Technologies as of September 29, 2016	

B Characteristics of the Degree Programmes

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF[3]	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Computer Engineering	B. Eng.		6	Full time	/	8 Semester	240 ECTS	2009, September
Information Technologies	B. Eng.		6	Full time	/	8 Semester	240 ECTS	2009, September
Process Automation Engineering	B. Eng.		6	Full time	/	8 Semester	240 ECTS	2009, September

Sumgayit State University is located in the city of Sumgayit, about 30km from Azerbaijan's capital, Baku. Sumgait is an important industrial city in Azerbaijan with a strong chemical and metal processing industry. Sumgayit State University was established in 1962 to provide highly qualified personnel for newly established oil and chemical plants in Azerbaijan, and until 1965 it was the Sumgayit branch of the Azerbaijan Oil and Chemical Institute. Since 2000, Sumgayit State University has existed in its present form. In the past academic year, 6 084 students were enrolled at the university. 5 819 of them are studying a Bachelor's programme. The university consists of seven faculties and 29 departments. In the last year, 602 students were studying one of the programmes of the Engineering Faculty.

For the Bachelor's degree programme Computer Engineering the institution has presented the following profile in the self-assessment report:

"The purpose of the Education Program is to provide knowledge and skills for fundamental, social, electronics, electrical engineering and computer sciences, development of computer intellectual devices, creative and critical solving of computer engineering problems arising

[3] EQF = The European Qualifications Framework for lifelong learning

in computer systems, the importance of using computers in solving social development and environmental problems, lifelong improvement and maintenance of professional skills to apply graduate engineering and project management skills.

Computer Engineering is an engineering field that combines various fields of technical electronics and computer science and creates computer systems.

A computer engineer is a specialist who works on computer software and hardware and creates software-controlled nodes, networks and systems based on this.

Computer engineers are employed in civil service, banking, industrial and agricultural departments, foreign companies, technology parks, secondary education, higher education, scientific research, and medical institutions. Enterprises and organizations where computer equipment is widely used, including embassies, large production facilities, companies and firms, as well as companies engaged in the sale and repair of computer equipment, are happy to hire a computer engineer.

During the bachelor studies, completing the Specialization Education Program students acquire the following theoretical knowledge and practical skills:

• Structure of the computer

• Computer architecture

• Computer circuit engineering

• Computer software

• Computer hardware

• Computer systems

• Security of computer systems

• Peripheral devices of computers and networks

• Intelligent devices."

For the Bachelor's degree programme Information Technologies the institution has presented the following profile in the self-assessment report:

„The purpose of the Education Program is to apply the graduate's engineering and project management skills in fundamental, social, electronics, electrical engineering and computer sciences, development of computer-based intellectual devices, Information technologies emerging in computer systems. It consists of providing knowledge and skills on creative

and critical problem solving, the importance of using computers in solving social development and environmental problems, lifelong improvement and preservation of professional skills.

Information technologies - is an engineering field that combines various fields of information technology and computer science and creates computer systems.

A graduate in Information technologies is a specialist who works with computer software and hardware and creates software-controlled nodes, networks and systems based on this.

Graduates in Information technologies are employed in civil service, banking, industrial and agricultural departments, foreign companies, technology parks, secondary education, higher education, scientific research, and medical institutions. Enterprises and organizations where computer equipment is widely used, including embassies, large production facilities, companies and firms, as well as companies engaged in the sale and repair of computer equipment, are happy to hire an information technology engineer.

During the Bachelor's studies acquire the following theoretical knowledge and practical skills:

- Structure of the computer
- Computer architecture
- Computer software
- Computer hardware
- Computer systems
- Security of computer systems
- Information technologies
- Programming languages
- Intelligent devices."

For the Bachelor's degree programme Process Automation Engineering the institution has presented the following profile in the self-assessment report:

"The purpose of the Educational Program is to enable the graduate to apply the skills of engineering and project management in fundamental, social, automatic management, electronics, electrical engineering and computer sciences, development of controller and intelligent control systems, creative and critical solving of problems arising in automatic and automated control systems, social control systems. The importance of its use in solving

development and environmental problems is to provide knowledge and skills for lifelong improvement and maintenance of professional skills.

Process Automation engineers work on the algorithm, software, technical and other support of automatic and automated control systems and creates control systems on this basis. They are employed in civil service, banking, industrial and agricultural departments, foreign companies, technology parks, secondary, higher education, scientific research, and medical institutions.

Enterprises and organizations where process automation methods are widely used, including large production facilities, companies and firms, as well as companies engaged in the sale and repair of automation equipment, gladly hire a process automation engineer.

During the bachelor's studies after completing the Specialization Education Program:

- Principles of automatic and automated management;
- Automatic control theory;
- Functions of automated management systems;
- Provisions of automatic and automated management systems;
- Applications of software-controlled controllers;
- Modelling of management objects;
- Design and synthesis of automatic and automated management systems;
- Systematic analysis of automatic and automated management systems;
- Intelligent management systems.”

C Expert Report for the ASIIN Seal[4]

1. The Degree Programme: Concept, Content & Implementation

Criterion 1.1 Objectives and Learning Outcomes of a Degree Programme (Intended Qualifications Profile)

Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions
- Websites of all study programmes
- Discussion during the audit
- Objective-module-matrix per programme

Preliminary assessment and analysis of the experts:
The experts base their assessment of the learning outcomes on the information provided on the websites, the objective-module-matrices and in the Self-Assessment Report of the three degree programmes under review.

A detailed description of the programme learning outcomes of all three degree programmes under review can be found at the end of the report.

The experts refer to the Subject-Specific Criteria (SSC) of the Technical Committee Electrical Engineering and Information Technology and the Technical Committee Computer Science as a basis for judging whether the intended learning outcomes of the three programmes correspond with the competences as outlined by the SSCs.

After reviewing the documents and carrying out the audit discussions, the auditors confirm that the programme learning outcomes are made transparent to all relevant stakeholders and are described in a clear and concise manner.

[4] This part of the report applies also for the assessment for the European subject-specific labels. After the conclusion of the procedure, the stated requirements and/or recommendations and the deadlines are equally valid for the ASIIN seal as well as for the sought subject-specific label.

The experts assess the intended learning outcomes of the three programmes and conclude that the level of the objectives and intended learning outcomes of the programmes adequately reflects the intended level (EQF 6) of the academic qualification. The outcomes also sufficiently meet the ASIIN Subject Specific Criteria (SSC) of the Technical Committee Electrical Engineering and Information Technology and the Technical Committee Computer Science. However, as explained in more detail in Chapter 1.3, the experts learn that while the learning outcomes as documented reflect EQF level 6 and the SSC, the curricula of the Information Technologies and Computer Engineering programmes are not designed in such a way that students actually achieve these objectives. Therefore, although the documented objectives are satisfactory, students do not acquire the skills and competences presented at the end of their studies.

Since Sumgayit State University also applied for the EUR-ACE® label for the Process Automation Engineering programme, and the EURO-Inf® label for the programmes Information Technologies and Computer Engineering, the experts check whether the respective learning outcomes of the degree programmes are aligned with the EUR-ACE® Framework Standards and Guidelines (EAFSG) for engineering programmes and EURO-Inf® Framework Standards and Accreditation Criteria for Informatics Degree Programmes.

The EUR-ACE® Framework Standards and Guidelines require that the programme Process Automation Engineering covers the following seven competence areas: Knowledge and Understanding, Engineering Analysis, Engineering Design, Investigations, Engineering Practice, Making Judgements Communication and Team-working, and Lifelong Learning. The experts confirm that the intended learning outcomes cover all the required competence areas and the experts perceive during the audit discussions with teachers and students that the mentioned competences are conveyed in the respective courses. They decide that the intended learning outcomes of the programme are aligned with the EUR-ACE® Framework Standards and Guidelines (EAFSG).

The EURO-Inf® framework of standards and accreditation criteria requires underlying Conceptual Basis for Informatics, Analysis, Design and Implementation, furthermore Economic, Legal, Social, Ethical and Environmental context, Informatics Practice and other Professional Competences. When examining the intended learning outcomes of the degree programmes Computer Engineering and Information Technologies, the experts found that the degree programmes do not comply with the essential criteria of EQANIE.

In the case of the Bachelor's degree in Computer Engineering, the problem is that instead of focusing on the software side and the actual computer science, the programme is oriented towards the study of hardware/electrical engineering and electronics, microelectronics and digital systems. For this reason, the programme cannot be classified as a computer science programme and awarded the EURO-Inf® label. Instead, the experts consider

the Computer Engineering programme to be a candidate for the EUR-ACE label. However, here too the experts see a number of shortcomings that do not yet qualify the programme for the EUR-ACE label. Among other things, the programme does not cover modern computer hardware and software concepts and practices as used in embedded systems today.

With regard to the Bachelor's programme in Information Technologies, the experts agree that its profile clearly corresponds to a computer science programme. However, the Information Technologies programme also fails to meet the EURO-Inf® criteria due to its outdated curriculum, teaching staff who are qualified but not specialised in modern topics, and outdated laboratory equipment. These aspects will be discussed in more detail in the following chapters.

The experts confirm that the objectives and learning outcomes are regularly analysed and further developed. Students, alumni and industry partners are regularly consulted in this context and contribute to the development process. However, as described in Chapter 5, the auditors note that the involvement of industry partners is not properly documented, which is why this step needs to be rectified.

In conclusion, the experts agree that the intended learning outcomes of the three degree programmes as documented adequately reflect the intended level of academic qualification and correspond with the ASIIN Subject-Specific-Criteria (SSC) of the respective technical committees. However, the Information Technologies and Computer Engineering programmes are not designed in such a way that students actually acquire the skills and competences described. Nevertheless, the experts are of the opinion that the qualification level actually achieved by the graduates of these two programmes is not extremely different from the targeted EQF level 6 and that the university, with its current resources, will be able to adapt the curricula in the coming years so that the students of the programmes actually achieve the targeted learning outcomes and their competences will correspond to EQF level 6 and the SSC. Employers confirm in the audit discussions that they are satisfied with the overall qualification profile of the graduates and find that the graduates are prepared to enter the labour market and find suitable jobs in Azerbaijan.

Criterion 1.2 Name of the Degree Programme

Evidence:

- Self-Assessment Report
- Diploma Supplements

Preliminary assessment and analysis of the experts:
The experts confirm that the names of the three Bachelor's degree programmes correspond with the intended aims and learning outcomes as well as the content of the respective degree programme. The titles (both in English and Azerbaijan) are used consistently in all relevant documents.

Criterion 1.3 Curriculum

Evidence:

- Self-Assessment Report
- Study plans
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the experts:

Content & Structure of the programmes

The three Bachelor's programmes have a duration of four years (8 semesters).

The three Bachelor's degree programmes are structured in the same way: In the first semester, students are taught the basics of their subject. In the following semesters, they deepen their knowledge and skills. About 12% of each programme (about 30 credits out of a total of 240 credits) is devoted to non-technical courses such as Azerbaijani history, sociology and foreign languages. Each programme also includes electives so that students can expand their knowledge in an area of their choice. In the Process Automation Engineering programme, 39 credits can be taken from electives. In the Computer Engineering and Information Technologies degree programmes, students can take electives worth up to six credits each. At the end of each degree programme, students are required to complete an industrial internship. In the programme Process Automation Engineering, the industrial practice is worth 21 credits. In the programmes Computer Engineering and Information Technologies the industrial internship has 30 credits each. Based on the internship, the students will write a Bachelor's thesis.

The detailed study plans of each programme can be found at the end of the report.

The experts review the curriculum of the Process Automation Engineering programme. The degree programme focuses on the areas of

- Principles of automatic and automated management;
- Automatic control theory;

- Functions of automated management systems;
- Provisions of automatic and automated management systems;
- Applications of software-controlled controllers;
- Modelling of management objects;
- Design and synthesis of automatic and automated management systems;
- Systematic analysis of automatic and automated management systems;
- Intelligent management systems.

The experts note that the programme is of high quality and meets the ASIIN Subject Specific Criteria (SSC) of the Technical Committees for Electrical Engineering and Information Technology and for Mechanical Engineering. They are convinced that the curriculum is well designed and enables students to achieve the intended learning outcomes. Having reviewed samples of examinations and theses, they conclude that the programme is of an excellent standard and clearly meets EQF level 6. The experts also recognise that the programme complies with the standards and guidelines of the EUR-ACE® Framework and produces highly qualified engineers who are capable of working in the professions described.

The focus of the Bachelor's programme in Computer Engineering is on:

- Structure of the computer
- Computer architecture
- Computer circuit engineering
- Computer software
- Computer hardware
- Computer systems
- Security of computer systems
- Peripheral devices of computers and networks
- Intelligent device

The main areas in the Bachelor's programme in Information Technologies are:

- Structure of the computer
- Computer architecture
- Computer software
- Computer hardware
- Computer systems

- Security of computer systems
- Information technologies
- Programming languages
- Intelligent devices.

The experts note that these two programmes differ from Process Automation Engineering in a number of ways. Firstly, the two programmes have a strong technical similarity, as evidenced by the areas of focus listed above, with a strong emphasis on computer systems and hardware. Secondly, the two programmes are of a lower standard in terms of content, complexity and scientific nature than the Process Automation Engineering programme. On the one hand, the experts see that the two programmes have a strong foundation in the sense that students achieve a high level of competence in the fundamentals of electronics (e.g. digital electronics, analogue electronics and computer architecture), mathematics and physics. On the other hand, several industrially relevant topics are missing from the curricula of both programmes, which lowers the level of the programmes. In addition, the experts note that many topics are covered superficially but not in sufficient depth. The specific shortcomings are described below.

During the audit, the experts discuss with the programme coordinators which programming languages are used in the Computer Engineering and Information Technologies programmes. The coordinators explain that about two to three programming languages are taught in each programme. These include Pascal, Delfi, Prolog and, in the advanced semesters, C. They cover C++ and C sharp in the programmes, but only in a descriptive way, i.e. to outline the differences between the programmes, not in an applied way. Depending on the student's specialisation and personal interest, teachers support individual students in learning other programmes such as Auto CAD. The programme coordinators add that students also have the opportunity to learn other programming languages through the Code Academy. This is a separate facility that offers fee-based courses and workshops to which SSU students have access. The experts welcome the fact that students have the opportunity to further their education if they wish. However, they agree that the programming languages actually taught in the programmes are clearly outdated. They insist that modern programming languages that support object-oriented design and prototyping, such as Java and Python, must be included in the curricula, while obsolete programming languages such as Prolog and Pascal should be dropped. Students and industry representatives agree with the experts: Given the developments and recent demands of industry, they share the experts' view that the acquisition of skills in modern programming languages is essential in the respective technical fields. In the Information Technology programme, education in corresponding software engineering methodologies, software architectures and CICD is recommended.

Since in cooperating industries more and more data are collected, the experts recommend to include state-of-the art data-driven and machine-learning based algorithms into suitable modules such as Control Engineering or Artificial Intelligence.

In addition, after reviewing the documentation and holding discussions, the experts observe that neither the Computer Engineering nor the Information Technologies programmes cover modern hardware and systems engineering methods. As these are relatively important for engineering professions, the experts recommend that modern hardware engineering methods such as Verilog or VHDL and FPGA be included in the Computer Engineering programme, while virtualization and cloud-based technologies are mandatory for the Information Technology program.

With regard to the Bachelor's programme Information Technologies, the experts find that students acquire only limited competences in terms of analytical and quantitative skills in the IT modules such as e.g. algorithms and data structures, as well as multimedia. Inspection of examination materials indicate that students focus on definitions rather than application and transfer of concepts. Hence, they suggest enhancing the students' skills in these areas.

In summary, the experts conclude that the programmes in Computer Engineering and Information Technologies are of good quality in terms of teaching the fundamentals of the disciplines. However, with regard to other, more advanced modules, the experts note that the content actually taught does not correspond to the level described in the module descriptions and the intended learning outcomes. This impression is reinforced by the examination and dissertation samples (see Chapter 2). Consequently, the two curricula do not provide students with all the competences specified in the intended learning outcomes of the two programmes. Many relevant and modern topics are either missing or only superficially covered. However, due to the highly qualified teaching staff, they see the potential for the programmes to reach this level if the requirements for the missing curriculum elements are met. As mentioned in chapter 1.1, the programmes in Information Technologies and Computer Engineering do not qualify for the EURO-Inf® label because their curricula do not contain a sufficient number of modern elements in computer science.

With regard to the structure of the programmes, experts confirm that all three degree programmes under review are divided into modules and that each module is a sum of coherent teaching and learning units. They also find that the technical modules build on each other in a coherent way to ensure continuous learning growth.

As mentioned above, the industrial internship is worth 21 credits in the Process Automation Engineering degree programme and 30 credits each in the Computer Engineering and Information Technologies degree programmes. The internship takes place in the final, i.e.

eighth, semester. The experts note critically that neither the self-evaluation report nor the module descriptions contain a detailed description of the form, structure and organisation of the internship. In fact, there is no designated module description for the internship at all. For example, the experts cannot find any information on the duration of the work placement. For example, 30 credits correspond to a duration of 22.5 weeks, i.e. between five and six months for a full-time placement; however, the industry partners report in the review that placements can last from two to four months or longer, depending on the individual agreement between the student, the SSU and the company concerned.

Regarding the organisation of the internship, the experts learn that SSU has a number of cooperation partners that are proposed to the students. However, students can also choose a company themselves, in which case SSU must first approve the company. The student, the SSU and the company then jointly agree on a contract that defines all the student's tasks and the learning content. The industrial partners also inform the experts that there are regular meetings between the academic supervisor and the industrial supervisor throughout the internship. Based on the information provided by the industry representatives, the experts consider that the internships are well organised and contribute to the achievement of the programme outcomes. However, they insist that all relevant information, including the duration and organisation of the internship, must be documented in separate module descriptions for the internship in order to create transparency for all stakeholders.

Student Mobility

According to the self-assessment report, the International Cooperation Department of Sumgayit State University supports the participation of students in exchange programmes with a number of foreign universities. Through initiatives such as Erasmus+, Tempus and Mevlana, students have the opportunity to go abroad. The “Mevlana Programme” offers opportunities for academic mobility with Turkish universities. In total, the University cooperates with institutions in Turkey, USA, Russia, England, Germany, France, Poland, etc.

A look at the statistics shows that student participation in exchange programmes is low. In Process Automation, only one student has gone abroad in the last 6 years, while in Computer Engineering, two students have gone abroad in the last 5 years. In the Information Technologies programme, five students have participated in exchange programmes during the same period. The university is aware of the low number of students going abroad and sees the students' lack of foreign language skills as the main obstacle.

During the audit discussions with the university management, questions were raised about the exchange programmes and mobility opportunities for students and staff. The university

participates in programmes such as Erasmus+, with a significant influx of international students from Turkey due to the low language barrier. Overall, however, the experts learn that internationalisation is not currently a priority for the university.

Students participating in the audit stated that although they are interested in studying abroad, the language barrier often prevents them from doing so. The university offers a one-year language course, but many students perceive this as an additional workload.

The teaching staff is involved in international research to a small extent, but these co-operations are mostly limited to post-Soviet countries and Turkey. They state that they occasionally take part in conferences and training courses in other countries. Some participated in online conferences on topics such as artificial intelligence and fuzzy logic in information security.

Azerbaijan has entered the Bologna process by the adoption of the Bologna Declaration in 2005 and the adoption of the Lisbon Recognition Convention in 2006. The objective of these actions was the harmonization of Azerbaijan education system with the education systems of EU countries. This gives students the opportunity to study abroad while their acquired credits are recognised at SSU.

The experts conclude that the conditions and opportunities for mobility can be greatly improved. They note a significant lack of international exchanges for both students and teachers and recommend greater cooperation with industry and academic institutions abroad. The experts strongly advise Sumgayit State University to develop a more robust internationalisation plan to provide more opportunities for students and teachers to study abroad. Improving the English language skills of students and staff is highlighted as a crucial step in promoting international engagement. In line with this, the experts recommend increasing the use of English in study programmes, for example by offering more technical courses in English. Overall, the experts' recommendations aim to promote a more globally connected and competitive environment at Sumgayit State University.

Periodic Review of the Curriculum

According to the self-evaluation report, the curricula are periodically reviewed to ensure that they meet the needs of the industry. For this reason, all stakeholders are invited to participate in regular evaluations. The results are used for the revision of the programmes. The experts welcome the fact that the SSU carries out evaluations and feedback discussions with its various stakeholders. However, due to the fact that many curricular elements are outdated, the experts suggest that SSU should take more account of the latest innovations in science and technology. The audit discussions also show that the industry partners agree with the experts on the need for more modern elements, such as modern programming

languages. Therefore, SSU should give more consideration to the suggestions of the industrial partners. This aspect is further discussed in chapter 5.

Criterion 1.4 Admission Requirements

Evidence:

- Self-Assessment Report
- Admission Regulations
- https://sdu.edu.az/en/curriculum
- https://sdu.edu.az/en/application_rules
- Discussions during the audit

Preliminary assessment and analysis of the experts:

The admission procedure for Bachelor's students is based on the Unified National Exams: Azerbaijan citizens holding appropriate documents from a high school are required to pass the entrance examination, which is centrally organised by the State Examination Center. The entrance examination is carried out in two stages. In the first stage, applicants take entrance exams in Azerbaijani or Russian language and in foreign languages and mathematics. The maximum number of points that applicants can earn in the first stage of the entrance exam is 300 points, with 100 points for each subject. The second stage of the entrance exams to higher education institutions depends on the concrete study programmes that the applicants want to join. The maximum score that applicants can get in the second stage of the entrance exam is 400 points. Based on the total score, students are admitted to the different programmes at universities in Azerbaijan. Admission of international students is managed by the International Office and is carried out in accordance with the regulations of the Ministry of Education.

The annual intake for the Process Automation Engineering and Information Technologies programmes is 25 students each. The Computer Engineering programme has an average intake of 50 students per year.

The Ministry of Education regulates and administers the recognition of prior learning and transfer students in general.

In summary, the auditors find the terms of admission to be binding and transparent. They confirm that the admission requirements support the students in achieving the intended learning outcomes.

Criterion 1.5 Workload and Credits

Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions
- Study Regulations
- Discussions during the audit

Preliminary assessment and analysis of the experts:

The experts confirm that all modules have a duration of one semester and are credited. One ECTS point is awarded for 30 hours of students' total workload.

The specific workload for each module is described in detail (time spent in lectures, time for self-studies etc.) in the respective module description. In general, in the Process Automation Engineering programme 50% of the workload is assigned to classroom activities and 50% to the self-study of students. In the programmes for Computer engineering and Information Technologies the proportion of the students' self-study is slightly higher making up around 60% of the overall workload. Formally, the workload calculation seems correct to the experts. However, they learn that there is no systematic mechanism in place in order to verify and monitor the student workload. Thus, students are not surveyed on the time they actually spend for a module.

During the audit, the students state that they find the workload to be adequate and that it is possible to finish the degree programmes within the expected four years. Nevertheless, the experts insist that a monitoring system must be implemented in order to verify whether the credits awarded for each module correspond to the actual student workload. The experts suggest adding questions regarding the workload to the existing student survey so that students can regularly give their feedback on this matter. The workload in the module descriptions should then be revised if necessary.

The dropout rates in all the programmes under review are rather low (around 10%); very few students decide to leave SSU. The remaining students graduate on average within the intended graduation period of four years.

Based on the study plans, the statistical data, and the comments of the students, the experts conclude that there is no structural pressure on the quality of teaching and the level of education due to the workload.

Criterion 1.6 Didactic and Teaching Methodology

Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the experts:
Various teaching and learning methods (including lectures, classroom and lab exercises, individual and group assignments, seminars and projects, etc.) have been implemented. Structured activities include homework, assignments and practical activities. Group project assignments are given in some courses to develop students' skills in teamwork, communication, and leadership.

The most common method of learning is class session, with some courses having integrated laboratory practices. Lecturers generally prepare presentations to aid the teaching process. With individual or group assignments, such as discussions, presentations, or written tasks, students are expected to improve their academic as well as their soft skills. Laboratory work covers laboratory exercises and reports.

During the audit, the experts ask about the extent to which students carry out projects. The programme coordinators explain that the carrying out of projects or case studies is not compulsory in the three programmes, but is an option offered to the students and is usually carried out by high-performing students. In this case, the topic and structure of the project is agreed with the teacher. The coordinators explain that these projects are usually carried out by students at an advanced stage of their studies.

The experts believe that project work provides students with a range of highly relevant skills that are essential for students in the three programmes. For example, project work teaches students project management, teamwork, communication, independence, individual creative and critical thinking, scientific work and many other skills that are important for graduates' professional success. In addition, the experts note that these skills correlate with the intended learning outcomes of the three programmes, i.e. in order to improve the achievement of the qualification profile described in the programme objectives, the experts believe that more diverse teaching methods should be used in the three programmes, which also promote the above-mentioned skills. The most important form of teaching and learning that corresponds to this is project work or a case study assignment. The experts therefore recommend the introduction of project modules with research-based learning

for all three programmes, especially in the early years of study, so that these skills are developed at an early stage. These projects could be carried out, for instance, in the subjects computer networks and computer architecture.

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

The SSU explains in its statement that a number of changes have already been made to the curricula on the basis of the experts' suggestions. However, the university does not provide any documentation to prove or substantiate the changes in the curricula. For example, with regard to the missing elements in the Information Technology programme, the university reports that the curricula of several modules (Database Systems, Computer Networks, IT Project Management, Human-Computer Interaction and Systems Analysis and Computer Modelling) have been updated, taking into account the suggestions of the industrial partners. However, there is no evidence of these updates. Regarding the outdated programming languages, SSU states that the subjects on Programming Languages (Fundamentals of Programming) and Modern Programming Languages have been updated and approved. The curriculum of the Programming Languages course now includes C++ and C Sharp languages. In addition, the Modern Programming Languages course has been based on the Java and Python programming languages. Furthermore, the University states that it is currently considering the application of modern hardware engineering methods, including hardware description languages such as VERILOG, VHDL and FPGA platforms, for modelling electronic and high-speed integrated circuits in the teaching process. The experts appreciate that SSU is taking their suggestions into account. However, in the absence of evidence of implementation, the experts maintain the critical points.

With regard to the experts' recommendation that industry partners should be more involved in the process of programme development, SSU states that industry partners were consulted when the programmes were set up. The experts acknowledge this, but suggest that feedback from industry partners should be taken into account on an ongoing basis when reviewing the programmes.

Regarding the experts' recommendation to increase the use of projects and problem-based learning, SSU reports that students are already assigned independent project topics in the pre-professional subjects. In addition, from the third semester onwards, project assignments will also be introduced in several specialised subjects such as Database Systems, Computer Networks, IT Project Management, Human-Computer Interaction, Systems Analysis and Computer Modelling, Computer Architecture, Digital Systems, Computer Networks, Computer Modelling, etc. Again, the experts welcome the planned changes, but as they have not yet been implemented, they maintain the recommendation.

As mentioned above, SSU is aware of its low level of student and academic mobility, which is also linked to English language barriers. SSU explains that in order to improve the English language skills of students and staff, the university operates a Language Centre and Translation Department. The department also prepares students for the International English Language Testing System (IELTS) exams. The experts acknowledge that the basic structures for English language training are in place, but as the results of the training structures are not yet sufficient for the implementation of mobility, they maintain their recommendation.

Criterion not fulfilled.

2. Exams: System, Concept and Organisation

Criterion 2 Exams: System, Concept and Organisation

Evidence:

- Self-Assessment Reports
- Module descriptions
- Examination regulations
- Study Guidelines
- Audit Discussions

Preliminary assessment and analysis of the experts:
According to the self-assessment report, students' academic performance is assessed on the basis of their performance throughout the module and in the final examinations. The following table illustrates the calculation of the final grade: 50% of the grade is based on the student's continuous performance, which consists of small tests in the fifth and tenth weeks of study, as well as the student's continuous performance in the laboratory and their participation in lectures. 50% of the mark will be based on the final examination taken after week 14. To pass a module, students must obtain at least 70% of the total points. If students have not attended at least 75% of the classes, they will not be allowed to take the final exam. Students are required to take 5-6 written exams per semester.

Control unit	Academic weeks															Total %
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	

Colloquium (3 questions, written)					*					*					*	10
Laboratory (6 works)	*		*		*		*		*		*		*		*	20
Participation activity in the training process	*		*		*		*		*		*		*		*	10
Report on TSI														*		10
Total																50
Exam (5 questions, written)																50
Final																100

The most common form of assessment is written exams, but quizzes, laboratory work, reports and presentations can also count towards the final grade. Written examinations usually include short answer, problem-solving or case-based questions and mathematical problems. Some lecturers may also include multiple choice or true/false questions in exams or quizzes.

Examination dates are organised by the Dean's Office and announced to students at the beginning of each semester.

Absences from examinations due to illness or other reasons can be compensated by making up the examination. Students may also ask for explanations and appeal against their grades. The details and rules for examinations are described in the Examination Regulations.

The examination system seems reasonable and well structured to the experts. Students confirm that they receive all relevant information in good time and are well prepared for the examinations. Overall, the exams are manageable and the grading fair and transparent. However, similar to the teaching methods, the experts consider that the range of examination methods should be broadened in order to cover the range of competences in relation to the intended learning outcomes. For example, in addition to more project and case study tasks, the experts suggest introducing more forms of examination that assess students' independent critical and creative thinking, their scientific and presentation skills. For the latter, they suggest more oral examinations. The desire for more oral examinations is also expressed by students.

During the audit, the experts inspect samples of examinations from all three programmes. They come to the same conclusion as in the review of the curricula: although the examinations in all three programmes correspond to EQF level 6, the experts see clear differences in the level between the programmes. For example, the examinations in Process Automation Technology assess students' competences at a significantly higher level than the examinations in Computer Engineering and Information Technologies. As mentioned in Chapter 1.3, the experts observe that the actual level of the two programmes is lower than indicated in the module descriptions.

In the final year of study, all Bachelor's students must complete an industrial internship, which forms the basis for the final thesis. Similar to the internship, the experts cannot find any information on the final thesis in the module descriptions. After reviewing the samples of the final theses, the experts note that a final thesis is only conducted in the Process Automation Technology degree programme, while in the other degree programmes Computer Engineering and Information Technology, the final work cannot actually be described as a thesis, as it more closely resembles an internship report. These documents therefore merely summarise the experiences and learning processes of the students during the internship. The reports also contain descriptions of some experiments, but do not go beyond the descriptive dimension. The experts therefore miss all the essential parts of a Bachelor's thesis, such as the independent research, the analysis and discussion of the data as well as the scientific reporting including validation and testing. These steps of a scientific project should be evident from the thesis. In accordance with the criteria, the experts require that a final thesis or a final project, which must contain the aforementioned elements, is mandatory in the Bachelor's degree programmes in Computer Engineering and Information Technologies. Overall, the final thesis or project must demonstrate the students' problem-solving skills and correspond to EQF level 6. Industry representatives agree that students should carry out a scientific paper instead of a practical report in order to train their problem-solving skills. The samples of the Process Automation Engineering programme are fully satisfactory to the experts as they contain the scientific elements mentioned above and correspond to EQF level 6. In addition, all relevant information about the final thesis or project must be documented in the module descriptions.

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

The SSU does not provide a statement on the experts' request to establish a thesis or a final project report corresponding to EQF level 6 in the Information Technology and Computer Engineering programmes. Therefore, the experts maintain their assessment.

Criterion not fulfilled.

3. Resources

Criterion 3.1 Staff and Staff Development

Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions
- Study Plans
- Staff Handbook
- Discussions during the audit

Preliminary assessment and analysis of the experts:
At SSU, the staff members have different academic positions. There are professors, associate professors, and lecturers. The academic position of each staff member is based on research activities, publications, academic education, supervision of students, and other supporting activities.

As of January 1, 2023, the Faculty of Engineering at Sumgayit State University (SSU) comprises 38 faculty members, of whom 19 hold a Ph.D. Among the faculty, there are 5 professors, 11 assistant professors, 16 head teachers, 3 teachers, and 3 assistants serving as professors.

Within the Department of Automatic and Control Engineering (responsible for the Process Automation Engineering programme) there are three professors, one associate professor and two senior lecturers. The support staff includes the laboratory manager and two senior laboratory assistants. During the last five academic years, 5 PhD students have graduated. During this period, the faculty's scientific output included two textbooks, three methodological materials and 37 articles. The teaching staff also participated in national and international conferences, 14 of them abroad. The Faculty conducts joint scientific experiments and exchanges scientific experience with various educational and production institutions. The student-teacher ratio in the department is 7.5, and the average age of professors and teachers is 56. SSU declares that it is aware of the need to recruit younger teachers in all engineering faculties.

There are four Associate Professors and six Lecturers in the Department of Computer Engineering. The support staff consists of the Head of Laboratory, two Senior Laboratory Assistants and two Laboratory Assistants. In the last five academic years, four students have

submitted their Ph.D. theses to the Thesis Committee for defence. In recent years, the faculty members of the department have published, among others, three textbooks and 31 articles (6 in journals with international impact factor). The faculty has actively participated in conferences and presented 71 theses, 3 of which were presented abroad. The student/teacher ratio is 6.5 and the average age of professors and lecturers is 54.

The Department of Information and Programming (responsible for the Information Technologies degree programme) has 2 professors, 3 lecturers, 6 head teachers and 2 assistants. The academic staff is complemented by the head of the laboratory, a senior laboratory technician and a laboratory assistant. Eight of the staff are SSU graduates. In the last five academic years, six students have obtained their Ph.D. degrees. The faculty's scientific output includes four monographs, six books and 384 scientific articles published by renowned publishers, as well as presentations at national and international symposia. The student/teacher ratio is 6.5 and the average age of the teaching staff is 50.5 years.

In total, the standard teaching load per lecturer across the University is 92 academic hours. In all programmes, lecturers may also undertake other management and administrative duties.

In terms of professional development, SSU ensures the continuous improvement of its teaching staff through appropriate certificates, workshops and participation in conferences, seminars, exchange programmes and long-term trips. Training courses in pedagogical skills are provided for newly recruited professors and teachers. Every five years, teachers are expected to attend courses or workshops for professional or pedagogical development. Professional development courses are mainly organised within the university's Centre for Continuing Education. SSU also supports the improvement of teachers through internships funded by the university.

The university has a student council, a student youth organisation, a student trade union organisation and a student scientific society for general student support. Furthermore, the students add during the audit that SSU offers various events and seminars informing students about their rights as students, how to receive financial support and other relevant matters. SSU also has a psychological center and a center for disabled students.

The experts confirm that the composition, academic orientation and qualifications of the teaching staff are appropriate for the successful running and maintenance of the three programmes. They also agree that there are sufficient non-technical staff to provide both subject-specific and general guidance and support with administrative tasks. However, the experts see differences in the level of qualification of the teaching staff between the departments.

Overall, Process Automation Engineering faculty are more involved in international research and the global research community than their counterparts in the other disciplines. In addition, the teaching staff in Process Automation Engineering have a higher qualification profile than those in the other two programmes. While the teaching staff in Computer Engineering and Information Technologies are generally considered by the experts to be highly qualified, they also agree that the teaching staff lack competences in some highly relevant areas.

In line with the lack of state-of-the-art content in Computer Engineering and Information Technologies (as described in Chapter 1.3), the teaching staff do not have sufficient knowledge of modern software and hardware engineering. The experts therefore call for either additional staff to be hired or for the teachers' technical knowledge to be developed so that they can also teach modern software and hardware engineering.

In addition, the experts recommend that the scientific and didactic training of the teaching staff of Computer Engineering and Information Technologies programmes be improved in terms of professional development. This includes greater involvement of teaching staff in research collaborations with industry (both regional and international) and institutions abroad, and stronger networking with the international research community.

Criterion 3.2 Funds and equipment

Evidence:

- Self-Assessment Report
- Discussions during the audit
- Visit of the facilities during the audit

Preliminary assessment and analysis of the experts:
The financial sustainability of the university is mainly based on tuition fees, supplemented to a limited extent by cooperation with external companies. During the audit, the experts learned that SSU is seeking more cooperation with companies in order to increase financial income for more modern equipment and higher salaries for teaching staff.

In general, teaching at the Faculty of Engineering takes place in 17 lecture halls, one special lecture hall and 7 laboratories. These rooms are equipped with projectors, cameras and special blackboards. SSU states in its self-evaluation report that although the lecture theatres and laboratories are adequately maintained and equipped for normal teaching needs, there is a lack of support for scientific research, leading to the planning of a new teaching building.

The Process Automation Engineering programme uses 42 computers for teaching, supplemented by equipment such as Cassy lab 2, 3D Range Vision Smart and Desinger Pro250. In the laboratories, students learn the following methods: control engineering, industrial automation and programmable logic controllers.

For the Computer Engineering programme, the laboratories have 68 computers equipped with the necessary software such as Multisim, MathCad and LabVIEW. These tools are used to develop practical skills such as computer modelling and virtual device development. The laboratories are also equipped with Cassy lab 2, 3D Range Vision Smart and Desinger Pro 250.

For the Information Technologies programme, 23 computers in the laboratories are equipped with the most important software. The laboratories are equipped with electronic devices, technical measuring equipment and sensors for various purposes.

The University has a scientific and electronic library with a diverse collection of 154,415 copies of literature, including Azerbaijani, Russian and foreign works. The library contains books, journals, abstracts, theses and dissertations, as well as access to online databases and electronic resources. The library resources are regularly updated according to the principle of supply and demand with the active participation of teachers and students. Suggestions arising from enquiries and suggestions are discussed in the subject departments.

During the audit, the experts visit various laboratories and facilities. They enquire about the wireless data transmission laboratory which, according to the module description, is used in the “Bluetooth communication” module. The industry representatives state that, to their knowledge, students are trained in such a laboratory. However, the experts do not see such a laboratory during their entire visit to the facilities. As students would be taught relevant skills in such a lab, they recommend the establishment of a wireless data transmission lab.

Overall, the experts conclude that SSU has sufficient resources and infrastructure to run the three programmes. Students and lecturers indicate that they are generally satisfied with the resources available. However, the students would like to see more modern equipment in the laboratories. The experts agree with this request: During their inspection of the laboratories, they find that much of the equipment, although still functional and usable for experiments, is old and outdated. They therefore recommend that the equipment for all three programmes be modernised and brought up to date.

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

SSU acknowledges the points made by the experts and states that in order to improve the professional skills of the professorial staff, plans are underway to involve them in international projects. Thus, joint projects are being implemented with leading higher education institutions in the country, such as ADA University and Baku Engineering University. Each year, up to 25% of faculty members participate in these programmes. From the academic year 2024-2025, it is also planned to develop relations with leading foreign universities. Experts appreciate SSU's plans, but point out that they have not yet been implemented.

SSU also points out that new work is being carried out in the field of wireless data transmission using the "Bluetooth Communication" module. Zellio Controllers and Zellio Soft will therefore be used to manage industrial equipment in the laboratories. The experts welcome the changes, but as there is no evidence of the changes, the experts maintain their requirements.

Criterion not fulfilled.

4. Transparency and Documentation

Criterion 4.1 Module Descriptions

Evidence:

- Self-Assessment Report
- Module descriptions
- Websites of all study programmes

Preliminary assessment and analysis of the experts:

After studying the module descriptions the experts confirm that they include all necessary information (course name, course code, students' total workload, awarded ECTS points, grading scale, intended learning outcomes, content, recommended literature, possible prerequisites, name of teacher/teachers in charge, exam methods, and assessment criteria). The students confirm during the discussions that information about the courses are always available online and that details concerning examinations and contents are provided at the beginning of each course by the teaching staff. The experts note that the module descriptions contain information on the distribution of marks, i.e. the percentage of different assessment components such as laboratory work, final examination, etc. However, descriptions such as "free work" or "independent work" are very general and do not give a clear

insight into the type of assessment meant. Therefore, the module descriptions should be specified with regard to the forms of assessment.

As mentioned above, the reviewers found that the module descriptions of content and intended learning outcomes did not match the actual content and level of the Computer Engineering and Information Technology programmes. The curricula of the two programmes therefore need to be revised, particularly with regard to modern programming languages. Subsequently, the module descriptions need to be changed to reflect the actual content of the programmes.

Furthermore, as indicated in chapter 1.3, there are no module descriptions for the industrial internship and the final thesis/project. The experts therefore demand that module descriptions be created for these two compulsory elements of the Bachelor's degree programmes. These descriptions must contain all relevant information as defined by the criteria. In particular, the descriptions must inform about the intended learning outcomes, the structure, and the organisational process (e.g. the involvement of lecturers and companies in the supervision) of the final thesis and the industrial internship.

Criterion 4.2 Diploma and Diploma Supplement

Evidence:

- Exemplary diploma certificate per study programme
- Exemplary diploma supplement per study programme

Preliminary assessment and analysis of the experts:
The experts confirm that students of the three programmes receive a Diploma/Certificate and a Diploma Supplement on graduation. On closer inspection, however, the Diploma Supplement looks more like a Transcript of Records, as it only contains the basic data (student's name, degree and programme title) as stated on the diploma and a list of grades for each module. However, there is no explanation of the grading system or how the final grade is calculated. In addition, the Diploma Supplement lacks information on the qualification profile of students (i.e. the learning outcomes achieved) and on the classification of the programme within the education system in Azerbaijan. Furthermore, there is no contextualisation of the student's final grade within the cohort, as there is no statistical data on the final results of the other students in the cohort. The Diploma Supplement therefore needs to be completed with the above mentioned elements. SSU must also ensure that all documents are issued in English.

Criterion 4.3 Relevant Rules

Evidence:

- Self-Assessment Report
- All relevant regulations as published on the university's webpage
- Audit Discussions

Preliminary assessment and analysis of the experts:
The auditors confirm that the rights and obligations of both SSU and the students are clearly defined and binding. All regulations are published on the university's website and students receive their study documents at the beginning of each semester. In addition, all relevant information about the programmes (e.g. module handbook, curriculum, intended learning outcomes) is available on the programme homepage. However, the experts note that the study regulations do not contain detailed information on the student assessment process and the exact forms of assessment. They therefore suggest that detailed information on the existing forms of assessment should be included in the study regulations.

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

SSU explains that the Diploma and Diploma Supplement provided are in line with national regulations and that it is not allowed to include additional information in the documents besides standard information. The experts understand that SSU must adhere to the national regulations. However, they point out that in the current form the Diploma Supplement is not in line with ASIIN criteria.

SSU provides module descriptions for the internships in all three programmes. The module descriptions contain detailed information on all required aspects. The internships are now sufficiently documented so that the requirement can be removed.

Criterion partly fulfilled.

5. Quality management: quality assessment and development

Criterion 5 Quality management: quality assessment and development

Evidence:

- Self-Assessment Report

- Discussions during the audit
- Handout on the Evaluation of the Teaching Staff
- Samples of student questionnaires

Preliminary assessment and analysis of the experts:
SSU only set up a designated department for quality assurance in 2015. The university therefore states that the development of quality assurance mechanisms is still ongoing. The Quality Assurance Department is situated within the Teaching Methodological Center, which is the primary central unit responsible for organizing, planning, managing, and coordinating teaching staff and study programs at SSU.

The primary objective of the Quality Assurance Department is to strategically plan the quality of teaching and support services, encompassing medical, psychological, tutoring, dormitory, and canteen services. By identifying the strengths and weaknesses of educational activities and conducting specialized analyses, the department offers practical suggestions to attain expected goals. The strengths and weaknesses analysis is presented to the experts within the self-assessment report.

For an overall assessment of the study programmes, data on programme performance is systematically collected and analyzed. At the end of each academic year, the specialized department compiles information on programme implementation, preparing a report discussed at department meetings and presented to the Scientific Council of the faculty. These results are then summarized by the Teaching Methodological Center and deliberated upon in the Scientific Council of SSU, ultimately being presented to the Ministry of Science and Education.

Internal programme evaluation is conducted by both the Teaching Methodological Center and the newly established Quality Assurance Department. Stakeholders, including students, teachers, and other interested parties, actively participate in the evaluation process through monthly department meetings and open days, facilitating joint discussions and constructive feedback to enhance the educational process.

According to SSU, industry feedback is an essential part of programme development. There is regular communication with industry partners, including ongoing meetings and soliciting suggestions for curriculum improvement. During the audit, the experts were informed by the head of the university that, before the start of each academic year, the rector contacts the heads of the industry partners or their contact persons in order to obtain their feedback and suggestions. The industry representatives confirm that they are regularly consulted and that several industry partners are part of the departmental commission at SSU. How-

ever, the experts note that there is no official document defining the details of the involvement of industry partners in the quality assurance system. Therefore, this procedure needs to be documented in detail in order to ensure accountability and transparency for all parties involved. Furthermore, the experts are of the opinion that SSU should take more account of feedback from industry partners, as the curricula of the Computer Engineering and Information Technologies programmes contain various outdated elements and the industry representatives state in the audit that they are aware of these shortcomings. They note that although the programmes generally produce qualified graduates, they are aware that the curricula of the programmes are to a large extent not in line with the state of the art. The experts therefore suggest that the two programmes should take greater account of feedback from industry partners and generally be more closely aligned with the state of the art in the discipline.

The largest project recently launched by the Quality Assurance Department is the comprehensive evaluation of teaching and teaching staff at SSU. The evaluation is based on questionnaires with four groups: students, heads of department, deans and external experts. Students complete the questionnaire online and evaluate the lecturers who are teaching them in the current semester. The results are summarised in reports and then used by the Quality Assurance Department to develop strategies for further improvement of the quality of the study programmes at SSU.

In addition, students can participate in political life and quality assurance at SSU in a number of other ways: The university has a student council, a student youth organisation, a student trade union organisation and a student scientific society. Representatives of these student organisations are members of the Academic Faculty Council and the Academic University Council. They are directly involved in discussions and decisions. The academic councils meet at least once a month.

In the audit, students state that they are generally satisfied with SSU's quality management. They report that their suggestions for improvement are generally taken into account and implemented. Teachers are also generally open to criticism. For example, students reported one case where they complained that a course at the beginning of the Computer Engineering programme was extremely demanding, whereupon the lecturers changed the course to make it more feasible. When asked whether they receive the results of teaching evaluations, students explained that they are not directly informed of the results. However, they do notice when changes are made to courses. The experts therefore urge SSU to close the feedback loop by informing students of the results of their evaluation questionnaires in order to complete the quality assurance process. Furthermore, it is not entirely clear to the experts what happens with the results of the student questionnaires or what the exact

steps and procedures are once the student feedback has been collected. In order to establish a systematically clear evaluation procedure that is used effectively for the further development of the programmes, the experts call on SSU to introduce a PDCA cycle (Plan, Do, Check, Act) and to document all the steps taken.

Overall, the experts agree that SSU has a systematic quality assurance system that takes into account feedback from all stakeholders and continuously improves the quality of its programmes. They recognise that the quality management team is still developing and that there is room for improvement. However, they also have the impression that the quality management team and the SSU staff in general are very keen to develop and improve the standard and status of the programmes at SSU, both nationally and internationally. The experts are convinced that SSU will continue to develop strongly in the coming years.

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

SSU does not provide a detailed statement on criterion 5, which is why the experts' assessment remains unchanged.

Criterion not fulfilled.

D Additional Documents

No additional documents needed.

E Comment of the Higher Education Institution (22.02.2024)

The following quotes the comment of the institution:

Experts' recommendations	The activity to be carried out
The EUR-ACE® label is proposed for computer engineering, the EURO-Inf® label is proposed for information technologies.	The framework standard for information technologies is not EUR-ACE®. The framework standard for computer engineering is not EURO-Inf®. The computer engineering program, its content line, general subjects (24 credits), and specialization subjects (120 credits), general subjects determined by the higher education institution (60 credits), experience (30 credits), the number of credits allocated to modules have been simulated and evaluated within the framework of the Twinning project "Support to strengthening the higher education system in Azerbaijan".
The Information Technology program does not comply with the EURO-Inf label because it does not sufficiently cover the elements of Computer Science. However, it pays more attention to hardware and engineering measures.	In addition to the specialization in Information Technology, bachelor's degree programs are also offered in Computer Science within the higher education system of the Republic of Azerbaijan. More elements reflecting this specialization have been incorporated into the educational program of Computer Science. The curriculum for the Information Technology specialization includes elements that constitute the fundamentals of Information Technology.
Industrial partners' involvement in the educational process has not been properly documented. Therefore, it is necessary to rectify this step.	During the implementation of the curriculum designated by higher education institutions, consultations have been held with industry partners, and the educational programs that respond to the demands of the day have been planned to be included. With the joint organization of the Ministry of Education and the support of the Ministry of Digital Development and Transportation, 64 students who have been recognized as listeners of the "Code Academy" have continued their studies in English in the fields of

	Network Administration and WEB Programming. They have been deemed eligible for certification. https://www.sdu.edu.az/az/news/2342 It has been agreed to replace the subjects ATMF-B03 "Principles of Computer Application" (5 credits, 7 semesters) in the Computer Engineering specialization and ATMF-B04 "Digital Systems" (6 credits, 4 semesters) in the Information Technology specialization with the subject "Programmable Logic Controllers."
There are several industrial-relevant topics missing from the curriculum of the Information Technology specialization, which lowers the program's standard.	050616- In the curriculum of the Information Technology specialization, the syllabi of Database Systems, Computer Networks, IT Project Management, Human-Computer Interaction, and System Analysis and Computer Modeling have been updated considering the suggestions from industry partners.
It is recommended to exclude outdated programming languages like Prolog and Pascal from the curriculum of the Programming Languages course and instead include modern programming languages such as C++, Java, and Python.	The curriculum of the Programming Languages (Basics of Programming) and Modern Programming Languages courses have been updated and approved. The teaching program of the Programming Languages course now includes C++ and C Sharp languages. The curriculum and teaching program of the Modern Programming Languages course have been based on Java and Python programming languages.
It is also recommended to include modern program-hardware engineering methods covering platforms like Verilog, VHDL, and FPGA in both programs.	Currently, in the teaching of technical subjects, software platforms such as LabVIEW, MULTISIM, PROTEUS, and other programs are utilized. Additionally, we also consider the application of

	modern hardware engineering methods, including hardware description languages such as VERILOG, VHDL, and FPGA platforms, for modeling electronic and high-speed integrated circuits in the teaching process.
The modules for production experience and final release work have not been presented. .	The production experience for both Computer Engineering and Information Technology specializations consists of 30 credits. The internship is organized based on the agreement between the university and the internship field, following a predefined internship program. During the internship period, the student completes individual assignments and also undertakes a final project. The final project and the internship's comprehensive report are submitted to a joint commission formed by the university and the internship field, where they are discussed and evaluated for 30 credits. We provide you with the module for the İnternship (additional). Guidelines for the Internship of Higher and Secondary Specialized Education Institutions Students in Specialization // http://edu.gov.az/upload/file/ali-orta-ikhtisas-uzre-esasname.pdf
The university is aware of the low number of students going to foreign universities and considers the lack of proficiency in foreign languages, particularly English, as the main barrier. Improving the English language skills of both students and staff is emphasized as a significant step in promoting international relations. Accordingly, experts recommend increasing	To enhance the English language skills of both students and staff, the university operates a Language Center and Translation Department. The department also prepares students for the International English Language Testing System (IELTS) examinations. An English language course, funded by the university, has been organized for 65 students.

the use of English in educational programs, for example, by offering more technical courses in English.	In collaboration with the Ministry of Digital Development and Transportation, the Ministry of Education, and the "Code Academy" educational institution, Sumqayit State University has responded to the demands of the labor market 64 students who have been recognized as listeners of "Code Academy" have continued their studies in English, specializing in Network Administration and Web Programming, and have been awarded certificates.
Specialists consider that project work offers students a set of essential skills relevant to three programs. Project work teaches students various crucial skills including project management, teamwork, communication, independence, individual creativity, critical thinking, scientific research, and many other skills vital for the professional success of graduates.	https://www.sdu.edu.az/az/news/2504 https://www.sdu.edu.az/az/news/2650 Every year, 25% of students are enrolled in updated courses. Students are assigned independent project topics in the specialized-professional preparation subjects. Project works are planned to be assigned to teams of 4-5 students. Starting from the third semester, there will also be the implementation of project assignments in several specialized subjects such as Database Systems, Computer Networks, IT Project Management, Human-Computer Interaction, System Analysis and Computer Modeling, Computer Architecture, Digital Systems, Computer Networks, Computer Modeling, etc.
The professional and teaching skills of the faculty members in the programs of Information Technology and Computer Engineering can be further enhanced, particularly in terms of their limited involvement in international research projects. Therefore, experts recommend attracting the professo-	To enhance the professional skills of the professorial staff, plans are underway to engage them in international projects. Collaborative programs are being executed with leading higher education institutions in the country, such as ADA University and Baku Engineering University. Each year, up to 25% of faculty members participate in these programs. Starting from the aca-

rial staff to collaborate more with industry (both regional and international) and external institutions for research. In general, they suggest building stronger networks with the international research community.	demic year 2024-2025, the development of relations with leading foreign universities is also planned.
During the audit, experts visited various laboratories and facilities. They were particularly interested in the "Bluetooth Communication" module as described. However, during their visits to all the facilities, they did not come across such a laboratory. As students are taught relevant skills in such a laboratory, the experts recommend the creation of a Bluetooth communication laboratory.	New laboratory works for wireless data transmission, used in the "Bluetooth Communication" module, are being carried out: "ZELLIO CONTROLLERS" and "ZELLIO SOFT" are used for the management of industrial equipment in the laboratory works. A 1. The ATV 32 asynchronous motor driver is controlled and its parameters are measured via the Bluetooth protocol using the "SO-MOVE SOFTWARE."
Experts confirm that students receive a Diploma/Certificate and an Additional Diploma upon graduation from each of the three programs. Upon closer examination, the Additional Diploma resembles more of a Transcript of Records because it only contains basic information such as the student's name, degree, and program name, along with a list of grades for each module. However, there is no explanation regarding the grading system or how the final grade is calculated. Additionally, the Additional Diploma lacks information about the students' specialization profile (i.e., acquired training outcomes) and the	The Diploma and Diploma Supplement provided in the reports of all three educational programs are standard state documents. The Diploma Supplement includes the student's grades for the subjects envisaged in the respective educational program and their credits. It is against the rules to include additional information in this document besides standard information. Graduates can have the Diploma and Diploma Supplement translated into English and certified notarially when needed.

classification of the program within Azerbaijan's education system. SDU should also ensure that all documents are provided in English.	
Auditors confirm that both SDU and students have clear rights and responsibilities, which are clearly defined and mandatory. All regulations are published on the university's website, and students receive their educational documents at the beginning of each semester. Furthermore, all relevant information about the programs (such as module handbooks, curriculum, intended learning outcomes) is available on the program's main page. However, experts note that there is no detailed information in the regulations regarding the student assessment process and precise assessment forms. Therefore, they suggest that detailed information about the existing assessment forms should be included in the research regulations.	According to the order of the Ministry of Education of the Republic of Azerbaijan dated September 11, 2008, and the decision of the Cabinet of Ministers of the Republic of Azerbaijan dated December 24, 2013 (No. 348), students are graded out of 100 points as follows: E 1.50 points are allocated throughout the semester (30 points for attendance and/or laboratory work, 10 points for class participation, and 10 points for independent (project) work). E 2.50 points are allocated for the exam. The overall grade is determined as follows: E 1.Less than 51 points: F (unsatisfactory) E 2.51-60 points: E (satisfactory) E 3.61-70 points: D (sufficient) E 4.71-80 points: C (good) E 5.81-90 points: B (very good) E 6.91-100 points: A (excellent) This information is included in the course syllabi.
The Information Technology and Computer Engineering programs share strong technical similarities. Both programs have complexity in content and scientific character, al-	The Automation Engineering specialization prepares experts in the fields of industrial and technological automation processes and management. Information Technology encompasses all areas of information science and production, with a focus on household, social, and other

beit the Computer Engineering program may have slightly lower standards in terms of automation engineering processes.	broader fields, aiming to be accessible to a wide range of users. Computer Engineering is hardware and software-oriented, while Information Technology is programming-oriented. Although the nature of the documents is the same, their content differs.

F Summary: Expert recommendations (27.02.2024)

Taking into account the additional information and the comments given by SSU the peers summarize their analysis and **final assessment** for the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ba Computer Engineering	Suspension	/	EUR-ACE®	/
Ba Information Technologies	Suspension	/	Euro-Inf®	/
Ba Process Automation Engineering	With requirements for one year	30.09.2029	EUR-ACE®	Subject to the authorization by ENAEE

Prerequisites

For Ba Information Technologies and Ba Computer Engineering

V 1. (ASIIN 1.3) The curricula must include subjects that are state-of-the-art and in line with EQF level 6.

V 2. (ASIIN 1.3) Include modern programming languages such as Java and Python that support object-oriented design and protoyping.

V 3. (ASIIN 2) The programmes must end with a thesis or a final project report that should have elements of independent research, analysis, and scientific reporting including validation and testing. The thesis or final project must correspond to EQF level 6.

V 4. (ASIIN 3.1) Teachers must have extensive knowledge in the technical areas of modern software and hardware technology.

Requirements

For all programmes

A 1. (ASIIN 1.5) Introduce a monitoring system, which in regular intervals checks that the credits awarded for each module correspond to the actual student workload.

A 2. (ASIIN 4.1) Specify the module descriptions with regard to the exact assessment forms.

A 3. (ASIIN 4.2) Ensure that every graduate receives a Diploma Supplement, which contains detailed information about the educational objectives, intended learning outcomes, the structure, the academic level of the degree programme, the final grade of the student as well as statistical data as set forth by the ECTS Users' guide.

A 4. (ASIIN 5) Use the results of student and industry partner evaluations to incorporate them into a PDCA (Plan, Do, Check, Act) cycle. Document the quality management process in more detail and demonstrate how stakeholders are involved in the process.

A 5. (ASIIN 5) SSU must close the feedback loop by informing the students about the results of their evaluation questionnaires in order to complete the quality assurance process.

For Ba Information Technologies and Ba Computer Engineering

A 6. (ASIIN 1.3, 3.2) Modernize the IT-laboratory course work by including laboratory exercises based on modern microcontroller/microprocessor and FPGA-Boards. Include laboratory work that develops the fundamental understanding of wireless and optical links for data transmission.

A 7. (ASIIN 4.1) Revise the module descriptions so that they reflect the actual content and learning outcomes of the modules.

Recommendations

All programmes

E 1. (ASIIN 1.3) It is recommended to increase the use of English in the degree programmes in order to create better conditions for internationalisation.

E 2. (ASIIN 1.3, 3.1) It is recommended to strengthen the international collaboration with industry and academic institutions.

E 3. (ASIIN 3.2) It is recommended to introduce a laboratory on Wireless data transfer and include practice in the laboratory into module on Network.

E 4. (ASIIN 1.3) It is recommended to include modern data and machine learning based algorithms.

E 5. (ASIIN 1.6, 2) It is recommended that teaching and examination forms be more strongly aligned with the intended learning outcomes of the module. In particular, the number of projects involving research-based learning should be increased.

For Ba Information Technologies and Ba Computer Engineering

E 6. (ASIIN 3.1) It is recommended that the scientific and didactic training of the teaching staff be improved in terms of professional development

For Ba Information Technologies

E 7. (ASIIN 1.3) It is recommended to improve the competence requirements in IT modules by including material that enhances analytical and quantitative skills.

G Comment of the Technical Committees

Technical Committee 01 – Mechanical Engineering/Process Engineering (11.03.2024)

The Technical Committee discusses the procedure and follows the assessment of the auditors without any changes.

Assessment and analysis for the award of the EUR-ACE® Label:

The Technical Committee deems that the intended learning outcomes of the degree programme does comply with the engineering specific parts of Subject-Specific Criteria of the Technical Committee 1.

The Technical Committee 01 – Mechanical Engineering/Process Engineering recommends the award of the seals as follows:

Degree Programme	**ASIIN Seal**	**Maximum duration of accreditation**	**Subject-specific label**	**Maximum duration of accreditation**
Ba Process Automation Engineering	With requirements for one year	30.09.2029	EUR-ACE®	Subject to the authorization by ENAEE

Technical Committee 02 – Electrical Engineering/Information Technology (01.03.2024)

Assessment and analysis for the award of the ASIIN seal:

The TC discusses the accreditation procedure and follows the assessment of the experts without change.

Assessment and analysis for the award of the EUR-ACE® Label:

The Technical Committee deems that the intended learning outcomes of the degree programme Process Automation Engineering do comply with the engineering specific parts of Subject-Specific Criteria of the Technical Committee 2.

The Technical Committee 02 – Electrical Engineering/Information Technology recommends the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ba Computer Engineering	Suspension	/	Euro-Inf®	/
Ba Information Technologies	Suspension	/	Euro-Inf®	/
Ba Process Automation Engineering	With requirements for one year	30.09.2029	EUR-ACE®	Subject to the authorization by ENAEE

Technical Committee 04 – Informatics/Computer Science (28.02.2024)

Assessment and analysis for the award of the ASIIN seal:

The TC discusses the accreditation procedure and follows the assessment of the experts without change.

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

The Technical Committee deems that the intended learning outcomes of the degree programmes do not comply with the Subject-Specific Criteria of the Technical Committee 04 – Informatics/Computer Science.

The Technical Committee 04 – Informatics/Computer Science recommends the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ba Computer Engineering	Suspension	/	Euro-Inf®	/
Ba Information Technologies	Suspension	/	Euro-Inf®	/

H Decision of the Accreditation Commission (22.03.2024)

Assessment and analysis for the award of the subject-specific ASIIN seal:

The commission discusses the accreditation procedure and follows the assessment of the experts without change.

Assessment and analysis for the award of the EUR-ACE® Label:

The Accreditation Commission deems that the intended learning outcomes of the degree programme Process Automation Engineering do comply with the engineering specific parts of Subject-Specific Criteria of the Technical Committees 01 and 02.

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

The Accreditation Commission deems that the intended learning outcomes of the degree programmes Information Technologies and Computer Engineering do not comply with the Subject-Specific Criteria of the Technical Committee 04 – Informatics/Computer Science.

The Accreditation Commission decides to award the following seals:

Degree Programme	**ASIIN Seal**	**Maximum duration of accreditation**	**Subject-specific label**	**Maximum duration of accreditation***
Ba Computer Engineering	Suspension	/	Euro-Inf®	/
Ba Information Technologies	Suspension	/	Euro-Inf®	/
Ba Process Automation Engineering	With requirements for one year	30.09.2029	EUR-ACE®	Subject to the authorization by ENAEE

Appendix: Programme Learning Outcomes and Curricula

According to programme specific study regulations the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Computer Engineering:

“At the end of the Education Program, the graduate should acquire the following general competencies.

- Oral and written communication skills in Azerbaijani by specialty;
- Communication skills in at least one foreign language by specialty;
- Systematic and comprehensive knowledge of the historical, legal, political, cultural, ideological foundations of Azerbaijan statehood and its place and role in the modern world, the ability to predict the prospective development of our national state;
- The ability to identify the threats and challenges faced by our national state;
- Ability to use information technologies at work;
- Team work, the ability to achieve a common approach to problem solving;
- The ability to adapt to new conditions, take initiative and the will to succeed;
- Ability to identify and select additional information resources for problem solving;
- Ability to analyze, summarize and apply relevant information for professional purposes ;
- Ability to plan and organize professional activities, improve future education and existing skills, manage time and complete tasks on time;
- The ability to prioritize social and environmental responsibility, as well as civic awareness and ethical approach, as well as quality;
- Reassessing the situation and self in order to develop knowledge and skills

At the end of the Education Program, the graduate should acquire the following professional competencies:

- To the ability to apply information and communication technologies, including computer systems and networks, in state administration bodies, research institutes, educational institutions, various offices and companies;

- To the ability to work with automated and integrated computer technologies, knowledge acquisition systems in the main directions of the development of computer engineering science;
- To the ability to apply the possibilities of ICT in various fields, taking advantage of knowledge in the field of relevant sciences, language skills, information technologies (IT);
- To the ability to develop and apply system, application and special purpose software tools, information and communication technologies for solving computer engineering issues;
- The ability to use application and special purpose software packages designed for the management of various technological processes;
- To the ability to create computer systems and networks, monitor the correctness of their activity, apply new technologies, install additional equipment and develop software products;
- To the ability to apply the methods of designing computers, computer networks, computing and information systems, and their components in the field of computer engineering;
- Ability to apply programming languages and software creation systems to solve computer engineering problems;
- The ability to create, install, use, debug, service provision of modern computer systems and networks, software, hardware and technical means, to organize and control their work capacity and effectiveness;
- To the ability to work with modern information and communication technologies, software and technical support, computer systems and networks in the field of computer engineering, to build and manage information systems using them;
- Ability to develop and apply tools based on computer graphics, multimedia and virtual reality technologies;
- Ability to develop, test, integrate and manage basic modules of database, user interface, information systems;
- To the ability to develop the software of various technological devices using modern programming technologies, to eliminate faults and deficiencies
- know the working principle of devices used for computer control of technological processes in industry and the ability to intervene in the work of those devices at the software level;

- To the habits and skills of application of existing engineering works and technologies of computer systems and networks to hardware and software;
- To the ability to apply computer systems and networks, information systems and processes for decision-making under conditions of uncertainty in management;
- Ability to organize activities in the field of computer engineering on a scientific basis, to know, apply and purposefully use the methods of collecting, storing, protecting, processing and transmitting information used in the field of professional activity;
- Ability to select, study, summarize and summarize scientific and technical literature, normative and methodical documents in order to solve professional issues;
- To the ability to collect the necessary knowledge in the field of computer engineering and to apply them in appropriate conditions, to express them concisely and honestly;
- The ability to prepare presentations in accordance with modern requirements, to establish business communication, to lead the engineering work of teams in the appropriate field;
- The ability to use the necessary mathematical methods for solving computer engineering problems;
- Ability to use modeling (including mathematical modeling) methods in the analysis and evaluation of computer systems and networks, information processes and systems."

The following **curriculum** is presented:

Password of the subject	Name of subject	Credit number	Auditorium hour				Weekly course load
			Total	Including according to the type of teaching			
				Lecture	Seminar, training	Laboratory	
	1st semester	**30**	**330**	**105**	**165**	**60**	**22**
İF-B08	Fundamentals of programming	8	90	30	30	30	6

İF-B07	Fundamentals of computer engineering	8	90	30	30	30	6
İF-B01	Linear algebra and analytic geometry	3	30	15	15		2
ÜF-B03.1	Business and academic communication in a foreign language- 1	7	75		75		5
ÜF-B02	Business and academic communication in Azerbaijani language	4	45	30	15		3
	2nd semester	**30**	**330**	**120**	**165**	**45**	**22**
ÜF-B03.2	Business and academic communication in a foreign language-2	8	90		90		6
İF-B05	Physics	5	60	30	15	15	4
İF-B02	Mathematical analysis	7	75	45	30		5
İF-B14	Circuit theory	7	75	30	15	30	5
ÜFS-B02	Information technologies (specialization); Information management; Fundamentals of Entrepreneurship and Introduction to Business; Political science	3	30	15	15		2
	3rd semester	**30**	**345**	**150**	**120**	**75**	**23**
İF-B03	Differential equations	3	30	15	15		2
İF-B11	Operating systems	8	90	30	30	30	6
İF-B15	Basics of electronics	6	75	30	15	30	5
İF-B04	Discrete mathematics	3	30	15	15		2
ÜF-B01	The history of Azerbaijan	5	60	30	30		4
ATMF-B01	1) Basics of measuring technique; 2) Schematic engineering of measuring devices	5	60	30	15	15	4
	4th semester	**30**	**330**	**165**	**75**	**90**	**22**
İF-B05	Probability theory and mathematical statistics	3	30	15	15		2
İF-B16	Digital systems	7	75	30	15	30	5
İF-B09	Data structure and algorithms	6	60	30	15	15	4
ATMF-B02	1) Analog and digital signal processing; 2) Signals and systems	4	45	30		15	3

ATMF-B 04	1) Analog electronics; 2) Optoelectronics	5	60	30	15	15	4
ATMF-B 06	1) Computer circuit engineering; 2) Technical vision systems	5	60	30	15	15	4
	5th semester	**30**	**345**	**150**	**105**	**90**	**22**
İF-B18	Computer graphic	5	60	30	15	15	4
İF-B13	Computer architecture	8	90	30	30	30	6
İF-B20	Civil defense	3	30	15	15		2
ÜFS-B0 1	Philosophy; Sociology; Constitution of the Republic of Azerbaijan and fundamentals of law; Logic; Ethics and aesthetics; Introduction to Multiculturalism	3	30	15	15		2
ATMF-B 12	1) Internet technologies; 2) Parallel and distributed computing systems	5	60	30	15	15	4
ATMF-B 03	1) Sensor systems; 2) Microprocessor analytical devices	6	75	30	15	30	5
	6th semester	**30**	**345**	**150**	**90**	**105**	**22**
İF-B17	Security of computer systems	8	90	30	30	30	6
İF-B12	Computer networks	8	90	30	30	30	6
ATMF-B 09	1) Basics of communication and bus system; 2) Virtual device technologies	5	60	30	15	15	3
ATMF-B 05	1) Peripheral devices of computers and networks; 2) Modern computer systems and networks	5	60	30	15	15	4
ATMF-B 10	1) Multimedia technologies; 2) Theory of formal languages and automata	4	45	30		15	3
	7th semester	**30**	**345**	**150**	**75**	**120**	**23**
İF-B10	Database systems	7	75	30	15	30	5
İF-B19	Modeling on the computer	7	75	30	15	30	5
ATMF-B 07	1) Microprocessors; 2) Microcontrollers	5	60	30	15	15	4

ATMF-B 11	1) System programming 2) Operations research	6	75	30	15	30	5
ATMF-B 08	1) Basics of computer application theory; 2) Simulation of systems	5	60	30	15	15	4
	8th semester (Industrial experience)	**30**					
	Total hours		**2370**	**990**	**795**	**585**	**156**

According to programme specific study regulations the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Information Technologies:

"At the end of the Education Program, the graduate should acquire the following general competencies:

- Oral and written communication skills in Azerbaijani by specialty;
- Communication skills in at least one foreign language by specialty;
- Systematic and comprehensive knowledge of the historical, legal, political, cultural, ideological foundations of Azerbaijan's statehood and its place and role in the modern world, the ability to predict the prospective development of our national state;
- The ability to identify the threats and challenges faced by our national state;
- Ability to use information technologies at work;
- Team work, the ability to achieve a common approach to problem solving;
- The ability to adapt to new conditions, take initiative and the will to succeed;
- the ability to identify and select additional information resources for problem solving;
- skills to analyze, summarize and apply relevant information for professional purposes ;
- ability to plan and organize professional activities, improve future education and existing skills, manage time and complete tasks on time;
- the ability to prioritize social and environmental responsibility, as well as civic awareness and ethical approach, as well as quality;
- to the ability to reassess the situation and oneself and self-criticism in order to develop knowledge and skills.

At the end of the Education Program, the graduate should acquire the following professional competencies:

- the ability to apply the possibilities of ICT in all fields, taking advantage of knowledge in the field of relevant sciences, language skills, information technologies (IT);
- to the ability to present the role of information, information technologies and information security in modern society, as well as their importance for meeting the objective needs of the individual, society and the state in this field;
- the ability to develop and apply system, application and special purpose software tools, information and communication technologies for solving professional issues;
- to the ability to identify, select and apply the necessary information, information technologies and computing resources for solving professional issues;
- Ability to analyze problems and apply necessary software-based tools to support the IT system;
- to the ability to understand users' needs in order to develop, test, install and maintain ICT-based solutions that meet users' technical requirements;
- the ability to apply programming languages and systems for creating software tools to solve professional problems;
- the ability to develop and apply tools based on computer graphics, multimedia and virtual reality technologies;
- the ability to develop, test, integrate and manage basic modules of database, user interface, information systems;
- the ability to install, use, root, service provision of modern software, hardware and technical tools, to organize and conduct control inspections of their working capacity and effectiveness;
- to the ability to analyze, summarize and apply relevant information for professional purposes;
- the ability to make effective decisions in the field of information technology management by applying software and technical systems;
- the ability to select, study and generalize scientific and technical literature, normative and methodical documents in order to solve professional issues;

- the ability to determine the compliance of information technologies in the organization (department, enterprise) with the requirements of existing standards, to apply normative legal acts, normative and methodical documents regulating the activity in this field, and to conduct working technical documentation;
- to prepare initial data for designing information systems, technical and economic justification of suitable projects ;
- the ability to use mathematical methods necessary for solving professional problems;
- to the ability to apply modern (including mathematical) methods for modeling in the analysis and evaluation of information technologies and systems."

The following **curriculum** is presented:

Of the subject the password	Name of subject	Credit number	Prepared	Seminar, training	Laboratory	Freelance work	Total hours	The teacher who teaches the subject
	I semester	**36**	**120**	**165**	**60**	**585**	**900**	
I F -B0 1	History of Azerbaijan	6	30	30		90	150	h/t. P.T. Afarov
U F -B0 3.1	Business and academic comm-1 in a foreign language	8		90		150	240	h/t. A.E.Mammadova h/t. J.E. Mammadova
UFS-01	Introduction to Multiculturalism	8	15	15		60	90	Assoc. X.S. Jalalova
IF-B01	Linear algebra and analytic geometry	3	15	15		60	90	Assoc. F.F. Aliyev
IF-B06	Physics	5	30		30	90	150	h/t. A. Hashimova
IF-B08	Program. the basics	6	30	15	30	135	180	Assoc. Sh.M. Jafarova
	II semester	**30**	**135**	**150**	**60**	**555**	**900**	
UF-B02	Azerbaijani language business and academic com-2	4	30	15		75	120	h/t. M.H. Mharramova Assoc. I.A. Agayev

UF-B03.2	Business and academic comm-2 in a foreign language	7		75		135	210	h/t. A.E.Mammadova h/t. J.E. Mammadova
IF-B13	Operating systems	6	30	15	30	105	180	h/t. B.Q. Amiraslanov
IF-B02	Mathematical analysis	7	45	30		135	210	Asst. SSHadiyeva
IF-B09	Modern programming languages	6	30	15	30	105	180	Assoc. Sh.M. Jafarova
								.
	III semester	**30**	**180**	**45**	**90**	**470**	**900**	
IF-B03	Differential equations	3	15	15		45	90	h/t. X.I. Seifullayeva
IF-B07	Basics of information technology	8	45	15	30	150	240	h/t. GAMammadova
IF-B10	Computer architecture	8	45	15	30	150	240	Assoc. N.H.Talibov
ATMF-B02	Basics of electronics	5	30			120	150	Assoc. A.S.Huseynova
IF-B14	Multimedia technologies	6	45		30	105	180	h/t.. G.A.Mammadova
	IV semester	**30**	**165**	**90**	**105**	**525**	**900**	
IF-B04	Discrete mathematics	3	15	15		45	90	h/t.. LM Ramazanova
IF-B11	Data structures and algorithms	7	30	15	30	135	210	h/t.. G.E.Orucova
IF-B17	Computer networks	8	45	15	30	150	240	h/t. B. Amiraslanov
UFS-B02	Information management	3	15	15		60	90	B/m. GA Mammadova.
IF-B12	Civil defense	3	30	15	15	30	90	Assoc. V.A. Gadimov
ATMF-B04	Digital systems	6	30	15	30	105	180	Assoc. AM Namazov
	V semester	**37**	**195**	**90**	**120**	**675**	**1110**	
IF-B05	Probability theory	3	15	15		30	90	Asst. SS Hadiyeva
IF-B12	Database systems	7	45		30	135	210	h/t. G.E. Orucova
ATMF-B10	Systematic analysis v KM	7	30	15	30	135	210	Assoc. Sh.R. Rahimov

IF-B18	Artificial intelligence	6	30	30		120	180	Assoc. Sh.R. Rahimov
ATMF-B06	Logic programming languages	8	45	15	30	150	240	Assoc. Sh.R. Rahimov
ATMF-B01	Info. tex mathematical elements	6	30	15	30	205	180	h/t. T.A. Safarova
	VI semester	**30**	**180**	**15**	**150**	**555**	**900**	
IF-B15	Information security	6	30	15	30	205	180	h/t. A.G.Aliyeva
IF-B16	Human-computer interface	7	45		30	135	210	b/m. S.M. Ahmadova
IF-B20	IT project management	5	30		30	90	150	Prof. A.H. Huseynov
ATMF-B05	Computer graphic	5	30		30	90	150	h/t. B.Q. Amiraslanov
IF-B19	Web systems and technologies	7	45		30	135	210	Assoc. Sh.M. Jafarova
	VII semester	**32**	**210**	**75**	**90**	**525**	**900**	
HF-B03	Azerbaijani language and speech culture	3	30	15		45	90	h/t. N.S. Ahmadov
IPF-B09	Multimedia technologies	6	45		30	105	180	h/t. GA Mammadova
IPF-B015	Artificial intelligence	6	45	30		105	180	Prof. MAAhmedov
IPF-B010	Information security	6	30	15	30	105	180	h/t. GEOrucova
IPFS-B13	Computer network. And peripherals	6	30		15	75	120	Assoc. ASHuseynova
IPFS-B14	SAKM	5	30	15	15	90	150	Assoc. Sh.R. Rahimov
	VIII semester	**30**						
	Experiences	30						
	Total	**211**	**1185**	**1815**	**675**	**3890**	**6510**	

According to programme specific study regulations the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Process Automation Engineering:

At the end of the Education Program, the graduate should acquire the following general competencies:

- oral and written communication skills in Azerbaijani by specialty;
- communication skills in at least one foreign language by specialty;

- Systematic and comprehensive knowledge of the historical, legal, political, cultural, ideological foundations of Azerbaijan's statehood and its place and role in the modern world, the ability to predict the prospective development of our national state;
- the ability to identify the threats and challenges faced by our national state;
- the ability to use information technologies at work;
- Work in a team, the ability to achieve a common approach to problem solving;
- the ability to adapt to new conditions, take initiative and the ability to succeed;
- the ability to identify and select additional information resources for problem solving;
- skills to analyze, summarize and apply relevant information for professional purposes;
- the ability to plan and organize professional activities, improve future education and existing skills, use time efficiently and complete tasks on time;
- the ability to prioritize social and environmental responsibility, as well as civic awareness and ethical approach, as well as quality;
- in order to develop knowledge and skills, to evaluate the situation and oneself and self- criticism;
- the ability to draw up normative and legal documents on future professional activities and use them, to know ways to restore violated rights;
- maintaining a healthy lifestyle, being ready for intercultural dialogue, acquiring criticism and self-criticism habits, proposing and justifying new ideas, the ability to take initiative and take responsibility in problematic situations;
- according to the basic and professional training of the bachelor, professional activity in the fields of specialization, as well as the ability to study at the master's degree in the specialty;
- in any production areas, organizations, departments, enterprises, associations, etc., regardless of the form of ownership and subordination, corresponding to their profession and degree of specialization. the ability to work in places;
- the ability to work in various educational institutions (with the exception of scientific, scientific-pedagogical activities in higher schools) in compliance with existing rules;
- the ability of corporate cooperation;
- the ability to communicate with specialists of other fields;

- the ability to connect with advanced firms and organizations operating within the country and abroad in the field of automation and management;
- organizational, initiative and leadership skills.

At the end of the Education Program, the graduate should acquire the following professional competencies:

- apply mathematical rules and laws, use existing methods and apply mathematical methods to process results, use mathematical models in the natural sciences, simple systems and processes, and/or critically analyze experimental data considering sources of error and uncertainty should be able to do, use, interpret and present, perform analytical and numerical solutions of the basic equations of mathematics;
- the universe as a physical object and its evolution, methods of physics and experimental research, continuity and discreteness in nature, regularity, consistency of the structure of objects, probability theories objectively characterizing natural systems, fundamental constants in natural sciences, principles of symmetry and conservation of energy, natural state and its time dependence should be able to demonstrate in engineering the knowledge about individual and joint movements of objects in nature;
- must be able to use knowledge of basic chemical systems and processes, reactivity of substances, types of inorganic substances, physical and chemical properties and atom-molecule theory, methods of determination and chemical identification of substances;
- should be able to use fundamental and technical knowledge, mathematical justification of a technical problem, build its mathematical model and determine its adequacy;
- must know the physical basics of the professional field, must be able to give a physical explanation of the work of elements, devices and systems;
- must be able to use chemical reagents provided for in the technological process in the field, to handle them safely;
- should know modern planning and design methods (AutoCAD, etc.), should be able to use computer design in the design of automation and control systems;
- must know the mechanics, composition and working principle of machines and mechanisms used in the field, must be able to ensure their normal operation;
- field installations and equipment, must be able to assess their compliance with standards, ensure their electrical safety (automatic protection and grounding) and ensure their normal operation;

- should be able to analyze electronic elements of automatic control systems, read structural, functional, principle and assembly diagrams, synthesize analog and digital elements, microcircuits and electronic nodes, design programmable integrated microcircuits ("built-in") and create more efficient systems;
- must know programmable logic controllers (PLC), widely used in automatic control systems, their application characteristics and technical capabilities, be able to program them, apply them together with suitable sensors and actors;
- should know the basic regulation laws and principles, should be able to synthesize an automatic system based on typical dynamic models, determine the stability and quality indicators of automatic regulation and control systems, and implement their improvement;
- must master the principles of digital control, know the principles of analog-to-digital and digital-to-analog conversions, Z-transformation, structural analysis of discrete systems;
- must master the modeling of digital systems, be able to perform the modeling of digital systems in Matlab/Simulink and l_ABVIEW, the analysis and synthesis of digital control systems;
- should know industrial bus systems (Asi, HART, Profi Bus) applied in automation and control systems of technological processes, should be able to configure systems based on controllers of advanced companies ("Moeller", Siemens, "Schneider Electric");
- must be able to propose new ideas in the field of automation and management, its technical, scientific and economic justification;
- should know the main parameters characterizing technological processes and production, their characteristics, should be able to use primary measurement transducers to obtain the necessary information and be able to process, generalize and use the received information for decision-making;
- should be able to use scientific and technical achievements, modern computer and information technologies, software required in the field in the design and operation of automation systems and devices;
- must know the modern technical base of automation and control systems - sensors and execution mechanisms, communication and bus systems, microprocessors, software-controlled controllers, and be able to design intelligent automation and control systems based on them;

- Must know the scientific and technical basics of creating SCADA systems, master the basics of management with SMART and Web technologies, and be able to apply these technologies;
- should be able to diagnose automation systems and devices using modern methods and means of technical diagnostics, detect the malfunctions and eliminate them;
- should be able to read the technological, structural, functional and principle schemes of automation devices and systems, explain the working principles, organize their normal operation and restore them in case of failure;
- must be able to effectively use the database of advanced companies and enterprises that produce automation equipment and devices, to design and configure the required system based on them;
- field enterprises (drilling of oil and gas wells, oil and gas production, oil and gas processing, petrochemical processes, machine building, robotics and flexible automatic production areas, energy, transport, aviation, military equipment, food and light industries, construction and the construction field, discrete technologies, etc.) should know typical technological processes, be able to model and simulate them, build automatic process control systems;
- must be able to determine and understand safety rules of equipment, plant and system, as well as technological process and production, ensure their safe operation, use modern alarm and blocking systems;
- must know the economic basics of equipment, plant, system and organization of production, determine the main capital investment, calculate the cost of the product, learn modern methods of reducing the cost by ensuring its quality, and be able to increase the labor productivity of the enterprise;
- must know the regulatory requirements of the environment and labor protection, must be able to implement the fulfillment of those requirements at the workplace;
- He should know the norms of the International Organization for Standardization (ISO) used in the field of automation, he should be able to regulate the quality assurance of the manufactured product and environmental protection.

The following **curriculum** is presented:

№	Subject code	Name of subject	Credit count	Lecture	Seminar, training	Laboratory	Free jobs	common hours	The teacher which teaches the subject
		I semester	**thirty**	**150**	**165**	**45**	**360**	**720**	
1	**H F -B0 2.1**	Foreign language - 1	6		75		75	150	Mammadova J.E.
2	**H F -B0 3**	Azerbaijani language and culture of speech	5	thirty	thirty		60	120	Assoc. Agayev I.A.
3	**IPF -B01**	Mathematics - I (Basics of Mathematics)	5	thirty	thirty		60	120	Sadigov M.
4	**IPF -B04**	Physics-I (Fundamentals of Physics)	5	thirty	15	15	60	120	Associate Professor Latifova S.A.
5	**IPF-B07**	Basics of computer science	5	thirty	15	15	60	120	T.u.fd, Assoc. Jafarova Sh.M.
6	**IPF-B09.1**	Fundamentals of electrical engineering-I	4	thirty		15	45	90	Tech. en, Assoc. V.G. Sattarov
		II semester	**thirty**	**150**	**165**	**45**	**3 60**	**720**	
7	**H F -B0 2.2**	Foreign language -2	5		60		60	120	teacher Mammadova J.E.
8	**IPF -B02**	Mathematics - II (Engineering Mathematics)	4	thirty	15		45	90	tendos. Rahimov Sh.R.
9	**IPF -B05**	Physics-II (Applied Physics)	5	thirty	15	15	60	120	Assoc. Latifova SS
10	**IPF -B08**	Technical information	5	thirty	15	15	60	120	Tech. en, Assoc. Namazov A.M.
elev en	**IPF-B09.2**	Fundamentals of electrical engineering-II	6	thirty	thirty	15	75	150	ten, Assoc. V.G. Sattarov
12	**IPF-B12**	Electrotechnical materials	5	thirty	thirty		60	120	Tech. en, Assoc. Abbasov Akbar
		III semester	**thirty**	**195**	**105**	**60**	**360**	**720**	
13	**H F -B0 1**	history of Azerbaijan	6	45	thirty		75	150	H/t. Jafarov P.T.
14	**IPF -B03**	Mathematics - III (Applied Mathematics)	4	thirty	15		45	90	H/t. Sadikhov Z.A.
1 5	**IPF -B10**	Basics of measuring technique	5	thirty	15	15	60	120	H/t. Mammadova R.C.
16	**IPF -B14**	Adjustment technique	5	thirty	15	15	60	120	ten, Assoc. Agayev U.X.
17	**IPF -B17**	Basics of electric machines	5	thirty	15	15	60	120	ten, Assoc. Huseynov R.A.

18	IPF -B18	Fundamentals of electric power	5	thirty	15	15	60	120	Tech. en, Assoc. V.G. Sattarov
		IV semester	**thirty**	**195**	**60**	**105**	**360**	**720**	
19	IPF -B06	Technical mechanics	4	thirty	15		45	90	H/t. Ismayilova Sh.H.
20	IPF -B11	Technical foreign language	4		45		45	90	teacher Mammadova J.E.
21	IPF-B13	Basics of electronics	4	thirty		15	45	90	T.u.fd, Assoc. Huseynova A.S.
22	IPF-B16	Fundamentals of automation techniques	5	thirty		thirty	60	120	ten, Assoc. Namazov A.M.
23	IPF-B25	Analog and digital signal processing	5	45		thirty	75	150	Assoc. Mansurov G
24	IPSF -B01	Technological measurements	8	60		thirty	90	180	Bas. m. Salmanov M.S.
		V semester	**thirty**	**195**	**75**	**105**	**375**	**750**	
25	HFS -B0 1 _	Philosophy	4	thirty	15		45	90	Assoc. Hajiyev Osman
26	IPF -B19	Programmable logic controller	5	thirty	15	thirty	75	150	prof., tech.ed Alakbarli F.H.
27	IPF-B22	Project management	4	thirty	15		45	90	H/t. Hajiyeva Z.E.
28	IPF-B23	Sensor system	4	thirty		thirty	60	120	Assoc., tfd, Mammadov V.G.
29	IPF-B24	Analysis and identification of processes	5	thirty	15	15	60	120	H/t. Salmanov M.S.
thirty	IPSF - B 05	Operations Research in Control	8	45	15	thirty	90	180	Prof., ted Nagiyev A.H.
		VI semester	**thirty**	**210**	**45**	**120**	**375**	**750**	
31	IPF-B15	Basics of Communication and Bus System	5	thirty		thirty	60	120	H/t. Guliyev R.Y.
32	IPF-B20	Power electronics and transmission control	4	thirty		15	45	90	Assoc., Tufd. Abdulova N.A.
33	IPF-B26	Designing machinery and equipment	4	thirty	15		45	90	Tech. en, Assoc. Garamammadov H.A.
34	IPF-B27	Microprocessor control systems	5	45		thirty	75	150	prof., ted Alakbarli F.H.
35	IPF -B 28.1	Industrial automation-I	5	thirty	15	15	60	120	prof., ted Alakbarli F.H.
36	IPSF - B03 _	Modeling of objects	7	45	15	thirty	90	180	H/t. Salmanov M.S.
		VII semester	**thirty**	**210**	**90**	**90**	**375**	**765**	
37	HFS -B0 2 _	Economy	2	15	15		thirt y	60	H/t. Mirzabayov A.A.
38	IPF -B21	Engineer economy	4	thirty	15		45	90	H/t. Mirzabayov A.A.

39	**IPF-B28.2**	Industrial Automation-II	5	thirty	15	thirty	75	150	prof., ted Alakbarli F.H.
40	**IPF-B29**	Civil defense	3	thirty	15		45	90	H/t. Shammadova I.H.
41	**IPSF-B07**	Computer aided of control system	8	60		thirty	90	180	prof. ted Mammadov C.F.
42	**IPSF-B08**	Digital control systems	8	45	thirty	thirty	90	195	H/t. Ganjaliyeva G.Q.
		VIII semester	**thirty**						
	TE -B01	Experiments	21						
	TE -B02	The final state certification	9						
		Total	**240**	**1305**	**705**	**570**	**2565**	**5145**	