



ASIIN Seal, Euro-Inf[®], EUR-ACE[®] Label

Accreditation Report

Bachelor's Degree Programmes

Power Engineering

Computer Science

Robotics and Mechatronics

Provided by

**Kazakh National Research Technical University
named after K.I.Satbayev**

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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
Энергетика (Электроэнергетика)	Power Engineering (Electrical Power Engineering)	ASIIN, EUR- ACE [®] Label	ASIIN 30.09.2016 30.09.2022	02
Computer Science	Computer Science	ASIIN, Euro-Inf [®]	IAAR 11.06.2021 10.06.2024	04
Робототехника и мехатроника	Robotics and Mechatronics	ASIIN, EUR- ACE [®] Label	IQAA SA-A №0216/1 19.06.2021 18.06.2026	02
Date of the contract: 15.08.2022 Submission of the final version of the self-assessment report: 06.01.2023 Date of the onsite visit: 30-31.01.2023 at: Kazakh National Research Technical University named after K.I.Satbayev				
Peer panel: Prof. Dr. Madhukar Chandra, TU Chemnitz Dr. Bolatzhan A. Kumalakov, Astana IT University Amiret Konysbayev, president of the Association of innovative companies of the SEZ «Park of innovative technologies»				

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 04 - Informatics/Computer Science.

Issabek Muratov, student at Almaty University of Power Engineering and Telecommunications	
Representative of the ASIIN headquarter: Paulina Petrachenko	
Responsible decision-making committee: Accreditation Commission for Degree Programmes	
Criteria used: European Standards and Guidelines as of May 15, 2015 ASIIN General Criteria, as of December 07, 2021 Subject-Specific Criteria of Technical Committee 02 – Electrical Engineering/Information Technology as of December 9, 2011 Subject-Specific Criteria of Technical Committee 04 – Informatics/Computer Science as of March 29, 2018	

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
Power Engineering	Bachelor of Engineering and Technology		6	Full time	/	8 Semester	240 ECTS	2004
Computer Science	Bachelor of Engineering and Technology		6	Full time	/	8 Semester	242 ECTS	2018
Robotics and Mechatronics	Bachelor of Engineering and Technology		6	Full Time	/	8 Semester	242 ECTS	2019

For the Bachelor's degree programme Power Engineering the institution has presented the following profile on the website:

"The professional activities of the program's graduates are directed to the field of Electric Power Engineering, heat and electrical engineering. The direction of the specialty and specialization program covers engineering. The aim of the educational program is to teach students general education, basic and specialized disciplines with the achievement of appropriate competencies. The bachelor's education program "Power Engineering" differs from the existing educational programs in the specialties 5B071700 – "Heat Power Engineering" and 5B071800 – "Electric Power Engineering" by updating the internal content of disciplines related to the production, transmission and consumption of thermal and electrical Power Engineering and the addition of disciplines on renewable Power Engineering. A number of disciplines have proposed new content, including approaches based on Power Engineering conservation and Power Engineering efficiency in Power Engineering plants, and includes several courses on modern industrial technologies in the Electric Power Engineering industry. The educational program has increased the volume of mathematical, natural science, basic and language disciplines. Specialized disciplines have been added, which can be divided into four groups: disciplines in thermal Power Engineering, disciplines in Electric Power Engineering, disciplines on alternative Power Engineering and laboratory workshops on the use of modern technology. As a result, we have an educational program that has

³ EQF = The European Qualifications Framework for lifelong learning

innovative and practical content and is aimed at implementing the Digital Kazakhstan program. The educational program includes the following innovative disciplines:

- laboratory workshop on modern industrial technologies in the electric power industry
- Power Engineering audit and Power Engineering saving in enterprises;
- renewable Power Engineering;
- modelling in Power Engineering systems
- calculating and designing Electric Power Engineering systems;
- calculating and designing power grids and systems;
- calculating and designing thermal exchange equipment;
- calculating and designing an automated electric drive.”

For the Bachelor’s degree programme Computer Science the institution has presented the following profile in the website:

„The purpose of the educational program is to teach students General educational, basic and specialized disciplines with the achievement of relevant competencies. The educational program provides an individual approach to students, ensures the transformation of professional competencies from professional standards and qualification standards to learning outcomes. Student-centered learning is provided-the principle of education that involves shifting the emphasis in the educational process from teaching to teaching.

The educational program provides training of IT specialists in 3 areas:

- Software engineering. Software developers of a wide range. The educational program provides knowledge of various programming paradigms and operating systems, obtaining skills in designing and developing software products for any platform.
- Artificial intelligence. Data analysis specialists. The educational program provides knowledge of various models and methods of data analysis, including modern tools for extracting and processing large amounts of data, the use of artificial neural network models for classification and regression problems, methods and algorithms related to the field of artificial intelligence.
- Information system. Specialists in the field of information systems. The educational program provides knowledge of various methods and models for managing information systems infrastructure, organizing activities and business processes based on information

technologies, building scalable information systems, managing software development, ensuring the continuous operation and operational activities of IT software.

The educational program was developed on the basis of the analysis of the labor functions of software engineers, system administrators, and data analysis specialists stated in professional standards. Representatives of Kazakhstan companies in the field of software development participated in the development of the educational program. A number of disciplines in these areas offer relevant content in accordance with the current challenges of science and technology.

In the field of Software engineering:

- - Parallel programming
- - Microservice technologies
- - Game development
- - High load programming platforms
- - Enterprise Web Programming
- - SPA Web Programming
- - Interactive graphics systems
- - Mobile app development
- - Functional programming

In the direction of Artificial intelligence:

- - Data analysis
- - Scientific Python
- - Theory of neural networks
- - Deep Learning ANN
- - Natural language processing
- - Digital image processing
- - Business Intelligence

In the field of Information systems:

- - Human Computer Interaction
- - Management in information systems

- - Information security risk management
- - Supply chain and logistics
- - Social and Ethical Issues of the Internet
- - Big data
- - Production and operations management”

For the Bachelor’s degree programme Robotics and Mechatronics the institution has presented the following profile in the website:

“Educational program “Robotics and mechatronics” is aimed at training professional bachelors in the field of design and construction of robots, robotic and mechatronic systems for industrial and non-industrial purposes. The direction of the specialty and specialization program covers engineering and engineering business.

Purposes of EP "Robotics and mechatronics" are:

- meeting the needs of students for intellectual, creative and professional development by obtaining knowledge and skills in the field of robotic and mechatronic systems;
- preparing graduates for continuous self-improvement and self-development, mastering new knowledge, skills and abilities in innovative areas;
- meeting the needs of the Republic of Kazakhstan qualified personnel on the basis of the diversity and dynamism of the catalog of elective disciplines of the curriculum, with a predominance of practical skills competencies able to carry out professional functions in one or more activities based on the learning outcomes, taking into account the specifics of these activities, market requirements for organizational management, the professional competences.

The objects of professional activity of graduates who have completed the undergraduate program are robotic and mechatronic systems, including information and sensory, Executive and control units, their mathematical, algorithmic and software methods and tools for design, modeling, experimental studies, debugging and exploitation, research and production testing of robotic and mechatronic systems having different applications. Educational program "Robotics and mechatronics" contains a complete list of academic disciplines, grouped in cycles: compulsory disciplines (CD), basic (BD) and majors (MD) as mandatory components, and components for selection, indicating the complexity of each subject in academic credits and hours established by the State obligatory standards of higher and postgraduate education, approved by order of MES RK №604 dated October 31, 2018. The disciplines of the mandatory component of the CD cycle are aimed at forming the worldview, civic and moral positions of a future specialist who is competitive on the basis

of knowledge of information and communication technologies, building communication programs in the state, Russian and foreign languages, focusing on a healthy lifestyle, self-improvement and professional success. The BD cycle includes studying academic subjects and passing professional practice. The MD cycle includes academic disciplines and types of professional practices. The programs of disciplines and modules of the BD and MD cycles are interdisciplinary and multidisciplinary in nature, providing training at the junction of a number of areas of knowledge.”

C Peer Report for the ASIIN Seal⁴

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
- Discussions during the Audit
- Websites of all programmes
- Diploma Supplements for all programmes
- Module Handbooks for all programmes

Preliminary assessment and analysis of the peers:

For the degree programmes under review, the higher education institution (HEI) presents an extensive description of learning outcomes in the self-assessment report and the Diploma Supplements (SAR). These descriptions are accompanied by learning module matrices and module descriptions for each programme including the learning outcomes of each individual module.

The peers discuss the learning outcomes of each degree programme, which can be found in their entirety in the annex to this accreditation report, with regard to the following criteria: the level of academic qualification aimed at, the respective ASIIN subject-specific label (SSC), whether the intended qualification profiles allow the students to take up an occupation corresponding to their education, which stakeholders are involved in the continuous assessment and further development of the objectives. The peers refer to the SSC of the Technical Committees Electrical Engineering and Information Technology as well as Computer Science as a basis for judging whether the objectives and intended learning outcomes of the degree programmes under review correspond with the criteria.

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 peers conclude that the objectives and intended learning outcomes of all degree programmes under accreditation are well-anchored, binding and easily accessible to the public. In addition, they are consistent with the EQF levels aimed at and adhere to the relevant ASIIN SSC and criteria for the EUR-ACE®-Label. They note that the university has also applied for the EUR-ACE® label for the degree programme in Computer Science. However, the programme does not meet the criteria for the EUR-ACE® label because it does not contain sufficient engineering elements and, as the title of the programme indicates, it is primarily a scientific programme. Therefore, they decide that the EUR-ACE® label cannot be awarded to the Computer Science programme.

In addition, the peers notice differences in the presentation of the learning outcomes of all programmes between the Diploma Supplements and the self-assessment report. While in the Diploma Supplements, the learning objectives are rather general and vague, in the self-assessment report, the learning outcomes are described in a more concrete and precise manner. Furthermore, in contrast to the Diploma Supplements, the learning outcomes in the self-assessment report do not only specify the technical skills that the students should acquire but also the level thereof. Overall, the more detailed presentation in the self-assessment report enables a clearer insight into the actual learning outcomes of the individual programmes and is more in line with EQF level 6. For reasons of transparency and accuracy, the peers insist that the intended learning outcomes in the Diploma Supplements are adapted to those in the self-assessment.

Moreover, the peers note discrepancies between the learning outcomes presented in the Diploma Supplement (in connection with the self-assessment report) and the module handbooks. For example, according to the Diploma Supplement students of the Ba programme Computer Science gain competencies in the fields of Machine Learning and Data Science. Yet, the module handbook does not list these subjects as part of the curriculum. In the audit discussion, the programme coordinators explain that the Computer Science programme offers students two major tracks – Software Engineering and Machine Learning/Data Science – from which students can choose one. Mistakenly, the Diploma Supplement includes the intended learning outcomes of both tracks. The peers therefore require that the Diploma Supplement should clarify which track the student has studied and to list only the learning outcomes of the respective track. Another discrepancy identified by the experts refers to the Bachelor programme Robotics and Mechatronics. According to the Diploma Supplement, students will have acquired skills and knowledge in the subject Information Sensors. However, according to the module handbook, the topic of Information Sensors is only addressed within an elective module. The peers therefore inquire how the programme coordinators ensure that all students achieve this learning objective. In the audit, the programme coordinators explain that this is an error in the module handbook

since the module is actually obligatory for all students of the programme. The peers agree that the module handbooks of all programmes have to be revised so that they are in line with the Diploma Supplement and reflect the actual conditions.

Another peculiarity that the experts stumble upon when reviewing the module handbooks is the improbable feasibility of a few modules. For instance, according to the module description of the module “PHY 1111 Physics 1 2” in the Power Engineering programme the students are required to learn an enormous amount of topics within one semester. More precisely, the module objectives state at the end of the module students should know about “modern ideas about the state of matter (matter and fields), achievements of science of the 20th-21st centuries in the field of fundamental physics; and fundamentals of conducting experimental studies with modern measuring equipment and processing their results”. Not only are these goals very broad and do not provide a clear overview of the exact topics, but they also span an immense range of topics that can hardly be covered within one semester. Similarly, the module “ROB 509 Physical Basis for Obtaining Information” in the programme Robotics and Mechatronics also lists a huge number of topics and competencies that do not seem feasible to the experts. According to the module description, student should

“know about:

- basic physical laws, effects, phenomena used to obtain measurement information;
- theoretical material in the field of physical foundations for obtaining information, physical measurements, general theory of information, metrological support;
- principles for assessing the accuracy characteristics of various methods for measuring physical quantities
- the main measuring transducers and the physical effects used in them
- advantages and disadvantages of measuring transducers.

Be able to

- correctly choose the necessary transducer for measurements and justify his choice;
- understand the principles of construction of various types of measuring transducers.

Be competent:

- in practical and theoretical use different converters in professional activity”

These competencies are consolidated in practical work, in which students are among other things taught about “electrocapacitive, electropotential, piezo-tensoelectric, electrochemical transformation; induction, magneto-modulation, galvanomagnetic measuring conversion; conversion of eddy current parameters into an electrical signal; fields of application of eddy current measurement conversion; polarization of radio waves; areas of application of radio wave measuring conversion; interference and diffraction of acoustic waves” etc. In the audit discussions, the teachers admit that they usually only manage to cover about 70% of these topics, however, some topics might be studied by students autonomously. The peers conclude that the module descriptions must be revised so that the module objectives and content are feasible, precise, and reflect the actual conditions. Overall, the programme coordinators need to ensure that the module objectives are also in line with the learning outcomes stated in the Diploma Supplements.

The peers discuss with the programme coordinators if and how the programme objectives and programme learning outcomes are regularly reviewed and updated. The coordinators report that they have strong connections to the industry as can be seen by the extensive network with various companies, energy associations, and business chambers. Furthermore, Satbayev University regularly invites industry representative to lecture entire courses. In addition, the university carries out twice per year student surveys. Considering the feedback by students and industry partners, the academic council reviews and updates the curricula of the programmes once per year. The experts are glad to see that the programmes are regularly assessed and developed taking the feedback from students and stakeholders into consideration. They are impressed by the strong connection that is nurtured between university in general as well as the programmes to the industry and believe that the qualification profiles of the programmes are well adapted to the demands of the Kazakh industry. Furthermore, they are convinced that these qualification profiles would allow the students to take up an occupation, which corresponds to their qualification.

However, the practical orientation of the programmes seems to come at the expense of the theoretical foundations, as the peers consider the mathematical and physical content in the programmes to be insufficient in order to achieve the intended learning outcomes. For instance in the Computer Science programme, the module description of “Physics 1” indicates that the following topics are taught in the module: “‘Mathematics II’ sections: Indefinite integral; Definite integral; Multiple integrals; Numerical series; Power series; Fourier series”. The vague documentation of the content does not give a clear overview of the exact topics taught in the module. In addition, the experts note that the scientific dimension of the programme is rather low given the title “Computer Science” and should be expanded. The peers’ impression of the other programmes is similar since most mathematical and physical content is reduced to one or two specific modules per programme and the

documentation thereof is largely unspecific and/or overloaded with terms, as discussed above. In addition, the peers miss the interweaving of mathematical and physical fundamentals with technical content. Therefore, only occasional reference to or integration of mathematical or physical theories is made in the technical modules. This image is consolidated after the review of the exams and final theses. According to the experts, the level of theoretical knowledge in the fields of mathematics and physics that students have to demonstrate in the exams is rather low. In conclusion, the peers agree that the more mathematics and physics content must be integrated into all programmes under review in order to achieve the intended learning outcomes.

Criterion 1.2 Name of the degree programme

Evidence:

- Diploma Supplements for all degree programmes
- Module Handbook for all degree programmes
- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The peers agree that the names of the degree programmes adequately reflect their respective aims, learning outcomes and curricula.

Criterion 1.3 Curriculum

Evidence:

- Diploma Supplements for all degree programmes
- Study Plans for all degree programmes
- Module Handbook for all degree programmes
- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:

All Bachelor programmes have a duration of four years/eight semesters. The curriculum of each Bachelor programme consists apart from technical subjects also of a variety of general subjects. These include language courses, physical education courses, and socio-political courses. In their self-assessment report as well as the module handbook, the university explains in detail the individual competences and skills that are associated with each of

these module groups and which individual modules are contained in which group. The peers thus gain a distinct overview of the curricular content of all degree programmes (cf. annex to this accreditation report).

The presented curricula of all Ba degree programmes leave the expert panel with the impression that these curricula offer a comprehensive overview and sound basis of power engineering, robotics and mechatronics, and computer science, respectively. In particular, the auditors come to see that the students gain the skills and competences defined by the SSC of the Technical Committees 02 and 04. In addition, the curricula of the Bachelor programmes Power Engineering and Robotics and Mechatronics correspond with the standards of ENAEE (EUR-ACE®-Label). The skills and competences students are expected to acquire in the broad fields of electrical engineering and computer science are adequately reflected in the Learning Objective Matrix, and largely implemented and operationalized in the curricula of the programmes. However, as mentioned in chapter 1.1, the peers come to the conclusion that the current curricula of the three programmes do not enable students to achieve all the intended learning outcomes outlined in the Diploma Supplements and self-assessment report. Hence, they deem the amount of mathematical and physical foundations and theories that are taught in the three programmes to be insufficient to achieve the intended learning outcomes and to provide students with a solid education in the respective disciplines. In order to comprehend and apply the subjects according to EQF level 6, it is essential that students are taught advanced theories in the fields of mathematics and physics. Therefore, the experts insist that more mathematics and physics content is to be incorporated in all three programmes.

Furthermore, the peers notice that all programmes only offer a relatively small range of elective modules that the students can choose from and which hinders students in specializing in a field that goes beyond the traditional subjects that are needed in the regional industry. Therefore, the peers recommend to extend the range of elective modules according to the state of the art of similar programmes such as “Renewable Energy” in Power Engineering.

In the audit discussion, the peers moreover inquire whether the subject of Electromagnetics is taught in all three programmes. The programme coordinators confirm that Electromagnetics are incorporated in all programmes. In the programme Robotics and Mechatronics, the subject is taught among other things in the modules “Fundamentals of Electromechanics and electronics” and “Theory of learning machines and neural networks”. The module descriptions reflect that Electromagnetics are addressed in these modules. Furthermore, the programme coordinators state that the subject is also taught in some modules

in the Ba programme Power Engineering. Yet, this is not illustrated in the module descriptions. The peers therefore request the programme coordinators to revise the module descriptions so that they match the actual content taught in the modules.

Criterion 1.4 Admission requirements

Evidence:

- Self-Assessment Reports
- Decree of Minister of Education and Science May 24, 2021, No. 241
- Discussions during the audit

Preliminary assessment and analysis of the peers:

According to the Self-Assessment Report, admission procedures and policies for new students follow the National Regulation No.241. The requirements, schedule, registration venue, and selection test are announced on the webpage and thus accessible for all stakeholders.

There are different ways by which students can be admitted to a Bachelor's programme depending on the type of grant they hold. In case more students than places are available apply for a programme a so-called express-testing is implemented with exams and oral testing. Generally, people with a secondary, technical, vocational, post-secondary, or higher education are admitted to a Bachelor programme at Satbayev University.

In the Ba programme Power Engineering, in 2019 there were 200 enrolled students, and in 2021 186 students. In the Ba programme Computer Science, the number of applicants and enrolled students grew rapidly in the last years. While in 2019, there were 242 enrolments, in 2021 309 students enrolled in the programme. In the Ba programme Robotics and Mechatronics the number of enrolled students has changed only slightly from 11 students in 2019 to 15 in 2021.

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.

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

The experts examine the statement by Satbayev University but do not consider the information provided to be sufficient to overcome the deficiencies they have identified in the programmes. Therefore, they insist that the mathematics and physics module contents are

substantiated in all programmes in order to match the learning outcomes that require the graduates to be capable of doing applied re-search and development. Furthermore, Satbayev University must ensure that the intended learning outcomes in the Diploma Supplement and the module descriptions are consistent with each other and overall align with the content of the module descriptions. On a less critical level, the suggest extending the range of elective modules according to the state of the art including renewable energy.

The Criterion is not fulfilled.

2. The degree programme: structures, methods and implementation

Criterion 2.1 Structure and modules

Evidence:

- Objective-Module Matrix for all programmes
- Study Plans for all degree programmes
- Module Handbook for all degree programmes
- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The structure of the programmes under review is clearly outlined on the subject specific website for each study programme. The programmes consist of modules, which comprise a sum of teaching and learning. The module descriptions are also published on the subject specific website. The programmes also offer several elective courses, which allow students to define an individual focus. Yet, as mentioned in chapter 1.3 the overall choice of elective modules is relatively small, which is why the experts recommend introducing more elective modules according to the state of the art.

Based on the analysis of the sequence of modules and the respective module descriptions the peers concluded that the structure of both programmes ensures that the learning outcomes can be reached. However, the experts notice that often the practical modules, in which the subject material is practically applied, is not taught alongside the corresponding theoretical module but during another semester. The peers therefore recommend revising

the structure of the curricula so that the practical modules are taught alongside theoretical modules. The temporal alignment should lead to the theoretical and practical knowledge of the students being linked and complemented as well.

Mobility

In order to support the international mobility of students the faculty has established several student exchange programmes with international, mainly Russian universities but also with Higher Education Institutions in Poland and Japan. Altogether Satbayev University has 153 agreements with universities and organizations from 32 countries. According to the documents submitted by the university, there is a regular exchange of outgoing and incoming students. For example, in 2021 about 33 students were sent to study at partner universities as part of the Academic Mobility programme. During the audit, the experts are informed that students are very interested in the opportunity of going abroad and, in particular, doing an internship abroad. For the recognition of courses, finished abroad Satbayev University has defined transparent regulations. The peers appreciate that students are very interested in the exchange programmes and that there is a high student demand.

The peers furthermore acknowledge that there is also a frequent exchange of teaching staff. For instance, Ozhikenov Kassymbek, the programme coordinator of the BA programme in Robotics and Mechatronics has visited the University Thomas More (Belgium) in 2018. In reverse, Satbayev University also regularly hosts guest lecturers. For example, professor Eduard Siemens from Anhalt University of Applied Sciences (Germany) taught 2019 taught a course on the “Theory of Electromechanical Energy Conversion”. The peers are content knowing that the university and the faculties do not only have strategies for further internationalization of the university but are also actively implementing measures. Nonetheless, the peers believe that there is room for improvement in terms of the English usage in the programmes. Currently, there are only few modules that are taught in English in each programme under review. The experts are glad that the students are generally introduced to the English language in a technical/professional context. However, they believe that an increase of technical modules in English would significantly enhance the qualification profile of the students and therefore improve their career prospects. For this reason, they recommend providing more technical modules taught in English.

Criterion 2.2 Work load and credits
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Evidence:

- Self-Assessment Report
- Study plans of the degree programmes

- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the peers:

Satbayev University uses the ECTS Users' Guide for the calculation of the credits. One ECTS point corresponds to 30 academic hours of study time, which includes teaching and self-study time. One academic hour for all types of educational work is equal to 50 minutes. Thus, one ECTS corresponds to 25 actual hours. According to the normative schedule, every student is supposed to study 30 academic hours per week (6 hours per day with a 5-day working week).

The SAR and the study plans illustrate that the workload is evenly distributed in all programs. Thus, the total amount of the planned student workload does not exceed 60 ECTS credits per academic year in all programs. The workload of most modules is structured so that approximately 30% of the study time is contact hours spent in the classroom, while approximately 70% of the time is devoted to students independently studying. The 30% contact hours are in turn divided into lecture and practical hours and - depending on the module - also laboratory hours. In most cases, about 65% of the contact hours are lecture hours and 35% are practical hours (including seminars) and, if applicable, laboratory hours. In the example of a 5 ECTS module (which makes up most modules in programmes), 30 hours are dedicated to lectures, 15 hours to practical work and the remaining 105 hours to students' independent study.

In the students discussion round, the students report that they are familiar with the workload regulations and that all teachers follow these norms. Therefore, the work load is evenly balanced and manageable. Furthermore, regular teaching evaluations assess and monitor the students' actual workload. The peers are satisfied to hear that the workload norms are transparently communicated and that all teachers follow these regulations so that no peaks in the work load emerge.

According to the self-assessment report, in the programme Power Engineering on average about 80 % of the students graduate in the designated time of eight semesters. In the Computer Science programme, about 70 % of the students graduate in time. In the programme Robotics and Mechatronics about 90 % of the students graduate in time. As the statistical data provided by Satbayev University shows, the average time students require to complete their studies corresponds roughly to the expected time of eight semesters. The data verifies that all three degree programmes under review can be completed in the expected period.

Criterion 2.3 Teaching methodology

Evidence:

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

Preliminary assessment and analysis of the peers:

Various teaching and learning methods (including lectures, computer training and classroom and lab exercises, individual and group assignments, seminars and projects, etc.) have been implemented. Structured activities include tutorials, homework, assignments (reading or problem exercises) and practical activities. Group project assignments are given in some courses to develop students' skills in teamwork, communication, and leadership. The assignments and exercises should help students to develop their abilities with respect to critical thinking, written/oral communication, data acquisition, problem solving, and presentations.

The most common method of learning is class session, with several 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 preparation, pre or post-tests, laboratory exercises, reports, discussions, and presentations. In addition, practical activities should enable students to be acquainted with academic research methods.

In summary, the peer group considers the teaching methods and instruments to be suitable to support the students in achieving the intended learning outcomes. In addition, they confirm that the study concept of all three undergraduate programmes comprises a variety of teaching and learning forms as well as practical parts that are adapted to the respective subject culture and study format. It actively involves students in the design of teaching and learning processes (student-centred teaching and learning).

Criterion 2.4 Support and assistance

Evidence:

- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:

Besides the field specific advisory system by the lecturers, the university offers support in medical and social belongings for the students. A distinctive feature of Satbayev University

is the large student network, which consists of 14 student organizations. Throughout the year, these unions organize more than 50 events in various areas. The Committee for Youth Affairs is the highest body of student and youth self-government of the university in the field of implementation of the state youth policy. In addition, the Career Center assists students in finding internships and employment after graduation or provides general advice on career prospects. is implemented at the university and dormitories are available for students.

The peers appreciate that in the discussion students praise the supporting system at the university and especially the availability of the teaching staff.

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

The experts only identify minor deficits with regard to the structure and the methods of the programmes. They recommend that the practical elective modules are held alongside the theoretical modules and that more technical modules in English are provided.

The Criterion is fulfilled.

3. Exams: System, concept and organisation

Criterion 3 Exams: System, concept and organisation
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Evidence:

- Module Handbooks for all programmes
- “Regulation Organization and Conduct of the Examination Session”
- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:

All course content within the reviewed study programmes is examined. The examination type is defined in the module descriptions. Overall, there are three examination types through which students’ knowledge is assessed: the “current control” which examines students’ performances during the course, for example, at practical and laboratory classes, the “mid-term control”, and the “final control”. For the current and mid-term control a variety of examination forms may be applied such as oral surveys, written surveys, defense of reports on laboratory work, solving situational problems, presentations, or group discussions of problematic issues. The final control is conducted in the form of an exam (written

or oral) at the end of the semester. The examination period spans at least two weeks. The peers are satisfied with the variety of exams. In the discussion with the students, they report to be satisfied with the number and diversity of exams as well. However, they criticize the fact that exams are sometimes very close to each other, so that students have exams on several days in a row, occasionally even two exams in one day. The peers understand the students' discontent and recommend distributing exams in a way so that students have at least one day free between exams.

The students are informed about the mid-term and final controls via the Academic Calendar. The final grade is the result of the different activities in the course.

If a student fails the course, he/she has to repeat the entire module in the following semesters. If a student fails by a narrow margin, i.e. only a few points short of passing, he or she will be given the opportunity to retake the exam. Within one week after the grade is published students have the opportunity to appeal or to ask about the assessment. In case of different opinions more lecturers could be invited to discuss the results.

During the on-site visit, the peers also inspect samples of examination papers and final theses. They notice on the exam sheets that there are no grading mechanisms visible. That is, the teachers only indicate the points that the student scored for each task and the final grade but they do not illustrate what the student has done wrong or offer the correct solution. This way, the student cannot clearly see what he/she has done wrong and how to improve him-/herself. Furthermore, it is not possible for the student to judge whether the grading was done correctly and fairly. Therefore, the experts insist that teachers provide feedback when grading exams to ensure transparent assessment.

Overall, the experts are satisfied with the quality of the exams and final theses. However, as discussed in chapters 1.1 and 1.3, the experts consider that these do not include the assessment of advanced theoretical content in the fields of mathematics and physics. Instead, most exams require students to use only simple formulas. Similarly, the final theses include elements of analysis and application but not on an advanced level. The level of the sample theses just corresponds to EQF level 6, yet the experts believe that the students would benefit if the thesis requirements were higher and included the application of advanced theoretical content.

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

The experts conclude that Satbayev University must ensure that the grading of the exams is detailed and thorough enough to allow meaningful feedback to students, when required.

In addition, they recommend spreading the exams further apart so that the exams become more manageable for students.

Criterion partly fulfilled.

4. Resources

Criterion 4.1 Staff

Evidence:

- Self Assessment Report
- Staff handbook
- Discussions with programme coordinators and teaching staff

Preliminary assessment and analysis of the peers:

At Satbayev University, the staff members have different academic positions. There are professors, associate professors, senior teachers and teachers. The academic position of each staff member is based on research activities, publications, academic education, supervision of students, and other supporting activities. For example, there are teachers who hold a Master's degree and teachers who hold a PhD degree. A full or associate professor needs to hold a PhD degree. The main difference of tasks and responsibilities based on academic staff position lies on the proportion of teaching and research activities. The higher the academic staff position is, the greater is the proportion of research activities, but the lower is the proportion of teaching activities. The latter may become professors once they have earned a certain amount of credits with regard to their academic work.

In the Ba programme Computer Science, there are 22 teachers (1 professor, 15 associate professors, and 6 (senior) lecturers). In the Ba programme Power Engineering, there are altogether 30 teachers (3 professors, 19 associate professors, and 8 (senior) lecturers). In the Ba programme Robotics and Mechatronics, teaching staff consists of 35 members: 7 professors, 17 associate professors, and 11 (senior) lecturers. The academic staff is supported by a considerable number of administrative and technical employees at department, faculty, and university level.

The quantity of teaching staff is calculated on an average student teacher ratio of 16:1 in accordance with the regulations of the Minister of Education and Science.

Professors are supported by the university to spend some time abroad to attend conferences, workshops or seminars; even a sabbatical leave is possible. The academic staff is actively involved in research projects funded by grants from the Kazakh government, the

university itself or other research funds, which results in a reasonable number of publications per year. Overall, the peers see an appropriate network of the university and the department with national and international research institutions.

In summary, the peers highlight the well qualified and engaged staff members and confirm that the composition and scientific orientation of the teaching staff are suitable for successfully implementing and sustaining the degree programmes. Both students and staff members confirm that in case of questions or problems, there is always an academic advisor available to solve the issues together with the student.

Criterion 4.2 Staff development

Evidence:

- Self-Assessment Report
- Staff handbook
- Discussions during the audit

Preliminary assessment and analysis of the peers:

Satbayev University encourages the training of its academic and technical staff, so it has developed a programme for improving the didactic abilities and teaching methods. One part of the capacity-building programme focuses on subject-specific skills, whereas other training courses are intended to further improve the teachers' didactic skills and to introduce new teaching methods. There are financial resources available for staff members to go abroad for a limited time and to take part at conferences or other events in order to stay up to date with the scientific development in their area of expertise.

The peers discuss with the members of the teaching staff the opportunities to develop their personal skills and learn that the teachers are satisfied with the internal qualification programme, their opportunities to further improve their didactic abilities.

In summary, the auditors confirm that the university offers sufficient support mechanisms and opportunities for members of the teaching staff who wish to further develop their professional and teaching skills.

Criterion 4.3 Funds and equipment

Evidence:

- On-site visit of the institution

- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The peers were explained that financial sources for the university is originated from government funding, society funding, and tuition fees. The operational funds were distributed to the Faculties based on a specific formula depending on the number of students. The salary for staff members included a basic salary from government and incentives depending on additional efforts of staff members. The financing of the equipment is ensured also by external funds (third party money).

The peers are convinced that the financial means are sufficient and secured for the timeframe of the accreditation. The equipment of the labs ensures to conduct the education in the programmes in the defined way. Students and teachers report to be generally satisfied with the equipment. Yet, teachers of the Power Engineering and Robotics and Mechatronics programmes indicate that there is room for improvement as some of the equipment still works but does not meet the current state of the art. As the physical space becomes smaller due to the increasing number of students, teachers suggest introducing more software and virtual reality programmes instead of hardware. The experts agree with this view.

From the student the peers learn that they have online access to national and international literature and that the inventory of the library is well equipped.

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

The experts consider the criterion to be fulfilled.

5. Transparency and documentation

Criterion 5.1 Module descriptions
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Evidence:

- Module descriptions
- Websites

Preliminary assessment and analysis of the peers:

The students, as all other stakeholders, have access to the module descriptions via the university's homepage.

After studying the module descriptions, the peers confirm that they include all necessary information about the persons responsible for each module, the teaching methods and work load, the awarded credit points, the intended learning outcomes, the content, the applicability, the recommended literature, the admission and examination requirements, and the forms of assessment and details explaining how the final grade is calculated.

As discussed in chapters 1.1 and 1.3, the experts identified discrepancies between the intended learning outcomes in the Diploma Supplement and the module handbooks in all programmes. For example, according to the Diploma Supplement all students of the Ba programme Computer Science gain competencies in the fields of Machine Learning and Data Science. However, Machine Learning & Data Science constitutes one of two optional tracks in the programme and is therefore not obligatory for the students to study. Another inconsistency can be found in the Bachelor programme Robotics and Mechatronics. According to the Diploma Supplement, students will have acquired skills and knowledge in the subject Information Sensors. However, according to the module handbook, the module is only an elective module. The experts insist that the documents are revised so that the intended learning outcomes in the Diploma Supplement and the module handbooks are in line with each other.

Moreover, as already explained in chapters 1.1 and 1.3, the module descriptions in all programmes are general rather vague or misleading. For instance, in the Power Engineering programme the module description of the module “Physics I/II” lists a huge amount of content, which the programme coordinators agree is neither feasible nor does it correspond to reality, as the module actually covers much less than indicated. The same applies to the module “ROB 509 Physical Basis for Obtaining Information” in the Robotics and Mechatronics programme. According to the module description of “Physics 1” in the programme Computer Science, students learn “Indefinite integral; Definite integral; Multiple integrals; Numerical series; Power series; and Fourier series”. Here again, the experts cannot deduce what exactly the module covers, as the module description only roughly refers to topics within Physics and Mathematics. The module “ERG158 Reading electrical diagrams” in the Power Engineering programme, which lists as prerequisite the completion of module “Physics 1”, constitute another example. Firstly, the experts criticize that the description is very imprecise, as it does not specify which skills the student should have exactly. Secondly, they believe that students do not have to possess a wide range of knowledge in Physics in order to attend this module. In conclusion, the peers agree that the module descriptions in all programmes must be revised and contain clear and precise information that reflects the actual module content and conditions.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

- Sample Diploma Supplement and Transcript of Records for each degree programme

Preliminary assessment and analysis of the peers:

The peers confirm that the students of all degree programmes under review are awarded a Diploma and a Diploma Supplement after graduation. The Diploma consists of a Diploma Certificate and a Transcript of Records. The Diploma as well as the Diploma Supplement inform about the students' qualifications profile and the classification of the degree programme with regard to its applicable education system. The transcript of records contains information about the individual modules and the grading procedure on which the final mark is based.

However, the peers note that the Diploma Supplement is missing several elements including the individual performance and the final mark of the student as well as statistical data as set forth in the ECTS User's Guide. The peers request that this information will be added to the Diploma Supplement in order to comply with the ASIIN criteria.

Criterion 5.3 Relevant rules

Evidence:

- Self-Assessment Reports
- All relevant regulations on the studies, examination, admission and quality assurance are published on the university's website

Preliminary assessment and analysis of the peers:

The auditors confirm that the rights and duties of both UB and the students are clearly defined and binding. All rules and regulations are published on the university's website and hence available to all stakeholders. In addition, the students receive all relevant course material in the language of the degree programme at the beginning of each semester.

In the audit, the students confirm that they know their rights and duties. However, throughout the conversation, the peers learn that the students are not aware of all their rights and opportunities. While they confirm that they are regularly invited to participate in evaluations of their courses and their study experience in general, they state they are not aware that they have the opportunity to influence the structure and curricular composition of the programmes, for example, by recommending the inclusion of other courses. The experts

urge Satbayev University to communicate transparently to all students their right to actively participate in the development of the degree programmes. Furthermore, the peers learn that not all students are informed about the possibilities of selecting elective modules. For instance, some students report that they did not know that it is possible to choose elective modules from other departments and degree programmes. Therefore, Satbayev University must ensure that students receive all available information about the choice of elective modules.

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

The experts conclude that Satbayev University must ensure that the module descriptions are clear and precise, and reflect the actual content. Furthermore, the HEI must ensure that students are provided sufficient information about their participation in the development of the programmes and the organization as well as selection of the elective modules.

6. Quality management: quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

- Self-Assessment Reports
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The auditors discuss the quality management system at Satbayev University with the programme coordinators and the students. They learn that there is a continuous process in order to improve the quality of the degree programmes and it is carried out through internal and external quality assurance.

All programmes at KazNRTU are regular part of internal quality assessment procedures of the Management and Quality System which is certified in accordance with International Quality Standards ISO 9001. This includes besides internal audits also evaluations of the single courses by students. The result of the student evaluations are taken into account for the further development of the programmes. Student confirm to the peers that they get a

feedback about the results. Partners from industry also are regularly involved in the programme evaluations regarding the needs of the labor market.

The auditors gain the impression that the Departments take the students' feedback seriously and changes are made if necessary. The panel confirms that the quality management system is suitable to identify weaknesses and to improve the degree programmes.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 6:

The experts consider the criterion to be fulfilled.

D Additional Documents

No additional documents needed“

E Comment of the Higher Education Institution (26.05.2023)

The following quotes the comment of the institution:

„ The University supports the opinions of experts on the identified inconsistencies according to the criteria of the Template and Guidelines for Preparing a Self-Assessment for an International ASIIN Program Accreditation for the ASIIN Seal & European Labels:

Criterion 1.1 Objectives and learning outcomes of a degree programme (intended qualifications profile)

The reference book of modules and the diploma supplement will be revised and amended in the new academic year. Module descriptions will be revised so that the objectives and content of the module are feasible, accurate and reflect the actual conditions. The recommendations on the content of mathematics and physics are considered. These subjects are fundamental to developing critical thinking, problem-solving skills, and a deeper understanding of the real-world environment. By incorporating more mathematics and physics into the curriculum, students can gain valuable analytical skills and a solid foundation for future scientific pursuits. And also, the programs under consideration will integrate more materials in mathematics and physics.

Criterion 2.1 Structure and modules
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The curriculum is based on the fundamental scientific principles underlying EP Computer Science. This includes such areas as software development, databases, Web programming, artificial intelligence, machine learning, data science, new ICT technologies. From 2023, the curriculum will include research methodologies commonly used in computer science, such as experiment planning, data collection and analysis, hypothesis formulation and interpretation of results. During their studies, teachers encourage students to participate in research projects or participate in research competitions, hackathons that promote scientific and applied research. Diploma projects demonstrate how IT can be used to solve scientific problems and contribute to scientific achievements, and at the same time students develop a broad scientific worldview. The Institute of Automation and Information Technology promotes interaction between students and the scientific community, invites invited speakers from research institutions, universities and industry to exchange knowledge and experience.

It is important to find a balance between theory and practice in order to provide a comprehensive education.

According to the Energy program, the structure of the curricula is structured so that practical modules are taught along with theoretical modules.

It is planned to introduce disciplines in English for three educational programs. And also to revise the working curricula.

Criterion 3 Exams: System, concept and organisation

For the 2023-2024 academic year, changes will be made to the Academic Calendar regarding the timing of the examination session to ensure free days between exams. (*Appendix, extract from the minutes of the Office Registrar's meeting*).

Criterion 4.3 Funds and equipment

The laboratory base of the Department of Power Engineering is equipped with Stands of the Schneider Electric company. There is also a virtual laboratory for renewable energy sources. <https://official.satbayev.university/en/industrial-engineering/kafedra-energetiki/obrazovatelnye-programmy-kafedry-energetiki>

At the Department of Robotics and technical means of automation, elementary students study basic disciplines on the existing equipment of the department. Financing of the equipment is provided by the university, as well as by external funds and (scientific projects, employers, Erasmus). <https://official.satbayev.university/en/industrial-engineering/reta/obrazovatelnye-programmy-ritsa>

Criterion 5.2 Diploma and Diploma Supplement

For transparency and accuracy, the expected learning outcomes will be adapted to the diploma. (*Appendix, extract from the minutes of the Office Registrar's meeting*)

Criterion 5.3 Relevant rules

Advisors constantly work with students, in the context of the educational program, students have the right to choose elective disciplines, students who are informed in this direction.

Please pay attention to criterion 1.1: In the latest report of ASIIN experts, it was noted that in the subject "Information sensors", the topic of information sensors is considered only in the module of choice, although there is no such discipline in our RUE, there are disciplines "ROB510 Fundamentals of information and measurement technologies" and "Sensory electronics, sensors", we assume that the commission has in mind the discipline "ROB510 Fundamentals of Information and Measurement Technologies". During the visit of ASIIN experts on the RUE "6B07113 Robotics and Mechatronics" program for the 2021-2022 academic year, it was found that the discipline "ROB510 Fundamentals of Information

and Measurement Technologies" is on the 5th semester in the selective module, which is a mistake in the RUE, since the module is actually is required for this program. The department agrees with the decision of the ASIIN Accreditation Commission, because the discipline "ROB187 Fundamentals of Information and Measurement Technologies" has always been a compulsory subject, just a technical error has occurred, and is being corrected. In the RUE for the 2022-2023 academic year, the discipline was included in the 5th semester as a mandatory module. <https://official.satbayev.university/en/industrial-engineering/reta/obrazovatelnye-programmy-ritsa>“

F Summary: Peer recommendations (01.06.2023)

Taking into account the additional information and the comments given by Satbayev University, 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 Power Engineering	With requirements for one year	30.09.2028	EUR-ACE®	Subject to the approval of the ENAEE Administrative Council
Ba Computer Science	With requirements for one year	30.09.2028	Euro-Inf®	30.09.2028
Ba Robotics and Mechatronics	With requirements for one year	30.09.2028	EUR-ACE®	Subject to the approval of the ENAEE Administrative Council

Requirements

For all degree programmes

- A 1. (ASIIN 1.1, 1.3) Substantiate the mathematics and physics module contents in order to match the learning outcomes that require the graduates to be capable of doing applied re-search and development.
- A 2. (ASIIN 3) The grading of the exams should be detailed and thorough enough to allow meaningful feedback to students, when required.
- A 3. (ASIIN 1.1, 5.1) Ensure that the intended learning outcomes in the Diploma Supplement and the module descriptions are consistent with each other and overall align with the content of the module descriptions.
- A 4. (ASIIN 5.1) Ensure that the module descriptions are clear and precise, and reflect the actual content.

- A 5. (ASIIN 5.3) Ensure that students are provided sufficient information about their participation in the development of the programmes and the organization as well as selection of the elective modules.

Recommendations

For all degree programmes

- E 1. (ASIIN 1.3, 2.1) It is recommended to extend the range of elective modules according to the state of the art including renewable energy.
- E 2. (ASIIN 2.1) It is recommended that the practical elective modules are held alongside the theoretical modules.
- E 3. (ASIIN 2.1) It is recommended to provide more technical modules in English.
- E 4. (ASIIN 3) It is recommended to spread the exams further apart.

G Comment of the Technical Committees 02 and 04- (07.06.2023)

Technical Committee 02 – Electrical Engineering/Information Technology (07.06.2023)

Assessment and analysis for the award of the ASIIN seal:

The committee members discuss the case and follow the assessment of the peers 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 do comply with the engineering specific parts of Subject-Specific Criteria of the Technical Committee 02 – Electrical Engineering/Information Technology.

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 Power Engineering	With requirements for one year	30.09.2028	EUR-ACE®	Subject to the approval of the ENAEE Administrative Council
Ba Robotics and Mechatronics	With requirements for one year	30.09.2028	EUR-ACE®	Subject to the approval of the ENAEE Administrative Council

Technical Committee 04 – Informatics/Computer Science (15.06.2023)

The TC discusses requirement A 2. The members of the TC are not sure whether the problem described in the report is not too specific. The TC is of the opinion that it is only important that there is consistent and transparent grading and that it does not matter whether solutions and corrections are noted in writing or whether they take place orally, for example. In addition, it is more important to ensure that there is a possibility to complain to which students can turn if necessary. However, it is not clear from the report how fundamental the problem is and whether the students feel that there is a non-transparent and inconsistent grading system. Therefore, the TC is in favour of deleting requirement A 2. In addition, the TC proposes editorial changes to requirement A 5 and recommendation E 2.

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 Science	With requirements for one year	30.09.2028	Euro-Inf®	30.09.2028

~~A 6. (ASIIN 3) The grading of the exams should be detailed and thorough enough to allow meaningful feedback to students, when required. [FA 04]~~

A 7. (ASIIN 5.3) Ensure that students are provided sufficient information about their rights to participate ~~participation~~ in the development of the programmes and the organization as well as selection of the elective modules. [FA 04]

E 1. (ASIIN 2.1) It is recommended that the practical elective modules are held alongside the corresponding theoretical modules. [FA 04]

H Decision of the Accreditation Commission (23.06.2023)

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

The Accreditation Commission discusses the accreditation case. It follows the proposals and reasoning of TC 04 and adopts their amendments, including the deletion of requirement A2 and the changes in the wording. They also conclude that requirement A 5 relates to two separate points: The first part relates to programme development and that students should be better informed of their rights and opportunities to participate in the process. The second part relates to the structure and content of the curriculum and that students should be better informed about the organisation and choice of elective modules. The commission members therefore agree to split the requirement into two parts. They also agree that the shortcomings are rather in the milder area of possible optimisation, since the essential criteria to which these two points refer are generally fulfilled: Technically students have the right and the opportunity to participate in the development of the study programmes and in a more flexible choice of modules. Therefore, the Commission members decide to turn these requirements into recommendations.

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

The Accreditation Commission deems that the intended learning outcomes of the degree programmes do comply with the engineering specific parts of Subject-Specific Criteria of the Technical Committee 02 – Electrical Engineering/Information Technology.

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 Power Engineering	With requirements for one year	30.09.2028	EUR-ACE®	Subject to the approval of the ENAEE Administrative Council
Ba Computer Science	With requirements for one year	30.09.2028	Euro-Inf®	-

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ba Robotics and Mechatronics	With requirements for one year	30.09.2028	EUR-ACE®	Subject to the approval of the ENAEE Administrative Council

*Subject to the approval of the ENAEE Administrative Council

Requirements

For all degree programmes

- A 1. (ASIIN 1.1, 1.3) Substantiate the mathematics and physics module contents in order to match the learning outcomes that require the graduates to be capable of doing applied research and development.
- A 2. (ASIIN 1.1, 5.1) Ensure that the intended learning outcomes in the Diploma Supplement and the module descriptions are consistent with each other and overall align with the content of the module descriptions.
- A 3. (ASIIN 5.1) Ensure that the module descriptions are clear and precise, and reflect the actual content.

Recommendations

For all degree programmes

- E 1. (ASIIN 1.3, 2.1) It is recommended to extend the range of elective modules according to the state of the art including renewable energy.
- E 2. (ASIIN 2.1) It is recommended that the practical elective modules are conducted alongside the corresponding theoretical modules.
- E 3. (ASIIN 2.1) It is recommended to provide more technical modules in English.
- E 4. (ASIIN 3) It is recommended to spread the exams further apart.
- E 5. (ASIIN 5.3, 6) It is recommended to better inform the students about their rights to participate in the development of the programmes.
- E 6. (ASIIN 1.3, 5.3) It is recommended to better inform the students about the organization and selection of elective modules.

I Fulfilment of Requirements (28.06.2024)

Analysis of the experts and the Technical Committee/s (16.06.2024)

Requirements

For all degree programmes

- A 1. (ASIIN 1.1, 1.3) Substantiate the mathematics and physics module contents in order to match the learning outcomes that require the graduates to be capable of doing applied research and development.

Initial Treatment	
Peers	not (completely) fulfilled Justification: The experts find that the content of the modules is in line with the programmes and that the mathematics syllabi are developed taking into account applied research and development. However, the HEI did not provide a detailed course description of the physics courses, so the experts cannot assess the fulfilment of the requirement with regard to the physics courses.
TC 02	not (completely) fulfilled Vote: unanimous Justification: The TC follows the vote of the experts.
TC 04	not (completely) fulfilled Vote: unanimous Justification: The TC follows the vote of the experts.
AC	not fulfilled Vote: unanimous Justification: The commission follows the vote of the experts.

- A 2. (ASIIN 1.1, 5.1) Ensure that the intended learning outcomes in the Diploma Supplement and the module descriptions are consistent with each other and overall align with the content of the module descriptions.

Initial Treatment	
Peers	fulfilled

	Justification: The HEI provides revised Diploma Supplements and Module Descriptions which demonstrate that the intended learning outcomes are now consistent across all documents and reflect the content of the modules.
TC 02	fulfilled Vote: unanimous Justification: The TC follows the vote of the experts.
TC 04	fulfilled Vote: unanimous Justification: The TC follows the vote of the experts.
AC	fulfilled Vote: unanimous Justification: The commission follows the vote of the experts.

- A 3. (ASIIN 5.1) Ensure that the module descriptions are clear and precise, and reflect the actual content.

Initial Treatment	
Peers	fulfilled Justification: The experts review the module descriptions and conclude that the module descriptions are now clear, precise and reflect the actual content.
TC 02	fulfilled Vote: unanimous Justification: The TC follows the vote of the experts.
TC 04	fulfilled Vote: unanimous Justification: The TC follows the vote of the experts.
AC	fulfilled Vote: unanimous Justification: The commission follows the vote of the experts.

Decision of the Accreditation Commission (28.06.2024)

Degree programme	ASIIN-label	Subject-specific label	Accreditation until max.
Ba Power Engineering	Requirement 1 not fulfilled	EUR-ACE®	6 months prolongation
Ba Computer Science	Requirement 1 not fulfilled	Euro-Inf®	6 months prolongation

Degree programme	ASIIN-label	Subject-specific label	Accreditation until max.
Ba Robotics and Mechatronics	Requirement 1 not fulfilled	EUR-ACE®	6 months prolongation

J Fulfilment of Requirements (06.12.2024)

Analysis of the experts and the Technical Committees (22.11.2024)

Requirements

For all degree programmes

- A 1. (ASIIN 1.1, 1.3) Substantiate the mathematics and physics module contents in order to match the learning outcomes that require the graduates to be capable of doing applied research and development.

Secondary Treatment	
Peers	Fulfilled Justification: The university provides a detailed course description of the basic physics course, which is integrated into all three programmes. The experts consider that the physics course is a valuable addition to the three programmes and ensures that students are able to carry out applied research. However, they note that the number of topics covered in the physics course is quite high and wonder whether it is possible to study all of them in sufficient depth. For this reason, they suggest that a reference be included in the final documents to the HEI to the effect that the physics module and its implementation in particular should be reviewed in the next reaccreditation process.
TC 02	Fulfilled Vote: unanimous Justification: The TC follows the vote of the experts.
TC 04	Fulfilled. Vote: unanimous

	Justification: The TC follows the experts' assessment without any changes.
AC	fulfilled Vote: unanimous Justification: The commission follows the experts' vote.

Decision of the Accreditation Commission (06.12.2024)

Degree programme	ASIIN-label	Subject-specific label	Accreditation until max.
Ba Power Engineering	All Requirements fulfilled	EUR-ACE®	30.09.2028
Ba Computer Science	All Requirements fulfilled	Euro-Inf®	30.09.2028
Ba Robotics and Mechatronics	All Requirements fulfilled	EUR-ACE®	30.09.2028

Appendix: Programme Learning Outcomes and Curricula

According to the Diploma Supplement the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Power Engineering:

- “Application of extensive knowledge to solve problems in the field of professional activity;
- Ability to calculate and design, plan and conduct experimental studies related to the definition and selection of parameters, basic characteristics of electrical equipment of power facilities for various purposes;
- Skills in using modern technical means and software complexes for the development of promising projects and calculations, determining optimal production and technological modes of operation of energy facilities;
- Knowledge of the organization of work on testing, installation and adjustment of electrical equipment, processing and generalization of research results, interpretation of data; ability to draw conclusions and make reports
- Develop the principles of organization and design of energy enterprises;
- Use application software packages for calculations, modeling and automation of energy systems design;
- Formulate the main technical and economic requirements for the projected energy systems;
- Organize work on the operation, installation and adjustment of electrical and thermal equipment.”

According to the Diploma Supplement the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Computer Science:

- “Program in modern algorithmic languages, understand the fundamental principles of software development; own different approaches in programming methodology, know the paradigms of modular and object-oriented programming
- Analyze the subject area and coordinate the requirements for the project with the customer; extract information processes from business processes

and model them for domain automation

- Use a unified modeling language, establish architectures and key points of distributed client-server applications, apply networking technologies for communication systems, create networking applications for tools, implement a structural and object-oriented approach in working with tools.
- Use the basic concepts and methods of discrete mathematics, the basics of mathematical logic, methods of probability theory and mathematical statistics in the study of mathematical models of the subject area; establish links between different mathematical theories to develop integrated methods used to build mathematical models of the subject area.
- Formulate technical requirements taking into account the functions performed by computing systems; justify the architecture; define tools for evaluating system performance.
- Use methods for constructing various models of data types, information-processing algorithms; it is rational to use the opportunities provided by the algorithmizing technique for solving practical problems.
- Use the basic structures and mechanisms of various operating systems, work with modern operating systems. apply the basic concepts of system programming, develop programs that cover system programming issues.
- Design an information model of the subject area; install, configure, use and interact with a relational database management system
- Own tools for deploying and monitoring loosely coupled computing systems, use a basic set of microservices development tools
- To possess knowledge of historical, cultural and scientific achievements of the Republic of Kazakhstan; use data from historical sources and specialized literature; analyze and evaluate historical facts and events.
- To have a broad socio-social, political and professional outlook. Have an idea about the subject, functions, main sections and directions of philosophy; place and role of philosophy in the life of society and man, apply the knowledge of the philosophical and methodological principles of knowledge in professional activities.
- Knowledge of Kazakh, Russian, foreign languages. Be able to work with scientific and technical literature in Kazakh, Russian and foreign languages; search for scientific and technical information; understand the information provided by the normal pace, followed by the transmission of its content. Conduct intercultural dialogue, develop and deepen your knowledge, be open to new information; establish professional contacts and develop professional communication in a foreign language, make business contacts in a foreign language, know terminology, read literature in a specialty in a foreign language.”

According to the Diploma Supplement the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Robotics and Mechatronics:

- “Demonstrate knowledge of the branches of higher mathematics, physics and other natural sciences and apply them to solve problems that have arisen in the course of professional activity,
- Apply modern software products and the latest technologies to solve and manage interdisciplinary engineering problems in various fields of science and technology,
- Research in the field of development of new samples and improvement of existing mechatronic and robotic systems, search for new ways of information management and processing,
- Collect and analyze scientific and technical information, taking into account current trends in the development and use of achievements of science, technology and technology in professional activities,
- To determine the safety, environmental friendliness and economic efficiency of the implementation of the projected robotic and mechatronic systems, their individual modules and subsystems,
- Calculate and design individual blocks and devices of robotic and mechatronic systems, intelligent control, information-sensor and executive subsystems and mechatronic modules, in accordance with the terms of reference,
- Plan tests of modules and subsystems of robotic and mechatronic systems, organize and conduct experiments on existing objects and experimental models, processing the results of experimental research, using modern information technologies,
- To assess the compliance of the technical documentation of the developed projects with standards and technological conditions,
- Organize the operation, installation and commissioning of modern mechatronic systems,
- Organize the activities of the team, make organizational and managerial decisions in the context of different opinions and assess the consequences of the decisions taken.”

For the Bachelor degree programme Power Engineering the following **curriculum** is presented:

Year of study	Code	Name of discipline	Cycle	Credits	Total hours	lec/lab/pr	INS (including INSMT), in hours	Code transfer of funds	pre-requisites
1	1 semester (autumn 2021)								
	LNG108	English	G	5	150	0/0/3	105		The diagnostic
	LNG104	Kazakh (Russian) language	G	5	150	0/0/3	105		The diagnostic
	HUM100	Modern history of Kazakhstan (state exam)	G	5	150	1/0/2	105		
	PHY111	Physics I	B	5	150	1/1/1	90		
	MAT101	Mathematics I	B	5	150	1/0/2	105		
	ERG104	Introduction to specialty	B	5	150	2/0/1	105		
	HUM128	Political science	G	2	60	1/0/0	45		no
	KFK101	Physical education I	G	2	60	0/0/2	30		
	Total:			34					
2	3 semester (autumn 2022)								
	CHE452	Ecology and sustainable development	G	2	60	1/0/0	45		
	HUM127	Sociology	G	2	60	1/0/0	45		
	CSE677	Information and Communication technology (eng)	G	5	150	2/1/0	90		
	MAT103	Mathematics III	B	5	150	1/0/2	105		MAT102
	ELC542	Theoretical Foundations of Electrical Engineering I	B	5	150	2/1/0	90		
	ERG519	Theoretical fundamentals of heat engineering	B	5	150	2/0/1	105		
	ERG528	Electrotechnical and thermotechnical measurements	B	5	150	2/1/0	90		
	KFK103	Physical education III	G	2	60	0/0/2	30		KFK102
	Total:			31					
3	5 semester (autumn 2023)								
	ERG504	Laboratory workshop on modern industrial technologies in the electric power industry I	S	5	150	0/3/0	60		
	ERG153	Engineering Thermodynamics	B	5	150	2/0/1	105		PHY112
	3215	Elective	B	5	150				
	NSE143	Industrial economics	G	5	150	2/0/1	105		
	ERG527	Electrical machines	S	5	150	2/1/0	90		ELC543
	Total:			25					
4	7 semester (autumn 2024)								
	ERG124	Basics of electrical safety	S	5	150	1/1/1	90		
	4306	Elective	S	5	150				
	4307	Elective	S	5	150				
	4308	Elective	S	5	150				
	4309	Elective	S	5	150				
	4310	Elective	S	5	150				
Total:			30						

Code	Name of discipline	Cycle	Credits	Total hours	lec/lab/pr	INS (including INSMT), in hours	Code transfer of funds	pre-requisites
2 semester (spring 2022)								
LNG108	English	G	5	150	0/0/3	105		
LNG107	Kazakh (Russian) language	G	5	150	0/0/3	105		
PHY112	Physics II	B	5	150	1/1/1	90		PHY111
MAT102	Mathematics II	B	5	150	1/0/2	105		MAT101
ERG158	Reading electrical circuits	B	5	150	1/0/2	105		
KFK102	Physical education II	G	2	60	0/0/2	30		KFK101
HUM129	Culturology	G	2	60	1/0/0	45		
ERG176	Electrical and technical material science	B	5	150	2/0/1	105		
Total:			34					
4 semester (spring 2023)								
MNG487	Fundamentals of Entrepreneurship, Leadership and Anti-corruption culture	G	3	90	1/0/1	60		
HUM122	Psychology	G	2	60	1/0/0	45		
HUM124	Philosophy	G	5	150	1/0/2	105		
CHE451	Life safety	G	2	60	1/0/0	45		
ELC543	Theoretical Foundations of Electrical Engineering II	B	5	150	2/1/0	90		ELC519
ERG521	Heat and mass transfer equipment in heat power engineering	B	5	150	2/0/1	105		PHY111
ERG509	Industrial electronics	S	5	150	2/1/0	90		
KFK104	Physical education IV	G	2	60	0/0/2	30		KFK103
Total:			29					
6 semester (spring 2024)								
ERG532	Electrical apparatus	B	5	150	2/1/0	90		
3218	Elective	B	5	150				
3219	Elective	B	5	150				
3220	Elective	B	5	150				
ERG555	Laboratory workshop on modern industrial technologies in the electric power industry II	S	5	150	0/3/0	60		ERG504
ERG530	Power supply of enterprises	B	5	150	2/1/0	90		
Total:			30					
8 semester (spring 2025)								
ERG159	Environmental Issues in Heat Power Engineering	B	3	90	1/0/1	60		
ERG535	Industrial Energy Audit and Energy-Saving	S	3	90	1/0/1	60		
ERG534	Renewable energy	S	3	90	1/0/1	60		
ECA001	Graduate thesis (project) preparation	FA	6					
ECA103	Graduate thesis (project) defense	FA	6					
Total:			21					

Year of study	Code	Name of discipline	Cycle	Credits	Semester
Obligatory education with P/NP assessment					
1	AAP101	Training Practice	B	2	2
2	AAP109	Industrial Internship I	B	2	4
3	AAP158	Industrial Internship II	S	4	6
Other education					
2-3	AAP500	Military training	B	0	3-6
1		Sports club sectional	0	0	3-7

Total number of credits				
Cycle of disciplines	Credits			
	compul-sary	elective		total
Cycle of general disciplines (G)	51	7		58
Cycle of basic disciplines (B)	92	20		112
Cycle of special disciplines (S)	35	25		60
Total of theoretical study:				178
Final attestation (FA)	12	0		12
Total:				190

For the Bachelor degree programme Robotics and Mechatronics the following **curriculum** is presented:

Full-time study				Study duration : 4 years					
Year of study	Code	Name of discipline	Cycle	Total amount in credits	Total hours	classroom volume of le/lab/pr	CSI (including CSNW) in hour	pre-requisites	
1	1st semester (autumn 2021)								
	LNG108	Academic English 1	G	5	150	0/0/3	105	Diagnostic	
	LNG104	Kazakh (Russian) language	G	5	150	0/0/3	105	Diagnostic	
	KFK101	Physical education I	G	2	60	0/0/2	30	not	
	HUM100	Modern history of Kazakhstan	G	5	150	1/0/2	105	not	
	HUM128	Political science	G	2	60	1/0/0	45	not	
	GEN177	Engineering and computer graphics	B	5	150	1/0/2	105	not	
	PHY111	Physics I	B	5	150	1/1/1	105	not	
	MAT101	Mathematics I	B	5	150	1/0/2	105	not	
	Total:				34				
2	3rd semester (autumn 2022)								
	CHE452	Ecology and sustainable development	G	2	60	1/0/0	45	not	
	HUM127	Sociology	G	2	60	1/0/0	45	not	
	CSE677	Information and Communication technology	G	5	150	2/1/0	105	not	
	KFK103	Physical education III	G	2	60	0/0/2	30	KFK102	
	MAT103	Mathematics III	B	5	150	1/0/2	105	MAT102	
	ROB410	Fundamentals of electromechanics and electronics	Fund	5	150	1/1/1	105	PHY112	
	ROB503	Mechanics of robots	B	5	150	2/0/1	105		
	2201	Elective	B	5	150		105		
	Total:				31				
3	5th semester (autumn 2023)								
	3203	Elective	B	5	150		105		
	3204	Elective	B	5	150		105		
	3205	Elective	B	5	150		105		
	3206	Elective	B	5	150		105		
	3207	Elective	B	3	90		60		
	ROB506	Integral and microprocessor circuit design	S	5	150	2/1/0	105	ROB154	
Total:				28					
4	7th trimester (autumn 2024)								
	ROB528	Programming for engineers with MATLAB	S	5	150	1/0/2	105		
	4302	Elective	S	5	150		105		
	4303	Elective	S	5	150		105		
	4304	Elective	S	5	150		105		
	4305	Elective	S	5	150		105		
	4306	Elective	S	3	90		60		
Total:				28					
	2nd semester (spring 2022)								
	LNG108	English	G	5	150	0/0/3	105	LNG105	
	LNG104	Kazakh (Russian) language	G	5	150	0/0/3	105	LNG107	
	KFK102	Physical education II	G	2	60	0/0/2	30	KFK103	
	HUM129	Culturology	G	2	60	1/0/0	45	not	
	MAT102	Mathematics II	B	5	150	1/0/2	105	MAT101	
	PHY112	Physics II	B	5	150	1/1/1	105	PHY111	
	ROB428	Robotics and mechatronics	B	5	150	2/0/1	105	not	
	Total:				29				
		4th semester (spring 2023)							
MNG487		Fundamentals of Entrepreneurship, Leadership and Anti-corruption culture	G	3	90	1/0/1	60	not	
HUM122		Psychology	G	2	60	1/0/0	45	not	
HUM132		Psychology	G	5	150	1/0/2	105	not	
CHE451		Life safety	G	2	60	1/0/0	45	not	
KFK104		Physical education IV	G	2	60	0/0/2	30	AAP122	
ROB154		Electronics	B	5	150	1/1/1	105	PHY111	
ROB504		High-level Programming	B	5	150	2/1/0	105		
2202		Elective	B	5	150		105		
Total:				29					
	6th semester (spring 2024)								
	3208	Elective	B	5	150		105		
	3209	Elective	B	5	150		105		
	3210	Elective	B	5	150		105		
	3211	Elective	B	5	150		105		
	3212	Elective	S	5	150		105		
	3301	Elective	S	3	90		60		
Total:				28					
	8th trimester (spring 2025)								
	4307	Elective	S	5	150		105		
	4308	Elective	S	5	150		105		
	4309	Elective	S	5	150		105		
	ECA003	Preparation and writing of the thesis (project)	FA	6					
	ECA103	Graduate thesis (project) defense	FA	6					
	Total:				27				
Year	Code	Name of discipline	Cycle	Credits	Semester				
Mandatory types of training with an assessment of P/NP									
1	AAP101	Training Practice	B	2	2				
2	AAP174	Industrial practice I	B	2	4				
3-4	AAP175	Industrial practice II	S	4	6				
Additional academic programmes (AAP)									
1	AAP107	Sports club sectional	G	0	3-7				
2-3	AAP500	Military Training	G	0	3-6				
Total number of credits									
Cycle of disciplines						Credits			
						com pul.	elect live	Prac tice	Total
Cycle of general disciplines (G)						51	7	0	58
Cycle of basic disciplines (B)						55	53	4	112
Cycle of special disciplines (S)						10	46	4	60
Total for theoretical training:						116	106	8	230
Final attestation (FA)						12	0	12	12
Total:						128	106	20	242

For the Bachelor degree programme Computer Science the following curriculum is presented:

Year of study	Code	Trajectory	Name of discipline	cycle	Academic credits	total hours	lec/ lab/ pr	ISW (including ISWT), in hours	prerequisites	
1	1st semester (autumn 2021)									
	LNG108		English language	G	5	150	0/0/3	105	Diagnos test	
	LNG104		Kazakh (Russian) language	G	5	150	0/0/3	105	Diagnos test	
	HUM100		Contemporary history of Kazakhstan (state exam)	G	5	150	1/0/2	105		
	PHY111		Physics I	B	5	150	1/1/1	105		
	MAT101		Mathematics I	B	5	150	1/0/2	105		
	CSE624		Introduction to the Specialty - Computer Science	B	5	150	1/1/1	105		
	HUM128		Political science	G	2	60	1/0/0	45		
	KFK101		Physical education I	G	2	60	0/0/2	30		
	Total:				34		21			
2	3rd semester (autumn 2022)									
	CSE677		Information and Communication Technologies (eng)	G	5	150	2/1/0	105		
	MAT103		Mathematics III	B	5	150	1/0/2	105	MAT102	
	HUM127		Sociology	G	2	60	1/0/0	45		
	CHE452		Ecology and Sustainable Development	G	2	60	1/0/0	45		
	CSE500	IS	Information System Infrastructure	B	5	150	1/1/1	105		
	CSE662	SE	Introduction to Web programming						CSE155	
	CSE678		Algorithms and Data Structures	B	5	150	1/1/1	105		
	CSE679		Databases	B	5	150	1/1/1	105	CSE155	
	KFK103		Physical education III	G	2	60	0/0/2	30		
Total:				31		19				
3	5th semester (autumn 2023)									
	1010		Elective	B	5	150	2/1/0	105		
	1011		Elective	B	5	150	2/1/0	105		
	1012		Elective	B	5	150	2/1/0	105		
	1013		Elective	B	5	150	2/1/0	105		
	1014		Elective	P	5	150	2/1/0	105		
	1015		Elective	P	5	150	2/1/0	105		
	Total:				30		18			
	4	7th semester (autumn 2024)								
		1019		Elective	P	5	150	2/1/0	105	
1020			Elective	P	5	150	2/1/0	105		
1021			Elective	P	5	150	2/1/0	105		
1022			Elective	P	5	150	2/1/0	105		
Total:				20		12				
2nd semester (spring 2022)										
LNG108			English language	G	5	150	0/0/3	105		
LNG104			Kazakh (Russian) language	G	5	150	0/0/3	105		
GEN177			Engineering and computer graphics	B	5	150	1/1/1	105		
PHY112		Physics II	B	5	150	1/1/1	105	PHY111		
MAT102		Mathematics II	B	5	150	1/0/2	105	MAT101		
HUM129		Cultureology	G	2	60	1/0/0	45			
CSE155		Algorithmization and Programming	B	5	150	1/1/1	105	CSE624		
KFK102		Physical education II	G	2	60	0/0/2	30			
Total:				34		21				
5	4th semester (spring 2023)									
	HUM132		Philosophy	G	5	150	1/0/2	105		
	HUM122		Psychology	G	2	60	1/0/0	45		
	MNG487		Fundamentals of Entrepreneurship, Leadership and Anti-corruption culture	G	3	90	1/0/1	60		
	CHE451		Life safety	G	2	60	1/0/0	45		
	CSE680		Algorithms	B	5	150	1/1/1	105	CSE164	
	ELC500		Microelectronics	B	5	150	2/1/0	105		
	CSE122		Computer Networks	B	5	150	2/1/0	105	CSE618	
	CSE676		Computer Architecture and Concurrency	B	5	150	1/1/1	105	CSE195	
	CSE127		Object oriented programming	B	5	150	1/1/1	105	CSE164, MAC 11	
KFK104		Physical education IV	G	2	60	0/0/2	30			
Total:				39		24				
6	6th semester (spring 2024)									
	CSE636		Mobile Programming	B	5	150	1/1/1	105	CSE127	
	CSE458		Computer vision	B	5	150	1/1/1	105		
	1016		Elective	P	5	150	2/1/0	105		
	1017		Elective	P	5	150	2/1/0	105		
	1018		Elective	P	5	150	2/1/0	105		
	Total:				25		15			
	7	8th semester (spring 2025)								
		1023		Elective	P	5	150	2/1/0	105	
		1024		Elective	P	5	150	2/1/0	105	
ECA007			Preparation and writing of the thesis (project)	FA	6					
ECA101			Graduate thesis (project) defense	FA	6					
Total:				22		6				
Total credits for the entire period of study										
Cycle of disciplines				Credits						
				compulsory	elective	Total				
Cycle of general disciplines (G)				58	0	58				
Cycle of basic disciplines (B)				2	110	112				
Cycle of special disciplines (S)				5	55	60				
Total for theoretical training:				65	165	230				
Final certification (FA)				12	0	12				
Total:				77	165	242				
TOTAL:						242				
Year of study	Code	Names	Cycle	Credits	Semester					
Compulsory training with P / NP grading										
1	AAF101	Educational practice	B	2	2					
2	AAF109	Industrial internship I	P	2	4					
3	AAF114	Industrial internship II	P	3	6					
Additional types of training										
1	AAF107	Sports club sectional	G	0	5-7					
2-3	AAF500	Military training	G	0	3-6					

