ASIIN Seal & European Labels

Accreditation Report

Bachelor's and Master's Degree Programmes
Computer Science and Software Engineering
Information Systems
Radioengineering, Electronics and Telecommunications

Provided by
International Information Technology University (IITU), Almaty, Kazakhstan

Version: 06 December 2019

Table of Content

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]
Есептеу техникасы және бағдарламалық қамтамасыз ету	Ba Computer Science and Software Engineering	Euro-Inf®	Independent Kazakh Agency for Quality Assurance in Education (IQAA) 27.12.2014 – 26.12.2019	**04**, 02
Есептеу техникасы және бағдарламалық қамтамасыз ету	Ma Computer Science and Software Engineering	Euro-Inf®	Independent Kazakh Agency for Quality Assurance in Education (IQAA) 27.12.2014 – 26.12.2019	**04**, 02
Ақпараттық жүйелер	Ba Information Systems	Euro-Inf®	Independent Kazakh Agency for Quality Assurance in Education (IQAA)	**04**, 02

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

[2] TC: Technical Committee for the following subject areas: TC 02 – Electrical Engineering/Information Technology; TC 04 – Informatics/Computer Science

			27.12.2014 – 26.12.2019	
Ақпараттық жүйелер	Ma Information Systems	Euro-Inf®	Independent Kazakh Agency for Quality Assurance in Education (IQAA) 27.12.2014 – 26.12.2019	**04**, 02
Радиотехника, электроника және телекоммуникациялар	Ba Radioengineering, Electronics and Telecommunications	EUR-ACE®	Independent Kazakh Agency for Quality Assurance in Education (IQAA) 27.12.2014 – 26.12.2019	02
Радиотехника, электроника және телекоммуникациялар	Ma Radioengineering, Electronics and Telecommunications	EUR-ACE	–	02

Date of the contract: 10.01.2018

Submission of the final version of the self-assessment report: 25.07.2018

Date of the onsite visit: 10.-11.10.2018

at: Almaty

Peer panel:

Prof. Dr. Madhukar Chandra, Technical University of Chemnitz;
Tatyana Em, KAZ Travel Experts LLP;
Artem Fedoskin, Master student at M. Auezov South Kazakhstan State University;
Prof. Dr. Susanne Strahringer, Technical University of Dresden;
Prof. Dr. Udo Hahn, University of Jena

Representative of the ASIIN headquarter: Dr. Siegfried Hermes

Responsible decision-making committee: Accreditation Commission for Degree Programmes
Criteria used: European Standards and Guidelines as of 15.05.2018 ASIIN General Criteria, as of 28.03.2014 Subject-Specific Criteria of Technical Committee 02 – Electrical Engineering and Information Technology as of 09.12.2011 Subject-Specific Criteria of Technical Committee 04 – Electrical Engineering and Information Technology as of 09.12.2011

B Characteristics of the Degree Programmes

Name	Final degree (original/English translation)	Areas of Specialization	Corresponding level of the EQF[1]	Mode of Study	Double /Joint Degree	Duration	Credit points/unit	Intake rhythm & First time of offer
Computer systems and software Engineering	Техника және технологиялар бакалавры / Bachelor of Engineering and Technology	Software development, Network and system administration, Data analysis, Robotics.	Level 6	Full time	no	8 semesters	247 ECTS/148 national CP	Fall semester, 3 February 2010
Computer systems and software engineering	Техника ғылымдарының магистрі / Master of Technical Sciences	Data analysis and software architecture (with orientation to embedded systems)	Level 7	Full time	no	4 semesters	176 ECTS/59 national CP	Fall semester, 29 April 2010
Information systems	Техника және технологиялар бакалавры/ Bachelor of Engineering and Technology	Big Data Analytics, Developing enterprise applications, Business analysis, ERP Development	Level 6	Full time	no	8 semesters	247 ECTS/148 national CP	Fall semester, 3 February 2010
Information systems	Техника ғылымдарының магистрі / Master of Technical Sciences	Business analysis, Project management in IT	Level 7	Full time	no	4 semesters	176 ECTS/59 national CP	Fall semester, 29 April 2010
Radioengineering, electronics and telecommunications	Техника және технологиялар бакалавры/ Bachelor of Engineering and Technology	Wireless Technologies, Telecommunication Systems and Networks, Systems of Radio – Communications and Broadcasting.	Level 6	Full time	no	8 semesters	247 ECTS/148 national CP	Fall semester, 30 March 2010
Radioengineering, electronics and telecommunications	Техника ғылымдарының магистрі / Master of Technical Sciences	Digital signal processing, built – in systems, increasing the efficiency of using the radio frequency spectrum, new radiodetermination systems	Level 7	Full time	no	2 years, 4 Semesters	176 ECTS/59 national CP	Fall semester, 1 June 2016

According to the SAR, the Bachelor's and Master's degree programmes Computer Science and Software Engineering focus mainly on Software Development, Network and System Administration, Data Analysis, Robotics at the respective academic level.

According to the SAR, the Bachelor's and Master's degree programmes Information Systems is mainly concerned with issues of programming languages (Oracle[3], Java), Basics of Programming, MS Programming, Mobile Applications, Robotics, ERP Systems, and Data Mining.

According to the SAR, the Bachelor's and Master's degree programmes Radioengineering, Electronics and Telecommunications mainly covers cover Wireless Technologies, Telecommunication Systems and Networks, Systems of Radio – communications and Broadcasting.

[3] Which should be rightly addressed, according to the peers, not as a programming language but rather as a database management system.

C Peer Report for the ASIIN Seal[4]

1. The Degree Programme: Concept, content & implementation

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

Evidence:

- Learning objectives according to SAR, see also Appendices 1.1.3.1e (MAP Bachelor's degree) and 1.1.3.2a (MAP Master's degree) of the SAR; citation in Appendix to this report; information available at: http://www.iitu.kz/ (Download: 2018-10-24)
- Modular Academic Programmes (MAP) Bachelor's degree and MAP Master's degree, see appendices 1.1.3.1.e and 1.1.3.2.a of the SAR
- Objective Matrices, see Appendix 1.1.f of the SAR respectively
- Diploma Supplement, see Appendix 5.2e of the SAR
- Audit discussions

Preliminary assessment and analysis of the peers:

The Faculty of Information Technologies has put considerable effort in defining the programme-specific objectives and learning outcomes adequately in terms of curricular content and educational level aimed at. However, study objectives and learning outcomes for the Bachelor's and Master's degree programmes are presented at multiple occasions. The most significant description appears to be the one given in the SAR, anyway. Although the differentiation between study objectives and intended learning outcomes is not always convincing, since many "objectives" are framed as qualifications or learning outcomes, it is here where programme coordinators most convincingly try to give an overview of the intended learning outcomes in the sense of a distinct qualification profile of the respective graduates. However, even here, there is no coherent or unified formula (see below). Moreover, there are still other descriptions of the super-ordinated learning objectives in the so-

[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.

called objectives-matrices and, too, in the Diploma Supplement.[5] Unfortunately, there is little connection between the various accounts of learning objectives/outcomes, which is particularly regrettable in the case of the *objectives-matrices*.

This instrument should normally facilitate the assessment of the correspondence of learning outcomes and curricular content, and be used for this purpose by internal and external quality assurance processes alike. In case of incoherent descriptions of the intended learning objectives at programme level, the utilisation of this instrument is basically dysfunctional. It is impossible to prove whether the curriculum fits with the prescribed learning outcomes, if it is largely unclear which set of qualifications should figure as ultimate benchmark. This is why the objectives matrices at hand are barely of analytical help for the peers but add to their confusion about the qualifications the degree programmes aim at and the related match of qualifications and curricula. Either the "intended learning outcomes" are not identical with the ones presented in the SAR or learning outcomes at programme level are not referred to at all (as is the case with the matrix for the Bachelor's and Master's degree programmes Information Systems).

Even the generally acceptable list of intended learning outcomes in the SAR appears to be heterogeneous in terms of form and content. Text and tables are interchangeably used. Although it is acknowledgeable that the difference between the Bachelor's and Master's level is generally better grasped than in the related objectives matrices, the intended qualifications at Master's level are mostly formulated rather generic, often barely conveying precise subject-specific learning outcomes. Evidence for this can be found by any selection of relevant learning outcomes, for instance: the ability to "critically analyse the existing concepts, theories, and approaches to study processes and phenomena, the current trends in their development, and to apply scientific methods for solving problems in the subject area"; the ability "to evaluate the methods of relevant information search, processing and presentation, methods of and approaches to teaching"; the ability "to formulate innovative problems and apply heuristic methods to solve them", or the ability to "evaluate, compare and analyse scientific results of research and implement them in practice". It is plausible that – as the programme coordinators suggest – the intended programme learning outcomes are carefully drafted based on Blooms taxonomy. However, apart from the issue of terminology, the *programme-specific dimension* of learning outcomes is largely missing, in particular in the case of the Master's programmes.

[5] Samples of Diploma Supplements are basically submitted (together with the SAR) for just two programmes, and regarding the programmes under consideration for the Bachelor Information Systems only.

This, in turn, is addressed meticulously and at times exaggerated in another list of programme-related learning outcomes (see Appendices MAP Bachelor's degree and MAP Master's degree respectively). It seems plausible for the peers that these lists have been set up in comparison with the respective ASIIN Subject-Specific Criteria (SSC), e. g. SSC Informatics/Computer Sciences for the degree programmes Computer Science and Software Engineering and Information Systems, and SSC Electrical Engineering / Information Technology in case of the degree programmes Radioengineering, Electronics and Telecommunications. In particular, the core discipline-related competences such as knowledge of the fundamentals in Mathematics and Natural Sciences (particularly Physics), knowledge of Engineering and Informatics basics, skills in applying scientific methodologies, analytical, design and implementation competences, and finally competences regarding Engineering practice and Product Development in the fields of Informatics and Electrical Engineering/Information Technology, respectively, are all elaborated there. Thus, the peers in principal have little doubt – particular with a view to the curricular content of the programmes – that subject-specific competences equivalent to those of the relevant ASIIN SSC are achieved in the programmes under review. They would also subscribe to the HEI's assertion that the MAP learning outcomes largely reflect the Bachelor's and Master's level according to the European Qualification Framework (level 6 for the Bachelor and level 7 for the Master).

Personal and social skills and competences, including competences implying societal, cultural, political and ethical dimensions of the graduates' future professional activities, are also reflected at different length and places in the mentioned descriptions of learning outcomes. It goes without question that the programme learning outcomes are duly published and made accessible, especially to students and applicants. In addition to that, peers are convinced that the university's processes concerning the development, set-up and implementation of degree programmes, from the definition of the programmes' objectives and learning outcomes to the curriculum design to the programme operation include all relevant stakeholders. This surely contributes to maximizing the procedural legitimacy and the societal and industrial benefit of higher education at the same time.

In sum, the peers appreciate the quality cycle concerned with the educational objectives and learning outcomes of the degree programmes under review. Unfortunately, the inconsistency and disparity of the objectives and learning outcomes makes it difficult to finally grasp the leading idea or red line distinguishing the qualifications profile of each programme. Taking the formulations of the SAR as a starting point – as mentioned above – the expert panel would suggest evolving out of the different versions consolidated programme learning outcomes for each degree programme concerned here, which are short, precise and appropriate at once.

To engage in research work particularly in the Master's programmes is defined as a core qualification of graduates. De facto, the SAR explicitly declares that these programmes are research-oriented. With a view to the curriculum of the programmes, the expert panel is questioning this educational goal. By all accounts, the Bachelor's and the Master's programmes are primarily application-oriented and focused on educating students for the related job market. The emphasis programme coordinators lay on including the employers in the (further) development of the programmes points to this conclusion. So does the remarkable demonstration of the employers' engagement and the reception of graduates of the programmes in their companies during the audit session with employers. The peers expect this observation to be reflected more adequately in the programme learning outcomes and in the external promotion of the (Master's) programmes.

From the peers' point of view, this judgement does not generally contradict with the fact that the Master's programmes Information Systems and Radioengineering, Electronics and Telecommunications are themselves subdivided into two directions: a scientific and pedagogical track with a study duration of two years and a profession-oriented track with a study period lasting only 1 to 1.5 years. Both, the pedagogical-scientific track aiming primarily to educational and scientific careers of the graduates and the professional track, which directly leads to the labour market according to the demands of the industry, do require a certain set of science-based abilities of graduates. These are stated to various degrees – as pointed out above – in the learning objectives of the Master's programmes.

Criterion 1.2 Name of the degree programme

Evidence:

- Relevant chapter of the SAR
- Classifier of Higher and Postgraduate Education of the Republic of Kazakhstan, see Appendix 1.1.2.a
- Audit discussions

Preliminary assessment and analysis of the peers:

The peers acknowledge that the names of the programmes are in a broad sense in accordance with the curricular content. However, at least in the case of the Information Systems and Radioengineering programmes, the peers would not wholly subscribe to the HEI's assumption that the programme title reflects the understanding of the relevant scientific community. With a view to the curricular content, peers are of the opinion that the naming of these latter programmes convey a specific understanding of the respective educational field, which does not altogether resemble internationally established subject areas. In the case of the Information Systems programmes, it turns out that the Bachelor largely focuses

on issues of software development missing out socio-technical aspects of operating software systems in an organisational environment, which business analysis is much about (process management, organisational design and change management being key words in this context). To some extent, these topics are addressed in the Master's programme as the programme coordinators frankly admit.

Concerning the Radioengineering degree programmes, at least the Bachelor appears to be more of a fundamental training in Electrical Engineering with a focal point on Telecommunication than a programme conveying specialised competences in the telecommunication field. This is essentially reflected in the programme's content as will be pointed out in section 1.3.

Regarding these peculiarities of the programmes, the different trajectories in each of them are all the more significant with a view to potential job markets and employers. The peers therefore strongly agree with the programme coordinators that individual specialisations (tracks) of graduates should be clearly stressed in the diploma supplement. This would facilitate potential employers or other universities to identify and match the competence profile of the graduate.

Overall, the expert panel agrees with the titles of the degree programmes.

Criterion 1.3 Curriculum

Evidence:

- Relevant chapter of the SAR
- Objectives Matrices, see Appendix 1.1.f of the SAR
- Curricular tables, see Appendix 1.1.3.1a of the SAR
- Standard Academic Programmes (Tables), see Appendix 1.1.3.1c of the SAR
- Course/module descriptions, see Appendix 1.g of the SAR (Bachelor and Master)
- Course Catalogues (Electives), see Appendices 1.1.3.1d, 1.h (Bachelor), 1.1.3.2.c (Master) of the SAR
- Employers' feedback, see Appendix 1.1.3.1f of the SAR
- Audit discussions

Preliminary assessment and analysis of the peers:

With the Computer Science and Software Engineering and Information Systems degree programmes of IITU, the expert panel encounters study programmes already successfully running since 2010. The peers take note also that – contrary to this – the Radioengineering

Bachelor and Master programmes have been started only recently. Employers' written assessment of these programmes as well as their response during the audit discussions generally confirm their high estimation of the programme content and the competences of the graduates. Moreover, it could be seen that the University maintains close connections to the employers. Feeding in suggestions and recommendations of the industry in the establishment and (further) development of the degree programmes to a considerable degree ensures their adaptability to the demands of the technological development.

The University undertakes considerable efforts to demonstrate how the pursued programme learning outcomes are actually achieved in the related modules/courses of the respective programme. Although the resulting matrices are complicated and require considerable attention for a full understanding, they principally visualize how the curricula are supposed to implement the programme-related learning objectives. It would have helped a lot to better grasp the conceptual idea of the programmes if not only course descriptions in different volume and significance had been submitted together with the SAR, but in addition to that (exemplary) study plans delivering a clear conception of the sequence of the modules/courses across the semesters. Keeping in mind, that almost all programmes do also leave an array of specialisation tracks up to the students' choice, study plans would have been all the more relevant for the assessment (as to that see further discussion in sec. 2.1).

The expert panel considers the curricula of the programmes under review to broadly cover the programme-specific qualification objectives discussed above (see sec. 1.1). This applies to so-called key competences such as the ability to ponder one's professional decisions with ecological, political, societal, and/or ethical requirements, to communicate them to relevant audiences and, not least, to hold oneself accountable. But it principally also counts for those subject-specific learning objectives laid out in different versions and at different places as already discussed at length.

Going into the curricular details, the expert panel discusses with the programme coordinators about where in curriculum and how managerial competences shall be acquired in the Bachelor and Master programmes Information Systems. They learnt that Management competences are conveyed in active and interactive teaching/learning formats at increasing complexity levels such as projects, group works, case studies and business games. Whereas at the Bachelor level these methods are more directed towards acquiring professional competences, the Master primarily aims at deepening students' analytical and methodical competences without losing sight of the managerial competences, particularly in the project management track of the course. According to the SAR, this direction is devoted to the theoretical and practical study of project management such as content, timing, cost,

quality, human resources, communications, risks, and suppliers. As a result, Master graduates are expected to know the types and organizational structure of IT projects, the lifecycle and phases of the project development, basic standards in the field of project management, approaches to the formation of a team and methods for assessing the project risks.

When asked about mathematical foundations, algorithmic results, concrete databases, relational algebra, algorithms and efficiency of algorithms, and students' notions of complexity classes of algorithms, it is indicated that the Bachelor programme primarily deals with relational data basis in practice, followed by embedding data bases in specifically designed projects. According to the coordinators, the Master programme builds on that, in particular conveying a more complex picture of the algorithms and elaborating on complexity classes of algorithms. The expert panel receives the impression that employers' reporting about the working fields and achievements of graduates reflect an adequate level of competences in the respective fields of knowledge.

Regarding the Information Systems programmes, the peers note that a series of vendor-specific programmes are represented in the curriculum under their commercial vendor name (Oracle, Microsoft, SAP, iCarnegie etc.). The peers wonder why the University stresses the vendor instead of highlighting the application focus of the particular software in use. Apparently, the University compromised to the purchasing and marketing strategy of the partnering companies, which also support the faculties through donations of software and physical resources. In addition, the coordinators point to the fact that the mentioned programmes are broadly in use internationally and do in fact attract students to the degree programmes. Otherwise, they clearly underline fostering the students' awareness of the application focus of these programmes. As the students confirm, they are well aware of the obsolescence of software programmes in the course of the technological evolution and through working with them adopt an attitude to adapting to new technologies as well. The peers appreciate this, but still ask the University to provide a full account of the courses / modules actually named after commercial vendors. As for the Bachelor programme Information Systems, they additionally suggest reflecting the essentially conceptual focus of the vendor-specific learning software more adequately in the respective course title.

Concerning the Bachelor programme Radioengineering, Electronics and Telecommunications, the peers already expressed their general concern about (but principal approval of) the adequacy of the programme title. While the objectives defined for the Master programme appear to be aptly covered by the programme title, in particular considering topics as, among others, the use of satellite systems for radio frequency spectrum monitoring, the peers doubt whether the Bachelor programme provides a sufficient basis for the Master in this respect. Discussing the inclusion of, inter alia, S-Parameters, Satellite Communication and Coding Theory in the curriculum of the Bachelor programme, the peers are told

that these issues are dealt with to a certain degree in the Antenna and Satellite Communication courses (in the first place in the modules *Antenna-feeder devices and propagation of radio waves* and *Satellite communication systems*). Limitations concerning the calculation of S-Parameters are mainly ascribed to shortcomings in the respective laboratory apparatuses, which the expert panel considers plausible after the inspection of the laboratories and related equipment (see below sec. 4.3). Irrespective of this, the peers suggest including essential radio frequency topics into the curriculum of the Bachelor programme in order to achieve the relevant learning outcomes in the field of Telecommunications and to adequately prepare students for the consecutive Master programme.

Criterion 1.4 Admission requirements

Evidence:

- Respective chapter of the SAR
- Standard Regulations for Admission to Educational Institutions, see Appendix 1.1.4.1b of the SAR (in Russian language only)
- The University admission rules for Bachelor degree, see Appendix 1.1.4.1d (available only in Russian language) of the SAR
- Rules for Admission rules to Master degree program, see Appendix 1.1.4.2a of the SAR
- Bachelor and Master student quota in relation to state grants, Appendices 1.1.4.1a
- Audit discussions

Preliminary assessment and analysis of the peers:

Admission to Bachelor programmes in Kazakhstan is basically regulated by the Ministry of Education. High School graduates take a unified national test (UNT) the result of which indicates which programmes at which university they are allowed to study. A proportion of the best students will receive government scholarships, everybody else passing the defined threshold for the respective programmes is allowed to enrol on self-payment basis. As the SAR points out, the university is not allowed to initiate its own, subject-specific application process but may define its additional requirements such as the English language knowledge and computer science basics. As is also explained in the SAR, some students who prove to be unfit to successfully pass the required courses are forced to drop out or change the degree program. Moreover, as education in IITU is mostly in English and not all enrolled students have a good command of it, the first two years of study include intensive courses not only in Mathematics and Physics, but also in English. The peers take note that the University offers undergraduate programmes of various length for different kinds of applicants

(school leavers, college graduates, etc.) and that IITU keeps close ties to schools and colleges in order to identify and encourage talented school leavers and college graduates.

For admission to Master programmes students have to complete a Bachelor programme in the relevant field of study or in a closely related field. Before enrolment, applicants have to take an exam in English and a comprehensive exam in their respective major subject. According to the admission rules, the foreign language examination provides 50% of the maximum possible score to be achieved, the remaining part being allocated for the professional examination. As the University admits, this could lead to hard decisions by the Admission Committee preferring applicants with a good command of English to those finishing with higher subject-specific competences but less overall points. The expert panel agrees with the programme coordinators that this principle might result in undesirable admission decisions. They strongly support the willingness explicitly expressed in the SAR to reconsider the ratio between the language and subject-specific scores in order to more effectively assess the applicant's ability to study the chosen programme successfully.

With this reservation, the expert panel deems the admission requirements and the admission process as contributing to identifying appropriate applicants for the Bachelor and Master programmes and thereby to the quality assurance of the programmes under consideration. In the audit discussions, the students generally confirm this assessment; in particular, they highly value the language requirements and the University's course offers to further support their English language proficiency. In addition to that, peers appreciate IITU's close contacts with schools and colleges, which ensure an awareness of the level of knowledge of school leavers and college graduates helping the university to tailor its Bachelor programmes and supporting courses accordingly.

As students also point out, all information about the admission procedure is available on IITU website and transparent to them.

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

The peer group concludes that the requirements of the criteria dealt with in this section are *not fully met*.

Learning outcomes (criterion 1.1)

They acknowledge the university's considerable efforts to implement the learner orientation in its degree programmes from scratch that is from defining and formulating study / learning objectives through developing curricula corresponding to these objectives to ap-

propriate mechanisms of quality assurance. The experts are in accordance with the programme coordinators that this is a major change taking some time and at the same time attest that the university is on a good path to reach its aims. In particular, they welcome the diligence, which has been spent on the accurate definition of learning outcomes for the degree programmes under review. In this respect, they are particularly grateful for the submission of the objectives matrices for the Bachelor and Master programmes Information Systems. However, as has been detailed above, the HEI's efforts so far also led to a variety of overly voluminous, largely generic, occasionally inconsistent and contradictory formulations, which also do not always adequately reflect the level of the programme. The peers welcome that the programme coordinators are apparently intent to draft more consistent, programme-specific and level-differentiating learning outcomes. They propose to keep up a requirement, until the achievement of the intention has been proven convincingly (see below, Chap. F, A 1.)

Names of the degree programmes (criterion 1.2)

The peers decidedly welcome the programme coordinators' initiative to include also the name of specified tracks in the Diploma Supplement, since this would give external stakeholders valuable additional information about the competences of the graduates. They take particularly note of the HEI's justification of the Radioengineering, Electronics and Telecommunications programmes' title.

Curriculum Bachelor Radioengineering, Electronics and Telecommunications (criterion 1.3)

The peers appreciate the explanation of the programme coordinators concerning radio frequency topics in the respective Bachelor programme. In their view, a focus on the Radio Regulations of the International Telecommunication Union, the Table of frequency distribution between radio services, ITU-R recommendations, and the items of the ITU World Radiocommunication Conference agenda is worthwhile. Nevertheless, taking into consideration the related modules and module/course descriptions, the panel is of the opinion that there is still room for improvement. It sounds encouraging that the programme developers think about enhancing the Bachelor curriculum with respect to the Master. A respective recommendation should advice the peer panel of the re-accreditation procedure to have a closer look at the development of the curriculum in this respect (see below, Chap. F, E 4.).

Vendor-named courses / Course title and content in the Bachelor Information Systems (Criterion 1.3, 5.1)

The peers take not of the list of courses of the modules actually named after commercial vendors. As the panel has verified in the audit discussions, the students are well aware of

fact that these vendor-promoted programmes are inevitably subject to the technological evolution and thus to their own obsolescence. At the same time, the panel is convinced that students generally catch the conceptual focus of the vendor-specific learning software. The inaugurated modification of the title of the related modules will reasonably contribute to reflect this observation more appropriately and therefore is considered conducive. Since the modification is about to come into effect in 2019 at the earliest, the peers suggest maintaining a recommendation to this end supportive (see below, Chap. F, E 5.).

2. The degree programme: structures, methods and implementation

Criterion 2.1 Structure and modules

Evidence:

- Relevant chapter of the SAR
- Objectives Matrices, see Appendix 1.1.f of the SAR
- Curricular tables, see Appendix 1.1.3.1a of the SAR
- Standard Academic Programmes (Tables), see Appendix 1.1.3.1c of the SAR
- Course/module descriptions, see Appendix 1.g of the SAR (Bachelor and Master)
- Course Catalogues (Electives), see Appendices 1.1.3.1d, 1.h (Bachelor), 1.1.3.2.c (Master) of the SAR
- Student Guidebook, see Appendix 2.4.e (internships)
- Agreements with Companies, see Appendix 2.1.1.c of the SAR (internships)
- State Compulsory Standard of Higher Education, see Appendix 1.i of the SAR
- Regulations on the System of Credit Transferring of ECTS Type, see Appendix 1.1.3.2.b of the SAR
- The order no. 152 of the Minister of Education and science of the Republic of Kazakhstan as of April 20, 2011: On approval of the rules of Educational process organization in the Credit System of Education, see Appendix 2.1.1.e
- Exemplary recognition of academic achievements after completion of courses in studies abroad, see Appendix 2.1.1.f of the SAR
- Audit discussions

Preliminary assessment and analysis of the peers:
The expert panel takes note that the programmes under review are modularized, with courses/modules generally consisting of reasonable and self-contained teaching and learning units usually lasting one semester.

Taking a closer look at the curricula, the expert panel sees that the Bachelor programmes basically consist of three categories of modules: general education disciplines (GED), basic disciplines (BD), and professional disciplines (PD), each of them, in turn, being divided into fixed proportions of compulsory and elective modules. It is understood that the GED modules should convey generic competences as, for instance, the ability to analyse and synthesize, work independently, apply knowledge in practical work settings, information management skills, etc. BD modules are supposed to convey generic and subject-specific competences related to technical specialties such as Mathematics or Physics, which explains that these courses are taught cross-disciplinary. The biggest and in a way defining proportion of modules is attributable to the third category, the PD modules. These courses are subject- and profession-oriented in a stricter sense, encompassing a considerable share of electives, which allow the programme coordinators to keep the curriculum up-to-date, not least in response to suggestions and recommendations of the different stakeholders.

Concerning the Master's programmes, the expert panel sees that each of them is composed of essentially two sets of modules/courses: basic disciplines (BD) and specialised or profiling disciplines (PD), both, again, subdivided into compulsory and elective modules/courses.

From the peers' perspective, the closely regulated scheme for the design of Bachelor and Master programmes can be seen as a strength and weakness at once. On the one hand, the regulatory framework ensures a comparable level of knowledge independent of university and study programme as a starting point bridging school and university careers. On the other hand, the amount of compulsory course requirements by Ministry and University severely restrains the discretionary margin of the curriculum designers, in particular with a view to scientific and profession-oriented programme objectives. The peers accept this ambiguity as status quo of Higher Education in Kazakhstan, which, however, seems constantly worthy of discussion.

However, due to the lack of study plans illustrating the modules / courses and the related workload/ECTS per semester, the peer panel finds it difficult to decide whether the sequence of courses/modules does follow a logical order in each programme. As they understand, the so-called Standard Academic Programmes present the fixed framework for the degree programmes, which are the basis of the students' Individual Study/Educational/Work Plan. It is therefore comprehensible that individually composed curricula are not representative of a typical sequence of courses since a significant amount of electives

is up to the individual choice of the students. The peers appreciate that students are comprehensively informed beforehand about study tracks and electives as coordinators and students concurrently confirm. Nevertheless, they assume that at least exemplary study plans assembling meaningful combinations of mandatory and elective courses for each semester could be presented and made available not only to the expert panel but to the students as well. Providing exemplary or even typical study plans might assist students in developing their individual study plan. In order to get a reliable overview of the study schedule of the Bachelor and Master programmes and study tracks respectively, the peers ask the University to provide a study plan for each degree programme indicating the courses and ECTS/Workload per semester (see also sec. 2.2).

As the peers already observed, the degree programmes are distinguished by their remarkable practical relevance. This finding has been impressively endorsed by the employers' response in the audit discussions and written statements. The peers are aware that laboratory units, project works, business cases, and different sorts of internships are essentially contributing to this practical approach. The integration of various types of internship (one educational, two field, one pre – diploma) in the Bachelor curricula appears to be well figured out. Peers are told that especially field internships are conducted on the basis of contracts with enterprises and firms of various forms of ownership and need to be done in summer periods after each academic year. By contrast, the pre – diploma internship follows the final exams in the 7th semester. Duration and requirements of the internships are obviously set forth in the State Educational Standard, but module descriptions with detailed information about the content, learning objectives, workload and requirements are missing (some information being provided in the Student Guidebook, Appendix 2.4.e). The University is asked to provide these module descriptions along with their statement to the audit report. The expert panel welcomes the efforts of the coordinators to ensure that the intended learning outcomes could be achieved in the cooperating companies, of which students get a list before commencing their field internships.

The peer panel takes note that the University has put in place rules for the recognition of academic achievements of students studying at other universities, in particular abroad. The peers also appreciate that the University encourages students to engage in academic mobility activities, inter alia through participating in a number of international student exchange programs (such as Erasmus+) and many bilateral student exchange agreements. It is also noteworthy in this context, that the University provides funding and stipend programmes to foster the academic mobility, although still few students actually decide to take the opportunity for studying abroad. Peers note that exchanges are handled on the basis of learning agreements recommending students to present a study plan before starting their studies abroad so as to make sure that the planned courses abroad are fitting with

the IITU curriculum and thus may be recognized. Although not directly oriented towards the achieved and matched learning outcomes, the principles of the recognition process concerning academic achievements acquired at other universities, from the perspective of the peers, comply with the respective chapter of the Lisbon convention.

Criterion 2.2 Work load and credits

Evidence:

- Relevant chapter of the report
- Curricular tables, see Appendix 1.1.3.1a of the SAR
- Module descriptions (Handbooks, Syllabus), see Appendix 1.1g of the SAR
- Regulations on the System of Credit Transferring of ECTS Type, see Appendix 1.1.3.2.b of the SAR
- Audit discussions

Preliminary assessment and analysis of the peers:
The University has a (national Kazakh) credit point system in place. This credit point system does count lecture hours as well as self-study hours of students. According to this, one Kazakh credit in the Bachelor programmes counts for altogether 45 hours workload, including 15 contact hours and 30 hours of self-study. As reported in the SAR, each semester consists of 5 to 8 modules and each module is usually valued 2 to 3 (Kazakh) credits. The recommended workload per semester spans from 18 to 22 credits. In the Master programmes one credit is attributed to 75 hours, including 15 contact hours and 60 hours of self-study time, the ratio between contact hours and self-study time being 1 to 4 thus in a way attesting to the advanced standard and complexity of the studies at Master level. Modules in the Master programmes usually count 2 to 3 (Kazakh) credits. In addition to the credit system in place, the University has set forth rules for converting Kazakh credits into the ECTS by using different conversion coefficients (1.67 for the Bachelor programmes and 2.75 for (theoretical courses of) Master programmes).

Generally, the expert panel acknowledges the efforts to reflect the different level of Bachelor and Master programmes and increased requirements at the Master level in the calculation basis of the (national) credit system and thereby in the conversion of national credits into ECTS. Otherwise, judged from the figures in the SAR this results in an occasionally uneven and extremely high workload distribution in the Information Systems and Radioengineering Bachelor programmes (ranging from 25 or 27 to 37 ECTS). Particularly in the Master programmes, where credit numbers in the Information Systems and Radioengineering programmes span from 33 to 47 ECTS, the calculation appears to be unrealistic (meaning a

weekly workload ranging from 60 to 85 hours). Although in the Computer Science and Software Engineering programmes the credit point allocation seems to be more balanced at a first glance, the numbers for the Master programme suggest an equally unrealistic average student workload of 70 hours per week. After the students reassured considering the workload as manageable, but at the same time showed little experience in either of the two credit systems, the expert panel deems the issue largely one of technicalities. However, in order to deliver a more reliable workload calculation and credit distribution scheme and to avoid overburdening the students, the Faculty of Information Technologies and the responsible departments must make sure that the workload in terms of distribution of ECTS points is more even across semesters. For validating the workload calculation and credit point allocation, workload evaluations should be conducted on a regular basis.

Criterion 2.3 Teaching methodology

Evidence:

- Relevant chapter of the SAR
- Regulations on recognition of student's non-academic achievements, see Appendix 2.3.3.a of the SAR
- Student questionnaire of Teaching performance, see samples in Appendix 2.3.3.d of the SAR
- Sample reports on Peer observation, see Appendix 2.3.3.e
- Audit discussions

Preliminary assessment and analysis of the peers:

The peers see that, in general, teaching includes lectures, classroom exercises, tutorials, case studies, laboratory work, group and individual projects as well as various forms of internships (see above sec. 2.1). They acknowledge the increasing weight given to teaching methods fostering problem-based learning, best portrayed by the role of business case studies, (mini-)projects, and simulation of professional and business-life situations. This didactical concept is closely and persuasively linked to the application-oriented approach of the programmes as such, particularly the Bachelor programmes.

Regarding this, the peers took positive note of the established connections with local industry that are made use of in order to enhance the practical aspects of teaching. Thus, industry representatives are regularly invited to give lessons or presentations as part of the existing courses at the University giving students the possibility to get in contact with real work life.

Additionally, the SAR describes in detail measures, processes and instruments used to support the further development of the teaching quality and encourage teachers to adapt new and innovative teaching and learning methods. Regular student evaluation of the teaching process is part of this strategy as are peer observation and mandatory self-assessing reports of teachers' teaching performance. It is well received that the University observes the quality of the teaching process as pivotal to the resulting study success and pursuant to that has made it a focal point of its quality assurance system and instruments. Otherwise, the peers notice that, according to the SWOT-Analysis in the SAR, the departments still see room for improvement in the didactical area, which may be considered as honest and evidence of a living quality culture too.

Of particular importance in an internationally oriented university aiming at offering and conducting programmes primarily in English is of course the English proficiency of its teaching staff. Apart from the Radioengineering programmes, which are taught in Russian only at present, this too applies to the programmes under review. From their experience in the audit discussions, the peers have the impression that in general the teaching staff (see below sec. 4) does possess of a good command of English (although very few exceptions were noticeable).

In sum, the peer panel appraises the teaching methodology as up-to-date and adequate in order to convey the contents envisaged by the programmes.

Criterion 2.4 Support and assistance

Evidence:

- Relevant chapter of the SAR
- Regulations on Curatorship, see Appendix 2.4.a of the SAR
- Student Guidebook, see Appendix 2.4.e of the SAR
- Audit discussions

Preliminary assessment and analysis of the peers:

The peers have a very good impression of the offers related to support and assistance of the students at the IITU. In fact, many students declared that the young, dynamic and supportive staff was a major reason why they decided to take up their studies at IITU. They also confirmed that the teaching staff is always available for any questions and supports the students. During the on-site-visit, the peers gained a good impression of the variety of clubs and projects offered to support the students and to give them an opportunity to develop their own projects. A recently opened research lab has created a productive and creative environment, where excellent students have the best opportunities to start their own

companies or follow projects under guidance from experienced staff members. Further, they can receive legal and economic advice for their own business. Consequently, the peers are impressed by the opportunities given to the students.

With reference to the international strategy of the IITU, a major issue of support in the programmes under review is the English language. As already mentioned (see above sec. 1.4), the University has introduced a number of supporting courses to improve the English language level of the students at and before the beginning of the first semester; additional language courses during the summer break have been created and students feel generally well-supported in this regard. The peers gained the impression that students in general make good use of these opportunities or that they had advanced English skills before commencing their studies anyway. This is noteworthy, since it cannot be taken for granted under the prevailing circumstances of little or no English language tradition in Kazakh High school education.

Information about the courses, modules and study programmes in general are presented on the Kazakh website but also at the beginning of each course. During the discussion, the students confirmed that they receive all necessary information concerning the programmes, courses, exams, etc. What could be improved though, is the access to international research literature. In particular for the Master students this would be an important asset. The peers consider it recommendable taking on this issue.

Apart from this small reservation, the peers had no doubt that sufficient support and assistance is given to the students ensuring the best possible success.

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

The expert panel considers the requirements of the above mentioned criteria *broadly but not completely fulfilled*.

Study plans (criterion 2.1)

The peers are grateful for the study plans submitted along with the statement of IITU. The course plans give a better and more complete picture of each degree programme, its structure and content, the logical order and consistency of its modules (in combination with the relevant module descriptions). The peers strongly suggest making them available to the students too, since they might serve as a good orientation and overview.

Internships (criterion 2.1, 5.1)

The expert panel welcomes the module descriptions and related guidelines[6] of the different internships. This additional information clarifies the respective objectives, structure and content as well as assessment criteria of each internship. It also demonstrates convincingly that the internships are adequately and reasonably integrated into the curriculum and thoroughly supervised by the university (which is of particular concern in the case of the industrial placement).

Credit point allocation and student workload (criterion 2.2)

The peers take note of the additional explanations of the programme coordinators regarding the uneven credit point allocation in almost all degree programmes along with significant peaks in the student's workload. The statement results in saying that

- students actually finish their everyday assignments and homework considerably faster than calculated,
- students need significant less time for passing the general educational courses of the first study year (especially in the Bachelor programmes where significant peaks occur in that study period),
- the workload has to be calculated realistically on the basis of 18 semester weeks (rather than 15 as in the SAR) due to effectively three additional weeks of preparation and immersion time after the end of lectures, and finally
- the fixed conversion coefficients of the responsible ministry must be and have been adhered to.

Given this, the credit, ECTS and workload columns of the revised study plans offer considerable discrepancies, showing for instance different total working hours per week despite identical Kazakh credit numbers, apparently due to discretionary calculation of the reduced workload of general educational courses.[7] Moreover, the explanation in no way rules out the imbalance of the workload per semester with a constant decrease in the later study phases, particularly in the Bachelor programmes, but in the Master programmes as well. In addition, the workload accounts according to the study plans, which allegedly are more accurate than the previous ones, still have remarkable peaks on both the Bachelor's and the Master's level. But the most disturbing fact is, that the argument of the programme

[6] The peers assume that similar guidelines apply for the Radioengineering programmes for which only module descriptions have been presented (presumably, because the rules and regulations are not available in English since the programmes are as yet taught in Russian language only).

[7] By comparison, for instance, of the study plans of the Computer Science programme on the one side and the Information Systems programme on the other.

coordinators leaves little room for conceiving how the actual workload calculation and corresponding credit point allocation and even the conversion coefficients of the ministry are ever going to be adapted to the reality (monitored *and* adapted), if it turns out to be significantly inaccurate. Overall, the peer group deems it necessary to keep up and slightly supplement a preliminary drafted requirement with regard to the credit point allocation and student workload distribution (see below, Chap. F, A 2.).

3. Exams: System, concept and organisation

Criterion 3 Exams: System, concept and organisation

Evidence:

- Relevant chapter of the SAR
- Module descriptions (Handbooks, Syllabus), see Appendix 1.1g of the SAR
- Course Catalogues (Electives), see Appendices 1.1.3.1d, 1.h (Bachelor), 1.1.3.2.c (Master) of the SAR
- Documented Procedure for Organizing the Educational Process (Bachelor's degree), see Appendix 1.1.c of the SAR
- Documented Procedure for Organizing the Educational Process (Master's degree), see Appendix 1.1.d of the SAR (in Russian language only)
- Procedures for Formative, Mid-Term/End-of-Term and Final Assessment of the Student's Academic Performance, see Appendix 3.3b of the SAR
- Rules of Writing a Diploma Paper, see Appendix 2.4.c of the SAR
- Forms of examination for each discipline, see Appendix 3.1.a of the SAR
- Student Guidebook, see Appendix 2.4.e of the SAR
- On-site-visit: Inspection of exemplary examinations as well as Bachelor and Master theses
- Audit discussions

Preliminary assessment and analysis of the peers:

Each course-content in the reviewed study programmes is reflected in exams which are distributed in three examination periods each semester, the mid- and end-of-term exams during the 7th and 15th week of the semester and the final examination in a period of 2-3 weeks after the end of the semester. Additionally, students have to undergo continuous (week-to-week) assessment through tests, assignments, quizzes, etc. This amounts to an

altogether very high number of examinations and assessments, which on the one hand have the benefit to constantly inform students about their learning progress and prepare them in the best possible way for the mid- and end-of-term exams. On the other hand, this assessment scheme obviously raises the burden of examinations significantly putting continuous stress on students. However, the peers take note that this generally high amount of exams during one semester is not considered problematic but helpful by the students since they apparently favour the benefit of a continuous evaluation of the individual study progress.

If students fail the final exam they can retake it if they reached a minimum mark that is accumulated from the previous examinations. If they perform below that, they have to retake the whole course, which means additional costs as students have to pay for each module individually. Courses may be repeated two times but repetitions are only possible in summer, which may result in an extension of the study duration. However, the peers understand that usually there are no interdependencies between courses, so there is little immediate impact if students have to repeat a course. Students report about 7 to 8 (final) examinations on average per semester, which are organised with two-day intervals between the exams for rest and further preparation. At the same time, they consider this a fair and bearable exam load. Overall, the students confirm that the examination organization works well and flexible and that the workload implied in the preparation of exams is manageable.

The expert panel welcomes that the performance of students in the different course assessments is evaluated twice in a semester in order to identify significant anomalies and respond appropriately to improve on the examination process in the future. This can be taken as evidence for the examination system being adequately integrated in the quality assurance of the degree programmes under consideration.

With regard to the question as to how the assessment forms of an individual course effectively measure the degree in which the intended learning outcomes have been achieved ("competence orientation"), the apparent multiplicity of assessment forms within the same course per se raises the prospect of their competence orientation. Consequently, teaching staff and students concurrently perceive that the various combinations of content-related assignments, written tests, reports, presentations, and different forms of project works adequately address the learning objectives of the respective courses. This does not preclude that in certain cases, as for instance in the foundational courses of the Radioengineering Bachelor programme, specified assessment methods such as tests are not seen as covering the intended learning objectives appropriately. Again, the University's SWOT analysis shows that the coordinators are fully aware of and, as the peer panel assumes, will work on the issue of matching assessment forms and learning objectives.

In this respect, the peers particularly acknowledge that the Bachelor thesis consists of an assignment related to a course in the student's major studies, elaborated mainly in the form of a project report, which may also include an empirical research part. By comparison, the Master thesis is perceived to be a research work in the student's major subject requiring the student to demonstrate his/her ability to carry out the project independently according to a previously drawn plan. During the audit visit, the peers had the opportunity to inspect a number of examinations and theses. They conclude that, in general, the examinations and, especially, the theses provide evidence of the achievement of the respective learning outcomes. Concerning the theses and the accompanying ability to work scientifically, the peers observed that the faculty does not only provide detailed instructions of how to write a Thesis paper but also introductory lessons preparing students for scientific and research work, which students explicitly highlight.

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

The expert panel concludes that the concept and the organisation of assessments does *fully comply* with the requirements.

The panel acknowledges the dissenting opinion of the programme coordinators with regard to the use and benefit of tests as one assessment method among others, with special emphasis on the Radioengineering Bachelor programme. The peers readily acknowledge that tests, if appropriately designed and regularly adding up to other forms of assessments, may well contribute to an overall meaningful assessment of the achievement of the intended learning objectives.

4. Resources

Criterion 4.1 Staff

Evidence:

- Relevant chapter of the SAR
- CVs of the Teaching Staff, see Appendix 4.1e of the SAR
- Human Resources Policy, see Appendix 4.1.a of the SAR
- Internal Labor Code of Conduct, see Appendix 4.1.b of the SAR
- Audit discussions

Preliminary assessment and analysis of the peers:
In the SAR, the University presents data about the number and overall qualification of staff for the respective programmes and of the rules and procedures in place to ensure the best possible qualification for the position to be filled. In addition to that, the discussion on site has conveyed a good impression of the quality of the teaching personnel.

The peers are convinced that the current staff available is sufficiently qualified and their number enough to manage the programmes under review. They take note that the number of full professors in the programmes under consideration is relatively small (5 in the Computer Science and Software Engineering programmes, 5 in the Information Systems programmes and only 2 in the Radioengineering programmes). However, taking into account the number and qualification of associate and assistant professors, the peers nevertheless see a solid competence base for the teaching process. Especially with regard to the level and further development of the Master programmes, but also for the Bachelor programmes, the peer panel highly esteems the increasing engagement of the relatively young staff members in research activities. Although a high teaching load of assistant and associate professors may put limiting conditions on this potential, the generally encouraging and supporting teaching, learning and research environment in the faculty is considered conducive to implementing the intended learning objectives.

Concerning the English language proficiency of the teaching staff, the peers learned that conflicting goals might raise the challenge of either hiring the best-qualified teacher or one who is fluent in English. The peers accept that this is an issue, which currently leads in some courses to a mixture of teaching in English and Russian/Kazakh. Irrespective of this situation, in the discussion with the teaching staff the peers experienced a principally high level of English language proficiency. Financial incentives of the University to foster individual language skills and teaching in English, which are already provided, may positively affect this development.

Criterion 4.2 Staff development

Evidence:

- Relevant chapter of the SAR
- Skills development of faculty staff members, see Appendix 2.3.3.i of the SAR
- Human Resources Policy, see Appendix 4.1.a of the SAR
- Scientific and methodical publications, see Appendix 4.1.f of the SAR
- Audit discussions

Preliminary assessment and analysis of the peers:
The University is offering a number of supportive measures for the teaching staff to continuously improve their didactical and teaching skills and also their language skills, particularly in the English language. Apparently, there are various offers for professional development, be it through guest lecturers giving courses on didactical or subject-specific aspects, or through the many international projects that allow the teaching staff members to spend some time at other Universities.

As has been noted already, the peers acknowledge the supportive stance of the University and faculty in the field of research. However, while the University aims at constantly increasing its output in academic research, at the same time many staff members have a high teaching load. Similarly, while it is generally possible to take sabbaticals for individual research projects, apparently only few do so at present. Hence, the expert panel strongly supports the University's measures and incentives to increase the staff members' continuous involvement in current research in order to best enable them to stay up-to-date and share their experience with their students. This is even more so the case, since the University is developing a growing number of Master and PhD-programmes that need to be much more research-related than the Bachelor programmes.

The University's efforts to connect and cooperate with other universities in the region, but also on the international scale will promote the exchange of both students and teachers and will be a major asset in the challenging internationalisation and research strategy.

Criterion 4.3 Funds and equipment

Evidence:

- Relevant chapter of the SAR
- Equipment for Academia, see Appendix 4.3a of the SAR
- Description of the Software, see Appendix 4.b
- Technical Support of IS Department
- Audit discussions

Preliminary assessment and analysis of the peers:
The peers take note of the information about the funding of the degree programmes in the SAR and additional explanations given in the audit discussions. Overall, they conclude that the University's main sources of funding (state budget, tuition-fees of self-paying students, R&D projects and other operational revenues) appear to be sufficient for the programmes to be self-sustaining.

From the self-assessment report and its annexes as well as a tour through the University premises, the peers received a detailed impression of the facilities, equipment and laboratories. While they are generally content with what they saw, the University further reports about the construction of a new campus envisaged for the coming years. This will render more space for labs and an increasing number of students as for the moment the available facilities have reached a limit.

As the peers could see, the programmes use a variety of laboratories and lecture rooms offering sufficient space and up-to-date technology for operating the programmes. While this adequately describes the overall infrastructure, the available labs and lab equipment for the Bachelor and Master programmes Radioengineering, Electronics and Telecommunications from the peers' perspective are serving no more than the most basic needs to conduct relevant experiments in the area of radio frequency technology at the respective level. Consequently, the expert panel recommends taking appropriate steps to refurbish the relevant laboratory infrastructure in this respect in order to achieve the intended learning outcomes in the field of Telecommunications.

Considering the close ties and manifold cooperation of the University with companies in the IT branch, it comes to no surprise to the peers that the companies in many ways provide physical support to the responsible departments and their degree programmes. Thus, they either directly supply laboratories or specialised equipment or, more indirectly, allow students to use their own technological apparatuses when doing their internships or working on their theses. In this context, it should be mentioned again, as was in a previous section, that courses named after well-known vendors of relevant business software in some significant cases reflect the vendors' material support. Obviously, all this fits very well with the outright application-oriented approach of the degree programmes under review.

Eventually, as stated previously in this report, the panel considers it generally commendable to provide better access to international research literature for the students.

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

The peers consider the requirements with respect to staffing, financial and material resources *sufficiently fulfilled* for the Computer Science and Information Systems degree programmes. Regarding the physical equipment available for the Radioengineering degree programmes, the panel sees the necessity to take further actions.

Laboratory equipment of the degree programmes Radioengineering, Electronics and Telecommunications (criterion 4.3)

As argued above in more detail, the experts conclude that the relevant laboratory infrastructure for radio frequency technology needs to be updated and modernized in order to live up to the study objectives aimed at. The panel appreciates the affirmative statement of the university in this respect and confirms a proposed requirement for this purpose (see below, Chap. F, A 3.).

Research activities of teaching staff (criterion 4.2)

The peer panel acknowledges that the causes of individual lecturers high teaching load and often corresponding limited research work is due to manifold reasons – department needs and rising living costs, inter alia. It is also highly appreciable that the university not only spares a small portion of the academic workload for research, but also provides additional incentives such as preserving the salary for periods of participation in conferences or reimbursement of costs for the publication of the results of research activities. Since the Master programmes and particularly the PhD programmes (which are not under consideration in this report) demand continuous and potentially rising research capabilities, the peers nevertheless recommend to further encourage teaching staff members to constantly engage in research activities (see below, Chap. F, E 1.).

Access to research literature (criterion 4.3)

As pointed out above, the peers consider the available corpus of scientific work in terms of books, periodicals, conference papers and proceedings etc. sufficient but still improvable, in particular regarding the access to international research literature. The panel recognizes the positive reception of their respective recommendation, which it upholds (see below, Chap. F, E 2.).

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

- Relevant chapter of the SAR
- Module descriptions (Handbooks, Syllabus), see Appendix 1.1g of the SAR
- Course Catalogues (Electives), see Appendices 1.1.3.1d, 1.h (Bachelor), 1.1.3.2.c (Master) of the SAR

- Audit discussions

Preliminary assessment and analysis of the peers:
The peers appreciated the module descriptions presented beforehand with the self-assessment report. As the SAR states and students confirm, apart from the internships and the final project, all module descriptions are available to the students via the University's website. They give full information, inter alia, about the courses, examinations, contents, learning outcomes and recommended literature. Nevertheless, the peers have the impression that the module descriptions in the strict sense of the Bologna Process have been primarily produced for the accreditation procedure, superimposed on the traditional structure of lengthy syllabi and short-cut versions of the course descriptions. Since they should be in the first instance a helpful instrument for the students, it seems questionable to provide three voluminous sources containing essentially identical information in different length. Apart from the problem of keeping all of them up-to-date in the day-to-day operation of the programmes, students will simply focus on one source and in a worst-case scenario on none of them. Peers would therefore suggest focusing only on the (new) module descriptions. Regarding this, they ask the programme coordinators/lecturers to add and provide them with descriptions for the Internships and the Thesis projects of the Bachelor and Master programmes respectively, which are missing so far.

As treated earlier in the report (see sec. 1.3), it is also recommended with reference to the module/course descriptions of the Information Systems programmes that the essentially conceptual focus of the vendor-specific learning software should be more adequately reflected in the related course titles. Referring to the module descriptions of the mentioned degree programmes, the expert panel perceives the names of the modules/courses not always properly conveying the module/course content (the vendor-specific courses being only the most visible example of this). It suggests checking the module titles in further advancement of the programmes.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

- IITU, Extracts from Minutes No.7 of Science and Methodology Council Meeting held on April 25, 2017, see Appendix 5.2e of the SAR
- Issues of the Diploma Supplement for the Bachelor programmes Computer Science and Software Engineering and Information Systems, see Appendix 5.2e of the SAR

Preliminary assessment and analysis of the peers:
At graduation, all students are provided with a diploma and a Diploma Supplement in English language. Referring to the issues included in the Annexes of the SAR, the Diploma Supplement gives information about the course content, schedule of studies, intended qualification profile, the individual study performance, the selected courses, a relative grade of the student, and an overview over the Kazakh system of higher education.

Samples of the Diploma Supplement for only two of the degree programmes under review have been included in the SAR. However, the peers assume that pursuant to the relevant decision of the Science and Methodology Council of IITU, the DS of all degree programmes shall be filed accordingly. Consequently, no further action on the University's side is needed in this regard.

Criterion 5.3 Relevant rules

Evidence:

- Relevant chapter of the SAR
- see List of main applicable documents, Appendix 9 of the Quality Manual, QM-01, Appendix 6.1b of the SAR
- Audit discussions

Preliminary assessment and analysis of the peers:
The documents provided and the discussion sessions during the on-site visit have convincingly demonstrated that the IITU follows a policy of transparent and open rules and regulations. All required rules and regulations are made accessible to students at any time online and especially through computer terminals within the university building. The discussion with the students confirmed that they felt well-informed about regulations and comfortable about the access to any information about their degree programmes. It is notable though, that those responsible for the programme point out in their SWOT analysis that the density of the regulatory framework may negatively affect the flexibility and innovativeness in the degree programmes. The experts agree with this argument but are at the same time optimistic that the self-critical attitude of the programme coordinators – not least demonstrated in the conclusions of the SWOT analyses of the SAR – might work as an essential antidote to their fears.

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

The transparency of the degree programmes concerning the available information, rules and regulations, do *generally comply* with the accreditation requirements.

Diploma Supplements (criterion 5.2)

The peer panel appreciates the supplement of the missing exemplary Diploma Supplements. These are considered adequate; no further action of the university is necessary.

Module descriptions (criterion 2.1, 5.1)

As already stated in the final assessment to section 2 of this report, the peers consider the supplemented module descriptions for the internships informative and distinguishing. No further action of the university is necessary.

Title of vendor-specific courses (criterion 1.3, 5.1)

The peers have taken a stance on this matter in their final assessment to section 1 of this report.

6. Quality management: quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

- Relevant chapter of the SAR
- Quality Assurance Policy, see Appendix 6.1.c of the SAR
- Quality Manual QM-01, see Appendix 6.1b of the SAR
- Audit discussions

Preliminary assessment and analysis of the peers:
The IITU only recently subjected itself to an institutional accreditation by ASIIN that confirmed that the University generally complies with the required standards of quality management processes. This is amplified through the published version of a Quality Assurance Policy and a comprehensive Quality Assurance Manual, encompassing all core processes of the University and the respective quality assurances measures, processes and responsibilities. It is attested through the practiced quality assurance methods and procedures in the programmes under review.

During the on-site-visit, the peers found their impression confirmed that the University has established a well-organized system of quality assurance, thereby including all stakeholders. All programmes and courses are constantly under review for further development. Students learning results across the whole student life cycle are monitored in different surveys

and the results fed in the improvement of the degree programmes' quality. In this connection, it is particularly noteworthy that the faculty apparently managed to establish a remarkably responsive feedback culture between teachers and students (at least in the programmes considered here). Students reported that they perceive their assessment of courses generally taken seriously and that they feel well informed about follow-up measures in response to potential critical remarks. Teachers confirm the trustful and cooperative relationship in the teaching/learning community at the faculty.

Another aspect the peers note positively is the established participation of the industry and potential employers in the further development of the degree programmes. This observation apparently reflects the application-oriented approach of the degree programmes. Otherwise, from the peers' perspective it constantly needs to be weighed against the requirements of a science-based education and the long-term objective of increasing the research capabilities of the faculty.

What could be improved in the already established quality assurance system is the documentation and use of largely missing student statistical data. The small amount of statistical data submitted in the SAR does not include any significant collection of cohort-wise related student and graduate numbers, dropout rates, average lengths of study etc., which might be advantageously combined with the qualitative results of surveys and evaluations in order to identify and remove shortcomings in the programmes. Accordingly, the peers recommend to include meaningful cohort-wise related statistical data concerning the graduation rate, the drop-out rate, the examination failure rate and the duration of study in the monitoring of the study progress and its intended use for the development of the programmes.

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

The peer panel concludes that the quality assurance of the degree programmes under review do *fully comply with* the accreditation requirements.

The peers take note of the statistical data presented in the aftermath of the audit visit (appendices of the statement of the university). They also appreciate the declaration of the programme coordinators that the results extracted from the statistics are feed in the quality assurance cycle on a routine basis. Notwithstanding, they point to the fact that neither do the data contain any information about the average study progress of individual student cohorts or the achievements of successive cohorts in comparison nor do they reveal any indication on how the university analyses the results and makes use of them for the further

development of the programmes. It is here, where the expert panel encourages additional efforts of the university to improve its quality assurance system (see below, Chap. F, E 3.).

D Additional Documents

Before preparing their final assessment, the panel ask that the following missing or unclear information be provided together with the comment of the Higher Education Institution on the previous chapters of this report:

D 1. List of courses of the modules actually named after commercial vendors (ASIIN 1.3)

D 2. Study plan for each degree programme indicating exemplary or typical combinations of mandatory and elective courses and the related credits (ECTS) per semester (ASIIN 2.1)

D 3. Module descriptions for the various internships (ASIIN 2.1, 5.1)

E Comment of the Higher Education Institution (26.11.2018)

The institution provided an extensive statement as well as the following additional documents:

- Samples of Diploma Supplements
- Module descriptions of Internships
- Objectives Matrix for the degree programmes Information Systems
- Study plans
- List of of Vendor specific courses and notification of renaming the courses
- Enrolment statistics 2009 – 2018, statistics about graduates 2013 – 2018 for all degree programmes
- exemplary grade statistics for the Bachelor programmes Computer Science and Software Engineering as well as Radioengineering, Electronics and Telecommunications

Both the statement and the statistical data have been taken note of in the final assessment of the peers in each section of this report (grey boxes) as well as in the recommended resolution of the peers in the following chapter F.

F Summary: Peer recommendations (01.12.2018)

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

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Computer Science and Software Engineering	With requirements for one year	ASIIN, Euro-Inf	30.09.2024
Ma Computer Science and Software Engineering	With requirements for one year	ASIIN, Euro-Inf	30.09.2024
Ba Information Systems	With requirements for one year	ASIIN, Euro-Inf	30.09.2024
Ma Information Systems	With requirements for one year	ASIIN, Euro-Inf	30.09.2024
Ba Radioengineering, Electronics and Telecommunications	With requirements for one year	ASIIN, EUR-ACE	30.09.2024
Ma Radioengineering, Electronics and Telecommunications	With requirements for one year	ASIIN, EUR-ACE	30.09.2024

Requirements

For all degree programmes

A 1. (ASIIN 1.1) Provide a consistent version of the learning objectives, which is programme-specific, and at the same time clearly reflects the difference between the Bachelor and Master level of education. Adapt it to the application-oriented profile of the degree programmes.

A 2. (ASIIN 2.2) Ensure that the workload in terms of distribution of ECTS points is more balanced across semesters. Make also sure that the workload is realistically calculated and validated on a regular basis, in order to adapt the related credit point allocation if necessary.

For the Bachelor and Master degree programmes Radioengineering, Electronics and Telecommunication

A 3. (ASIIN 4.3) Take appropriate steps to refurbish the relevant laboratory infrastructure for radio frequency technology in order to achieve the intended learning outcomes in the field of Telecommunications.

Recommendations

For all degree programmes

E 1. (ASIIN 4.2) It is recommended to further encourage the teaching staff members to constantly engage in research activities and leave sufficient room for that.

E 2. (ASIIN 4.3) It is recommended to provide better access to international research literature for the students.

E 3. (ASIIN 6) It is recommended to include cohort-related statistical data in the monitoring of the study progress (such as the graduation rate, the dropout rate, the examination failure rate and the duration of study) and transparently document its use for the development of the programmes.

For the Bachelor degree programme Radioengineering, Electronics and Telecommunication

E 4. (ASIIN 1.3) It is recommended to include essential radio frequency topics into the curriculum in order to achieve the relevant learning outcomes in the field of Telecommunications.

For the Bachelor Information Systems

E 5. (ASIIN 1.3, 5.1) It is recommended to reflect the essentially conceptual focus of the vendor-specific learning software more adequately in the respective course titles.

G Comment of the Technical Committees

Technical Committee 02 – Electrical Engineering and Information Technology (27.11.2018)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure. It agrees with the recommended resolution of the peers without any changes.

(Procedural Note: The TC takes its decision with the reservation that the recommended resolution of the peers remains essentially unchanged.)

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

The Technical Committee deems that the intended learning outcomes of the degree programmes Radioengineering, Electronics and Telecommunications do comply with the engineering specific part of its Subject-Specific Criteria.

The Technical Committee recommends the award of the seals as follows:

Degree Programme	**ASIIN-seal**	**Subject-specific label**	**Maximum duration of accreditation**
Ba Radioengineering, Electronics and Telecommunications	With requirements for one year	ASIIN, EUR-ACE	30.09.2024
Ma Radioengineering, Electronics and Telecommunications	With requirements for one year	ASIIN, EUR-ACE	30.09.2024

Technical Committee 04 – Informatics (27.11.2018)

Assessment and analysis for the award of the ASIIN seal:

The TC discusses the procedure and generally agrees with the assessment of the peers.

(Procedural Note: The TC takes its decision with the reservation that the recommended resolution of the peers remains essentially unchanged.)

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

The Technical Committee deems that the intended learning outcomes of the degree programmes Ba and Ma Computer Science and Software Engineering and Ba and Ma Information Systems comply with the Subject-Specific Criteria of the Technical Committee 04 - Informatics.

The Technical Committee recommends the award of the seals as follows:

Degree Programme	**ASIIN-seal**	**Subject-specific label**	**Maximum duration of accreditation**
Ba Computer Science and Software Engineering	With requirements for one year	ASIIN, Euro-Inf	30.09.2024
Ma Computer Science and Software Engineering	With requirements for one year	ASIIN, Euro-Inf	30.09.2024
Ba Information Systems	With requirements for one year	ASIIN, Euro-Inf	30.09.2024
Ma Information Systems	With requirements for one year	ASIIN, Euro-Inf	30.09.2024

Technical Committee 07 – Business Informatics/Information Systems (circulation procedure November 2018)

Assessment and analysis for the award of the ASIIN seal:

The TC discusses the procedure and agrees with the assessment of the peers concerning the proposed requirements and recommendations. Special emphasis is laid on the fact, that the naming of modules after certain products is not acceptable and should be changed within the near future. In order to demonstrate that students have the competence to work with these products all relevant information should be provided in the Diploma Supplement.

(Procedural note: The decision has been taken under the precondition that the final assessment of the peers does not deviate from their previous assessment after the presentation of the HEI's comments and additional material.)

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

The Technical Committee deems that the intended learning outcomes of the degree programmes do comply with the Subject-Specific Criteria of the Technical Committee 04 - Informatics.

The Technical Committee recommends the award of the seals as follows:

Degree Programme	**ASIIN-seal**	**Subject-specific label**	**Maximum duration of accreditation**
Ba Computer Science and Software Engineering	With requirements for one year	ASIIN, Euro-Inf	30.09.2024
Ma Computer Science and Software Engineering	With requirements for one year	ASIIN, Euro-Inf	30.09.2024
Ba Information Systems	With requirements for one year	ASIIN, Euro-Inf	30.09.2024
Ma Information Systems	With requirements for one year	ASIIN, Euro-Inf	30.09.2024

H Decision of the Accreditation Commission (07.12.2018)

Assessment and analysis for the award of the ASIIN seal

The Accreditation Commission discusses the procedure. It agrees with the recommended resolution of the peers and Technical Committees without any changes.

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

The Accreditation Commission deems that the intended learning outcomes of the degree programmes Radioengineering, Electronics and Telecommunications do comply with the engineering specific part of the Subject-Specific Criteria of the Technical Committee 02 – Electrical Engineering and Information Technololgy.

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

The Accreditation Commission deems that the intended learning outcomes of the degree programmes Ba and Ma Computer Science and Software Engineering and Ba and Ma Information Systems comply with the Subject-Specific Criteria of the Technical Committee 04 – Informatics.

The Accreditation Commission for Degree Programmes decides to award the following seals:

Degree Programme	**ASIIN-seal**	**Subject-specific label**	**Maximum duration of accreditation**
Ba Computer Science and Software Engineering	With requirements for one year	ASIIN, Euro-Inf	30.09.2024
Ma Computer Science and Software Engineering	With requirements for one year	ASIIN, Euro-Inf	30.09.2024
Ba Information Systems	With requirements for one year	ASIIN, Euro-Inf	30.09.2024

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ma Information Systems	With requirements for one year	ASIIN, Euro-Inf	30.09.2024
Ba Radioengineering, Electronics and Telecommunications	With requirements for one year	ASIIN, EUR-ACE	30.09.2024
Ma Radioengineering, Electronics and Telecommunications	With requirements for one year	ASIIN, EUR-ACE	30.09.2024

Requirements

For all degree programmes

A 1. (ASIIN 1.1) Provide a consistent version of the learning objectives, which is programme-specific, and at the same time clearly reflects the difference between the Bachelor and Master level of education. Adapt it to the application-oriented profile of the degree programmes.

A 2. (ASIIN 2.2) Ensure that the workload in terms of distribution of ECTS points is more balanced across semesters. Make also sure that the workload is realistically calculated and validated on a regular basis, in order to adapt the related credit point allocation if necessary.

For the Bachelor and Master degree programmes Radioengineering, Electronics and Telecommunication

A 3. (ASIIN 4.3) Take appropriate steps to refurbish the relevant laboratory infrastructure for radio frequency technology in order to achieve the intended learning outcomes in the field of Telecommunications.

Recommendations

For all degree programmes

E 1. (ASIIN 4.2) It is recommended to further encourage the teaching staff members to constantly engage in research activities and leave sufficient room for that.

E 2. (ASIIN 4.3) It is recommended to provide better access to international research literature for the students.

E 3. (ASIIN 6) It is recommended to include cohort-related statistical data in the monitoring of the study progress (such as the graduation rate, the dropout rate, the examination failure rate and the duration of study) and transparently document its use for the development of the programmes.

For the Bachelor degree programme Radioengineering, Electronics and Telecommunication

E 4. (ASIIN 1.3) It is recommended to include essential radio frequency topics into the curriculum in order to achieve the relevant learning outcomes in the field of Telecommunications.

For the Bachelor Information Systems

E 5. (ASIIN 1.3, 5.1) It is recommended to reflect the essentially conceptual focus of the vendor-specific learning software more adequately in the respective course titles.

I Fulfilment of Requirements (06.12.2019)

Analysis of the peers and the Technical Committees (November 2019)

Requirements

For all degree programmes

A 1. (ASIIN 1.1) Provide a consistent version of the learning objectives; which is programme-specific and at the same time clearly reflects the difference between the Bachelor and Master level of education. Adapt it to the application-oriented profile of the degree programmes.

Initial Treatment	
Peers	fulfilled Justification: The HEI puts a lot of effort into the revision of the learning objectives, which appear much more precise now, even if there remains room for improvement.
TC 02	fulfilled Justification: The Technical Committee agrees with the assessment of the peers.
TC 04	fulfilled Justification: The Technical Committee agrees with the assessment of the peers.
TC 07	fulfilled Justification: The Technical Committee agrees with the assessment of the peers.

A 2. (ASIIN 2.2) Ensure that the workload in terms of distribution of ECTS points is more balanced across semesters. Make also sure that the workload is realistically calculated and validated on a regular basis, in order to adapt the related credit point allocation if necessary.

Initial Treatment	
Peers	fulfilled Justification: The workload distribution has been accommodated now, in particular in the undergraduate programmes. In the Mas-

	ter programmes it appears that the distribution is somewhat levelled at a comparatively low level (of 26 +/- 3 ECTS), which otherwise – if correctly grasped – would leave Master students with a significant amount of self-study time in order to deepen the acquired knowledge.
TC 02	fulfilled Justification: The Technical Committee agrees with the assessment of the peers.
TC 04	fulfilled Justification: The Technical Committee agrees with the assessment of the peers.
TC 07	fulfilled Justification: The Technical Committee agrees with the assessment of the peers.

For the Bachelor and Master degree programmes Radioengineering, Electronics and Telecommunication

A 3. (ASIIN 4.3) Take appropriate steps to refurbish the relevant laboratory infrastruc-ture for radio frequency technology in order to achieve the intended learning out-comes in the field of Telecommunications.

Initial Treatment	
Peers	not fulfilled Justification: The HEI has listed substantial improvements, yet they fall short of meeting the stated goals and objectives of achieving international standards in “Radio-Engineering”. The HEI still has not acquired a Vector Network Analyser (or reported access to this instrument). This equipment is an essential laboratory tool in Radio Engineering at large.
TC 02	partly fulfilled Justification: The Technical Committee agrees with the peers regarding the fulfilments 1 (learning objectives) and 2 (workload distribution) and deems the requirements as fulfilled. With respect to the lab equipment of the Radioengineering programmes, the Committee also follows the assessment of the experts. The IITU has listed substantial improvements, yet these fall short of meeting the stated goals and objectives of achieving international standards in ‚Radio-Engineering‘. Most importantly, the HEI still has not acquired a *Vector Network Analyser* (or reported access to this instrument). This equipment is an essential laboratory tool in Radio Engineering at large.

	The Technical Committee takes into account that major changes in the university management have taken place in 2019 impairing the efforts to purchase further equipment for the Radioengineering programmes. Lately, the HEI has substantiated recent purchasing activities (although not covering the above-mentioned "Vector Network Analyser"). But even considering the already purchased procurement list, the Technical Committee could not see that the above-mentioned basic equipment is available or about to be procured. Consequently, it follows the recommendation of the experts to prolong the period for fulfilling requirement 3 satisfactorily.

Decision of the Accreditation Commission (06.12.2019)

The Accreditation Commission discusses the fulfilment of requirements. It concurs with the assessment of the peers that requirement 3 concerning the lab equipment of the Radioengineering programmes is not satisfactorily fulfilled yet.

Apart from that, all requirements are fulfilled meaning that the accreditation of the Computer Science and Information Systems programmes can be prolonged for the full accreditation period.

The Accreditation Commission extends the award of the seals as follows:

Degree Programme	**ASIIN-seal**	**Subject-specific label**	**Maximum duration of accreditation**
Ba Computer Science and Software Engineering	All requirements fulfilled	ASIIN, Euro-Inf	30.09.2024
Ma Computer Science and Software Engineering	All requirements fulfilled	ASIIN, Euro-Inf	30.09.2024
Ba Information Systems	All requirements fulfilled	ASIIN, Euro-Inf	30.09.2024
Ma Information Systems	All requirements fulfilled	ASIIN, Euro-Inf	30.09.2024
Ba Radioengineering, Electronics and Telecommunications	Requirement 3 not fulfilled	ASIIN, EUR-ACE	6 months prolongation

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ma Radioengineering, Electronics and Telecommunications	Requirement 3 not fulfilled	ASIIN, EUR-ACE	6 months prolongation

Justification regarding requirement 3:

The IITU has listed substantial improvements, yet these fall short of meeting the stated goals and objectives of achieving international standards in ‚Radio-Engineering'. Most importantly, the HEI still has not acquired a *Vector Network Analyser* (or reported access to this instrument). This equipment is an essential laboratory tool in Radio Engineering at large.

The Accreditation Commission takes into account that major changes in the University's management have taken place in 2019 impairing the efforts to purchase further equipment for the Radioengineering programmes. Lately, the HEI has substantiated recent purchasing activities (although not covering the above-mentioned "Vector Network Analyser"). But even considering the already purchased procurement list, the Commission could not see that the above-mentioned basic equipment is available or about to be procured. Consequently, it follows the recommendation of the experts and the Technical Committees to prolong the period for fulfilling requirement 3 satisfactorily.

J Assessment of Major Changes / “New Programmes” (06.12.2019)

Statement of the facts

The University has been instructed by the Kazakh Ministry of Education and Science about modifications of the so-called “Classifier of training directions in higher and postgraduate education”. In consequence, according to the IITU annotations, a need for the development of some other educational programmes to provide training for specialists in the areas included in the classifier arises (see table below). The new programmes are largely evolved out of the former specialisation tracks thus maintaining a close relationship between them.

“Old” programmes	**“New” programmes**
Ba Computer Science and Software Engineering	Ba Software Engineering Ba Data Science and Machine Learning Ba Network and System Administration Ba Applied Cybernetics
Ma Computer Science and Software Engineering	Ma Software Engineering Ma Computing and Data Science
Ba Information Systems	Ba Big Data Analytics Ba ERP Systems Ba Information Systems Ba Business Analysis
Ma Information Systems	Ma IT Project Management Ma Business Analysis

“Old” programmes	“New” programmes
Ba Radioengineering, electronics and telecommunications	Ba Telecommunication systems and networks Ba Radioengineering, information, transmission systems
Ma Radioengineering, electronics and telecommunications	Ma Telecommunication systems and networks

According to the university, the educational programmes at IITU have always offered training in various areas. This has been represented as directions (tracks) of the programmes. As a result of the reorganization, each area has become an independent educational programme. The goals and learning outcomes of each of the programmes either duplicate the previously reviewed programmes, or specify thern in terms of the courses chosen under the newly launched programs. Alongside with this, IITU has included new courses in the newly created programmes, but indicated that the number of new modules is insignificant.

IITU delivers a synopsis in order to facilitate a comparison of the old and new programmes and thus enable an assessment whether the programmes are equivalent in terms of learning outcomes and contents.

Analysis of the peers (November 2019)

The documents were reviewed by the peers involved coming to the following conclusion:

Regarding the Information Systems programmes, the peers conclude that on the Bachelor level the new programme is quite similar to the old one. In a specialized programme however, which does not include the more general field in its name, more specific modules in comparison to general modules could be expected. Moreover, as Bachelor programmes should lay the groundwork in the respective disciplinary field, highly specialised Bachelor programmes are problematic in itself. In most cases, students need some help in finding out what they should specialize on. The former study structure with majors/minors or electives does serve this purpose much better.

Before deciding about the extension of the accreditation, the peers would therefore like to know whether students can easily change between the programmes during their studies. In addition, the learning objectives of each new programme as such (not the synopsis with

the old one) need to be provided. in order to decide if the objectives are fitting the respective new programme name.

Regarding the Master level, the Master IT Project Management refers to a very narrow field. However, the curriculum does not offer enough in the field of IT Project Management to justify such a narrow title. Instead, it includes some modules, whose significance for the specialty is not quite clear such as High Performance Computing Systems, Econometric Information technology, Mathematical Programming, Pattern Recognition methods. There is no apparent need for them in IT Project Management, whereas more content-related modules are missing. Thus, the concept appears to be an arbitrary collection of modules related to CSSE or IS with only a few having a clear focus on IT project management. Consequently, the panel suggests supports the transfer of the accreditation to the Business analysis Master (as this is a quite general term anyway and closer to a general IS programme), but not to the IT project management.

As to the Computer Systems and Software Engineering programmes, the peers share the same assumption concerning the differentiation of programmes on the Bachelor level as in the case of the IS programmes. The pointed out that students at the Bachelor level have to acquire the basics of computer science and may specialize afterwards at the MA level. With respect to the new Master programmes, the peer panel has no objections to extend the accreditation on the new programmes.

The same assessment applies with regard to the Radioengineering programmes.

As a result, the picture is differentiated, largely along the lines of the Bachelor / Master boundary:

"Old" programmes	**"New" programmes**	**Accreditation extended**
Ba Computer Science and Software Engineering	Ba Software Engineering Ba Data Science and Machine Learning Ba Network and System Administration Ba Applied Cybernetics	No extension
Ma Computer Science and Software Engineering	Ma Software Engineering Ma Computing and Data Science	Extension

"Old" programmes	"New" programmes	Accreditation extended
Ba Information Systems	Ba Big Data Analytics Ba ERP Systems Ba Information Systems Ba Business Analysis	No extension
Ma Information Systems	Ma IT Project Management	No extension
	Ma Business Analysis	Extension
Ba Radioengineering, electronics and telecommunications	Ba Telecommunication systems and networks Ba Radioengineering, information, transmission systems	No extension
Ma Radioengineering, electronics and telecommunications	Ma Telecommunication systems and networks	Extension

Statement of the Technical Committees (November 2019)

Statement of the Technical Committee 02 – Electrical Engineering/Information Technology

The Technical Committee follows the assessment and the recommended resolution of the peers.

Decision

The Technical Committee suggests extending the award of the seals as follows:

"Old" programmes	"New" programmes	Accreditation extended ASIIN seal	Accreditation extended EUR-ACE/ Euro-Inf
Ba Radioengineering, electronics and	Ba Telecommunication systems and networks	No extension	

telecommunications	Ba Radioengineering, information, transmission systems		
Ma Radioengineering, electronics and telecommunications	Ma Telecommunication systems and networks	Extension	EUR-ACE

Statement of the Technical Committee 04 – Informatics / Computer Science

The Technical Committee largely follows the assessment and recommended resolution of the peers. In addition, it found that with apparently altogether nine new modules in the Master Computing and Data Science – as compared to the “old” Computer Science and Software Engineering Master’s curriculum –, the changes in the programme are too far-reaching to keep up and expand the existing accreditation on it.

Decision

The Technical Committee suggests extending the award of the seals as follows:

“Old” programmes	**“New” programmes**	**Accreditation extended** **ASIIN seal**	**Accreditation extended** **EUR-ACE/** **Euro-Inf**
Ba Computer Science and Software Engineering	Ba Software Engineering Ba Data Science and Machine Learning Ba Network and System Administration Ba Applied Cybernetics	No extension	
Ma Computer Science and Software Engineering	Ma Software Engineering	Extension	Euro-Inf
	Ma Computing and Data Science	no extension	

Ba Information Systems	Ba Big Data Analytics Ba ERP Systems Ba Information Systems Ba Business Analysis	No extension	
Ma Information Systems	Ma IT Project Management	No extension	
	Ma Business Analysis	Extension	Euro-Inf

Statement of the Technical Committee 07 – Business Informatics / Information Systems

The Technical Committee largely follows the assessment and recommended resolution of the peers. In addition, it points to different ECTS numbers of the programmes, which even on the formal level suggest differences between the old and the new programmes – and that counts for both the Bachelor's and the Master's programmes.

Decision

The Technical Committee suggests extending the award of the seals as follows:

"Old" programmes	**"New" programmes**	**Accreditation extended** **ASIIN seal**	**Accreditation extended** **EUR-ACE/** **Euro-Inf**
Ba Information Systems	Ba Big Data Analytics Ba ERP Systems Ba Information Systems Ba Business Analysis	No extension	
Ma Information Systems	Ma IT Project Management	No extension	
	Ma Business Analysis	Extension	Euro-Inf

Decision of the Accreditation Commission (06.12.2019)

The Accreditation Commission decides on the extension of the award of the seals as follows:

“Old” programmes	**“New” programmes**	**Accreditation extended ASIIN seal**	**Accreditation extended EUR-ACE/ Euro-Inf**
Ba Computer Science and Software Engineering	Ba Software Engineering Ba Data Science and Machine Learning Ba Network and System Administration Ba Applied Cybernetics	No extension	
Ma Computer Science and Software Engineering	Ma Software Engineering	Extension	Euro-Inf
	Ma Computing and Data Science	No extension	
Ba Information Systems	Ba Big Data Analytics Ba ERP Systems Ba Information Systems Ba Business Analysis	No extension	
Ma Information Systems	Ma IT Project Management	No extension	
	Ma Business Analysis	Extension	Euro-Inf
Ba Radioengineering, electronics and telecommunications	Ba Telecommunication systems and networks Ba Radioengineering, information, transmission systems	No extension	

Ma Radioengineering, electronics and telecommunications	Ma Telecommunication systems and networks	Extension	EUR-ACE

Justification of the AC decision:

Regarding the Information Systems programmes, the Accreditation Commission concludes that on the Bachelor level the new programme is quite similar to the old one. In a specialized programme however, which does not include the more general field in its name, more specific modules in comparison to general modules could be expected. Moreover, as Bachelor programmes should lay the groundwork in the respective disciplinary field, highly specialised Bachelor programmes are problematic in itself. In most cases, students need help in finding out what direction they should specialize on. The former study structure with majors/minors or electives does serve this purpose much better.

Regarding the Master level, the Master IT Project Management refers to a very narrow disciplinary field. However, the curriculum does not offer enough content in the field of IT Project Management to justify such a narrow title. Instead, it includes some modules, whose significance for the specialty is not quite clear, such as High Performance Computing Systems, Econometric Information technology, Mathematical Programming, or Pattern Recognition methods. There is no apparent need for them in IT Project Management, whereas more content-related modules are missing. Thus, the concept appears to be an arbitrary collection of modules related to CSSE or IS with only a few having a clear focus on IT project management. Consequently, the Accreditation Commission supports the transfer of the accreditation to the Business analysis Master (as this is a quite general term anyway and closer to a general IS programme), but not to the IT project management.

As to the Computer Systems and Software Engineering programmes, the Accreditation Commission shares the same assumption concerning the differentiation of programmes on the Bachelor level as in the case of the Information Systems programmes. The Commission pointed out that students at the Bachelor level have to acquire the basics of computer science and may specialize afterwards at the Master level. With respect to the "new" Master programmes, the Accreditation Commission found that with apparently altogether nine new modules in the Master Computing and Data Science – as compared to the "old" Computer Science and Software Engineering Master's curriculum –, the changes in the programme are too far-reaching to keep up and expand the existing accreditation without further information.

With regard to the Radioengineering programmes, the Accreditation Commission once again underlines its concerns with a view to the Bachelor level, whereas it sees the new Master’s programme largely fitting the prospects of the pronounced learning outcomes and their curricular implementation.

The overall critical view particularly on the new Bachelor programmes might be subject to a re-assessment, when information is available about the students’ option to change between the programmes during their studies. Moreover, the learning objectives of each “new” programme as such (apart from a synopsis with the old one) shall be provided in order to see whether the objectives are fitting the respective new programme name and the new programmes’ curricula as well.

Appendix: Programme Learning Outcomes and Curricula

According to SAR, the following **study objectives** and **learning outcomes (intended qualifications profile)** shall be achieved in the Bachelor's programme Computer Systems and Software Engineering:

The Bachelor Degree Program in CSSE aims to train highly qualified professionals in ICT, able to solve the problems of software products development and maintenance, with the necessary knowledge in the field of hardware construction and exploitation of information and communication systems, and with the developed critical thinking, decision – making, problem solving skills and team work abilities.

The learning outcomes of the Bachelor Degree Program in CSSE are:

- to analyze the structure of the major computer components including CPU, ALU and control unit, memory, I/O and storage memory organization and optimization;
- to estimate the current trends in microelectronics, computer architecture and networking;
- to develop and implement software for computer systems using a variety of programming methods including OOP as well as software – development tools, processes, and concepts such as debugging, data representation, source codes, executable codes, verifiers, and APIs;
- to apply the fundamental principles of electronics in computation systems, electronic modules, architecture design and calculation parameters;
- to demonstrate the programming skills using the Structured Query Language (data manipulation language, data definition language and data control language);
- to select and implement appropriate security mechanisms to preserve the security of the systems, i.e. protocols, policies, cryptographic algorithms, etc.;
- to implement and configure basic network connectivity between devices (e.g. computers, router and switches);
- to select the main types of microprocessors, main stages and features of designing, both individual subsystems and the entire microprocessor system as a whole for various applications.

The following **curriculum** is presented:

0 Appendix: Programme Learning Outcomes and Curricula

Course cycle	Course code	Course Name	Number of credits	Semester	Form of control
BD	**General Educational courses**		**28**		
CC	**Compulsory Component**		**21**		
	SIK 1101	Modern History of Kazakhstan	3	1	State exam
	Fil 2102	Philosophy	3	4	exam
	IYa 5202	Foreign language	6	1,2	exam
	IYa 5202	Kazakh (Russian) language	6	1,2	exam
	IKT 1105	Information Communication Technologies	3	2	exam
EC	**Elective Component**		**7**		
BC	**Basic Courses**		**69**		
CC	**Compulsary Component**		**20**		
	PK(R)Ya2201	Professional Kazakh (Russian) Language	2	3	exam
	POIYa 2202	Professionally Oriented Foreign Language	2	4	exam
	Fiz 2203	Physics	3	2	exam
	Mat1202	Mathematics	3	1	exam
	El 3210	Electronics	2	4	exam
	DD	Digital Circuit Design	2	5	exam
	AOCS	Architecture and organization of computer systems	3	4	exam
	AP 1204	Algorithmization and Programming	3	1	exam
CE	**Elective Component**		**49**		exam
PD	**Profiling disciplines**		**32**		
CC	**Compulsory Component**		**5**		
	SP 2301	System level programming	3	4	exam
	ISRP 3302	Software Development Tools	2	5	exam
KB	**Elective Component**		**27**		
	Total theoretical training		**129**		
ATT	Additional types of training				
CC	Compulsary Component		No less than 14		
PhT	Physical training		8		
PI	Professional Internship		No less than –6		
	Educational Internship				differentiated exam
	Industrial Internship				differentiated exam
	Pre-diploma Internship				differentiated exam
FE	Final Examination		3		
	State examination		1	8	
	Writing and defense of diploma project/work		2	8	
	TOTAL:		**No less than 146**		

According to SAR, the following **study objectives** and **learning outcomes (intended qualifications profile)** shall be achieved in the Master's programme Computer Systems and Software Engineering:

The goal of the program is to train highly qualified professionals in Information and Communication Technologies (ICT) who know how to solve research problems, develop new and maintain the existing software products and work at the intersection of technologies.

The *objectives* of the Master Degree Program in CSSE are:

- to provide students with up – to – date knowledge at the intersection of sciences, enhance the theoretical and practical training in the chosen field of science, guaranteeing their professional mobility
- to train the ability to solve problems in new or unfamiliar situations and contexts within broader (or multidisciplinary) fields related to the study area;
- to integrate knowledge, deal with the complexities and make judgments based on incomplete or limited information, taking ethical and social responsibility for the application of such judgments and knowledge;
- to develop communication skills for effective collaboration with specialists and non – specialists.

The *learning outcomes* of the Master's Degree Program in CSSE are:

- to comprehend fundamental functioning patterns and capabilities of computer systems utilization in scientific research and industrial projects;
- to critically analyze the existing concepts, theories and approaches to study processes and phenomena, the current trends in their development, and to apply scientific methods for solving problems in the subject area;
- to integrate knowledge gained in the various courses, demonstrate creative thinking in making decisions for the solution of analytical and managerial tasks in complex, non – standard or unfamiliar conditions;
- to conduct analytical and bibliographic work, summarize the results of experimental research and analysis in the form of a master's thesis, article, report, etc.;
- to demonstrate teaching skills using psychological, technical and interactive methods and means to improve the efficiency and quality of technical education.

Master Degree Program in CSSE includes two main directions: data analysis and software architecture (with orientation to embedded systems). These two priorities are the main research interests of CET department. After the theoretical course completion and defense of a master thesis a postgraduate student is awarded an academic degree of Master of Technical Sciences.

The following **curriculum** is presented:

Course cycle	Course code	Course Name	Number of credits	Semester	Form of control
BD	**General courses**		**20**		
CC	**Compulsory Component**		**8**		
	IFN 5201	History and philosophy of science	2	1	exam
	IYa 5202	Foreign language (professional)	2	1	exam
	Ped 5203	Pedagogy	2	2	exam
	Psi 5204	Psychology	2	1	exam
EC	**Elective Component**		**12**		
PD	**Profiling disciplines**		**22**		
CC	**Compulsory Component**		**2**		
	TRPOSR 5301	Software development technology for real time systems	2	2	exam
KB	**Elective Component**		**20**		
	Total theoretical training		**42**		
ATT	**Additional types of training**		**At least 13**		
PTR	Practice (teaching, research)		At least 6*		report
SRWM	Scientific research work of the undergraduate, including the performance of the master's thesis		At least 7		report
FA	**Final assesment**		**4**		
CE	Complex exam		1	4	
FDMT	Formalization and defense of the master's thesis		3	4	
	TOTAL		**At least 59**		

According to SAR, the following **study objectives** and **learning outcomes (intended qualifications profile)** shall be achieved in the Bachelor's programme Information Systems:

0 Appendix: Programme Learning Outcomes and Curricula

The objectives of the Degree Program in IS are to develop:

- an ability to provide the mathematical ground for the problem formulation, use the mathematical modeling for the description of the information systems components, conduct a mathematical analysis, mathematically support the process of designing and development of information systems;
- an ability to write a technical task for information system development, define quality criteria of IS, formulate technical, program and information requirements, design database algorithms and models, develop functional information programs and provide technical support of IS based on the standard software packages and research;
- an ability to develop information and program support of IS based on the modern development methods and tools;
- an ability to maintain IS;
- an ability to organize interaction between developers and a client, make managerial decisions.

Knowledge	– to identify the principles of mathematical, technical and technological programs, organizational and legal support of information systems
	– to learn the fundamentals of information systems design, modeling, development and maintenance
	– to describe the latest trends in and prospects of modern information systems development; models, methods and technologies of information systems creation
Comprehension	to distinguish the standards, mathematical models, methods, approaches and technology of design, development, implementation and maintenance of information systems and networks
	– to select and illustrate the subject area of an information system
Application	– to apply system concepts for understanding and defining a problem, and to program using modern software development tools
	– to develop technical documentation for information systems
	– to operate the IS hardware and software
	– to create information systems and their components for various subject areas
Analysis	– to analyze data in databases
	– to calculate the costs and other economic indicators of information systems development

The following **curriculum** is presented:

№	Code of the discipline	Name of the discipline	Total number of credits	Term	Type of assessment	Total number of hours	including				CPO		Credits distribution within years and terms							
							in auditory	lectures	laboratory	practicals	in all	including IWST	1 year		2 year		3 year		4 year	
													Term		Term		Term		Term	
													1	2	3	4	5	6	7	8
													number of weeks							
													15	15	15	15	15	15	15	15
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1 GE	1 General Education (GE) - 28 credits																			
1.1 MC	1.1 Mandatory courses - 21 credits																			
GE 1	MHK 1101	Modern History of Kazakhstan	3	2	Exam	135	45	15		30	90	45		3						
GE 2	Fhi 2102	Philosophy	3	4	Exam	135	45	15		30	90	45				3				
GE 3	FL 1103	Foreign language	6	1,2	Exam	270	90			90	180	90	3	3						
GE 4	K(R)L 1104	Kazakh (Russian) language	6	1,2	Exam	270	90			90	180	90	3	3						
GE 5	ICT 1105	Information and Communication Technologies	3	1	Exam	135	45	15		30	90	45	3							
		Total:	21			945	315	45	0	270	630	315	9	9	0	3	0	0	0	0
	1.2 Component of electives- 7 credits																			
GE 6	IE 4106	Internet entrepreneurship	3	6	Exam	135	45	15		30	90	45						3		
GE 7	EIS 4107	Ecology and Industrial Safety	2	7	Exam	90	30	15		15	60	30							2	
GE 8	FL 1108	Foreign language	2	1,2	Exam	90	30			30	60	30	1	1						
		Total:	7			315	105	30	0	75	210	105	1	1	0	0	0	3	2	0
2 BC	2 Basic courses (BC) - 69 credits																			
2.1 MC	2.1 Mandatory courses - 20 credits																			
BC 1	PKRL 2201	Professional Kazakh (Russian) language	2	3	Exam	90	30			30	60	30			2					
BC 2	POFL 2202	Professionally-oriented foreign language	2	4	Exam	90	30			30	60	30				2				
BC 3	Fhy203	Physics	2	2	Exam	90	30	15		15	60	30		2						
BC 4	Mat 1204	Mathematics 1	3	1	Exam	135	45	15		30	90	45	3							
BC 5	Mat 1205	Mathematics 2	2	2	Exam	90	30	15		15	60	30		2						
BC 6	Mat 2206	Mathematics 3	3	3	Exam	135	45	15		30	90	45			3					
BC 7	ADSP 1207	Algorithms, data structures and programming	3	1	Exam	135	45	15	15	15	90	45	3							
BC 8	ITI 3208	IT-infrastructure	3	5	Exam	135	45	15	15	15	90	45					3			

0 Appendix: Programme Learning Outcomes and Curricula

		Total:	**20**			**900**	**300**	**90**	**30**	**180**	**600**	**300**	**6**	**4**	**5**	**2**	**3**	**0**	**0**	**0**
2.2 CE-BC		**2.2 Component of electives -49 credits**																		
BC 1	DM 1209	Discrete Mathematics	3	1	Exam	135	45	15		30	90	45	3							
BC 2	OS 2210	Operating Systems	2	3	Exam	90	30	10	10	10	60	30			2					
BC 3	CSA 3211	Computer Systems Architechture	2	5	Exam	90	30	15	15		60	30					2			
BC 4	FLS 212	Foreign language for STEM	4	3,4	Exam	180	60			60	120	60			3	1				
BC 5	OOP 2213	Object-oriented Programing	3	3	Exam	135	45	15	15	15	90	45			3					
BC 6	ISDP 2214	Information security and data protection	3	4	Exam	135	45	15	15	15	90	45				3				
BC 7	CPS 1215	Computing and Problem Solving (SDP 1)	3	1	Exam	135	45	15	15	15	90	45	3							
BC 8	AD 1216	Application Development (SDP 2)	3	2	Exam	135	45	15	15	15	90	45		3						
BC 9	ADC 2217	Application Design Choices (SDP 3)	3	3	Exam	135	45	15	15	15	90	45			3					
BC 10	PDSA 2218	Performance, Data Structures and Algorithms (SDP 4)	3	4	Exam	135	45	15	15	15	90	45				3				
BC 11	AD 2219	Architecture and Design (SDP 5)	3	4	Exam	135	45	15	15	15	90	45				3				
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
BC 12	DCSA 3220	Database and Client/Server Applications (SDP 6)	3	5	Exam	135	45	15	15	15	90	45					3			
BC 13	HCI 3221	Human/Computer Interaction and Communication (SDP 7)	3	5	Exam	135	45	15	15	15	90	45					3			
BC 14	PM 3222	Project Management (SDP 8)	3	6	Exam	135	45	15	15	15	90	45						3		
BC 15	NS 4223	Networking and Security (SDP 9)	3	7	Exam	135	45	15	15	15	90	45							3	
BC 16	MTP 4224	Managing Technical People (SDP 11)	3	7	Exam	135	45	15	15	15	90	45							3	
BC 17	LACS 2225	Legal aspects of computer science	2	3	Exam	90	30	15		15	60	30			2					
		Total:	**49**			**2205**	**735**	**235**	**205**	**295**	**1470**	**735**	**6**	**3**	**13**	**10**	**8**	**3**	**6**	**0**
3 MC		**3. Major courses - 32 credits**																		
3.1 MC		**3.1 Mandatory courses - 5 credits**																		
MC 1	FIS 1301	Fundamentals of Information Systems	2	2	Exam	90	30	10	10	10	60	30		2						
MC 2	DIS 2302	Databases in IS	3	3	Exam	135	45	15	15	15	90	45			3					
		Total:	**5**			**225**	**75**	**25**	**25**	**25**	**150**	**75**	**0**	**2**	**3**	**0**	**0**	**0**	**0**	**0**
3.2 CE		**3.2 Component of electives - 27 credits**																		
CE 1		**Elective - 1.1**	3	5	Cour.w, Exam	135	45	15	15	15	90	45					3			
	ADM 3303	Application development on MS .NET Framework platform (MS prog																		
	DWC 3303	Development of Web components on the Java EE platform (Java 1)																		
	OSB 3303	Oracle SQL Basics (Oracle 1)																		
	DMA 3303	Development of mobile applications for IOS (Mobile 1)																		
	ISE 3303	Introduction to SAP ERP (ERP 1)																		
	IR 3303	Introduction robotics (Robotics 1)																		
CE 2		**Elective - 1.2**	3	6	Cour.w, Exam	135	45	15	15	15	90	45						3		
	DAA 3304	Developing ASP .NET applications (MS prog 2)																		
	DBC 3304	Development of the business components on the Java EE Platform (Java																		
	PPS 3304	Programming with PL / SQL (Oracle2)																		
	DMA 3304	Development of mobile applications for Android (Mobile 2)																		
	IBP 3304	Integration of business processes (ERP 2)																		
	Rob 3304	Robotics (Robotics2)																		
CE 3		**Elective - 1.3**	3	7	Cour.w, Exam	135	45	15	15	15	90	45							3	
	DAA 4305	Developing ADO.NET applications (MS prog 3)																		
	DWS 4305	Development of web- services in the Java EE Platform (Java 3)																		
	DWA 4305	Development web applications based on the Oracle (Oracle 3)																		
	CPA 4305	Cross-platform Applications Development (Mobile 3)																		
	PP 4305	Production Planning (ERP 3)																		
	Rob 4305	Robotics (Robotics 3)																		
CE 4		**Elective - 2.1**	3	6	Cour.w, Exam	135	45	15	15	15	90	45							3	
	DM 3306	Data Mining (DM 1)																		
	ADM 3306	Application development on MS .NET Framework platform (MS prog 1)																		
	DWC 3306	Development of Web components on the Java EE platform (Java 1)																		
	OSB 3306	Oracle SQL Basics (Oracle 1)																		
	DMA 3306	Development of mobile applications for IOS (Mobile 1)																		
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
	ISE 3306	Introduction to SAP ERP (ERP 1)																		
	IR 3306	Introduction to robotics (Robotics1)																		
CE 5		**Elective - 2.2**	3	7	Cour.w, Exam	135	45	15	15	15	90	45							3	
	DM 4307	Data Management (DM 2)																		
	DAA 4307	Developing ASP .NET applications (MS prog 2)																		
	DBC 4307	Development of the business components on the Java EE Platform (Java 2)																		
	PPS 4307	Programming with PL / SQL (Oracle2)																		
	DMA 4307	Development of mobile applications for Android (Mobile 2)																		
	IBP 4307	Integration of business processes (ERP 2)																		
	Rob 4307	Robotics (Robotics2)																		
CE 6	CCED 3308	The course from the catalog of elective disciplines - 1	3	5	Cour.w, Exam	135	45	15	15	15	90	45					3			
CE 7	CCED 3309	The course from the catalog of elective disciplines - 2	3	6	Cour.w, Exam	135	45	15	15	15	90	45						3		
CE 8	WT 2310	WEB technology	3	4	Exam	135	45	15	15	15	90	45				3				
CE 9	AAI 3311	Algorithms of Artificial Intelligence	2	6	Exam	90	30	15	15		60	30						2		
CE 10	BSR 3312	Bases of scientific research (BOSR)	1	7	Cour.w, Exam	45	15	5		10	30	15							1	
		Total:	27			**1215**	**405**	**140**	**135**	**130**	**810**	**405**	**0**	**0**	**0**	**3**	**6**	**11**	**7**	**0**
		Total of theoretical training				**5805**	**1935**	**565**	**395**	**975**	**3870**	**1935**								
		Total of credits	**129**										**22**	**19**	**21**	**18**	**17**	**17**	**15**	**0**
		Number of exams:	**45**										7	7	8	6	6	6	5	0
		4. Supplementary education																		
		4.1 Mandatory courses																		
SE1		Physical Training	8	1,2,3,4		240	240			240			2	2	2	2				
SE2		Military training				594	450							90	90	90	90	90		
SE3		Professional Training (PT)	14	2,4,6,8																
		-Study	2	2		30	30							2						
		-Industrial	8	4,6		600					600					4		4		
		-Pre-diploma training	4	8																4
		5. Final examination																		
		5.1 Preparation and Diploma Work (Final Project) Defense	2	8		210					210									360
		5.2 Final Examination in Specialty	1	8		105					105									
		TOTAL (52 weeks x 4 years = 208)	**154**			**1185**	**270**			**240**	**915**									

According to SAR, the following **study objectives** and **learning outcomes (intended qualifications profile)** shall be achieved in the Master's programme Information Systems:

The *objectives* of the MSc/Ed Degree Program in IS are:

- strengthening of self – improving and self – developing abilities and skills of gaining new knowledge;
- in – depth theoretical and practical training in the field of IS and Processes;
- development of an ability to formulate and solve modern scientific and practical problems, teach in higher educational institutions, conduct research and management activities;
- development of the skills to organize and conduct scientific research in IS, in order to continue scientific work in PhD;
- gain knowledge in Pedagogy and Psychology.

Knowledge	– to recognize the modern achievements in the IT sphere
	– to practice the methodology of scientific research in the subject area and patterns of information processes flow
	– to differentiate the main types and classify information systems
	– to evaluate the methods of relevant information search, processing and presentation, methods of and approaches to teaching
Comprehension	– to comprehend the current state and trends in the technologies development
	– to understand the fundamentals of scientific and pedagogical activities in the subject area and related fields
Application	– to formulate innovative problems and apply heuristic methods to solve them
	– to develop and use software products for innovative projects implementation
	– to practically apply the results of scientific research
	– to be able to teach in higher educational institutions
Analysis	– to analyze information and business processes

The following **curriculum** is presented:

0 Appendix: Programme Learning Outcomes and Curricula

№	Code of the discipline	Name of the discipline	Total number of credits	Term	Type of assessment	Total amount of hours	including				MIW		Credits distribution			
													1 year		2 years	
													term		term	
							in auditry	lectures	laboratory	practicals	total	including MIWT	1	2	3	4
													number of weeks			
													15	15	15	15
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 BC		**Basic courses - 20 credits**														
1.1.MC		**Mandatory courses - 8 credits**														
BC 1	HPS 5201	History and phylosophy of science	2	1	exam	150	30	15		15	120	30	2			
BC 2	FLP 5202	Foreign language (professional)	2	1	exam	150	30			30	120	30	2			
BC 3	Ped 5203	Pedagogy	2	1	exam	150	30	15		15	120	30	2			
BC 4	Psy 5204	Psyhology	2	1	exam	150	30	15		15	120	30	2			
		Total:	**8**			**600**	**120**	**45**		**75**	**480**	**120**	**8**	**0**	**0**	**0**
		Elective courses - 12 credits														
EC1		**Elective - 1**	2	1	exam	150	30	15		15	120	30	2			
	MMD 5205	Models and methods of data management														
EC2		**Elective - 2**	3	1	exam	225	45	15		30	180	60	3			
	AMS 5206	Application of mathematics and statistics in IT														
EC4		**Elective - 3**	2	2	exam	150	30	15		15	120	30		2		
	FL 5207	Foreign language														
EC5		**Elective - 4**	3	2	exam	225	45	15		30	180	60		3		
	MML 5208	Methods of machine learning														
EC6		**Elective - 5**	2	2	exam	150	30	15		15	120	30		2		
	OSR 5209	Organization of scientific research														
		Total	**12**			**900**	**180**	**75**	**0**	**105**	**720**	**210**	**5**	**7**	**0**	**0**
		Total of basic courses	**20**			**1500**	**300**	**120**	**0**	**180**	**1200**	**330**	**13**	**7**	**0**	**0**
		Major courses - 22 credits														
		Mandatory courses - 2 credits														
MC1	AMD 5301	Analysis, modeling and design of IS	2	2	exam	150	30	15	15		120	30		2		
		Total:	**2**			**150**	**30**	**15**	**15**		**120**	**30**	**0**	**2**	**0**	**0**
		Elective courses - 20 credits														
EC1		**Elective - 6**	3	1	exam	225	45	15		30	180	60	3			
	ASE 5302	Advanced Software Engineering														
EC2		**Elective - 7**	3	2	exam	225	45	15		30	180	60		3		
	DMB 5303	Data Mining and Business Intelligence														
EC3		**Elective - 8**	2	2	exam	150	30	15	15		120	30		2		
	ITPM 5304	IT project management														
EC4		**Elective - 9**	3	3	exam	225	45	15		30	180	60			3	
	TBM 5305	Theoretical bases of management decision-making														
EC5		**Elective - 10**	3	3	exam	225	45	15		30	180	60			3	
	DCG 5306	Distributed computing and Grid														
EC6		**Elective - 11**	3	3	exam	225	45	15		30	180	60			3	
	AEP 5307	Application of econometrics in planing and forecasting														
		Elective - 12	3	3	exam	225	45	15		30	180	60			3	
EC7	ISM 5308	Information Security Management														
		Total:	**20**			**1500**	**300**	**105**	**15**	**180**	**1200**	**390**	**3**	**5**	**12**	**0**
		Total of major courses:	**22**			**1650**	**330**	**120**	**30**	**180**	**1320**	**420**	**3**	**7**	**12**	**0**
		Total of basic + major courses	**42**			**1650**	**330**	**120**	**30**	**180**	**1320**	**420**	**16**	**14**	**12**	**0**
		Research work of a masters including the implementation of the master's thesis (including Coursework 1 credit)	**7**			525								3		4
		Pedagogical practice	2			150							2			
		Research practice	4			300								4		
		Total of practice:	**13**			**975**										
		1. Comprehensive exams of speciality	1	4		75										1
		2. Execution and defence of the master's thesis	3	4		225										3
		Total	**59**			**2925**	**330**	**120**	**30**	**180**	**1320**	**420**				

According to SAR, the following **study objectives** and **learning outcomes (intended qualifications profile)** shall be achieved in the Bachelor's programme Radioengineering, Electronics and Telecommunications:

The aim of the RET Bachelor Degree Program is training of highly qualified specialists in the field of Radio Engineering, Electronics, Telecommunications and the effective implementation of innovations in education and science to meet the needs of the individuals, society and the state.

The objectives of RET Bachelor Degree Program are to develop:

- an ability to demonstrate knowledge and understanding of concepts, terminology, application area and trends in the study area;
- an ability to collect and interpret information for the formation of arguments and judgments, taking into account social, ethical and scientific considerations
- an ability to form a theoretical knowledge base for mastering competencies in the professional field
- an ability to apply the acquired knowledge in professional activities.

Learning outcomes by the end of the program the students will be able to:

- conduct feasibility studies of radio engineering and telecommunication projects.
- collect and analyze baseline data for the calculation and design of devices for radio engineering and telecommunications systems.
- draft technical documentation, carry out design and engineering work.
- perform mathematical modeling of objects and processes using standard methods, including the use of standard software packages.
- implement the rules and methods of installation, configuration and adjustment of the nodes of radio engineering and telecommunication devices and systems.
- test, configure and adjust equipment and software used to develop, maintain and deploy radio and telecommunications devices and systems.

The following **curriculum** is presented:

Cycle of the course/ module	Code of the course/ module	Name of the course/ module	Number of credits	Semester	Form of the control
GEC	General Educational courses		28		
CC	Compulsary Component		21		
	SIK1101	Modern History of Kazakhstan	3	1	State examination
	Fil2102	Philosophy	3	4	examination
	IYa 1103	Foreign Language	6	1,2	examination
	K(R)Ya1 104	Kazakh (Russian) Language	6	1,2	examination
	IKT1105	Information and Communication Technologies (in English)	3	2	examination
CE	Elective Component		7		
BC	Basic Courses		69		
CC	Compulsary Component		20		
	PK(R)Ya 22 01	Professional Kazakh (Russian) Language	2	6	examination
	POIYa 2202	Professionally Oriented Foreign Language	2	6	examination
	Mat(I)120 3	Mathematics I	3	1	examination
	Mat(II) 1204	Mathematics II	3	2	examination
	Fiz 1205	Physics	4	2	examination
	TEC2206	Theory of electrical circuits	3	3	examination
	TES 3207	Theory of electrical communication	2	3	examination
CE	Elective Component		49		
SC	Specialized Courses		32		
CC	Compulsary Component		5		
	OEIT 2301	Fundamentals of electronic and measuring technology	3	4	examination
	ORT 2302	Fundamentals of Radio Engineering and Telecommunications	2	4	examination
CE	Elective Component		27		
Total of theoretical training:			**129**		
ATT	Additional types of training				
CC	Compulsary Component		No less than 14		
PhT	Physical training		8		
PI	Professional Internship		No less than –6*		
	Educational Internship				differentiated exam
	Industrial Internship				differentiated exam
	Pre-diploma Internship				differentiated exam
FE	Final Examination		3		
	State examination		1	8	
	Writing and defense of diploma project/work		2	8	
	TOTAL:		**No less than 146**		

According to SAR, the following **study objectives** and **learning outcomes (intended qualifications profile)** shall be achieved in the Master's programme Radioengineering, Electronics and Telecommunications:

Objectives of the Degree Program are:

- to provide an in – depth knowledge in natural, technical and economic sciences as a basis for professional education;
- to develop skills and abilities in planning and organization of scientific theoretical and laboratory research required for designing parts and components of radio engineering and telecommunication systems;
- to develop skills in performing technical and economic feasibility study of radio and telecommunications systems and justifying design and research solutions using modern computer technologies and programs;
- to train the ability to develop models of radio engineering and telecommunication parts and units with the use of computer technologies.

Learning outcomes of the Degree Program are:

- to create physical and mathematical models of nodes and blocks of radio engineering systems;
- to apply research methods, conduct theoretical and empirical research into radio engineering and telecommunications units, blocks, devices and systems;
- evaluate, compare and analyze scientific results of research and implement them in practice;
- to write technical tasks and documentation for the design of radio engineering and telecommunications units, blocks, devices and systems according to regulatory and reference documents.

The following **curriculum** is presented:

Discipline	Discipline Code	Title of Discipline	Number of credits	Semester	Form of control
BD	**Fundamental Disciplines**		**20**		
CC	**Compulsory Component**		**8**		
	IFN 5201	History and philosophy of science	2	1	exam
	IYa 5202	Foreign language (professional)	2	1	exam
	Ped 5203	Pedagogy	2	2	exam
	Psi 5204	Psychology	2	1	exam
EC	**Elective Component**		**12**		
PD	**Profiling disciplines**		**22**		
CC	**Compulsory Component**		**2**		
	NTPRET 5301	Scientific and technical problems of radio engineering, electronics and telecommunications	2	1	exam
KB	**Elective Component**		**20**		
	Total theoretical training		**42**		
ATT	**Additional types of training**		**At least 13**		
PTR	Practice (teaching, research)		At least 6*		report
SRWM	Scientific research work of the undergraduate, including the performance of the master's thesis		At least 7		report
FA	**Final assesment**		**4**		
CE	Complex exam		1	4	
FDMT	Formalization and defense of the master's thesis		3	4	
	TOTAL		**At least 59**		

Note: * The number of credits allocated to the practice is not included in the total labor intensity. If necessary, the university can increase the number of credits allocated to the practice.