ASIIN Seal

Accreditation Report

Bachelor's Degree Programme
Mathematics
Applied mathematics
Physics

Master's Degree Programme
Mathematics
Mathematical Engineering
Physics

Provided by
Urgench State University

Version: 27 March 2026

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]
Amaliy matematika (Bakalavr)	Applied Mathematics (Bachelor)	ASIIN	license OT № 5000028 State inspection of quality control of Education under the Cabinet of Ministers of the country for a period of 5 years from December 31, 2020, to December 31, 2025 (Appendix 13.1-13.2 Recogn_Certificate)	TC-12
Matematika (Bakalavr)	Mathematics (Bachelor)	ASIIN	license OT № 5000028 State inspection of quality control of Education under the Cabinet of Ministers of the country for a period of 5 years from December 31, 2020, to December 31, 2025 (Appendix 13.1-13.2 Recogn_Certificate)	TC 12
Matematika (yo'nalishlar bo'yicha) (Magistratura)	Mathematics (by majors) (Master)	ASIIN	license OT № 5000028 State inspection of quality control of Education under the Cabinet of Ministers of the country for a period of 5 years from December 31, 2020, to December 31, 2025 (Appendix 13.1-13.2 Recogn_Certificate)	TC 12
Fizika (Bakalavr)	Physics (Bachelor)	ASIIN	license OT № 5000028 State inspection of quality control of Education under the Cabinet of Ministers of the country for a period of 5 years from December 31, 2020, to December 31, 2025 (Appendix 13.1-13.2 Recogn_Certificate)	TC 13

[1] ASIIN Seal for degree programmes.

[2] TC: Technical Committee for the following subject areas: TC 01 - Mechanical Engineering/Process Engineering; TC 02 - Electrical Engineering/Information Technology; TC 03 - Civil Engineering, Geodesy and Architecture; TC 04 - Informatics/Computer Science; TC 05 - Materials Science, Physical Technologies; TC 06 - Engineering and Management, Economics; TC 07 - Business Informatics/Information Systems; TC 08 - Agriculture, Forestry, Food Sciences, and Landscape Architecture; TC 09 - Chemistry; TC 10 - Life Sciences; TC 11 - Geosciences; TC 12 - Mathematics; TC 13 - Physics; TC 14 - Medicine.

Fizika (yo'nalishlar bo'yicha) (Magistratura)	Physics (by directions) (Master)	ASIIN	-	TC 13
Matematik injiniring (Magistratura)	Mathematical engineering (Master)	ASIIN	-	TC-12
Date of the contract: 31.01.2025 **Submission of the final version of the self-assessment report:** 07.10.2025 **Date of the onsite visit:** 12.-13.11.2025 **at:** Urgench				
Expert panel: Prof. Dr. Mathias Getzlaff, Heinrich-Heine University Düsseldorf Prof. Dr. Günter Gramlich, TH Ulm - Ulm University of Applied Sciences Prof. Dr. Jürgen Nolting, Aalen University of Applied Sciences Prof. Dr. Christof Schelthoff, FH Aachen - Aachen University of Applied Sciences Gulomov Abrorjon, Industry representative, 'FORTIS SCT' Abduazimov Doniyor, Master's Student, Tashkent State Technical University named after Islam Karimov				
Representative of the ASIIN headquarter: Dr. Natalia Vega				
Responsible decision-making committee: Accreditation Commission for Degree Programmes				
Criteria used: European Standards and Guidelines as of May 15, 2015 ASIIN General Criteria, as of March 28, 2023 Subject-Specific Criteria of Technical Committee 12 – Mathematics as of December 9, 2016 Subject-Specific Criteria of Technical Committee 13 – Physics as of March 20, 2020				

B Accreditation Status

Result Overview

The most recent decision for the ASIIN Seal was made by the ASIIN Accreditation Commission on 27.03.2026.

Degree Programmes	ASIIN Seal	Validity
Ba Mathematics	Accredited with requirements	27.03.2026 – 22.04.2027
Ma Mathematics	Accredited with requirements	27.03.2026 – 22.04.2027
Ba Applied Mathematics	Accredited with requirements	27.03.2026 – 22.04.2027
Ma Mathematical Engineering	Accredited with requirements	27.03.2026 – 22.04.2027
Ba Physics	Accredited with requirements	27.03.2026 – 22.04.2027
Ma Physics	Accredited with requirements	27.03.2026 – 22.04.2027

Fulfilment of the Accreditation Criteria

ASIIN General Criteria / Subject-Specific Criteria	Ba Mathematics	Ma Mathematics	Ba Applied Mathematics	Ma Mathematical Engineering	Ba Physics	Ma Physics
1 Degree programme: Concept, Content & Implementation						
1.1 Objectives and learning outcomes (intended qualification profile)	**Not fulfilled** Requirement **A1**	**Not fulfilled** Requirement **A1**	**Not fulfilled** Requirement **A1**	**Not fulfilled** Requirement **A1**	**Not fulfilled** Requirement **A1**	**Not fulfilled** Requirement **A1**
1.2 Title of the degree programme	Fulfilled	Fulfilled	Fulfilled	Fulfilled	Fulfilled	Fulfilled
1.3 Curriculum	Fulfilled	Fulfilled	Fulfilled	Fulfilled	**Not fulfilled** Requirements **A7, A8**	Fulfilled
1.4 Admission requirements	Fulfilled	Fulfilled	Fulfilled	Fulfilled	Fulfilled	Fulfilled
1.5 Workload and credits	**Not fulfilled** Requirement **A2**	**Not fulfilled** Requirement **A2**	**Not fulfilled** Requirement **A2**	**Not fulfilled** Requirement **A2**	**Not fulfilled** Requirement **A2**	**Not fulfilled** Requirement **A2**

ASIIN General Criteria / Subject-Specific Criteria	Ba Mathematics	Ma Mathematics	Ba Applied Mathematics	Ma Mathematical Engineering	Ba Physics	Ma Physics
1.6 Didactics and teaching methodology	Fulfilled	Fulfilled	Fulfilled	Fulfilled	Fulfilled	Fulfilled
2 Exams: System, Concept and Organisation						
2 Exams: System, Concept and Organisation	**Not fulfilled** Requirement **A6**	Fulfilled	**Not fulfilled** Requirement **A6**	Fulfilled	**Not fulfilled** Requirement **A6**	Fulfilled
3 Resources						
3.1 Staff and staff development	Fulfilled	Fulfilled	Fulfilled	Fulfilled	Fulfilled	Fulfilled
3.2 Student support and student services	Fulfilled	Fulfilled	Fulfilled	Fulfilled	Fulfilled	Fulfilled
3.3 Funds and equipment	Fulfilled	Fulfilled	Fulfilled	Fulfilled	**Not fulfilled** Requirement **A9**	Fulfilled
4 Transparency and Documentation						
4.1 Module descriptions	**Not fulfilled** Requirement **A3**	**Not fulfilled** Requirement **A3**	**Not fulfilled** Requirement **A3**	**Not fulfilled** Requirement **A3**	**Not fulfilled** Requirement **A3**	**Not fulfilled** Requirement **A3**

ASIIN General Criteria / Subject-Specific Criteria	**Ba Mathematics**	**Ma Mathematics**	**Ba Applied Mathematics**	**Ma Mathematical Engineering**	**Ba Physics**	**Ma Physics**
4.2 Diploma and Diploma Supplement	**Not fulfilled** Requirement **A4**	**Not fulfilled** Requirement **A4**	**Not fulfilled** Requirement **A4**	**Not fulfilled** Requirement **A4**	**Not fulfilled** Requirement **A4**	**Not fulfilled** Requirement **A4**
4.3 Relevant rules	Fulfilled	Fulfilled	Fulfilled	Fulfilled	Fulfilled	Fulfilled
5 Quality Management: Quality Assessment and Development						
5 Quality Management: Quality Assessment and Development	**Not fulfilled** Requirement **A5**	**Not fulfilled** Requirement **A5**	**Not fulfilled** Requirement **A5**	**Not fulfilled** Requirement **A5**	**Not fulfilled** Requirement **A5**	**Not fulfilled** Requirement **A5**

Requirements

For all degree programmes

A 1. (ASIIN 1.1) The intended learning outcomes need to be revised in order to provide clearly differentiated profiles for scientific/industrial as well as pedagogic competences. Ensure that the intended learning outcomes are transparently anchored and published, making them accessible to all relevant stakeholders.

A 2. (ASIIN 1.3) A method of monitoring the students' workload needs to be implemented.

A 3. (ASIIN 4.1) The module descriptions need to be reviewed and updated.

A 4. (ASIIN 4.2) Ensure that all graduates are provided a Diploma Supplement in English in line with the ASIIN criteria which includes the programmes learning outcomes and information on the classification of the degree programme with regard to the national education system. In addition to the final mark, statistical data about the student's GPA relative to the cohort as set forth in the ECTS Users' Guide need to be included.

A 5. (ASIIN 5) Ensure that the teaching surveys are provided to the students. The results of these surveys need to be made available to teachers and students and be discussed with the students.

For the Bachelor's degree programmes

A 6. (ASIIN 2) Ensure that the programme includes a mandatory final thesis or project demonstrating the student's ability to independently undertake an academic task at an appropriate level (EQF 6).

For the Bachelor's degree programme Physics

A 7. (ASIIN 1.3) The elective module Quantum Mechanics needs to be offered as compulsory course.

A 8. (ASIIN 1.3, 3.3) Basic topics on "Physics of Molecules" need to be included in the new curriculum as compulsory content.

A 9. (ASIIN 3.3) For the students' laboratories, appropriate safety measures need to be implemented or improved.

Accreditation History

The programmes have not been previously accredited by ASIIN.

C Characteristics of the Degree Programmes

a) Name	Final degree (original/ English translation)	b) Areas of Specialization	c) Corres-ponding level of the EQF[3]	d) Mode of Study	e) Double/ Joint Degree	f) Duration	g) Credit points/ unit	h) Intake rhythm & First time of offer
60540200-Applied mathematics	Bakalavr / Bachelor	60540200-Applied mathematics	6	Full-time	-	4 years / 8 semesters	240 credits	Every year since 1992
60540100-Mathe-matics	Bakalavr / Bachelor	60540100-Mathematics	6	Full-time	-	4 years / 8 semesters	240 credits	Every year since 1992
70540101-Mathe-matics (by majors)	Magistr / Master	70540101-Mathematics (by majors)	7	Full-time	-	2 years / 4 semesters	120 credits	Every year since 2001
60530900-Physics	Bakalavr / Bachelor	60530900-Physics	6	Full-time	-	4 years / 8 semesters	240 credits	Every year since 1992
70530901-Physics (by direction)	Magistr / Master	70530901-Physics (by direction)	7	Full-time	-	2 years / 4 semesters	120 credits	Every year since 2017
70540301-Mathe-matical Engineering	Magistr / Master	70540301-Mathematical Engineering	7	Full-time	-	2 years / 4 semesters	120 credits	Every year since 2017

Introduction

Urgench State University named after Abu Rayhan Biruni is a public higher education institution located in the city of Urgench, Khorezm Region, Republic of Uzbekistan. The University traces its origins to the Khorezm Teacher Training Institute established in 1935 and subsequently reorganised as the Khorezm State Pedagogical Institute in 1942. Following a decree issued by the President of the Republic of Uzbekistan in February 1992,

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

the Khorezm State Pedagogical Institute was granted university status, leading to the establishment of Urgench State University.

Currently, the university comprises eight faculties including 39 departments, with over a thousand professors and lecturers actively engaged in academic activities. 113 undergraduate programs and 45 master's degree specializations are offered, and more than 24,000 students are enrolled.

The Faculty of Physics and Mathematics of Urgench State University has historical roots dating back to the mid-1930s. It comprises four departments: Applied Mathematics and Mathematical Physics, Mathematical Analysis, Physics, and Algebra and Mathematical Engineering.

Summary experts' assessment

Based on the Self-Assessment Report (SAR) and the on-site visit conducted on 12–13 November 2025, the expert panel concludes that the Mathematics and Physics study programmes at Urgench State University demonstrate a generally high academic standard and strong regional relevance. The university is recognized as one of the leading higher education institutions in Uzbekistan, with well-prepared documentation, competitive curricula covering fundamental disciplines, adequate laboratory infrastructure, and a well-equipped library. The teaching staff is highly motivated and committed to continuous improvement.

At the same time, the experts identified some areas for further development. Key recommendations include the introduction of mandatory Bachelor's theses, improved transparency of module descriptions, systematic student feedback mechanisms, issuance of diploma supplements, and clearer assessment regulations. The panel also emphasizes the need to strengthen practical training, industry cooperation, English-taught modules, digital and AI-related competencies, and pedagogical training pathways. Specific curriculum adjustments and safety improvements in the labs are recommended for the Bachelor Physics programme.

For the Bachelor's degree programme Applied Mathematics, the institution has presented the following profile in the National "Qualification Requirements[4] approved by Order No.

[4] According to the University, the document called "qualification requirements" for each study programme is "based on the "State Education Standard for Higher Education", "Basic Provisions", the "Classifier of Higher Education Directions and Specialties", the National and Sectoral Qualification Frameworks of the Republic of Uzbekistan, professional standards, and the proposals of employers and stakeholders. This document is considered an official regulatory and methodological guide".

367 of the Ministry of Higher Education, Science and Innovation of the Republic of Uzbekistan, dated March 21, 2023:

“Graduates of the 60540200 – Applied Mathematics program are trained in the field of science and technology, focusing on the application of mathematics in various branches. This includes studying, understanding, and solving real-world problems using mathematical tools, defining the relevance of the field, developing professional competencies, and mastering theoretical and practical knowledge. They gain qualifications to work in state and non-state institutions in subjects such as mathematics, informatics, information technology, fundamental and applied mathematics, and mathematical models in natural sciences”

“After completing the bachelor's program in this field, graduates will be qualified to work in general secondary, secondary specialized, vocational education institutions, extracurricular educational centers, and higher education institutions. They will also be capable of teaching modern pedagogical and information technology subjects, such as mathematics, informatics, and information technologies. In addition, graduates will have the right to work in scientific research institutes and analytical departments of state administration bodies to solve complex problems”.

For the Bachelor’s degree programme Mathematics, the institution has presented the following profile in the National “Qualification Requirements approved by Order No. 367 of the Ministry of Higher Education, Science and Innovation of the Republic of Uzbekistan, dated March 21, 2023:

“60540100 – The field of study of Mathematics is a bachelor’s degree in the field of science, covering a range of professional areas related to the teaching of subjects related to the field of study in general secondary, secondary specialized and professional educational institutions; the Academy of Sciences of the Republic of Uzbekistan and sectoral research institutes, state administration bodies, state and non-state institutions of general secondary, secondary specialized vocational education”.

“After completing the bachelor's degree in Mathematics education, graduates will have the right to teach mathematics in general secondary, secondary specialized and vocational educational institutions, out-of-school educational institutions using modern pedagogical and information technologies, and to solve complex problems at the Academy of Sciences of the Republic of Uzbekistan and sectoral research institutes, manufacturing enterprises, and banking and financial organizations.”

For the Master’s degree programme Mathematics, the institution has presented the following profile in the National “Qualification Requirements approved by Order No. 367

of the Ministry of Higher Education, Science and Innovation of the Republic of Uzbekistan, dated March 21, 2023:

“The 70540101 – Mathematics (by majors) Master's program belongs to the field of "Natural Sciences, Mathematics, and Statistics." It includes professional activities such as: Teaching specialized subjects in higher education institutions, institutions of professional development and retraining, secondary specialized, and vocational education institutions; Conducting scientific research in the institutes of the Academy of Sciences of the Republic of Uzbekistan, branch scientific research institutes, scientific-research centers, and scientific-production associations; Engaging in scientific-research activities in fields that utilize mathematical methods and computer technologies; Solving various problems using mathematical models of processes and objects, and developing their software; Creating effective mathematical methods for solving problems in natural sciences, engineering, economics, and management; Conducting research and providing software-information support for design and engineering activities”.

For the Master’s degree programme Mathematical Engineering, the institution has presented the following profile in the National “Qualification Requirements approved by Order No. 367 of the Ministry of Higher Education, Science and Innovation of the Republic of Uzbekistan, dated March 21, 2023

“70540301- Areas of professional activity for masters in mathematical engineering: 70540301 - Master's degree in Mathematical Engineering - teaching mathematics in higher, advanced training and retraining, secondary specialized, vocational education institutions; conducting scientific research in research centers of the Academy of Sciences of the Republic of Uzbekistan and branch research institutes, design institutes, scientific and production associations, solving various problems using mathematical models of processes and objects; conducting research on the creation of effective mathematical methods for solving technical, economic and management problems, covering a complex set of issues related to the specialty in production and service enterprises, state administration bodies, industrial and business organizations”.

For the Bachelor’s degree programme Physics, the institution has presented the following profile in the National “Qualification Requirements approved by Order No. 367 of the Ministry of Higher Education, Science and Innovation of the Republic of Uzbekistan, dated March 21, 2023:

“The undergraduate programme 60530900 – Physics belongs to the field of science and covers general secondary, secondary special, and professional educational institutions, as well as scientific institutions of the Academy of Sciences of the Republic of Uzbekistan and

sectoral research institutes. It also includes public media organisations, government agencies, and other organisations working in the development of science and education.

Graduates may also work in technical and technological areas based on labour market demand and employer requirements".

"**Upon completion of the undergraduate programme in 60530900 – Physics, graduates are qualified to**:

- Teach physics in general, secondary specialised, and professional education institutions;
- Work as laboratory assistants, senior laboratory technicians, methodologists, engineers, and methodical or academic managers in the education system;
- Conducting scientific research in scientific institutions within the field of natural sciences;
- Working as a physicist or research engineer in the field of production;
- Working in various entrepreneurial entities, non-governmental non-profit and public organisations, as well as other institutions;
- Creating new high-performance materials and technologies and working as an engineer, researcher, or technologist in manufacturing enterprises producing them;
- Developing regulatory documents for the educational process and pedagogical technologies;
- Working as a specialist in the field of software provision and information-communication technologies.

For the Master's degree programme Physics, the institution has presented the following profile in the National "Qualification Requirements approved by Order No. 367 of the Ministry of Higher Education, Science and Innovation of the Republic of Uzbekistan, dated March 21, 2023:

"The specialisation 70530901 – Physics (by directions) belongs to the field of physics and encompasses teaching discipline-related subjects in educational institutions, conducting research at the Academy of Sciences of the Republic of Uzbekistan and in various sectoral research institutes and centres, participating in scientific production associations, managing activities in enterprises of different ownership types, non-governmental and non-profit organisations, central and local public administration bodies, as well as small business and private entrepreneurship entities.

It also includes the design, application, and prospective planning of complex issues in the development and use of physical, optical, material science and laser systems and devices.

The professional activity is focused on forming practical skills, responsibility, and managerial capabilities, covering a broad range of methods, tools, and techniques".

D Expert Report for the ASIIN Seal

1. The Degree Programme: Concept, Content & Implementation

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

Evidence:

- Self-Assessment Report (SAR)
- Learning outcomes of each study programme
- Learning Outcome Matrix-Subjects
- SSC-based Objective-Module Matrix
- Module descriptions
- Website of the Faculty of Physics and Mathematics: https://urdu.uz/en/site/facultyview?id=25
- Qualification Requirements
- Student Surveys and Results
- Discussion during the audit

Preliminary assessment and analysis of the experts:

The university provides an overview of the relationship between ILOS and ASIIN SSC to demonstrate that the objectives align with the specified exemplary learning outcomes in the relevant SSC. Furthermore, the Module Handbook details the learning outcomes of each module, which outline the knowledge, skills and competencies that will be acquired in the course.

As stated by the university, learning outcomes are presented in a stable and consistent manner in the official "qualification requirements" for each study programme. These requirements are "based on the 'State Education Standard for Higher Education', 'Basic Provisions', the 'Classifier of Higher Education Directions and Specialties', the National and Sectoral Qualification Frameworks of the Republic of Uzbekistan, professional standards, and the proposals of employers and stakeholders." This document is recognised as the official regulatory and methodological guide. Each educational programme is specified by

general and professional competencies, and the connection with academic disciplines and practical training is outlined. According to the SAR, additional changes and additions may be made to the types of professional activities, depending on the field, based on modern achievements in science, technology, and the requirements of employers. Consequently, job fairs and meetings between the university's management, faculty and employers are held on an annual basis. Furthermore, meetings are scheduled with the participation of graduating students.

The programme coordinators explain during the visit on-site that the learning outcomes of each module are available through the Higher Education Management Information System (HEMIS). The teachers introduce the information and students registered have access to all information regarding their courses.

The experts assess the objectives and intended professional activities of the programmes under review, noting that the bachelor's and master's programmes qualify both for teaching and for conducting scientific research. During on-site discussions, they seek clarification on this topic and ask the programme coordinators to outline the focus of the programmes and the real intended profile. The programme coordinators explain that, from their third year, students have the option to specialise in either a scientific or a pedagogical field. They emphasise that the compulsory modules of each programme set by the Ministry in the qualification requirements are consistent for all students and also include mandatory courses that focus on pedagogical skills. The list of elective subjects is proposed by the department and have been carefully tailored to align with the industry's current and future requirements. Based on that, students select their elective courses. The assessment process is conducted by the relevant advisor, who will provide guidance on the available options. Once assessed, the participants will be divided into new groups for the duration of the programme. The programme coordinators also explain that it is also possible, if necessary, to have internships in companies, not only in schools. Upon completion of the programme, students are eligible to pursue careers in teaching or industry, depending on their chosen specialisation. It is also explained that this specialisation is not reflected in the diploma, but only in the transcript of records. With regard to the master's programmes, the programme coordinators clarify that there are not different pathways available to students. It is emphasised that the compulsory modules of the bachelor's degree programme provide sufficient fundamental knowledge to enable students to successfully progress to master's studies.

The rectorate indicates that the regional industry does not currently have a high demand for graduates in Physics and Mathematics. Consequently, the majority of these graduates typically pursue careers as school or university teachers. The subject is addressed by the experts in a meeting with industry representatives, who are primarily directors of schools.

They confirm that the region is not yet home to any significant industry, with the exception of a small number of start-ups. Conversely, 550 schools in the region are in need of teachers specialising in Mathematics and Physics. The majority of them are alumni of Urgench State University. The participants highlight that while their theoretical knowledge is strong, some individuals lack the methodology to teach effectively. However, it should be noted that they require experience and practice to become proficient. Furthermore, there are several universities in the region that are keen to have graduates from this institution.

It is worth noting that, of the students interviewed during the on-site visit, only two expressed a desire to pursue a career in the industry. The majority of students aspire to become teachers.

The university presents the results of the students' satisfaction survey, which show that the majority of students believe that their education at Urgench State University is sufficient for professional employment in their field. However, the experts observe that approximately 20% of students regard their academic education as inadequate for professional employment. Therefore, they raise this issue with the university's management team to ascertain which measures have been taken, or are being planned, to improve the situation. The rectorate recognises the importance of enhancing the practical elements of the curriculum and ensuring that course content is aligned with labour market requirements. In addition, they have a strategy to improve the quality of teaching. For example, 30% of the teaching staff undergoes training in didactics, including both local and foreign training. Approximately 100 professors attend training abroad.

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions:

The objectives and learning outcomes of the degree programmes reflect the targeted academic qualification level, are feasible and equivalent to the relevant exemplary learning outcomes specified in the applicable SSC (academic classification). In the opinion of the experts, the intended competence profile represents the level of qualification according to the European Qualifications Framework. The experts further remark that the relevance of the objectives and learning outcomes are reviewed on a regular basis involving relevant stakeholders and considering the demand on the labour market and the society. Nevertheless, the experts are of the opinion that the objectives and learning outcomes of all programmes under review need to be transparently anchored and published on the programmes' web pages and thus make available to interested third parties. The experts further state that the learning outcomes must be included in the diploma supplement for each programme (see below **4.2**). Furthermore, they believe that AI skills should be introduced as competences to the study programmes.

The experts highlight that the programmes are designed according to the current demands of the region. However, they conclude that the demand of the industry for mathematicians and physicists is expected to increase and synchronized to this increase, also, the study programs have to be revised in order to provide clearly differentiated profiles for scientific/industrial as well as pedagogic competences.

Criterion 1.2 Name of the Degree Programme

Evidence:

- Self-Assessment Report (SAR)
- Website of the Faculty of Physics and Mathematics: https://urdu.uz/en/site/facultyview?id=25
- Classificator
- Discussion during the audit

Preliminary assessment and analysis of the experts:
According to the SAR, the names of the programmes under review are consistent with the Classifier approved by the Ministry of Higher Education.

During the discussion on-site, the experts learn that the designation used in the SAR and module descriptions “Bachelor of Education” and “Master of Education” is a translation of the Uzbek word “Talem” which means Education/Knowledge. The programme coordinator clarify that this does not mean that it is an educational/pedagogical degree programme. They emphasize that the degree obtained is equivalent to Bachelor or Master of Science.

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions:

The experts consider that the names of the programmes correspond to the intended programme and learning outcomes, as well as to the main language of the course. The experts agree that the teaching and learning content and the competence profile are consistent with the proposed title of the programme.

Criterion 1.3 Curriculum

Evidence:

- Self-Assessment Report (SAR)
- Learning outcomes of each study programme
- SSC-based Objective-Module Matrix
- Study Plan of each programme

- Module descriptions of each programme
- Qualification requirements
- List internship locations
- Statistics on Student Mobility
- Student Surveys and Results
- Website of the Faculty of Physics and Mathematics: https://urdu.uz/en/site/facultyview?id=25
- Discussion during the audit

Preliminary assessment and analysis of the experts:
Content and structure of the programmes

In the SAR, the university clarifies that its curriculum is structured into compulsory and elective subjects. The list of compulsory subjects is defined in the qualification requirements of the Ministry, whereas the list of elective subjects is proposed by the department and selected by the students. Compulsory subjects are designed to develop general and professional competencies essential to the bachelor's or master's level. Elective subjects provide students with additional knowledge in line with their specialisation, interests, talents, and intellectual potential. In the context of foreign language instruction, students have the autonomy to select one of the available languages, namely English, German, or French, and to earn credits for the chosen subject.

In addition to the area-specific compulsory modules, the bachelor's programmes also include mandatory general courses in the first two years. These include Modern History of Uzbekistan, Uzbek (Russian) language, Philosophy and Religious Studies. In the fifth and sixth semesters, the module entitled, ""General Pedagogy. General Psychology" is also included. Electives are offered from the fourth semester onwards until the seventh semester.

Urgench State University's bachelor's programmes comprise the following components: "Pedagogical Practice", "Qualification Practice" and "Final State Attestation". Regarding the Final State attestation see below **Chapter 2**.

The Bachelor programme in Applied Mathematics is a full-time, four-year course that includes modules in science and technology. The programme focuses on the application of mathematics in various branches. Students learn to understand and solve real-world problems using mathematical tools.

The Bachelor programme in Mathematics is a full-time, eight-semester programme. Students acquire general and professional competencies, knowledge and skills in the area

of Mathematics through the study of compulsory and elective subjects, which are included in the curriculum in a logical sequence. They also acquire these skills through internships and the performance of other educational and academic tasks.

The Bachelor programme in Physics is a full-time programme that lasts for eight semesters. The programme's modules are designed to instruct students in the theoretical principles of physics. From the first to the eighth semester, the programme incorporates a "Physics Practicum", which comprises experimental work in the laboratories and the application of contemporary experimental methods.

With regard to the internships, the university clarifies that all qualification practices specified in the bachelor's degree programmes at the Faculty of Physics and Mathematics are carried out at partner enterprises under mutual agreements, while educational practices are conducted at the university itself. In the fourth and sixth semesters, the training is primarily delivered in the form of an introductory internship, which is conducted at the university itself. In the eighth semester, the primary pedagogical internship is undertaken in educational organisations, such as schools, academic lyceums and vocational schools.

With regard to the master's programme at Urgench State University, the modules "Scientific Research Work and Preparation of the Master's Dissertation", "Scientific Seminar" and "Scientific and Pedagogical Work" are included in each semester, in addition to the specific courses. During the first semester, students will be enrolled in the course entitled "Scientific Research Methodology". Elective courses are also on offer in the second and third semesters. According to the SAR, all students enrolled in master's degree programmes in the fields of mathematics, physics and mathematical engineering are required to undertake an internship at the university. If necessary, internships may be arranged at other universities on a contractual basis. At the fourth semester, students are required to complete a scientific practice or an internship. During this internship, the dissertation work is researched, written down and completed. Furthermore, the master's thesis and its defence are incorporated into the final semester.

The Master programme in Mathematics is a four-year, full-time course that is designed to provide students with in-depth knowledge in a range of specialised subjects within the field.

The Master programme in Mathematical Engineering is an interdisciplinary course of study which is divided into four semesters. The programme integrates competencies in numerical methods of mathematical modelling, information technology and programming sciences. The interdisciplinary curriculum includes numerical methods, mathematical models, programming languages, and pedagogical technologies. The curriculum includes courses

that prepare students to solve various problems using mathematical models of processes and objects. It also includes research on the creation of effective mathematical methods for solving technical, economic and management problems. These courses cover a complex set of issues related to the specialty in production and service enterprises, state administration bodies, industrial and business organisations.

The two-year Master's programme in Physics includes specialised subjects in the Physics field. It also includes the development of skill in design, application, and prospective planning of complex issues in the development and use of physical, optical, material science and laser systems and devices.

During the discussion, the experts seek to clarify some unclear issues relating to the Bachelor in Physics curriculum. They learn that the content in the module Molecular Physics does not concern itself with molecular physics, but rather with thermodynamics. The programme coordinators confirm that the name is not correct due to administrative issues. Furthermore, the experts ask about the reasons behind the decision to offer the module Solid State Physics as an elective, while the course Fundamentals of Radio Electronics is mandatory. As states by the programme coordinators, this approach is in alignment with the stipulated qualification requirements set forth by the Ministry. The programme coordinators also note that the duration of the course remains consistent with that of the compulsory course, and statistical data indicates that this course is being selected by the majority of students. Furthermore, the experts learn that LaTeX is not taught or used in the programmes under review.

In relation to the internship, the programme coordinators clarify that students have the option of choosing to go to the industry, i.e. they can go to these places. The university has established partnerships with various organisations in domains such as standardisation, oncology, and related fields.

The students who attended the meeting on-site express their satisfaction with the programme, noting their appreciation for the balanced integration of theoretical and practical courses. However, there is a clear demand for more practical experience and the opportunity to learn in real-life situations. In addition, they are keen to expand their knowledge in the field of AI and its various applications. The industry partners interviewed stress that there is a need to enhance graduates' didactic competences, and that methodology and psychological topics related to teaching children should be emphasised.

Periodic Review of the Curriculum

As stated in the SAR, the university's curricula for the programmes offered are developed in accordance with the Qualification Requirements established by the Ministry of Higher

Education, Science, and Innovation of the Republic of Uzbekistan. The development of new curricula is contingent upon the release of new Qualification Requirements.

In addition, curricula are subject to review and potential updating at the beginning of each academic year. This is based on the introduction of new elective subjects by departments or employers, and on their selection by students. Such changes are approved by the decision of the University Council.

Student mobility

As stated in the SAR, Urgench State University promotes student mobility by entering into agreements and memoranda of understanding with partner and host universities. The institution also has transparent recognition rules and the credits of studies at other institutions are recognized.

In the framework of the International Credit Mobility Projects of the Erasmus + programme, agreements were signed with the following foreign universities: University of Porto, Portugal; University of L'Aquila, Italy; University of Padova, Italy; Hochschule Weihenstephan- Triesdorf; University of Applied Science, Germany; Keele University, Great Britain, Cluj Napoca University of Agricultural Sciences and Veterinary Medicine, Romania. As indicated in the student mobility statistics for the programme under review, which were provided by the university, Memoranda of Understanding were signed between Urgench State University and international universities, including the University of L'Aquila (Italy) and the University of Washington (USA). Furthermore, one student on the Master's in Mathematics programme participated in an Erasmus+ exchange programme, spending five months abroad. Furthermore, for the 2024–25 academic year, an incoming student from the University of L'Aquila will continue their studies in the Master's programme in Mathematical Engineering at Urgench State University.

According to the SAR, in 2024, the Physics and Mathematics faculty welcomed 26 international students as part of academic mobility programmes and joint scientific and practical research initiatives. As part of this cooperation, summer and winter schools were organised in collaboration with California State University (USA) and the university's talented students between 2022 and 2024. Furthermore, summer schools were held with the French CIMPA organisation in 2021, 2022, and 2024. A programme of lectures and seminars was organised for both international and local students. In addition, there were presentations by leading foreign and national scientists and professors. In 2024, a total of 165 international participants attended international conferences and summer/winter schools, where they shared their experiences.

The university's International Relations Department and Talented Students Department provide practical assistance and support to students applying for internships, employment, or study opportunities abroad.

During the audit, the rectorate emphasises that a key objective of Urgench State University is to enhance the international experience of students, fostering mobility and internationalisation of programmes. Furthermore, the institution is committed to the development of a strategy to attract an increased number of incoming students, particularly from countries such as Bangladesh and Pakistan.

The students interviewed confirm the wide range of offers for academic mobility. They feel supported by the university, which provides information on the mobility programmes on offer. Some students state that they have taken part in mobility international programmes and had stays in universities in France, Turkey or Russia. They explain that depending on the mobility programme and agreement, in some cases dormitories and living expenses, or flights, for example, are covered by the university. There is also funding by the government in Uzbekistan programme in which the tuition fee for example is covered.

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions:

In terms of the curriculum, the programmes under review are competitive and cover fundamental topics in mathematics and physics. In general, the auditors are satisfied with the curricula of all the programmes. They see that the programmes are well structured to enable students to effectively achieve the learning outcomes set for the programmes as a whole. Learning outcomes are also defined for each module. The electives provide opportunities for individual focus and study. The experts also appreciate that the curriculum is regularly reviewed and that changes are documented. The experts acknowledge the university's commitment to enhancing international student mobility and the support provided for study stays abroad. Furthermore, they commend the university's strategic initiatives to enhance incoming student enrolment and foster international collaboration with educational institutions and faculty members.

However, they conclude that it is necessary to review and update the curriculum of the Bachelor's degree in Physics, with particular reference to the following issues. Firstly, the elective module “Solid State Physics” needs to be offered as a mandatory course. According to the ASIIN Subject-Specific Criteria of Physics, it is regarded as a compulsory area of knowledge. In addition, the module “Fundamentals of Radio Electronics” should be changed to elective. The module “Molecular Physics” needs to be renamed to “Thermodynamics” in order to accurately reflect the content of the module. The experts

are also of the opinion that LaTeX should be taught and used for scientific writing in all programmes under review.

Following the students' feedback, the experts are of the opinion that the practical training should be enhanced in the bachelor and master programmes under review and, possibly, the option of an internship in the industry should be introduced. Furthermore, for the industry pathway, certain courses pertaining to management, business, communication, and related disciplines should be incorporated into the curriculum of the bachelor programmes under review. For the pedagogical pathway, it is recommended to introduce more modules on didactic competences, methodology and psychological topics related to teaching children. In addition, the experts believe that an industry advisory board should be introduced to assure that the programmes are designed according to the needs of the industry. To enhance the English level of students and lecturers, the experts recommended to offer more modules in English, especially in the first semesters and, also, given by local lecturers.

Criterion 1.4 Admission Requirements

Evidence:

- Self-Assessment Report
- Admission regulation Bachelor and Master programmes
- Statistics on Admission Rate
- Discussion during the audit

Preliminary assessment and analysis of the experts:
The national regulation for admission of Bachelor and Master students to higher education institutions regulates the procedure. The university admits students based on quotas for state grants and tuition contracts, which are approved annually by a relevant decision of the President of Uzbekistan or the Cabinet of Ministers.

The candidates for Bachelors programmes must have a general secondary, secondary specialized, or vocational education certificate (Grade 11 or equivalent) and has passed a standardized entrance test or exam. The assessment is carried out by the State Commission for Admission to Educational Organizations of the Republic of Uzbekistan according to a rating system of points accumulated. Students have the right to choose up to 3 areas of study.

Foreign citizens are admitted to bachelor's degree programmes based on the results of an interview.

Admission to state higher education institution master's programmes is based on the applicant's undergraduate diploma grade point average and the score of the relevant national or international foreign language certificate (for Physics at least B1 level, for Mathematics B2 level), without any additional entrance exams.

As stated in the SAR, starting from 2025, the part-time education format has been completely discontinued.

The institution also has transparent recognition rules. In a learning agreement, the set of learning elements that the student is expected to master at the receiving higher education institution, and how these elements will be integrated into the educational programme of the sending institution, must be clearly specified. The learning outcomes specified in the educational programmes of partner institutions abroad must correspond to or complement the learning outcomes of the student's programme at Urgench State University. During the mobility period, academic performance indicators are analysed, and credit recognition is carried out. The student, based on the recommendation of the sending higher education institution, submits the necessary documents to the receiving higher education institution for the implementation of academic mobility. The sending higher education institution provides the student with a transcript in the prescribed format.

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions:

The admission rules for all programmes under review provide potential students with detailed information on the requirements and steps necessary to apply for admission to the programmes. As they are based on national official regulations, the experts consider them to be binding and transparent. They confirm that the entry requirements support students in achieving the intended learning outcomes.

Criterion 1.5 Workload and Credits

Evidence:

- Self-Assessment Report (SAR)
- Study Plan of each programme
- Module descriptions of each programme
- Statistics on Academic Success
- Regulation regarding credit-module system
- Website of the Faculty of Physics and Mathematics: https://urdu.uz/en/site/facultyview?id=25

- Discussion during the audit

Preliminary assessment and analysis of the experts:

Urgench State University uses a credit system based on student workload which is regulated by the rules on the credit-module system for higher education institutions in Uzbekistan by the Cabinet of Ministers. As stated in the SAR, the credit system used in Uzbekistan is fully compatible with ECTS and conversion is not required. The student workload is set at 30 credits per semester, which corresponds to an average of 900 hours. In semesters where internships are scheduled, the weekly workload is adjusted, and the total workload is determined based on the number of weeks allocated for internships. Each internship week is equivalent to an average of 1 credit, and the associated workload is calculated accordingly.

As stated in the SAR, the academic load at Urgench State university is divided as follows: For Bachelor's degree programmes: 40–50% classroom hours and 50–60% independent work hours. For Master's degree programmes (excluding internships and graduation projects): 30–40% classroom hours and 60–70% independent work hours. Student workloads and credits are determined by subject, based on the curriculum. Students accumulate credits by achieving positive grades (grades of “3”, “4” or “5”) in these subjects.

The duration of bachelor’s degree programmes is four years (eight semesters), comprising a total of 240 credits, divided as follows: 202 credits for academic workload, 23 credits for internships, and 15 credits for final state certification. The students’ study loads are divided into compulsory and elective subjects. Compulsory subjects constitute approximately 80% of the total load, while elective subjects account for about 20%.

The workload by educational areas and specialties, including the number of contact hours, independent study hours, and practice hours, is presented in following table:

Bachelor's Degree:				
Field of Study	Academic work-load	Number of contact hours	Independent study hours	Internship hours
Mathematics	6060	2730	3330	690
Applied Mathematics	6120	2730	3390	630
Physics	6180	2730	3450	570
Master's Degree:				
Field of Study	Academic work-load	Number of contact hours	Independent study hours	Internship hours
Mathematics	1560	630	930	1740
Mathematical Engineering	1560	630	930	1740
Physics	1260	510	750	2040

The academic success of students is analysed on a semesterly and annual basis. The results are discussed regularly in faculty and university council meetings.

The experts note, based on the Statistics on Academic Success provided by the university, that the number of dropouts is low for a physics course. On the other hand, there are, apparently, many long-time students, that have not finished successfully even after more than 10 semesters. The programme coordinators clarify that the part-time students are not separately considered in these statistics. Therefore, the numbers are not accurate enough. Following the decision of the Ministry of Higher Education to discontinue part-time study across Uzbekistan, the university is transitioning to distance learning. In this process, the university aims to systematically transfer part-time students to alternative programmes. Once this process has been finalised, the statistics will need to be reviewed and adjusted.

All students interviewed from the programmes under review consider their workload to be appropriate. They agree that there are sufficient two weeks for exam preparation.

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions:

The credit system is based on workload, which includes contact hours and self-study time. The programme has been designed to ensure that all compulsory components are included, and credits are awarded for every module based on the respective workload. According to student feedback, the workload is manageable and appropriate. However, the experts conclude that the workload of all programmes under review needs to be verified. To that end, a monitoring method of the students' workload should be implemented. Furthermore, the experts recommend that student feedback on course workload should be collected systematically, for example by incorporating relevant questions in the course evaluation surveys.

Criterion 1.6 Didactic and Teaching Methodology

Evidence:

- Self-Assessment Report (SAR)
- Study Plan of each programme
- Module descriptions of each programme
- Website of the Faculty of Physics and Mathematics: https://urdu.uz/en/site/facultyview?id=25
- Discussion during the audit

Preliminary assessment and analysis of the experts:

The programmes under review use a variety of teaching methods and didactic tools to ensure the achievement of learning outcomes and support student-centred learning. The integration of traditional classroom activities and digital learning environments is a key aspect of the programme. A variety of teaching methods are employed, including lectures, problem-based learning, computational and experiential methods, collaborative group work, and the "flipped classroom" approach.

Students develop independent thinking, scientific and practical and analytical skills through group projects, scientific research activities, homework, coursework, graduation qualification works and master's theses. Digital platforms such as Moodle, Google Classroom, and HEMIS, as well as special software tools related to teaching are used.

Contact hours are organized in a ratio of approximately 40–60 percent of the total study load in the bachelor's degree to a ratio of 50/50 percent, and in the master's degree from a ratio of 30/70 percent to a ratio of 50/50 percent, which provides sufficient time for students to independently study, solve problems, and master.

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions:

The experts appreciate the diversity of teaching methods used. The teaching methods and instruments seems to be suitable to support the students in achieving the intended learning outcomes. However, the experts' group believes that a central policy for using AI at Urgench State University should be introduced. Regarding laboratory work, each experiment should be conducted in pairs. The lab instructions should additionally be given in English.

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

In its statement, the university states that the English version of the learning outcomes will be published on the website on April 1, 2026, and that the learning outcomes of each programme under review are reflected in the diploma supplement. The experts note that the supplied sample of the diploma supplement for the master's programme Mathematical Engineering contains a short description of the programme outcomes of the course of studies under 4.2. However, the information given here appear somewhat too generic and should be expanded to include more detailed competence descriptions. In addition, there still remains one open issue: In the present, state the description only covers the scientific/industrial competences. Pedagogical competences are not mentioned. The

intended learning outcomes need to be revised in order to provide clearly differentiated profiles for scientific/industrial as well as pedagogic competences.

Regarding the curriculum of the bachelor's programme Physics, a new curriculum for 2026-2027 approved by the Ministry was provided. It now covers Solid State Physics among the compulsory courses. The course on Fundamentals of Radio Electronics has been changed to elective, as recommended. The required renaming of the course Molecular Physics to (Fundamentals of) Thermodynamics has been performed. Nevertheless, Quantum Mechanics has been changed to elective. Additionally, the new curriculum now does not contain any course on Molecular Physics. These two findings are clearly in contradiction to the ASIIN subject specific criteria for a physics bachelor programme. Whereas the original requirements have been fulfilled, two new misalignments to the ASIIN criteria have been introduced.

Regarding workload monitoring, the provided survey questionnaires in appendix 7 do not include any questions regarding the workload and credit attribution. Currently, this topic is not properly assessed. As the HEI plans to implement these areas in future surveys (conducted regularly during autumn) a significant improvement can be envisaged. As implementation still is pending, the requirement should be maintained.

Furthermore, the university provides a course syllabus for "Application of Artificial Intelligence for Specific Purposes ", suitable as elective subject for all faculties. Students acquire practical skills and competencies in software development and artificial intelligence as part of their qualification internship programme. This component has been implemented as of the current academic year. New syllabi for the qualification internships have also been developed which include content on LaTeX and the use of AI in the field. This clearly demonstrates that the HEI considers AI as important future skill.

The module description of the qualification practice (internship) in the physics programme places significant emphasis on environmental monitoring and analysis, seemingly prompted by the presence of suitable partner companies. The industry experts are of the opinion that, should the partner companies have sufficient capacity to support all students of a given cohort, these measures will be adequate. The Uzbekistan National Metrology Institute is mentioned as the partner organisation for the physics internship. In 2024, a cooperation agreement was signed. Corresponding agreements for the mathematics programmes have been signed in 2026 but are not provided in English. As this is an ongoing process, the experts have maintained their recommendation.

In addition, topics on LaTeX are taught in the Mathematical Engineering program within the Scientific Software course (see Module Handbook, Mathematical Engineering, IDTM253). It is planned to introduce a requirement for students in the Mathematics,

Applied Mathematics, and Physics programs to develop LaTeX skills and prepare their internship reports and presentations using LaTeX at the end of the spring semester of the current academic year (in the first or second year of study). On this basis, the structure of the internship programs has been revised and is going to be implemented in the current academic year. An industry advisory board has been also established by the university.

The experts commend the university's efforts and acknowledge the consideration and implementation of their recommendations.

2. Exams: System, Concept and Organisation

Criterion 2 Exams: System, Concept and Organisation

Evidence:

- Self-Assessment Report (SAR)
- Examination regulations
- Module descriptions of each programme
- Samples of exams and final theses for each programme
- Statistics on Grade Distribution
- Website of the Faculty of Physics and Mathematics: https://urdu.uz/en/site/facultyview?id=25
- Discussion during the audit

Preliminary assessment and analysis of the experts:
According to the SAR, the assessment of students at Urgench State University is regulated by the regulation “On the system of monitoring and evaluating student knowledge in higher education institutions” approved by the Ministry’s order No. 19-2018 dated August 9, 2018.

The assessment is implemented through mid-term and final exams. The various forms of examination include oral, written, creative-practical and test types. These are determined by the department's faculty members, primarily based on the characteristics of the respective subjects. The assessment criteria and forms for each subject are fully provided in the syllabus for the subject and are communicated to students at the beginning of the semester, as well as introduced in the HEMIS System.

Intermediate tests are conducted once a semester during the academic year to assess the student's knowledge and practical skills. The department is responsible for determining the

method of conducting intermediate tests, which are carried out based on the control schedule. The tasks of the intermediate test are developed by the relevant department's professors and teachers and approved by the head of department. The final examination is held at the conclusion of the semester. The purpose of this examination is to determine the level of mastery of the student's theoretical knowledge and practical skills in the relevant subject.

Students have to pass the mid-term exam in each subject by the deadline for the final control type. Students who have not passed a mid-term exam, and those who have been awarded a grade of "2" (unsatisfactory), are not permitted to sit the corresponding final assessment. Prior to that, students are permitted to retake these subjects on two occasions. A student who has not passed the final examination or has been awarded a grade of "2" (unsatisfactory) in this type of examination (after re-examination processes) will not receive credits for the subject and be considered an “academic debtor”. They are entitled to retake failed subjects during the summer semester or vacation period, at their own expense.

In the event that a student is unable to pass the intermediate and/or final examination due to valid reasons, such as illness during the examination or other exceptional situations, they are permitted to retake the relevant examination by order of the Dean of the Faculty, following the submission of a request. In case of students with disabilities, measures are taken according to the student’s special needs. For instance, blind students can take written exams orally, assistants are assigned to enter test answers into the computer and to read the test questions during the exam, sign language interpretation is organized for students with hearing impairments.

Students who are dissatisfied with the assessment results have the right to appeal to the Appeals Commission established by the Dean of the Faculty.

After revising the module descriptions for the programmes under review, the experts note that only written exams are offered during the first two years of study. The programme coordinators explain that it depends on the topic of the course. For strong theoretically courses, they prefer written exams. However, according to the module descriptions, written exams are also given as examination form in practical modules such as Qualification practice or Programming Microcontrollers and Fundamentals of Robotics.

Final thesis

The bachelor’s degree programmes under review include a Final State Certification. As outlined in the module descriptions for the Bachelor in Mathematics, the Final State Attestation (FSA) can take the form of either an interdisciplinary (general and specialised)

exam or a defence of a qualifying thesis. The following subjects are covered for mathematics majors: mathematical analysis, algebra and number theory, probability theory and mathematical statistics, functional analysis, and the theory of functions of a complex variable.

As stated in the SAR, the final state certification exams are organized in written, test, or oral form, and the procedure is determined by the rector of the university on the decision of the Council of the higher educational institution and brought to the attention of students three months before the start of the final state certification.

During the audit, the programme coordinators explain that bachelor's students can choose to carry out a thesis or to write the final state certification exam.

According to the SAR, the final certification commission is composed of scientific and pedagogical personnel from the university (up to 50% of the total commission), as well as highly qualified specialists from enterprises, organisations, and institutions related to the field, leading professors and teachers, scientific workers of related higher educational institutions, and scientists in the relevant field within the system of the Academy of Sciences of the Republic of Uzbekistan.

All students enrolled on Master's programmes are required to complete a master's thesis in order to graduate with their chosen degree. The Master thesis is a research work aimed at the solution of a specific scientific-practical problem related to the relevant speciality field.

The scientific advisor oversees the preparation of a master's thesis ensuring that the student's approved personal work plan is followed on schedule and providing regular guidance. The advisor reviews the student's research reports, articles, and conference materials, making edits as needed, and monitors the step-by-step writing of the thesis to ensure it meets quality standards and deadlines. Once the thesis is completed, the advisor prepares an evaluation report which must thoroughly analyse the work's relevance, scientific contribution, and completeness, concluding with an assessment.

According to the regulations, the scientific advisor is responsible for overseeing the preparation of a master's thesis. This includes ensuring that the student's approved personal work plan is adhered to on schedule and providing regular guidance. The advisor will then review the student's research reports, articles, and conference materials, making edits as needed, and monitor the step-by-step writing of the thesis to ensure it meets quality standards and deadlines. Upon completion of the thesis, the advisor will prepare an evaluation report. This report will thoroughly analyse the work's relevance, scientific contribution, and completeness, concluding with an assessment.

A preliminary defence of the master's thesis is to be organised prior to the official defence. The official defence is conducted by the State Final Attestation Commission of the higher education institution. The thesis must first be passed through the preliminary defence process at the department, following the submission of the scientific advisor's conclusion, internal and external reviews, and department meeting minutes. The thesis defence is characterised by academic debate and is conducted openly, with strict requirements and scientific discussion. All scientific, theoretical and practical conclusions, recommendations and proposals in the master's thesis must be thoroughly substantiated and their reliability analysed. The student is required to present their thesis in a presentation not exceeding 20 minutes. Commission members may ask questions about the research problems and methods to clarify the research process and results. Following the presentation, the official reviewer and scientific advisor will express their opinion on the student's thesis, their research activities and their independent research capabilities.

The commission members then discuss and evaluate the thesis. The evaluation criteria include the justification of the relevance of the topic, identification of the most appropriate problem-solving methods, the student's level of research, the ability to analyse problems using evidence, the presentation of results in visual form, the justification of alternative solutions, the formulation of conclusions and proposals and the identification of application possibilities in relevant fields.

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions:

The experts observe that the responsibilities of the students in the evaluation process are very clearly defined. Students feel well informed about the exams. Students may also discuss the results of exams with the lectures and know the process for complaining about the results. Nevertheless, the experts are of the opinion that the examination forms should be diversified according to the teaching methods of the module. The competences of the modules should be revised and the examination forms adapted accordingly.

After reviewing sample examinations, the experts conclude that the requirements are demanding and that students are expected not only to demonstrate their knowledge, but also to analyse problems and apply their learning. The level of the students' academic performance and the content of the modules are sufficient for the programmes concerned. The Bachelor's and Master’s theses submitted by the programmes under review are considered to be of a high standard and show that students are able to work independently. However, the experts reach the conclusion that the bachelor’s graduation thesis needs to be mandatory for all students. All students are expected to demonstrate their ability to work independently at the intended level of their degree programme.

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

With regard to the introduction of a mandatory bachelor's thesis, for the physics bachelor programme 100% of all students have already been assigned a thesis topic by the rector's order. For the mathematics and applied mathematics bachelor programmes about 50% of all students have been assigned a thesis topic. An increase to 100% is envisaged for the near future. This clearly indicates the willingness of the university to comply to this requirement. A formal change of the curricula in this regard has not yet been implemented – even the new physics curriculum shows no indication of thesis work. Consequently, the experts decide to maintain the requirement.

With regard to examination forms, the university announces a plan to increase the use of project-based assessment. As the process is ongoing, the experts recommend maintaining the recommendation for future measures.

3. Resources

Criterion 3.1 Staff and Development

Evidence:

- Self-Assessment Report (SAR)
- Staff Handbook
- Module Handbook for each programme
- Recruitment regulations
- Human Resources Plan
- Regulation on advancing Training
- Website of the Faculty of Physics and Mathematics: https://urdu.uz/en/site/facultyview?id=25
- Discussion during the audit

Preliminary assessment and analysis of the experts:

The Faculty of Mathematics and Physics has 11 lecturers for the Bachelor's programme in Applied Mathematics, 23 for the Bachelor's programme in Mathematics, 22 for the Bachelor's programme in Physics, 10 for the Master's programme in Physics, 6 for the Master's programme in Mathematical Engineering, and 8 for the Master's programme in Mathematics. The majority of the teaching staff have a Master's degree; some of them have a PhD or are PhD candidates.

External part-time professors are also invited to work as lecturers at the faculty. These include foreign professors, leading scientists from within the republic, and highly qualified personnel from other organisations. Their primary responsibility is to teach newly introduced specialised subjects.

With regard to the recruitment of teaching staff at Urgench State University, the university states that teaching staff includes individuals holding the following positions: Head of Department, Professor, Associate Professor, Senior Teacher, Teacher (Assistant) and Teacher-Trainee. These positions within a higher educational institution are filled through a competitive selection process, with each appointment made for a period of five years. After a five-year period, the positions are once again filled through a competitive selection process in accordance with the relevant regulations. Candidates must possess an academic qualification (e.g. a Candidate of Sciences or Doctor of Philosophy (Ph.D.) in a relevant field, or equivalent academic qualifications obtained abroad), an academic title, and scientific works or inventions, if applicable.

The Regulation on Advanced Training sets out the protocol for the organisation of continuous professional development for managerial and teaching staff at higher educational institutions within the republic and training abroad. In line with this Regulation, each lecturer must complete professional development at least once every three years.

At present, five scientific schools have been set up at the Faculty of Physics and Mathematics, playing a key role in the faculty's and the university's development as scientific entities. In addition, faculty members from these departments are conducting research at leading national and international universities and hold academic degrees. In addition, teaching staff engages in scientific conferences, symposiums, and academic seminars. A range of initiatives has been implemented at the university in this regard, including the organisation of 25 international conferences over the past three years.

The teaching staff confirm during the on-site discussions that professional further qualification is mandatory, and they are required to regularly attend the trainings offered by the professional centre. The lecturers are satisfied with the offer for further qualification. The training programme comprises one-to-two-month courses in teaching methodology, training, modern software and special topics. The centre is equipped with a database, and the lecturers are duly notified, enabling them to select the training sessions. Training can also be provided by other centres or abroad. A number of lecturers are also pursuing doctoral studies, which is considered as qualification activity. With regard to research, the lecturers feel that they are adequately supported by the university. Most lecturers have approximately three days per week for research depending on experience.

In addition, there is an option to take a three-month research leave, which is funded by the university e.g. upon completion of a PhD or for completing a book.

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions:

The composition, scientific orientation and qualification of the teaching staff team are suitable for sustaining the degree programmes under review. Furthermore, the quantity of the teaching staff appears to be adequate according to the experts. They highlight that the teaching staff is very engaged. The faculty's support mechanisms and opportunities for developing personal skills and the further qualification offers for new teachers are considered to be adequate by the experts.

Criterion 3.2 Student Support and Student Services

Evidence:

- Self-Assessment Report
- Study Regulation
- Discussions during the onsite visit

Preliminary assessment and analysis of the experts:
The "Office Registrar" department of Urgench State University provides practical assistance on all essential matters, including registration, academic services, issuance of various types of certificates, submission of applications for academic mobility and course registration, support in selecting subjects or using electronic platforms, and applying for re-taking academic debt subjects during the summer semester. The department also provides information about participation in these courses and other related services.

Urgench State University has seven student dormitories which have a total capacity of 3,235 places. In addition, students are supported in maintaining a healthy lifestyle through the provision of four large indoor gyms and six sports fields, which are located on the main campus of the university.

The university's International Relations Department and Talented Students Department provide practical assistance and support to students applying for internships, employment, or study opportunities abroad. The university and the Republic offer scholarship programmes and financial incentives to talented students. These include opportunities to pursue further education free of charge or to have their tuition fees covered. Further scholarships are awarded on an annual basis to students who achieve the highest marks in their courses.

The Marketing and Internship Department organises annual career guidance and job (vacancy) fairs for graduating students, held in April–May. A variety of regional enterprises and organisations participate in these fairs, showcasing their current job openings.

Students confirm during the discussions on-site that they feel well supported by the University and by their lecturers. They get all required information at the university or via HEMIS system or in chat groups in Telegram.

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions:

The experts are of the opinion that the university's support system helps students to achieve the intended learning outcomes, completing their studies successfully and without delay. Students are well informed about the services available to them. The system for guidance and mentoring is considered to be adequate by the experts' team.

Criterion 3.3 Funds and equipment

Evidence:

- Self-Assessment Report
- Discussions during the audit
- Visitation of the institution

Preliminary assessment and analysis of the experts:
As stated in the SAR, Urgench State University pertains to the 10 universities in Uzbekistan which was transferred to a self-financing system due to its high scientific-pedagogical potential, stable financial performance, and adequate material-technical base.

Budgetary funds are allocated to the university from the state budget for each fiscal year. The university describes the funds distribution in the SAR. Between 2020 and 2024, over 3,500 students were funded annually at the university through budgetary means. Additionally, extra funding from the state is allocated to the university based on the results of competitive grant calls for research projects. The university's extra-budgetary funds come from tuition-based education fees and the development fund. Tuition fees are generated from contract (self-funded) students. Between 2020 and 2024, over 21,500 students per year studied on a tuition-contract basis.

The university emphasizes that extra-budgetary funds were used for the construction and renovation of several facilities at the campus. In addition, a substantial investment was made in teaching laboratory facilities, including over 1,000 computers and IT equipment. It

is also planned to complete the construction of a new educational building with 1,500 seats by 2026.

The central library's current total collection consists of 319,433 copies in 23,484 titles. 1,000 study places are available, and a new building has been commissioned with 200 electronic and 800 traditional study places. Separate study halls have been established for researchers and master's students working on scientific projects. The students have full access to a database comprising 406,955 educational books, 17,359 monographs, 96,145 articles and 66,641 dissertations. Furthermore, international scientific databases are available such as Elsevier's Scopus and SciVal platforms, MathSciNet from the American Mathematical Society. Additionally, access to resources from Springer Nature, Elsevier, and Clarivate Analytics is available through platforms such as SpringerLink, ScienceDirect, and Web of Science.

With regard to external collaboration, it is stated that the university has established 205 bilateral agreements with national and international universities, research centres and the industrial sector. Consequently, there are joint scientific publications and projects, student and faculty exchange programmes, and expanded opportunities for student internships.

Within the framework of the European Union's Erasmus+ programme, several projects have been implemented. These include the establishment of computing centres and curriculum development in the mathematical engineering master's programme – ECCUM, as well as the establishment of training and research centres and course development in intelligent big data analysis in CA - ELBA.

During the site visit, the experts inspect the facilities, lecture rooms, and the library as well as laboratories for teaching and research and computer rooms for mathematics programme. The teaching laboratories of the Physics degree programme were inspected. The laboratories are structured so that experiments from specific subfields can be conducted in dedicated laboratory rooms. All relevant fundamental areas of physics are adequately covered. They can observe how students work in the labs.

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions:

The available funds and facilities provide a robust foundation for the degree programmes under review. The library has been found to be well equipped according to the experts. They are of the opinion that the equipment in the laboratories is adequate for teaching and for research, particularly in the area of semiconductors. The available equipment is modern and well suited to its intended purpose, resulting in an overall positive impression.

Furthermore, the computer rooms and software are sufficient for teaching and research purposes. However, one area for improvement concerns occupational health and safety in the Physics labs. A systematic risk assessment of the laboratories should be conducted, and any identified deficiencies should be remedied. For example, some emergency stop switches were missing or not readily accessible. Furthermore, the additional translation of the task descriptions for the individual lab experiments should be also available in English language. The experts also noted that the lab called "Molecular Physics" should be renamed "Thermodynamics" since the experiments carried out there are related to this field.

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

With regard to staff development, the introduction of English taught lectures will be effective in the next academic year. To improve motivation of local teachers, a 30% bonus salary will be introduced. Financial resources are currently being planned for this purpose as well as for the invitation of foreign lecturers. The experts acknowledge these measures which from the next academic year on will be implemented.

The university provides a series of photographs of electrical safety measures applied in the lab rooms. Above the fire extinguisher a small switch case has been added in every room. This is supposed to contain an emergency cut-off switch – but it is not correspondingly marked. The fast reaction of the university leaves a positive impression. What still remains to do is to apply a clear marking of emergency features, so that everybody immediately recognizes these features in case of danger.

English language descriptions for the lab experiments of the physics department have been provided. In addition, the HEI states, that all experiments will be conducted in pairs. The experts commend the implementation of these recommendations.

4. Transparency and Documentation

Criterion 4.1 Module Descriptions

Evidence:

- Self-Assessment Report (SAR)
- Module descriptions

- Website of the Faculty of Physics and Mathematics: https://urdu.uz/en/site/facultyview?id=25
- Discussion during the audit

Preliminary assessment and analysis of the experts:
The university clarifies in its SAR that the syllabuses of the programmes under review are entered as a resource by teachers onto the HEMIS portal. All professors, students and users registered on the system are eligible to access these. In this section, you will find all the information you need on the subjects of the course. This includes control tables, syllabuses and the curriculum.

The experts found that the module descriptions contain, in general, all the required information for each one. However, the experts note some inconsistencies in the description of some modules. In addition, in the most cases, the learning outcomes are not detailed according to blooms taxonomy.

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions:

The experts note that all compulsory modules as well as electives are included in the module handbook. These are accessible to all students and teaching staff and contain, in general, the required information. However, the experts conclude that based on the syllabus of the modules, a document containing the module descriptions needs to be reviewed and updated. These should be maintained and made accessible to the public on the faculty's website including an English version.

Criterion 4.2 Diploma and Diploma Supplement

Evidence:

- Self-Assessment Report (SAR)
- Sample Diploma Supplement for each study programme
- Sample Certificate for each study programme

Preliminary assessment and analysis of the experts:
As stated in the SAR, after students successfully pass the final state certification exam, they will automatically receive electronic forms of the diploma and diploma supplement in their personal account on the HEMIS platform within two weeks. The diploma supplement is issued in Uzbek and English and contains the graduate's academic performance, a detailed list of modules, relevant grades, total educational credits obtained, a description of the

educational programme, the form of education, its duration, qualifications, and types of professional activities and its objects.

The university provides a general template of the diploma supplement, but it does not appear to include information regarding the programme's learning outcomes and statistical data on grades.

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions:

The university needs to provide samples of the diploma supplement for each programme under review. The diploma supplement needs to contain the required information including leaning outcomes and statistical data on the distribution of final grades according to the ECTS-Users' guide for each programme under review.

Criterion 4.3 Relevant Rules

Evidence:

- Self-Assessment Report
- Student Handbook (Charter)
- All relevant regulations

Preliminary assessment and analysis of the experts:
The university explains that all relevant rules including students' and teaching staff's rights and responsibilities as well as detailed information about the university's main goals, tasks, and functions are included in the University's Charter. The students interviewed confirm that they can find all relevant information on the website or through the HEMIS system.

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions:

The rights and duties of both the university and the students are clearly defined and binding. All rules and regulations are available to all stakeholders. In addition, the students receive all relevant course material in the language of the degree programme at the beginning of each semester.

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

The HEI indicates in their response their willingness to include new areas, e.g. AI skills. The revision of the module handbook is currently underway. As this process has not been completed, the experts consider the requirement not fulfilled.

According to the sample of the diploma supplement provided by the university, as statistical data relative to the cohort and the programme learning outcomes are not yet included, the requirement has been maintained.

5. Quality management: quality assessment and development

Criterion 5 Quality management: quality assessment and development

Evidence:

- Self-Assessment Report
- Student Handbook (Charter)
- Student surveys and results
- Satisfaction survey teaching staff
- Survey employers
- Regulations Department Quality Assurance of Education Urgench State University
- Discussion during the audit

Preliminary assessment and analysis of the experts:

The Department of Education Quality Control is responsible for ensuring and controlling the quality of education at the university. Urgench State University is committed to the continuous improvement of its educational programmes, and as such, undertakes regular internal and external evaluation to ensure their quality.

As stated in the SAR, the status and effectiveness of all educational programmes are regularly analysed through internal attestation (audit) processes. The previous external evaluation of the quality of education was conducted in 2020. In response to the identified areas for improvement, action plans were formulated and are being consistently and continuously implemented from 2020 to 2021. In particular, educational programmes were revised in terms of content, and a number of optimisation works were carried out on the methodological support and management system.

During the 2022 to 2023 period, an extensive internal evaluation was carried out at the university. A comprehensive review was conducted, encompassing all phases of the educational process. This involved a thorough analysis of educational materials, seeking insights from both students and professors, and gathering perspectives from employers. Following the completion of the comprehensive internal assessment, reports were prepared based on the results. These reports were then reviewed by the University Council and presented to the relevant leaders.

Each year, special surveys are conducted anonymously online, via the HEMIS system, and also on paper. In the 2024–2025 academic year, 3,563 students participated in student surveys. A separate satisfaction survey was also carried out for teaching staff. In addition, students' opinions are regularly collected and analysed at periodically organised meetings with the rector, as well as through such channels as social networks and other direct communication.

A survey of employers was conducted to assess graduates' knowledge, with 515 employers participating. It was noted by 68.7% of employers that the education provided was of a high standard. Departments and professors received proposals to continually reformulate the content of elective subjects, based on the results of questionnaires.

The university highlight that a performance KPI system has been introduced, as well as a process for its analysis. In this regard, the majority of professors and teachers who have demonstrated strong performance during the 2023-2024 academic year will receive a bonus of up to 40% of their monthly salary, based on the results of the year.

In the SAR, the university presents the results of the satisfaction surveys and details the measures taken and planned. The experts observe that approximately 20% of students regard their academic education as inadequate for professional employment and request that the rectorate provide details of measures that have been taken or are being planned to improve this situation. The rector confirms that they are working to enhance the quality of teaching by providing teaching staff with training in didactic methods, both domestically and internationally. Approximately 100 professors are currently pursuing training opportunities abroad. As the experts point out, only 3,500 students out of approximately 25,000 participated in the student surveys. The university emphasises that the survey does not include part-time students. Therefore, they should endeavour to include them more and encourage their participation.

The experts also raise the question of how students' feedback leads to concrete improvements. The university management team explains that faculty’s student representative has regular meetings scheduled with representatives of the university.

During these meetings, students are able to provide direct feedback. In addition, advisors provide support to students and assist them in the event of any issues.

During the meeting with the students, the experts note that the majority of them are unaware of any teaching surveys. However, they emphasise that they have the option to consult with the teachers during the course or to request further clarification on the subject and additional explanations. The students interviewed concur that their teachers are highly supportive. They also feel that their feedback is taken into consideration. At the commencement of the semester, students are supported by their advisors in selecting suitable elective courses.

According to the teaching staff, students are required to submit a survey response via the HEMIS system. It is not compulsory, but the university and lecturers do encourage students to participate in the surveys. They emphasise that informal feedback is also very common and welcomed. At the conclusion of each lecture, lecturers provide verbal feedback to students, as well as offering consultation services. In addition, the experts learn that the results of satisfaction surveys are kept strictly confidential. The Head of Department will receive the results and, in the event of critical cases, will inform the relevant parties and make the necessary changes.

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions:

The study programme is subject to periodic internal quality assurance, a process which engages all relevant stakeholders. It has been demonstrated that the outcomes of these procedures form a part of the ongoing improvement of the programme. A framework of processes and responsibilities has been established to guide the ongoing development of the programme. Nevertheless, the experts conclude that, at the end of each module, a separate survey of students on the teaching of this module needs to be carried out and the results need to be communicated to departments and professors. The results of these surveys have to be made available to teachers and students. In addition, the results have to be discussed with the students.

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

In their response the university declares that all survey results will be accessible via the HEMIS platform in the near future. As this integration has not been finalized, the requirement is regarded as not fulfilled yet. The experts remark that it should be guaranteed that students have equal access to this HEMIS area.

E 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:

No additional documents needed.

F Comment of the Higher Education Institution (14.02.2026)

The following quotes the comment of the institution:

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

In their summative evaluation of this criterion, the ASIIN expert team comes to the

following conclusions: The objectives and learning outcomes of the degree programmes reflect the targeted academic qualification level, are feasible and equivalent to the relevant exemplary learning outcomes specified in the applicable SSC (academic classification). In the opinion of the experts, the intended competence profile represents the level of qualification according to the European Qualifications Framework. The experts further remark that the relevance of the objectives and learning outcomes are reviewed on a regular basis involving relevant stakeholders and considering the demand on the labour market and the society. Nevertheless, the experts are of the opinion that the objectives and learning outcomes of all programmes under review need to be transparently anchored and published on the programmes’ web pages and thus make available to interested third parties. The experts further state that the learning outcomes must be included in the diploma supplement for each programme (see below 4.2). Furthermore, they believe that AI skills should be introduced as competences to the study programmes.

The experts highlight that the programmes are designed according to the current demands of the region. However, they conclude that the demand of the industry for mathematicians and physicists is expected to increase and synchronized to this increase, also, the study programs have to be revised in order to provide clearly differentiated profiles for scientific/industrial as well as pedagogic competences.

Response: The objectives and learning outcomes of all educational programs proposed for accreditation are posted on the university website. Currently, the objectives and learning outcomes of all educational programs are being translated into English. Specific measures have been identified to address this issue, and the deadline for posting them on the website is set for April 1, 2026. As suggested by the experts, the learning outcomes of each educational program are reflected in the diploma supplement. The evaluation system at the university is based on a 5-point system, with a separate grade for each module. If a student’s grade for a subject/module in the diploma supplement is 3, 4 or 5, the student is considered to have mastered this subject and is awarded the specified amount of credit. The number of hours allocated for each module is also indicated in the diploma

supplement. The procedure for calculating the amount of credit is simple: 1 credit = 30 hours. For example, if 150 hours are allocated for a module, the amount of credit is calculated as follows: 150 / 30 = 5 credits. This means that the student will receive 5 credits for this module. Therefore, it is possible to calculate the amount of credit based on the number of hours indicated in the Diploma Supplement. As an example, a student's diploma and diploma supplement are provided (Appendix-1).

Moreover, the experts emphasize that artificial intelligence (AI) competencies should be actively integrated into the higher education system. In Uzbekistan, special attention is given to this area. In accordance with Presidential Decree No. PQ-358 dated October 14, 2024, the Strategy for the Development of Artificial Intelligence Technologies until 2030 was approved. This strategy provides for the training of qualified specialists and the development of educational programs in the field of AI, thereby creating a solid foundation for integrating modern AI competencies into the academic processes of higher education institutions. Based on this national framework, AI-related topics have been incorporated into selected courses within the educational programs submitted for accreditation (see the Module Handbook of the Bachelor's program in Mathematics, KMTB304). Work is ongoing to integrate AI components into other relevant courses as well. In addition, students acquire practical skills and competencies in software development and artificial intelligence within the framework of their qualification internship program. This component has been implemented starting from the current academic year. New syllabi for the qualification internships have also been developed (Appendix-5), which include content on LaTeX and the use of AI in the field.

Based on the proposals of experts, it was planned to study the opinions of industrial enterprises. The composition of the newly introduced elective subjects will be agreed with the newly formed "Industry advisory board" and new curricula will be developed on this basis. Conducting part of the qualification practices at industries has been included in the current curricula and internship programs have been developed. (Appendix-2). To implement this, agreements have been concluded for the current 3rd or 4th year students to conduct qualification practice at industrial enterprises. (Appendix-3)

Criterion 1.3 Curriculum

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions: In terms of the curriculum, the programmes under review are competitive and cover fundamental topics in mathematics and physics. In general, the auditors are satisfied with the curricula of all the programmes. They see that the programmes are well structured to enable students to effectively achieve the learning outcomes set for the programmes as a whole. Learning outcomes are also defined for each

module. The electives provide opportunities for individual focus and study. The experts also appreciate that the curriculum is regularly reviewed and that changes are documented. The experts acknowledge the university's commitment to enhancing international student mobility and the support provided for study stays abroad. Furthermore, they commend the university's strategic initiatives to enhance incoming student enrolment and foster international collaboration with educational institutions and faculty members. However, they conclude that it is necessary to review and update the curriculum of the Bachelor's degree in Physics, with particular reference to the following issues. Firstly, the elective module “Solid State Physics” needs to be offered as a mandatory course. According to the ASIIN Subject-Specific Criteria of Physics, it is regarded as a compulsory area of knowledge. In addition, the module “Fundamentals of Radio Electronics” should be changed to elective. The module “Molecular Physics” needs to be renamed to “Thermodynamics” in order to accurately reflect the content of the module. The experts are also of the opinion that LaTeX should be taught and used for scientific writing in all programmes under review. Following the students’ feedback, the experts are of the opinion that the practical training should be enhanced in the bachelor and master programmes under review and, possibly, the option of an internship in the industry should be introduced. Furthermore, for the industry pathway, certain courses pertaining to management, business, communication, and related disciplines should be incorporated into the curriculum of the bachelor programmes under review. For the pedagogical pathway, it is recommended to introduce more modules on didactic competences, methodology and psychological topics related to teaching children. In addition, the experts believe that an industry advisory board should be introduced to assure that the programmes are designed according to the needs of the industry. To enhance the English level of students and lecturers, the experts recommended to offer more modules in English, especially in the first semesters and, also, given by local lecturers.

Response: Based on the proposals, the Physics undergraduate curriculum was redeveloped for the 2026–2027 academic year. Solid State Physics was included in the list of mandatory subjects. Fundamentals of Thermodynamics was introduced instead of Molecular Physics. Fundamentals of Radio Electronics was transferred to the elective subjects section. (Appendix-4)

Topics on LaTeX are taught in the Mathematical Engineering program within the Scientific Software course (see Module Handbook, Mathematical Engineering, IDTM253). It is planned to introduce a requirement for students in the Mathematics, Applied Mathematics, and Physics programs to develop LaTeX skills and prepare their internship reports and presentations using LaTeX at the end of the spring semester of the current academic year (in the first or second year of study). On this basis, the structure of the

internship programs has been revised and is going to be implemented in the current academic year. (Appendix-5)

Based on the experts' proposals, a "Industry advisory board" was established, consisting of specialists from industry and coordinators from higher education institutions. In cooperation with this council, appropriate measures were identified to propose and develop new courses, as well as to discuss the quality of education and the competencies of graduates. The council includes heads and representatives of leading production enterprises in the region, professors and lecturers from relevant academic fields, and researchers from scientific institutes. (Appendix- 6)

The curricula regarding the introduction of internships for students enrolled in bachelor's and master's programs were revised and discussed at the departmental level, and the following proposals were adopted:

- To facilitate the implementation of internships within the educational programs, bilateral agreements were concluded with manufacturing enterprises, and the corresponding internship programs were redeveloped.
- In all educational programs, with the exception of the Mathematics program, a 2–4-week industrial internship at enterprises was incorporated into the qualification internship scheduled for the third year of study. This measure has been implemented starting from the current academic year.
- In the Mathematics program, it was decided that a 6-week industrial internship would be conducted in the fourth year of study. These internships are planned to take place at manufacturing enterprises beginning in the current academic year, and the structure of the qualification internship program has been revised accordingly.
- In the master's degree programs, agreements were concluded primarily with research institutes, and it was determined that pre-qualification internships would be conducted at these institutes.

In addition, we welcomed the proposal to include subjects related to industry and production. In this regard, we will rely on the recommendations of the newly established "Industry advisory board" to develop courses in areas such as production, business, management, and communication. Based on the council's recommendations, it is planned to introduce new courses starting from the next academic year.

In the pedagogical field, the recommendation to introduce additional modules aimed at strengthening didactic competencies, methodology, and psychological and methodological

aspects related to children's education has been taken into account. The implementation of these proposals will be gradually launched beginning in the next academic year.

Starting from the next academic year, separate groups will be formed for courses taught in English, and all educational processes—namely teaching and assessment, including examinations—will be conducted in English. To ensure the effective implementation and sustainability of this initiative, a motivation mechanism for faculty members will be introduced, including a 30% bonus to the monthly salaries of participating professors and lecturers. In addition, foreign professors will be invited if necessary, and a dedicated plan and financial resources have been allocated for this purpose. In the current academic year, selected subjects are being taught in English on the basis of the Rector's order.

Criterion 1.5 Workload and Credits

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions: The credit system is based on workload, which includes contact hours and self-study time. The programme has been designed to ensure that all compulsory components are included, and credits are awarded for every module based on the respective workload. According to student feedback, the workload is manageable and appropriate. However, the experts conclude that the workload of all programmes under review needs to be verified. To that end, a monitoring method of the students' workload should be implemented. Furthermore, the experts recommend that student feedback on course workload should be collected systematically, for example by incorporating relevant questions in the course evaluation surveys.

Response: The recommendations given by the experts were taken into account. In order to more accurately assess the student workload, a mechanism for monitoring the workload in all educational programs under consideration will be introduced starting from the next academic year, in this regard, it is planned to conduct surveys and take into account the opinions of students, their analysis will be applied to the educational process. Regarding the to collect student feedback on subjects, course evaluations, the surveys have been taken in the frame of the autumn semester courses (Appendix 7). The results and analysis have been communicated to professors and students. Of course, appropriate improvement measures will be taken.

Criterion 1.6 Didactic and Teaching Methodology

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions: The experts appreciate the diversity of teaching methods used. The teaching methods and instruments seems to be suitable to support the students in achieving the intended learning outcomes. However, the experts' group believes that a

central policy for using AI at Urgench State University should be introduced. Regarding laboratory work, each experiment should be conducted in pairs. The lab instructions should additionally be given in English.

Response: Starting from January 2026, a 34-hour training course titled “Application of Artificial Intelligence in the Field” was organized for all professors and lecturers of the university based on the Rector’s order. At the same time, to date, students from two faculties of the university have been taught this program as an elective course in accordance with the approved schedule and curriculum. In the remaining faculties, instruction will be carried out according to the established schedule (Appendix 8). The introduction of a centralized policy on the use of artificial intelligence at Urgench State University (Appendix 8) will contribute to more effective and transparent use of AI technologies. It will also help establish unified standards and regulations for both students and faculty members.

With regard to laboratory work, in the Physics educational program at Urgench State University, each experiment is conducted in pairs, which helps reduce the number of errors in completing assignments. It was proposed to formally incorporate the requirement to conduct experiments in pairs into the methodological guidelines of all courses that include laboratory sessions. In addition, the proposal to provide laboratory work instructions in English was positively received, and it has been decided that this will be fully implemented starting from the current academic year (Appendix 9).

2. Exams: System, Concept and Organisation

Criterion 2 Exams: System, Concept and Organisation

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions: The experts observe that the responsibilities of the students in the evaluation process are very clearly defined. Students feel well informed about the exams. Students may also discuss the results of exams with the lectures and know the process for complaining about the results. Nevertheless, the experts are of the opinion that the examination forms should be diversified according to the teaching methods of the module. The competences of the modules should be revised and the examination forms adapted accordingly. After reviewing sample examinations, the experts conclude that the requirements are demanding and that students are expected not only to demonstrate their knowledge, but also to analyse problems and apply their learning. The level of the students' academic performance and the content of the modules are sufficient for the programmes concerned. The Bachelor's and Master’s theses submitted by the programmes under

review are considered to be of a high standard and show that students are able to work independently. However, the experts reach the conclusion that the bachelor's graduation thesis needs to be mandatory for all students. All students are expected to demonstrate their ability to work independently at the intended level of their degree programme.

Response: Taking into account the recommendations provided during the experts' visit in November, this process was promptly discussed at the university level and is being gradually implemented across all educational programs. The current status of bachelor's thesis (final qualification work) preparation is as follows:

- Physics program: Starting from the current academic year, 100% of students have been assigned bachelor's thesis topics; the topics have been approved and the Rector's order has been issued (a total of 56 graduates).
- Mathematics program: There are 113 graduates in total. Prior to the visit, 20 students had been assigned bachelor's thesis topics. Based on the experts' recommendations, this number was increased to 56. Beginning from the next academic year, this process will be expanded to cover 100% of graduates.
- Applied Mathematics program: There are 86 graduates in total. Before the visit, only 3 students had been assigned bachelor's thesis topics. Following the experts' conclusions, an additional 40 students were assigned theses, increasing the total to 43 (Appendix 10).

Considering the specific nature of the modules, the proposal to revise the examination procedures was also approved. Currently, the educational programs undergoing accreditation include written exams, oral examinations, and test-based assessments. It was proposed to introduce project-based assessment more widely. In the Mathematical Engineering program, several courses are already assessed on a project basis. The possibility of extending this practice to other educational programs was discussed, and its implementation in relevant modules was unanimously approved.

3. Resources

Criterion 3.3 Funds and equipment

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions: The available funds and facilities provide a robust foundation for the degree programmes under review. The library has been found to be well equipped according to the experts. They are of the opinion that the equipment in the laboratories is adequate for teaching and for research, particularly in the area of semiconductors. The available equipment is modern and well suited to its intended purpose, resulting in an overall positive impression. Furthermore, the computer rooms and software are sufficient

for teaching and research purposes. However, one area for improvement concerns occupational health and safety in the Physics labs. A systematic risk assessment of the laboratories should be conducted, and any identified deficiencies should be remedied. For example, some emergency stop switches were missing or not readily accessible. Furthermore, the additional translation of the task descriptions for the individual lab experiments should be also available in English language. The experts also noted that the lab called "Molecular Physics" should be renamed "Thermodynamics" since the experiments carried out there are related to this field.

Response: After the ASIIN experts inspected the rooms during the visit, based on their recommendations, the laboratories were re-equipped in accordance with safety requirements, electrical shields (safety equipment in case of danger) were added to all rooms, and all identified deficiencies were eliminated (Appendix 11). In addition, the task descriptions for some laboratory experiments were additionally provided in English (Appendix 9). (Also cited in Criteria 1.6) The experts also noted that the name of the “Molecular Physics” laboratory should be changed to the “Thermodynamics” laboratory. The response to this proposal is given in Criteria 1.3.

4. Transparency and Documentation

Criterion 4.1 Module Descriptions

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions: The experts note that all compulsory modules as well as electives are included in the module handbook. These are accessible to all students and teaching staff and contain, in general, the required information. However, the experts conclude that based on the syllabus of the modules, a document containing the module descriptions needs to be reviewed and updated. These should be maintained and made accessible to the public on the faculty’s website including an English version.

Response: The proposal to revise and reformulate the Module Handbook and publish it on the university website and make it available in English was positively received. Work has begun to this end, and the module handbooks are being reformulated by updating module descriptions, for example, teaching LaTeX, introducing artificial intelligence, developing internship programs at industrial enterprises, and taking into account changes in the direction of physics education. At the same time, appropriate measures are being taken to post it on the website and tasks have been distributed. The results of this process will soon be published on the website by the university departments, and deadlines for posting it on the website are being set.

Criterion 4.2 Diploma and Diploma Supplement

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions: The university needs to provide samples of the diploma supplement for each programme under review. The diploma supplement needs to contain the required information including leaning outcomes and statistical data on the distribution of final grades according to the ECTS-Users' guide for each programme under review.

Response: Diploma supplements contain all the necessary information, including statistics on the distribution of credits (in hours) for each subject and the final grade received in that subject, in accordance with the ECTS manual. Information on this issue is also provided above in Criteria 1.1. It is also worth noting that the forms of diplomas and diploma supplements are the same at the state level. In order to eliminate misunderstandings, we provide a diploma and diploma supplement for one student (Appendix 1). Usually, in addition to the diploma and diploma supplement, the university, if necessary, provides the student with a qualification requirement for the educational program. This document provides information on the results obtained by the student in the educational program, qualifications and skills, and in which areas and professions he can work.

5. Quality management: quality assessment and development

Criterion 5 Quality management: quality assessment and development

In their summative evaluation of this criterion, the ASIIN expert team comes to the following conclusions: The study programme is subject to periodic internal quality assurance, a process which engages all relevant stakeholders. It has been demonstrated that the outcomes of these procedures form a part of the ongoing improvement of the programme. A framework of processes and responsibilities has been established to guide the ongoing development of the programme. Nevertheless, the experts conclude that, at the end of each module, a separate survey of students on the teaching of this module needs to be carried out and the results need to be communicated to departments and professors. The results of these surveys have to be made available to teachers and students. In addition, the results have to be discussed with the students.

Response: The experts emphasized that a separate survey should be conducted among students at the end of the module, the results of which should be open to the department and professors, as well as students, and discussed with students. This process is also noted in Criteria 1.5, and the surveys and their results are attached (Appendix 7). The surveys were carried out at the department level and are planned to be conducted every semester in the future, as well as implemented at the university level.

In order to effectively organize this process, the Department of Education Quality Assurance has created a separate software platform where all questionnaires will be integrated into the Hemis platform. The questionnaires and results obtained using this platform will serve to monitor the quality of education throughout the university and improve the quality of education.

We would like to express our great gratitude to the ASIIN organization, because many useful suggestions and comments were received during the accreditation process. This will serve to improve the quality of education and sustainable development of the university. “

G Summary: Expert recommendations (17.02.2026)

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

Degree Programme	ASIIN Seal	Maximum duration of accreditation
Ba Mathematics	With requirements for one year	30.09.2031
Ma Mathematics	With requirements for one year	30.09.2031
Ba Applied Mathematics	With requirements for one year	30.09.2031
Ma Mathematical Engineering	With requirements for one year	30.09.2031
Ba Physics	With requirements for one year	30.09.2031
Ma Physics	With requirements for one year	30.09.2031

Requirements

For all degree programmes

A 1. (ASIIN 1.1) The intended learning outcomes need to be revised in order to provide clearly differentiated profiles for scientific/industrial as well as pedagogic competences. Ensure that the intended learning outcomes are transparently anchored and published, making them accessible to all relevant stakeholders.

A 2. (ASIIN 1.5) A method of monitoring the students' workload needs to be implemented.

A 3. (ASIIN 4.1) The module descriptions need to be reviewed and updated.

A 4. (ASIIN 4.2) Ensure that all graduates are provided a Diploma Supplement in English in line with the ASIIN criteria which includes the programmes learning outcomes and information on the classification of the degree programme with regard to the national education system. In addition to the final mark, statistical data about the student's GPA relative to the cohort as set forth in the ECTS Users' Guide need to be included.

A 5. (ASIIN 5) Ensure that the teaching surveys are provided to the students. The results of these surveys need to be made available to teachers and students and be discussed with the students.

For the Bachelor's degree programmes

A 6. (ASIIN 2) Implement a mandatory Bachelor´s thesis for all students.

For the Bachelor's degree programme Physics

A 7. (ASIIN 1.3) The elective module Quantum Mechanics needs to be offered as compulsory course.

A 8. (ASIIN 1.3) The module "Molecular Physics" needs to be included in the new curriculum.

A 9. (ASIIN 3.3) The risk analysis for each laboratory needs to be performed and the safety measures adapted or improved accordingly.

Recommendations

For all degree programmes

E 1. (ASIIN 1.3) It is recommended to enhance the practical training and, possibly, introduce the option of an internship in the industry.

E 2. (ASIIN 2) It is recommended to diversify the examination forms so that the respective learning objectives can be more adequately assessed.

E 3. (ASIIN 1.3) It is recommended to offer modules in English taught by local lecturers.

E 4. (ASIIN 4.2) It is recommended to made accessible the modules descriptions to the public on the faculty's website, including an English version.

For the Bachelor's degree programmes

E 5. (ASIIN 1.3) For the industry pathway, it is recommended to offer modules related to management, business, communication and similar subjects.

E 6. (ASIIN 1.3) For the pedagogical pathway, it is recommended to introduce modules on didactic competences, methodology and psychological topics related to teaching.

H Comment of the Technical Committees

Technical Committee 12 – Mathematics (03.03.2026)

Assessment and analysis for the award of the ASIIN seal:

The technical committee discuss recommendation E6. The wording of the text suggests that, at the present time, there are no modules available that cover educational content. This has given rise to the question of whether this should not, in fact, be a requirement, or whether there are modules of this kind, but not enough of them. This should be specified in the recommendation.

The Technical Committee 12 – Mathematics recommends the award of the seals as follows:

Degree Programme	**ASIIN Seal**	**Maximum duration of accreditation**
Ba Mathematics	With requirements for one year	30.09.2031
Ma Mathematics	With requirements for one year	30.09.2031
Ba Applied Mathematics	With requirements for one year	30.09.2031
Ma Mathematical Engineering	With requirements for one year	30.09.2031

Technical Committee 13 – Physics (13.03.2026)

Assessment and analysis for the award of the ASIIN seal:

The TC members discuss, especially requirements A8 and A9. With regard to A8, the proposal is to specify that basic topics on the Physics of Molecules are to be covered by the curriculum, rather than introducing a new module with the title "Molecular Physics". Furthermore, they consider the formulation in A9 to be misleading, particularly with regard

to the demand for a risk analysis that cannot be appropriately verified by the experts' team. They also correct a mistake in E4.

The Technical Committee 13 – Physics recommends the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum duration of accreditation
Ba Physics	With requirements for one year	30.09.2031
Ma Physics	With requirements for one year	30.09.2031

Requirements

For all degree programmes

A 1. (ASIIN 1.1) The intended learning outcomes need to be revised in order to provide clearly differentiated profiles for scientific/industrial as well as pedagogic competences. Ensure that the intended learning outcomes are transparently anchored and published, making them accessible to all relevant stakeholders.

A 2. (ASIIN 1.5) A method of monitoring the students' workload needs to be implemented.

A 3. (ASIIN 4.1) The module descriptions need to be reviewed and updated.

A 4. (ASIIN 4.2) Ensure that all graduates are provided a Diploma Supplement in English in line with the ASIIN criteria which includes the programmes learning outcomes and information on the classification of the degree programme with regard to the national education system. In addition to the final mark, statistical data about the student's GPA relative to the cohort as set forth in the ECTS Users' Guide need to be included.

A 5. (ASIIN 5) Ensure that the teaching surveys are provided to the students. The results of these surveys need to be made available to teachers and students and be discussed with the students.

For the Bachelor's degree programmes

A 6. (ASIIN 2) Implement a mandatory Bachelor´s thesis for all students.

For the Bachelor's degree programme Physics

A 7. (ASIIN 1.3) The elective module Quantum Mechanics needs to be offered as compulsory course.

A 8. (ASIIN 1.3) Basic topics on “Physics of Molecules” need to be included in the new curriculum as compulsory content.
A 9. (ASIIN 3.3) For the students’ laboratories, appropriate safety measures need to be implemented or improved.

Recommendations

For all degree programmes

E 1. (ASIIN 1.3) It is recommended to enhance the practical training and, possibly, introduce the option of an internship in the industry.
E 2. (ASIIN 2) It is recommended to diversify the examination forms so that the respective learning objectives can be more adequately assessed.
E 3. (ASIIN 1.3) It is recommended to offer modules in English taught by local lecturers.
E 4. (ASIIN 4.2) It is recommended to make accessible the modules descriptions to the public on the faculty's website, including an English version.

For the Bachelor’s degree programmes

E 5. (ASIIN 1.3) For the industry pathway, it is recommended to offer modules related to management, business, communication and similar subjects.
E 6. (ASIIN 1.3) For the pedagogical pathway, it is recommended to introduce modules on didactic competences and methodology as well as psychological topics related to teaching.

I Decision of the Accreditation Commission (27.03.2026)

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

The Accreditation Commission follows the experts' assessment and the changes pro-posed by the Technical Committees. The AC recommends using the standard formula-tion for Requirement A6 and editing the text of Recommendation E4.

The Accreditation Commission decides to award the following seals:

Degree Programme	**ASIIN Seal**	**Maximum duration of accreditation**
Ba Mathematics	With requirements for one year	30.09.2031
Ma Mathematics	With requirements for one year	30.09.2031
Ba Applied Mathematics	With requirements for one year	30.09.2031
Ma Mathematical Engineering	With requirements for one year	30.09.2031
Ba Physics	With requirements for one year	30.09.2031
Ma Physics	With requirements for one year	30.09.2031

Requirements

For all degree programmes

A 1. (ASIIN 1.1) The intended learning outcomes need to be revised in order to provide clearly differentiated profiles for scientific/industrial as well as pedagogic

competences. Ensure that the intended learning outcomes are transparently anchored and published, making them accessible to all relevant stakeholders.

A 2. (ASIIN 1.3) A method of monitoring the students' workload needs to be implemented.

A 3. (ASIIN 4.1) The module descriptions need to be reviewed and updated.

A 4. (ASIIN 4.2) Ensure that all graduates are provided a Diploma Supplement in English in line with the ASIIN criteria which includes the programmes learning outcomes and information on the classification of the degree programme with regard to the national education system. In addition to the final mark, statistical data about the student's GPA relative to the cohort as set forth in the ECTS Users' Guide need to be included.

A 5. (ASIIN 5) Ensure that the teaching surveys are provided to the students. The results of these surveys need to be made available to teachers and students and be discussed with the students.

For the Bachelor's degree programmes

A 6. (ASIIN 2) Ensure that the programme includes a mandatory final thesis or project demonstrating the student's ability to independently undertake an academic task at an appropriate level (EQF 6).

For the Bachelor's degree programme Physics

A 7. (ASIIN 1.3) The elective module Quantum Mechanics needs to be offered as compulsory course.

A 8. (ASIIN 1.3) Basic topics on "Physics of Molecules" need to be included in the new curriculum as compulsory content.

A 9. (ASIIN 3.3) For the students' laboratories, appropriate safety measures need to be implemented or improved.

Recommendations

For all degree programmes

E 1. (ASIIN 1.3) It is recommended to enhance the practical training and, possibly, introduce the option of an internship in the industry.

E 2. (ASIIN 2) It is recommended to diversify the examination forms so that the respective learning objectives can be more adequately assessed.

E 3. (ASIIN 1.3) It is recommended to offer modules in English taught by local lecturers.

E 4. (ASIIN 4.2) It is recommended to ensure that the module descriptions are made publicly available on the faculty's website, including in English.

For the Bachelor's degree programmes

E 5. (ASIIN 1.3) For the industry pathway, it is recommended to offer modules related to management, business, communication and similar subjects.

E 6. (ASIIN 1.3) For the pedagogical pathway, it is recommended to introduce more modules on didactic competences and methodology as well as psychological topics related to teaching.

Appendix: Programme Learning Outcomes and Curricula

According to the SAR, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor's programme Applied Mathematics:

Learning Outcomes
LO 1. To teach students to provide a system of mathematical knowledge based on a specific program, teaching students to consolidate their oral and written mathematical knowledge, teaching students to know real truths based on mathematical laws. Knowledge of the forms of organizing mathematics teaching, knowing the types of mathematics lessons and the requirements for the lesson, knowledge of modern mathematics teaching methods Teaching various levels of examples and problems from elementary mathematics, including equations, inequalities, trigonometry, plane geometry, and solid geometry. Teaching logical thinking based on rigorous mathematical foundations. Acquiring skills to solve complex examples and problems in elementary mathematics. Gaining skills to teach elementary mathematics in schools. Developing the skill to prepare students for solving olympiad problems.
LO 2. The course aims to illustrate the essential changes and fundamental reforms that have taken place in the Republic of Uzbekistan during the years of independence. It seeks to highlight the role of history as the foundation of spirituality in social life and demonstrate its importance as a means of self-awareness for students. Additionally, the course aims to convey the essence of the principles of personality, citizenship, humanity, society, and the state in educating a well-rounded generation in the new stage of Uzbekistan's development. The new edition of the Constitution of the Republic of Uzbekistan is aimed at developing students' theoretical knowledge and practical skills in the field of application of legal norms. Skills for understanding the Constitution of the Republic of Uzbekistan in the new edition, which contains provisions on the norms of state sovereignty, people's power, the supremacy of the constitution and the law

LO 3. The aim of the course is to develop theoretical knowledge and practical skills in understanding the essence of religion in the minds of students and young people, the religious landscape of the world, the interrelationship of religious and philosophical views, globalization and religious processes, as well as the negative impact of modern religious movements, religious fanaticism, extremism and terrorism on the security of the state and society, and to combat it.
LO 4. Construct a monologue in English on general language topics and on technical and professional topics;independently study the search for scientific information as the basis of professional activity;freely express their thoughts in oral and written form on professionally significant topics;independently work in preparing presentations, messages, abstracts on professional topics;in the professional field of the chosen specialty, master the language and speech norms of the modern Russian language.conduct a dialogue, participate in a polylogue on a given topic;produce a secondary scientific text (abstract, abstract, summary). Students will understand key concepts and principles of academic texts; Students will be able to analyze the language needs of a specific content area;
LO 5. It aims to create a generalized system of students' worldview and show the place of man in it, to form a person's cognitive, socio-political, moral, aesthetic and other attitudes towards the world, and to teach the skills of correct thinking
LO 6. Regulate educational activities by using modern, interactive forms and methods of educational work in lessons and out-of-class activities. Use methods of self-control and ensure harmony of theory and practice.
LO 7. Students will comprehend fundamental programming concepts, including variables, loops, functions, and data structures.Students will implement algorithms and write structured programs to solve computational problems using a high-level programming language Fundamental mathematical concepts and principles;Mathematical concepts and principles to solve problems
LO8. Fundamental concepts of mechanics, thermodynamics, electromagnetism, optics, and atomic physics; Principles governing motion, forces, energy, and electromagnetic

phenomena.Newton's laws, thermodynamic principles, and electromagnetic laws to solve physical problems; Wave and quantum mechanics to interpret light, radiation, and nuclear phenomena. The student understands the basic concepts of theoretical mechanics.The student analyzes the theories of theoretical mechanics in solving complex problems.
LO 9. Students will have an understanding of and knowledge about sets, number sets, mappings, mathematical symbols, number sequences, the concept of functions, the theory of limits, and function limits and continuity. Students will be able to solve problems related to the theory of limits, function limits and continuity, and differential calculus, as well as develop skills in applying these concepts. Students will be able to apply functional analysis techniques to real-world problems, including applications in partial differential equations, optimization, signal and image processing, and mathematical physics.
LO 10. Students will be able to understand how to solve first and higher-order linear differential equations, how to pose and solve the Cauchy problem for such equations. Students will be able to understand how to solve systems of first and higher-order linear differential equations, how to pose and solve the Cauchy problem for such system of equations, and how to check the stability of the solutions of differential equations and systems.Students will be able to apply differential equations to real-world problems. Students will be able to understand how to solve first and higher-order linear differential equations, how to pose and solve the Cauchy problem for such equations.Students will be able to apply differential equations to real-world problems.
LO 11. Mathematical physics equations play a crucial role in describing various physical processes, including wave propagation, heat diffusion, and fluid dynamics. The main types of equations include hyperbolic, parabolic, and elliptic partial differential equations, each corresponding to different physical phenomena. Methods such as the separation of variables, Fourier analysis, and integral

transform techniques are commonly used to solve these equations. Fundamental boundary value problems, including Dirichlet and Neumann problems, are essential in applications. Special functions, such as Bessel and harmonic functions, along with integral equations, provide powerful tools for analyzing and solving these equations.
LO 12. The purpose: to familiarize students with the necessary set of information in linear algebra and analytical geometry (concepts, assertions and their proof, methods for solving practical problems, etc.). At the same time, it helps students think logically, draw correct conclusions, and improve their mathematical culture.
LO 13. The subject aims to familiarize students with the essential concepts of mathematics (such as definitions, theorems and their proofs, methods for solving practical problems, etc.) and to study the interconnectedness of different branches of mathematics. At the same time, it serves to help students visualize geometric shapes, make logical conclusions, and enhance their mathematical culture. The subject is focused on teaching students, at general secondary schools, academic lyceums, and vocational colleges, more complex geometric problems and the methods for solving them. It also aims to form and develop generalized skills and qualifications for solving mathematical problems.
LO 14. Discrete Mathematics and Mathematical Logic are fundamental disciplines in computer science and engineering, providing essential tools for problem-solving, algorithm development, and system design. This module covers key topics such as set theory, combinatorics, graph theory, Boolean algebra, and formal logic.
LO 15. All the concepts are based on understanding stochastic experiments, probabilities, and random variables, which help to explain random processes using mathematical methods.These concepts are widely used in practice for modeling systems, analyzing data, and making statistical predictions. Students will be able to apply combinatorial techniques to solve complex counting and arrangement problems in various fields, including computer science, engineering, biology, and optimization. They will use methods such as permutations, combinations, the Pigeonhole Principle,

inclusion-exclusion, and generating functions to analyze structures, optimize solutions, and model real-world combinatorial problems.
LO 16. The student understands the fundamental concepts of mathematical modeling;The student can apply mathematical modeling concepts to solve problems Construction of mathematical models of various practical problems and analysis of these models;be able to use the basic methods of studying processes and optimal control; development of skills in applying the acquired theoretical knowledge in practice
LO 17. Methods of numerical solution of ordinary differential equations;methods of numerical solution of partial differential equations;apply methods of numerical solution of ordinary differential equations;apply numerical methods in solving problems of mathematical physics Core principles, history, and applications of FEM. Mathematical foundations (vector spaces, scalar products, norms, Hilbert and Sobolev spaces). Strong and weak forms of differential equations.Galerkin and weighted residual methods for FEM formulation. Solve heat conduction problems, ODEs, and boundary value problems. Implement FEM solutions in MATLAB. Fundamentals of error theory and approximation theory;Basic computational methods of algebra; Methods for constructing elements of best approximation; Methods for constructing interpolation polynomials.Solve algebraic and transcendental equations numerically; Solve systems of linear equations numerically by the simple integration method of Seidel; Solve systems of nonlinear equations numerically by Newton's method. Use technologies of application of computational methods in solving specific problems from various fields of mathematics and its applications
LO 18. Fundamental principles of cryptography, encryption models, and cryptographic protocols,symmetric/asymmetric algorithms, hash functions, and digital signatures. Fundamental principles of cryptography, encryption models, and cryptographic protocols,symmetric/asymmetric algorithms, hash functions, and digital signatures.

LO 19. In terms of knowledge:Be able to collect and visualize data for intellectual analysis of data;Be able to select features for intellectual analysis of data;Be able to propose suitable algorithms for intellectual analysis of data Develop Java applications using core Java features and object-oriented programming (OOP) principles.Implement collections, exception handling, and multithreading in Java programs.Design and integrate database-driven applications using JDBC.Build graphical user interfaces (GUIs) using JavaFX or Swing.Create and deploy web applications using Java EE or Spring (if covered in the module).
LO 20. The fundamental principles of web development, including frontend and backend technologies. The structure and functionality of modern web applications. The role of HTML, CSS, and JavaScript in web design and development. Create interactive and responsive web pages using HTML, CSS, and JavaScript. Develop dynamic web applications using JavaScript frameworks such as React, Angular, or Vue.js. Build and manage server-side applications with technologies like Node.js, PHP, or Python (Django/Flask). Connect web applications with databases such as MySQL or MongoDB.
LO 21. Comprehending the scientific, psychological, and pedagogical foundations of the mathematics curriculum's content and structure, as well as gaining an understanding of teaching methods and tools in mathematics.Implementing modern pedagogical technologies, interactive methods, and technical tools in mathematics teaching, as well as utilizing methods for assessing students' knowledge.
LO 22. The main objectives of this course are to:Analyze Sturm-Liouville problems on finite intervals and half-lines.Develop analytical and numerical solution methods for boundary value problems.Explore the spectral properties of Sturm-Liouville operators.Apply Sturm-Liouville theory to mathematical physics and engineering problems. Stud **LO 24.** Analyze mathematical problems using computational methods.Implement algorithms for solving mathematical equations and models. s and prop dents will be able to apply mathematical physics to real-world problems.
LO23. Students will acquire a comprehensive understanding of normed spaces, Banach spaces, and Hilbert spaces, as well as bounded linear functionals and operators, including the spectrum of bounded linear operators.

The following **curriculum** is presented for the Bachelor's programme Applied Mathematics:

Curriculum of B.Ed in Applied mathematics

Module Code	Module name	C/UC/E	ECTS	Theory, hrs	Practice, hrs
Semester 1					
UYTB104	Modern history of Uzbekistan	C	4	2	2
XJTB104	Foreign language	C	4	0	4
AAGB110	Linear Algebra and Analytic Geometry	C	5	2	2
DMM110	Discrete Mathematics and Mathematical Logic	C	5	2	2
MANB117	Mathematical Analysis	C	6	3	3
ATDB120	Algorithmic Languages and Programming	C	6	2	2
Semester 2					
URTB104	Uzbek (Russian) language	C	4	0	4
UFZB104	General Physics	C	4	2	2
AAGB110	Linear Algebra and Analytic Geometry	C	5	2	2
DMM110	Discrete Mathematics and Mathematical Logic	C	5	2	2
MANB117	Mathematical Analysis	C	6	3	3
ATDB120	Algorithmic Languages and Programming	C	4	2	2
MAB121	Qualification practice	C	2	0	0
Semester 3					
FANB204	Philosophy	C	4	2	2
MANB117	Mathematical Analysis	C	5	2	2
ATDB120	Algorithmic Languages and Programming	C	5	2	2
DFTB206	Differential Equations	C	6	2	4

ABSB206	Algorithms and data structures	C	6	2	2
ENMB209	Probability Theory and Mathematical Statistics	C	4	2	2
Semester 4					
DINB204	Religious studies	C	4	2	2
ATDB120	Algorithmic Languages and Programming	C	4	2	2
FANB204	Functional Analysis	C	4	2	2
ENMB209	Probability Theory and Mathematical Statistics	C	5	2	2
NZMB206	Theoretical Mechanics	C	6	2	4
CHOYSHLB210	Sturm-Liouville problem on the finite interval and a half-line	E	4	2	2
EMTBB210	Selected Chapters of Elementary Mathematics	E	4	2	2
KEB210	Elements of Combinatorics	E	4	2	2
ATDB120	Algorithmic Languages and Programming(Course work)	C	1	0	0
MAB121	Qualification practice	C	2	0	0
Semester 5					
UPPB308	General pedagogy.Psychology	C	4	2	2
MIMB306	The methodology of teaching mathematics and computer science	C	6	2	2
MFTB305	Equations of Mathematical Physics	C	5	2	2
MMLB310	Fundamentals of Mathematical Modeling	C	5	2	2
CHOYSHLB210	Sturm-Liouville problem on the finite interval and a half-line	E	6	3	3
EMTBB210	Selected Chapters of Elementary Mathematics	E	6	3	3

KEB210	Elements of Combinatorics	E	6	3	3
BBZB304	Data Subject Database	E	4	2	2
WDTB304	Web programming technologies	E	4	2	2
JATEB304	Java technologies	E	4	2	2
Semester 6					
UPPB308	General pedagogy and psychology	C	4	2	2
MMLB310	Fundamentals of Mathematical Modeling	C	4	2	2
JTOB305	Operations Research and Optimal Control	C	5	2	2
KMTB306	Computerized mathematical systems	C	6	2	4
DTNTB304	Selected chapters of the theory of differential equations	E	4	2	2
AXAB304	Information Security Fundamentals	E	4	2	2
KRUB304	Cryptographic methods	E	4	2	2
SNTMB309	Inverse problems of scattering theory	E	4	2	2
CEUB309	Finite element method	E	4	2	2
BITB309	Intelligent Data Analysis	E	4	2	2
MMLB310	Fundamentals of Mathematical Modeling (Course work)	C	1	0	0
MAB121	Qualification practice	C	2	0	0
Semester 7					
SUSB406	Numerical methods	C	5	2	4
KUFB406	Theory of functions of complex variables	C	6	2	2
SNTMB309	Inverse problems of scattering theory	E	5	2	4
CEUB309	Finite element method	E	5	2	4
BITB309	Intelligent Data Analysis	E	5	2	4

YORKB404	The Constitution of the Republic of Uzbekistan in the new edition	E	4	1	1
TIMB404	Educational work methodology	E	4	1	1
HUB405	Calculation methods	E	5	2	2
CHONB405	Theory of linear operators	E	5	2	2
MMDTTMUB405	Differential equations in mathematical modeling. Models and research methods	E	5	2	2
EMMMYMB404	Methodology for Solving Examples and Problems in Elementary Mathematics	E	4	2	2
MYBYEMMB404	Elementary mathematical problems are solved using special methods	E	4	2	2
GTBB404	Selected Topics of Geometry	E	4	2	2
SUSB406	Numerical methods(Course work)	C	1	0	0
Semester 8					
MAB121	Pedagogical practice	C	8	0	0
MAB121	Qualification practice	C	7	0	0
YDAB415	Final state certification	UC	15	0	0

Total ECTS
Theoretical course: **91**
Non Theoretical course: **149**
Sum: **240**

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

Learning Outcomes
LO 1. Develops a deep understanding of the main changes and reforms implemented in Uzbekistan during the years of independence. Recognizes the importance of history as the foundation of spirituality in society and understands its role as a means of self-awareness. By studying the principles of citizenship, humanity, society, and the state, attains a strong civic position. Understands the role and significance of history in educating a highly developed generation at the new stage of Uzbekistan's development.
LO 2. Demonstrate the culture of communication in everyday life.
LO 3. Demonstrate patriotism, national values and active citizenship.
LO 4. Understand and interpret the objective truth about religions, can classify the philosophical and theoretical aspects and social functions of religions.
LO 5. Manage collective and project work of students based on their age characteristics. Cooperate with the pedagogical staff and parents of learners (persons who replace them) in solving educational problems. Regulate educational activities by using modern, interactive forms and methods of educational work in lessons and out-of-class activities. Use methods of self-control and ensure harmony of theory and practice.
LO 6. Developing critical and logical thinking and teaching the analysis of perspectives on humans and society. It helps learners understand logical expressions, proofs, and reasoning. Additionally, it fosters systematic thinking, problem-solving abilities, and well-founded reasoning skills.
LO 7. Monitor the strengthening of students' physical health, develop hygiene skills, teach them to engage in physical education and sports, instill in them determination, independence, perseverance, discipline, a

sense of responsibility, friendship and camaraderie, and develop age-related creative abilities.
LO 8. Understand the theoretical foundations of physical phenomena and mechanical processes, apply the laws of classical mechanics, force balance, and equations of motion. Analyze and solve real-world problems using physical models.
LO 9. To have an understanding and knowledge of the theory of limits, function limits and continuity, differential calculus, integral calculus, multivariable function theory, and numerical and functional series. To apply creative and logical approaches in solving non-standard problems related to the theory of limits, function limits and continuity, differential and integral calculus, multivariable function theory, and numerical and functional series. To solve real and theoretical problems using mathematical analysis methods.
LO 10. Understanding matrices, determinants, systems of linear equations, and vector spaces, as well as their applications. Gaining knowledge of algebraic structures such as groups, rings, and fields. Analyzing theoretical and practical problems using algebraic and linear models.
LO 11. Understanding the analytical representations of planes and surfaces, the differential properties of curves and surfaces, and fundamental topological concepts. Analyzing the structure of fractals, their properties, and their applications in geometry.
LO 12. Understanding and applying the fundamentals of programming languages, algorithms, and data structures. Developing and optimizing programs for solving mathematical problems on a computer. Performing and analyzing complex computations using programming and mathematical systems.

LO 13. To study the solution of differential equations, as well as mathematical physics equations (such as Poisson, Laplace, and other physical equations), and analyze their solutions. To develop skills in solving systems of differential equations using analytical and numerical methods. To understand the practical application of differential equations and mathematical physics equations in mathematical modeling of physical processes.
LO 14. Understands stochastic processes, probability theory, and methods for analyzing random events. Analyzes basic models and distributions such as Markov processes and Poisson processes. Understands the law of large numbers, the central limit theorem, and their areas of application. Uses parametric and non-parametric estimation methods, and applies the main methods for testing statistical hypotheses. Understands stochastic differential equations and their applications in economics, finance, and technical sciences. Has the skills to apply stochastic analysis methods in practical fields such as economics, finance, insurance, biomathematics, and other areas.
LO 15. Understands complex numbers and complex functions, and studies their basic properties. Applies methods related to the integrability and differentiability of complex-variable functions. Analyzes conformal mappings and their geometric representations. Applies the geometric theory of complex-variable functions in practical problems.
LO 16. Understands the basic concepts of functional analysis (normalized vector spaces, Gilbert spaces, and operators). Applies the main properties of Banach and Hilbert spaces and the related theorems. Is able to apply functional analysis methods in practical problems, including differential equations and optimization problems.
LO 17. Understanding the theoretical and practical foundations of mathematics education, applying modern teaching methods and technologies, knowing the main stages of the history of mathematics and the scientific legacy of great mathematicians, and utilizing this knowledge in the teaching process. Additionally, effectively designing lessons and integrating innovative technologies, incorporating interactive and information-communication technologies into the mathematics education process, developing and applying teaching methods aimed at enhancing students' mathematical thinking, as well as mastering and teaching various techniques for solving

problematic and non-standard mathematical problems to foster creative thinking.
LO 18. Understanding the principles of optimization and calculus of variations, applying methods for finding extrema of functionals, mastering the fundamental concepts of numerical methods and their application to solving algebraic and differential equations, acquiring knowledge of numerical computation techniques, iterative methods, and approximation techniques, understanding their impact on exact and approximate solutions, utilizing optimization and numerical methods in applied mathematical problems, and developing algorithmic thinking.
LO 19. Understanding the current trends and contemporary problems in mathematics, mastering and applying modern methods of fundamental and applied mathematical research, utilizing mathematical modeling, analysis, and optimization techniques, applying information technologies and computational methods to solve contemporary mathematical problems, employing mathematical approaches in interdisciplinary research, and developing innovative solutions.
LO 20. Understanding the fundamental principles of mathematical modeling and its applications in various fields, converting practical problems into mathematical models and selecting the appropriate methods to find their solutions, constructing differential equations, linear and nonlinear models, and analyzing systems using these models, solving and simulating mathematical models with the help of computer tools and software.
LO 21. Get acquainted with modern techniques and technologies in science, culture and other fields, determine the available opportunities in the research field, apply theoretical knowledge in practice.

The following curriculum is provided for the **Bachelor's programme Mathematics**:

Module Code	Module name	C/UC/E	ECTS	Theory, hrs	Practice, hrs
Semester 1					
UYTB104	The newest history of Uzbekistan.	C	4	2	2
XJTB104	Foreign language.	C	4	0	4
MANB122	Mathematical analysis	C	6	3	3
ALGB118	Linear Algebra	C	6	2	2
ANGB112	Analytical geometry.	C	6	2	2
DASB108	Fundamentals of Programming.	C	4	2	2
Semester 2					
URTB104	Uzbek (Russian) language	C	4	0	4
DINB104	Religious studies	C	4	2	2
MANB122	Mathematical analysis	C	6	3	3
DFTB208	Linear Algebra	C	6	2	2
ANGB112	Analytical geometry	C	6	2	2
DASB108	Basics of programming	C	4	2	2
Semester 3					
UFZB204	General Physics	C	4	1	3
MANB122	Mathematical Analysis	C	6	3	3
ALGB118	Algebra	C	6	2	2
NZMB204	Differential Equations	C	4	2	2
DFGB208	Differential Geometry and Topology	C	4	2	2
DMMB206	Discrete Mathematics and Mathematical Logic	C	6	2	2

Semester 4					
FALB204	Philosophy	C	4	2	2
MANB122	Mathematical Analysis	C	4	2	2
NZMB204	Differential Equations	C	4	2	2
DFGB208	Differential Geometry and Topology	C	4	2	2
EHNB204	Theoretical Mechanics	C	4	2	2
ANMB206	Solving Non-Standard Problems in Analysis	E	6	3	3
GTBB206	Selected Topics in Geometry				
MAMB219	Qualifying Internship		4	0	0
Semester 5					
UPPB308	General Pedagogy. Psychology	C	4	2	2
MSTB304	Probability Theory and Mathematical Statistics	C	4	2	2
MFTB308	Partial Differential Equations of Mathematical Physics	C	4	2	2
KUFB310	Theory of Functions of a Complex Variable	C	6	2	2
MATB304	Selected Topics in Mathematical Analysis	E	6	3	3
MPB304	Mathematical Practicum				
MTB304	History of Mathematics				
HFXB304	Life Safety	E	6	2	2
YFG304	Physiology and Hygiene of Youth				
Semester 6					
UPPB308	General Pedagogy. Psychology	C	4	2	2

MSTB304	Probability Theory and Mathematical Statistics	C	4	2	2
MFTB308	Partial Differential Equations of Mathematical Physics	C	4	2	2
KUFB310	Theory of Functions of a Complex Variable	C	4	2	2
MOZB304	Modern Problems of Mathematics	E	4	2	2
KMTB304	Computer-Based Mathematical Systems				
MMTB304	Fundamentals of Mathematical Modeling				
HOFB306	Theory of Functions of a Real Variable	E	6	3	3
MMMB306	Methods for Solving Examples and Problems in Mathematics				
MNMB306	Techniques for Solving Non-Standard Problems in Mathematics				
MAMB219	Qualifying Internship (Educational)	C	4	0	0
Semester 7					
FANB310	Functional Analysis	C	6	2	2
MUMB404	Methods of Teaching Mathematics	C	4	2	2
VHOB404	Calculus of Variations and Optimization Methods	C	4	2	2
HUSB404	Numerical Methods	C	4	2	2
STAB404	Fundamentals of Statistical Analysis	E	5	2	2
SATMB404	Stochastic Analysis and Its Applications				
KOFB404	Geometric Theory of Functions of a Complex Variable	E	5	2	2
MOTB404	Mathematics Teaching Technologies and Design				
FGNB404	Geometric Theory of Fractals				
YORKB404	The Newly Revised Constitution of the Republic of Uzbekistan	E	2	1	1
YOTSB404	Development Strategy of New Uzbekistan				
Semester 8					
MAB219	Pedagogical Practice	C	8	0	0
MAMB219	Qualifying Internship	C	7	0	0
YDAB415	Final State Certification	C	15	0	0

Total ECTS
Theoretical course: **91**
Non Theoretical course: **149**
Sum: **240**

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

Learning Outcomes // O'quv natijalari
LO 1. Demonstrate patriotism, national values and active citizenship.
LO 2. Can calculate qualitative and quantitative changes, conduct logical analyzes in events and phenomena occurring in nature. Understand the scientific landscape of the world, integrate Natural Sciences.
LO 3. Understand and interpret the objective truth about religions, can classify the philosophical and theoretical aspects and social functions of religions.
LO 4. Demonstrate the culture of communication in everyday life.
LO 5. Regulate educational activities by using modern, interactive forms and methods of educational work in lessons and out-of-class activities. Use methods of self-control and ensure harmony of theory and practice. Manage collective and project work of students based on their age characteristics. Cooperate with the pedagogical staff and parents of learners (persons who replace them) in solving educational problems.
LO 6. Students will master C# programming, including OOP principles, algorithms, and .NET frameworks, while developing secure, high-performance applications. They'll gain expertise in mathematical physics, learning to analyze PDEs, wave equations, and harmonic functions. The program covers probability applications in physics, teaching statistical modeling of physical systems. Graduates will be equipped with strong analytical problem-solving skills and the ability to communicate complex technical concepts effectively across computational and theoretical physics domains.
LO 7. Students will master core calculus concepts (limits, derivatives, integrals), multivariable analysis (vector calculus, series), and differential equations (ODE solutions, modeling). The program develops rigorous analytical skills for solving real-world problems in physics, engineering,

and economics through mathematical modeling and proof-based reasoning.
LO 8. This course will enable students to: Understand: Experimental study of physical phenomena, application of modern experimental methods, ability to work with educational and scientific instruments and equipment. Apply: The student independently verifies and evaluates the fundamental laws and quantities of physics through experiments. Evaluate: Developing a theoretical model of physical phenomena and applying theoretical and experimental methods. Communicate: Strengthening theoretical knowledge acquired in mechanics, molecular physics, electricity and magnetism, optics, atomic nucleus, and elementary particles; conducting independent experiments and drawing conclusions based on the obtained results . Develop: the ability to learn and adapt to new physics concepts and methods.
LO 9. This courses provides foundational and advanced training in classical and modern physics. Students will master core principles of mechanics, electromagnetism, thermodynamics, optics, quantum physics, and nuclear physics. The curriculum emphasizes both theoretical understanding and practical application, developing skills to: analyze physical systems mathematically; solve real-world problems involving motion, energy, and waves; conduct and interpret experiments; and apply physics concepts to technology (circuits, lasers, medical imaging). Students will learn to evaluate models critically, compare theory with experimental data, and communicate scientific concepts effectively. The program prepares learners for advanced study or technical careers by integrating problem-solving, laboratory work, and modern research methodologies across all major physics disciplines.
LO 10. Students will master core physics principles (mechanics, thermodynamics, electromagnetism, optics) and modern teaching methodologies. They'll apply these through classroom demonstrations, laboratory experiments, and interactive problem-solving sessions

while utilizing educational technologies. The course develops skills to critically evaluate teaching effectiveness, analyze student outcomes, and assess experimental results. Participants will learn to clearly communicate complex physics concepts both verbally and in writing. Emphasis is placed on developing innovative instructional materials, fostering critical thinking, and creating engaging learning experiences. Graduates will gain comprehensive competencies for effective physics education, combining theoretical knowledge with practical teaching applications and problem-solving techniques.
LO 11. Students will develop comprehensive understanding and practical skills across key physics domains. In electromagnetism, they'll master fundamental laws, analyze circuits, and communicate complex concepts effectively. The physical ecology component focuses on applying thermodynamics to environmental systems, modeling ecological processes, and developing sustainability strategies. Spectroscopy studies will cover quantum foundations of optical spectra, light-matter interactions, and modern analytical applications. All courses emphasize: Deep theoretical knowledge of physical principles Hands-on experimentation and quantitative analysis Critical evaluation of models and experimental results Clear communication of scientific concepts Adaptive problem-solving for technological challenges Graduates will be equipped to connect theoretical physics with real-world applications, from circuit design to environmental protection and advanced spectroscopic analysis. The program cultivates both technical expertise and transferable scientific skills for research, industry, and education.
LO 12. Students will develop comprehensive understanding of electromagnetic and nuclear phenomena, mastering fundamental laws and their technological applications. They'll apply this knowledge to design electrical circuits, calculate nuclear reaction rates, and develop radiation detection systems. The course emphasizes critical analysis of theoretical models and experimental data, including assessment of safety and environmental impacts. Participants will refine skills in technical communication, clearly explaining complex

concepts in both written and oral formats. The program cultivates adaptive learning abilities to integrate emerging technologies with core physics principles for innovative problem-solving across energy systems, medical applications, and environmental protection.
LO 13. Core Physics Competencies Students will strengthen their understanding of fundamental physics principles across mechanics, electromagnetism, quantum physics, and thermodynamics. The curriculum integrates advanced mathematics including differential equations and tensor analysis to model complex physical systems. Participants will develop rigorous theoretical research capabilities while maintaining strong connections to practical applications. Quantum Mechanics Focus The program provides deep insight into microscopic physical laws and quantum phenomena. Students will master foundational quantum principles and their applications to real-world systems, analyzing complex behaviors at microscopic scales through both theoretical and computational approaches. Statistical Physics & Thermodynamics Participants will master statistical methods and thermodynamic laws, learning to: • Calculate system properties using partition functions • Analyze phase transitions and particle distributions • Evaluate models for ideal/non-ideal systems • Develop new approaches for complex systems
LO 14. This course equips students with fundamental knowledge of celestial phenomena and atmospheric processes. Learners will explore planetary motion, astrophysical principles, and Earth's atmospheric structure from surface to ionosphere. The curriculum develops skills in analyzing weather systems using thermodynamic diagrams, understanding radiation transfer, and explaining optical phenomena like sky colors. Students will apply physics principles to solve problems in orbital mechanics

and climate science while communicating scientific concepts effectively. The program emphasizes practical applications in space research and environmental studies.
LO 15. Active verb: What will be done/produced Understand: The new edition of the Constitution of the Republic of Uzbekistan is aimed at developing students' theoretical knowledge and practical skills in the field of application of legal norms. Apply: Skills for understanding the Constitution of the Republic of Uzbekistan in the new edition, which contains provisions on the norms of state sovereignty, people's power, the supremacy of the constitution and the law Analyze: analyze the norms regarding environmental guarantees and environmental rights in the new edition of the Constitution of the Republic of Uzbekistan, problematic situations related to justice, and related norms of legal documents; Synthesize: to synthesize thoughts on how to resolve problematic situations related to the right to education and important provisions concerning health care, reflected in the new edition of the Constitution of the Republic of Uzbekistan. Evaluate: evaluate the norms of state sovereignty, popular power, legality and the constitution.
LO 16. Get acquainted with modern techniques and technologies in science, culture and other fields, determine the available opportunities in the research field, apply theoretical knowledge in practice.

The following curriculum is presented for the Bachelor's programme Physics:

Module Code	Module Name	C/UC/E	ECTS	Theory, h	Practice, h
	Semester 1				
UYTB104	Modern History of Uzbekistan	C	4	2	2
XITB104	Foreign Language	C	4	0	4
MANB112	Mathematical Analysis	C	6	2	2
AAGB112	Linear Algebra and Analytic Geometry	C	6	2	2
FPKB124	Physics Practicum	C	4	0	4
MEXB106	Mechanics	C	6	4	2
			30	10	16
	Semester 2				
DINB204	Religious Studies	C	4	2	2
URTB104	Uzbek (Russian) Language	C	4	0	4
MANB112	Mathematical Analysis	C	6	2	2
AAGB112	Linear Algebra and Analytic Geometry	C	6	2	2
FPKB124	Physics Practicum	C	4	0	4
MOLB106	Molecular Physics	C	6	4	2
			30	10	16
	Semester 3				
FALB104	Philosophy	C	4	2	2
EIKB206	Computer Modeling of Physical Processes	C	6	2	2
FPKB124	Physics Practicum	C	4		4
ELMB206	Electricity and Magnetism	C	6	4	2
DFTB206	Differential Equations	C	6	2	2
PHY415	Methodology of Creating and Demonstrating Physics Experiments	E	2	1	1
PHY416	Physical Electronics				
PHY418	Physical Ecology				
DLRB441	The Newly Revised Constitution of the Republic of Uzbekistan	E	2	1	1
PHY419	Nuclear Technologies				
PHY420	Optical Spectra of Atoms and Molecules				
			30	12	14
	Semester 4				

FPKB124	Physics Practicum	C	4	0	4
OPTB206	Optics	C	6	4	2
NZMB206	Theoretical Mechanics	C	6	2	2
PHY309	Fundamentals of Nanophysics	E	6	4	2
PHY310	Physics of Energy Resources				
PHY311	Probabilistic Processes in Physics				
PHY312	Astronomy and Astrophysics	E	6	4	2
PHY313	Introduction to Atmospheric Physics				
PHY314	Methodology of Solving Physics Problems				
MAB219	Qualification Practice (Educational)	C	2	0	0
			30	14	12
	Semester 5				
UPPB308	General Pedagogy. General Psychology	C	4	2	2
FPKB124	Physics Practicum	C	4	0	4
RADB306	Fundamentals of Radio Electronics	C	6	2	4
ATFB308	Atomic Physics	C	6	2	2
EDNB306	Electrodynamics	C	6	2	2
PHY315	Physics of Semiconductors and Dielectrics	E	4	2	2
PHY316	Nuclear Energy				
PHY317	Programming Microcontrollers and Fundamentals of Robotics				
			30	10	16
	Semester 6				
UPPB308	General Pedagogy. General Psychology	C	4	2	2
FPKB124	Physics Practicum	C	4	0	4
YADB306	Physics of Atomic Nucleus and Elementary Particles	C	6	2	2
KVMB310	Quantum Mechanics	C	6	3	3
PHY410	Applied Optics	E	8	2	6
PHY413	Nuclear Astrophysics				
PHY414	Solid State Physics				
MAB2019	Qualification Practice (Educational)	C	2	0	0
			30	9	17
	Semester 7				
FOMB406	Methodology of Teaching Physics	C	6	2	2
MMFB406	Methods of Mathematical Physics	C	6	2	2
TSFB406	Thermodynamics and Statistical Physics	C	6	3	3
PHY403	Laser Physics	E	6	4	2
PHY404	Medical Physics				
PHY405	Elementary Devices of Nuclear Physics				
PHY406	Physics of Polymers and Nanotechnology	E	6	2	4
PHY407	Nuclear Technologies				
PHY408	Optical Spectra of Atoms and Molecules				
			30	13	13
	Semester 8				
MAB219	Pedagogical Practice	C	8	0	8
MAB219	Qualification Practice	C	7	0	7
YDAB415	Final State Certification	C	15	0	15
			30	0	30

Total ECTS
Theoretical course: **204**
Non Theoretical course: **36**
Sum: **240**

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

Learning Outcomes
LO 1. As a result, the course introduces masters to the specific aspects of scientific research, including working on a master's thesis, preparing it, and assisting in its preparation at the required level. It teaches how to use general philosophical, general scientific, and special scientific methods in scientific research, and creates the opportunity to correctly understand the requirements for a master's thesis.
LO 2. Understanding the principles, laws, methods, and criteria of teaching mathematics in higher education. Developing skills to integrate and apply knowledge gained from pedagogy, psychology, and mathematics. Being capable of evaluating existing methodologies, improving them, and developing new teaching approaches. Forming a reflective approach necessary for planning, analyzing, and improving pedagogical activities. Applying innovative approaches to teaching mathematics using information and communication technologies.
LO 3. The student in the subject should have an idea of the general foundations of the science of pedagogical technologies and modern teaching methods, subjects and categories of teaching methodologies; Know and be able to use the laws, concepts, categories, and characteristics of psychological processes in the science of pedagogical technologies and modern teaching methods;The student must have the skills to apply methods of analyzing pedagogical and psychological processes and to adopt solutions to pedagogical problems.
LO 4. The Theory of Measures and Integrals is a branch of mathematics focused on the study of measures, integrals, and related concepts. It forms a crucial foundation for various fields like probability theory, functional analysis, and real analysis.
LO 5. The Theory of Operators in Banach Spaces is a key area in functional analysis that deals with the study of linear operators acting on Banach spaces. Banach spaces are complete normed vector spaces, and operators on these spaces are studied to understand their properties and applications in various mathematical fields. This subject is foundational in many areas of mathematics, including analysis, quantum mechanics, and differential equations.
LO 6. The **Modern Methods of Mathematical Physics** is a branch of applied mathematics that focuses on the mathematical techniques and theories used to understand

and solve problems in physics, particularly in fields like quantum mechanics, classical mechanics, statistical mechanics, and field theory. The subject integrates mathematical rigor with physical insight to develop methods for describing physical phenomena in a precise and systematic way
LO 7. All fields revolve around potential theory, they involve the study of differential operators and singularities, they serve as a bridge between geometry and analysis, they have deep connections with mathematical physics and partial differential equations
LO 8. All fields contribute to the development of modern mathematical techniques, they involve advanced analytical tools and theoretical foundations, they have significant interdisciplinary applications in physics, computer science, and engineering, they serve as bridges between classical and modern mathematical research
LO 9. Both fields deal with complex analysis in multiple dimensions, they involve harmonic analysis and functional spaces, their methods are fundamental in complex geometry, number theory, and mathematical physics, they study the structure of domains and their influence on function theory
LO 10. Both fields deal with the geometry and analysis of complex structures, they involve iterative behavior, stability, and geometric deformations, they have applications in mathematical physics, topology, and nonlinear analysis, quasiconformal mappings are often used in the study of dynamical systems, especially in hyperbolic geometry.
LO 11. All three are fundamental to academic research and professional development, they emphasize critical thinking, problem-solving, and scientific communication, they serve as a pathway for higher education, research careers, and innovation, they are interconnected, where scientific seminars enhance research work, which contributes to the dissertation

LO 12. Scientific and pedagogical work combines academic research with teaching activities, aiming to advance knowledge and effectively educate students. It involves conducting scientific investigations, publishing research, developing curricula, and applying innovative teaching methods
LO 13. Scientific Internship (Practical Training) is a structured program designed to provide hands-on experience in scientific research and professional development. It allows students and young researchers to apply theoretical knowledge in real-world settings, conduct independent research, and gain expertise in their field.
LO 14. Can develop a deep understanding of the fundamental principles of harmonic analysis and distribution theory, apply these concepts to solving mathematical models in physics, engineering, and related fields, analyze problem formulations to determine existence and uniqueness of solutions, and enhance problem-solving skills for advanced studies in specialized disciplines.
LO 15. Analyze and solve finite difference equations of first and higher orders; Apply criteria for linear dependence and independence of functions; Work with the Hill equation and its solutions, including stability and trajectory analysis; Solve inverse spectral problems using algorithms for discrete systems; Integrate complex periodic nonlinear equations, such as the Toda equation, with various sources; skills Mathematical modeling; Working with discrete systems and their models; Analyzing the structure and properties of linear and nonlinear equations; Working with integrable systems; Solving complex mathematical problems related to discrete and periodic systems.
LO 16. Students will be able to understand the concepts and loaded differential equations;Students will be able to apply loaded differential equations to real-world problems
LO 17. Comprehending the scientific, psychological, and pedagogical foundations of the mathematics curriculum's content and structure, as well as gaining an understanding of teaching methods and tools in mathematics.Implementing modern pedagogical technologies, interactive methods, and technical tools in mathematics teaching, as well as utilizing methods for assessing students' knowledge.
LO 18. Students can investigate local and nonlocal boundary value problems for partial differential equations;Students can reduce mathematical models of physical phenomena and processes to partial differential equations

The following curriculum is presented for the Master's programme Mathematics:

Module Code	Module name	C/UC/E	ECTS	Theory, hrs	Practice, hrs
Semester 1					
ITMM151	Scientific Research Methodology	C	2	1	1
OINM151	Theory of Measures and Integrals	C	5	2	2
BFOM151	Theory of Operators in Banach Spaces	C	5	2	2
MFZM151	Modern Methods of Mathematical Physics	C	5	2	2
ITMD425	Scientific Research Work and Preparation of the Master's Dissertation	C	7	0	0
ISMI248	Scientific Seminar	C	2	0	2
IPIMI312	Scientific and Pedagogical Work	C	4	0	0
Semester 2					
MFOM152	Methodology of Teaching Specialized Subjects	C	5	2	2
PTTM253	Pedagogical Technologies and Modern Teaching Methods	C	5	2	2
PNAM152	Theory of Potentials	E	5	2	2
KANM152	Mathematical Analysis on Manifolds				
ITPM152	Integral Equations and Pseudodifferential Operators				
DISM152	Dynamical Systems				
KKFM152	Theory of Functions of Several Complex Variables	E	5	2	2
KVAM152	Quasiconformal Mappings				
XTTM152	Direct and Inverse Problems for Partial Differential Equations				
YDTM152	Loaded Differential Equations and Their Applications				

ITMD425	Scientific Research Work and Preparation of the Master's Dissertation	C	4	0	0
ISMI248	Scientific Seminar	C	2	0	2
IPIMI312	Scientific and Pedagogical Work	C	4	0	0
Semester 3					
PPNM253	Theory of Pluripotentials	E	5	2	2
AMBM253	Special Topics in Analysis				
DOSM253	Spectral Theory of Differential Operators				
GANM253	Harmonic Analysis and Theory of Distributions				
OMSHM253	Theory of Currents and m-Subharmonic Functions	E	5	2	2
KDSM253	Complex Dynamical Systems				
DFSM253	Nonlinear Evolution Equations in the Class of Periodic Functions				
XXDM253	Nonclassical Partial Differential Equations				
MZMM253	Modern Problems in Mathematics	E	5	2	2
KSAM253	Analysis in Classical Domains				
DXTM253	Inverse Problems for Discrete Hill Equations and Their Applications				
YTORKM253	New Edition of the Constitution of the Republic of Uzbekistan				
ITMD425	Scientific Research Work and Preparation of the Master's Dissertation	C	8	0	0
	Coursework (Scientific Research Work and Preparation of the Master's Dissertation)	C	1	0	0
ISMI248	Scientific Seminar	C	2	0	2
IPIMI312	Scientific and Pedagogical Work				
Semester 4					
ISMI248	Scientific Seminar	C	2	0	2
ITMD425	Scientific Research Work and Preparation of the Master's Dissertation	C	5	0	0
IATM113	Scientific Internship (Practical Training)	C	13	0	0
DAM10	State Attestation (Defense of the Master's Dissertation)	C	10	0	0

Total ECTS
Theoretical course: **21**
Non Theoretical course: **99**
Sum: **120**

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

Learning Outcomes // O'quv natijalari
LO 1. This program develops scientific research competencies, emphasizing theory-practice integration and evidence-based methodology. Students will master research design, thesis preparation, and application of philosophical/scientific methods. The curriculum builds specialized teaching skills, including lesson planning, pedagogical strategies, and adaptive instruction for diverse learners. Participants will learn modern physics research techniques, data analysis, and effective result presentation, preparing them for both academic and applied scientific careers.
LO 2. Students will master analysis of nonlinear systems (bifurcations, oscillations) and electromagnetic wave propagation through various media. The program develops mathematical modeling skills using analytical and computational methods, with applications in optics, materials science, and biological systems. Graduates gain research capabilities in complex wave phenomena and nonlinear behavior.
LO 3. This courses provides fundamental knowledge of solid-state physics and advanced surface science, covering electronic, thermal, and structural properties of materials. Students will master modern surface characterization techniques (STM, AFM, SEM) and thin-film technologies, while developing research skills for materials science applications. The program emphasizes both theoretical understanding and experimental analysis of surfaces and interfaces.
LO 4. This course explores polymer physics and chemistry, focusing on molecular/supramolecular structures and their impact on material properties. Students will analyze polymer behavior during phase transitions, crystallization, and deformation while learning industrial processing methods. The curriculum covers polymerization techniques, structure-property relationships, and practical applications of polymeric materials.
LO 5. This program provides comprehensive training in optoelectronic devices, optical measurement techniques, and light-matter interactions. Students will gain practical skills in working with lasers, photodetectors, and fiber optic systems while developing theoretical understanding of optical phenomena. The curriculum covers applications in communications, sensing, metrology, and spectroscopy,

preparing graduates for careers in photonics research and industry.
LO 6. This program combines theoretical quantum physics (QCD, quark-gluon dynamics) with applied optical technologies for nanomaterial analysis. Students will master both fundamental particle interactions and modern optical characterization methods, developing skills for research in particle physics and nanoscale material science.
LO 7. Active verb: What will be done/produced Objectives: to acquire theoretical and practical knowledge, To acquire knowledge, skills and qualifications in the field of pedagogical technology and modern forms of education for teaching undergraduates and knowing reflexes in the intellectual, emotional, personality, and communicative aspects of future professional activity and developing skills. Objectives: - The student in the subject should have an idea of the general foundations of the science of pedagogical technologies and modern teaching methods, subjects and categories of teaching methodologies; - Know and be able to use the laws, concepts, categories, and characteristics of psychological processes in the science of pedagogical technologies and modern teaching methods; - The student must have the skills to apply methods of analyzing pedagogical and psychological processes and to adopt solutions to pedagogical problems.

The following **curriculum** is presented for the Master's programme Physics:

Module Code	Module Name	C/UC/E	ECTS	Theory, h	Practice, h
	Semester 1				
ILTM1106	Research Methodology	C	6	2	2
MFOM1106	Teaching Methodology of Specialized Subjects	C	6	2	2
MFIZ1205	Modern Research Methods in Physics	C	6	2	2
NTTN1106	Theory of Nonlinear Oscillations and Waves	C	6	2	2
MITI3314	Scientific Research Work and Preparation of a Master's Thesis	C	2	0	0
MIPI3504	Scientific and Pedagogical Work	C	4	0	0
			30	8	8
	Semester 2				
ENMT1206	Interaction of Electromagnetic Radiation with Media	C	6	2	2
KDMF1206	Physics of Condensed Matter	C	6	2	2
MNFF2115	Mathematical Methods of Theoretical Physics	E	4	2	2
MNFF2125	Physics and Surface Diagnostics				
MPOL2215	Physics and Chemistry of Polymers	E	4	2	2
MPOL2225	Synthesis, structure, and properties of polymers.				
MITI3314	Scientific Research Work and Preparation of a Master's Thesis	C	6	0	0
MIPI3504	Scientific and Pedagogical Work	C	4	0	0
			30	8	8
	Semester 3				
MLZF2315	Fundamentals of Optoelectronics	E	4	2	2
MLZF2325	Optical metrology				
MNFF3215	Pedagogical Technologies and Modern Teaching Methods	E	5	2	2
MNFF3225	Quantum chromodynamics				
MLZF3115	Spectral Analysis	E	5	2	2
MOPT3125	Classical and Modern Foundations of Molecular Optics				
MOPT3215	Physical Foundations of Fiber Optic Devices	E	2	1	1
MOPT3225	Nanophysics				
MITI3314	Scientific Research Work and Preparation of a Master's Thesis	C	10	0	0
MIPI3504	Scientific and Pedagogical Work	C	4	0	0
			30	7	7
	Semester 4				
MITI3314	Scientific Research Work and Preparation of a Master's Thesis	C	12	0	12
MILA4218	Scientific Practice (Internship)	C	8	0	8
YDAM4310	Defense of the Master's Thesis	C	10	0	10
			30	0	30

According to the SAR, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Master's programme Mathematical Engineering:

Learning Outcomes // O'quv natijalari
LO 1. The purpose of science: The goal of teaching science is to develop a scientific research program and develop the skills to adhere to the unity of theory and practice. The task of science: The task of science is to conduct scientific research, understand the role of scientific evidence, and use knowledge as the main methodological tool in preparing a scientific research paper. The course introduces masters to the specific aspects of scientific research, including working on, preparing, and assisting in the preparation of a master's thesis at the required level. It teaches how to use general philosophical, general scientific, and special scientific methods in scientific research, and creates the opportunity to correctly understand the requirements for a master's thesis.
LO 2. Apply: The student will be able to apply Numerical Methods in Real-World Problems. Intended outcomes: Understand Numerical Approximation, Analyze and Control Errors, Solve Nonlinear Equations, Solve Systems of Linear and Nonlinear Equations, Perform Interpolation and Curve Fitting, Compute Numerical Differentiation and Integration, Apply Numerical Techniques for Differential and Integral Equations.
LO 3. The purpose of teaching the subject is to develop knowledge, skills and competencies in students in accordance with the profile of the educational field, including the creation of information systems for managing technological processes and the use of programming languages to create these systems, concepts such as programming, the concept of classes, properties, events, methods, components, inheritance, polymorphism, encapsulation, programming systems, the use of graphical programming capabilities, the use of flows and dynamic libraries, and program testing.
LO 4. The purpose of teaching the subject "Methodology of Teaching Specialized Subjects" is to familiarize undergraduates with the possibilities of using new information and pedagogical technologies, based on the specific characteristics of teaching subjects in the field of informatics and information technologies in higher and secondary specialized educational institutions.
LO 5. Objectives: Understand the fundamental properties of fluids and their behavior under static and dynamic conditions. Apply the basic principles of fluid mechanics, including conservation laws and Bernoulli's equation, to solve real-world problems. Analyze fluid flow in pipes,

channels, and around objects, considering laminar and turbulent flow regimes. Learning Outcomes: Knowledge on essential fluid properties such as density, viscosity, pressure, the Bernoulli equation and conservation laws to fluid flow problems, between laminar and turbulent flow using Reynolds number, solving practical fluid mechanics problems related to engineering applications.
LO 6. Start by discussing the computational contributions of contemporary numerical simulations and the details of the equation models used in fluids, solids, or acoustics. To relate to the basic and general mathematical ideas from a theoretical standpoint and use them in the mechanical engineering setting. To give a worldwide summary of the numerical techniques applied to mechanics (solids, fluids): Tto parameterise the fundamental computational code using traditional discretisation techniques (finite elements, finite volumes); the comprehension of the unique techniques used in computational codes to ascertain parameters in solids and fluids.
LO 7. The main goal of this course is to deepen the knowledge of nonlinear systems, to teach students theoretical and practical concepts related to nonlinear systems. During the course, students will have the opportunity to learn methods for solving nonlinear differential equations, analyze the stability of systems, study the phenomena of chaos and bifurcation, as well as simulate nonlinear systems by supporting programming tools such as MATLAB
LO 8. The course aims to equip students with the fundamental concepts and techniques of Optimization and Process Analysis (OR). It focuses on developing students' ability to formulate, analyze, and solve complex decision-making problems using mathematical models and computational techniques. By the end of the course, students will be able to apply optimization methods in various real-world applications such as logistics, finance, engineering, and artificial intelligence. Learning outcomes: Understand the fundamental concepts, principles, and methodologies of Optimization and Process Analysis. Formulate mathematical models for optimization problems, including linear, nonlinear, integer, and dynamic programming models. Apply the Simplex Method, Duality Theory, and Sensitivity Analysis to solve Linear Programming (LP) problems. Analyze Integer Programming and combinatorial optimization problems using Branch and Bound, Branch and Cut, and heuristic methods. Solve

complex optimization problems using Dynamic Programming and understand its applications in decision-making.
LO 9. To apply several of the most important numerical methods for solving initial value problems and boundary value problems; to derive some of the simpler methods from first principles; to know the strengths and weaknesses of the various methods and be able to decide which ones are appropriate for a particular problem; to decide whether a numerical method is stable and to give simple error estimates; to implement MATLAB for the solution of differential equations; to solve systems of linear equations by direct methods; to use iterative methods to solve systems of non-linear equations.
LO 10. Active verb: What will be done/produced Objectives: to acquire theoretical and practical knowledge, To acquire knowledge, skills and qualifications in the field of pedagogical technology and modern forms of education for teaching undergraduates and knowing reflexes in the intellectual, emotional, personality, and communicative aspects of future professional activity and developing skills. Objectives: - The student in the subject should have an idea of the general foundations of the science of pedagogical technologies and modern teaching methods, subjects and categories of teaching methodologies; - Know and be able to use the laws, concepts, categories, and characteristics of psychological processes in the science of pedagogical technologies and modern teaching methods; - The student must have the skills to apply methods of analyzing pedagogical and psychological processes and to adopt solutions to pedagogical problems.
LO 11. To teach students to create high-quality and beautiful scientific articles, reports, and presentations using LaTeX. To master the formatting of complex equations and data tables for mathematics, physics, and other scientific fields. To learn to use software tools to quickly and accurately solve mathematical and technical problems. To develop algorithms for solving complex problems by writing functions and scripts in the MATLAB environment. Students will gain skills in beautifully formatting and preparing scientific articles, dissertations, and books using LaTeX. Students will also learn how to effectively use MATLAB to automate mathematical problems and develop algorithms.

The following **curriculum** is presented for the Master's programme Mathematical Engineering:

Module Code	Module name	C/E	ECTS	Theory, hrs	Practice, hrs
Semester 1					
ITMM112	Scientific Research Methodology	C	2	1	1
DATM151	Programming Languages	C	5	2	2
USUM151	General Numerical Methods	C	5	2	2
MFZM152	Modern Methods of Mathematical Physics	C	5	2	2
ITIM1251	Scientific Research and Master's Thesis Preparation	C	7	0	0
IPIM1121	Scientific and Pedagogical Work	C	4	0	0
ILSM181	Scientific Seminar	C	2	0	2
Semester 2					
MFOM125	Methodology of Teaching Specialized Subjects	C	5	2	2
SUMM152	Fluid Mechanics	E	5	2	2
MMSM152	Numerical Modeling of Mechanical Problems	E			
NOTM152	Nonlinear Systems	E	5	2	2
OJTM152	Optimization and Process Analysis	E			
ODTM152	Numerical Methods for Solving Ordinary Differential Equations	E	5	2	2
CHEM152	Finite Elements	E			
ITIM1251	Scientific Research and Master's Thesis Preparation	C	4	0	0
IPIM1121	Scientific and Pedagogical Work	C	4	0	0
ILSM181	Scientific Seminar	C	2	0	2
Semester 3					
PTTM135	Pedagogical Technologies and Modern Teaching Methods	C	5	2	2
XHTM253	Numerical Methods for Partial Differential Equations	E	5	2	2
IDTM253	Scientific Software				
SDSM253	Numerical Methods in Fluid Dynamics	E	5	2	2
TGMB253	Numerical Solution of Wave Hydrodynamics Problems				
ITIM1251	Scientific Research and Master's Thesis Preparation	C	9	0	0
IPIM1121	Scientific and Pedagogical Work	C	4	0	0
ILSM181	Scientific Seminar	C	2	0	2
Semester 4					
ITIM1251	Scientific Research and Master's Thesis Preparation	C	5	0	0
ILSM181	Scientific Seminar	C	2	0	2
IASM2180	Scientific Internship (Practical Training)	C	13	0	0
DAM10	State Attestation (Master's Thesis Defense)	C	10	0	0

Total ECTS
Theoretical course: **25**
Non Theoretical course: **95**
Sum: **120**