



**ASIIN Seal**

## **Accreditation Report**

**Bachelor's Degree Programs**

***Mathematics***

***Actuarial and Financial Mathematics***

***Applied Statistics and Data Science***

**Master's Degree Programs**

***Financial Mathematics***

***Mathematics and Applications***

***Applied Statistics and Data Science***

Provided by

**Yerevan State University**

Version: 27 March 2026

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## A About the Accreditation Process

Name of the degree program (in original language)	(Official) English translation of the name	Labels applied for <sup>1</sup>	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC) <sup>2</sup>
Մաթեմատիկա Matematika	Mathematics	ASIIN	-	12
Մաթեմատիկա և կիրառություններ Matematika ev kirarutyunner	Mathematics and Applications	ASIIN	-	12
Կիրառական վիճակագրություն և տվյալների գիտություն Kirarakan vichakagrutyun ev tvyalneri gitutyun	Applied Statistics and Data Science	ASIIN	-	12
Կիրառական վիճակագրություն և տվյալների գիտություն Kirarakan vichakagrutyun ev tvyalneri gitutyun	Applied Statistics and Data Science	ASIIN	-	12
Ակտուարական և ֆինանսական մաթեմատիկա Aktuarakan ev financakan matematika	Actuarial and Financial Mathematics	ASIIN	-	12
Ֆինանսական մաթեմատիկա Financakan matematika	Financial Mathematics	ASIIN	-	12
<b>Date of the contract:</b> 05.02.2024				

<sup>1</sup> ASIIN Seal for degree programs

<sup>2</sup> 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.

<p><b>Submission of the final version of the self-assessment report:</b> 25.11.2025</p> <p><b>Date of the onsite visit:</b> 11.-13.03.2025</p> <p><b>at:</b> YSU</p>	
<p><b>Expert panel:</b></p> <p>Prof. Dr. Günter Gramlich, TH Ulm</p> <p>Prof. Dr. Bettina Harriehausen-Mühlbauer, HS Darmstadt</p> <p>Prof. Dr. Georg Illies, OTH Regensburg</p> <p>Dr. Juan Carlos Matutat, Mercedes Benz AG</p> <p>Prof. Dr. Armenak Babayan, National Polytechnic University of Armenia</p> <p>Meri Basoyan, EKLYA School of Business / European University of Armenia</p>	
<p><b>Representative of the ASIIN headquarter:</b> Maria Mothes, M.A.</p>	
<p><b>Responsible decision-making committee:</b> Accreditation Commission for Degree Programs</p>	
<p><b>Criteria used:</b></p> <p>European Standards and Guidelines as of May 15, 2015</p> <p>ASIIN General Criteria, as of March 28, 2023</p> <p>Subject-Specific Criteria of Technical Committee 12 – Mathematics as of December 9, 2016</p>	

## B Characteristics of the Degree Programs

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF <sup>3</sup>	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Mathematics	Matematikayi bakalavr / Bachelor of Mathematics	Mathematics	6	Full time	-	8 Semester	240 ECTS	1997/98 AY
Mathematics and Applications	Matematikayi magistros / Master of Mathematics	Mathematics	7	Full time	-	4 Semester	120 ECTS	2020/21 AY
Applied Statistics and Data Science	Vichakagrutyan bakalavr / Bachelor of Statistics	Statistics and Data Science	6	Full time	-	8 Semester	240 ECTS	2019/20 AY
Applied Statistics and Data Science	Vichakagrutyan magistros / Master of Statistics	Statistics and Data Science	7	Full time	-	4 Semester	120 ECTS	2018/19 AY
Actuarial and Financial Mathematics	Finansakan matematikayi bakalavr / Bachelor of Financial Mathematics	Financial Mathematics	6	Full time	-	8 Semester	240 ECTS	2003/04 AY
Financial Mathematics	Financakan matematikayi magistros / Master of Financial Mathematics	Financial Mathematics	7	Full time	-	2 Semester	60 ECTS	2023/24 AY

For the Bachelor's degree program Mathematics, the institution has presented the following profile on its website:

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<sup>3</sup> EQF = The European Qualifications Framework for lifelong learning

„The program aims to provide students with knowledge about various fields of mathematics, to familiarize them with modern programming languages and their application for solving various problems, to prepare specialists to teach "Mathematics" in public schools, to motivate them to continue their education in Master's and Postgraduate programs, as well as to do further scientific research, and to engage in pedagogical activities.”

For the Master's degree program Mathematics and Applications, the institution has presented the following profile on its website:

„The 'Mathematics and Applications' master's program is designed to enhance students' expertise in mathematical analysis, function theory, linear topological spaces and general theory of operators. It aims to develop comprehensive theoretical knowledge and practical skills in key areas such as algebra, real and complex analysis, probability theory and statistics, differential equations, and functional analysis.”

For the Bachelor's degree program Applied Statistics and Data Science, the institution has presented the following profile on its website:

“The aim of the educational program is to provide students with theoretical and applied knowledge in the field of statistics and data science, give opportunity to get a modern and in-demand specialty.”

For the Master's degree program Applied Statistics and Data Science, the institution has presented the following profile on its website:

“The program aims to equip students with theoretical and applied knowledge in the fields of statistics and data science, providing an opportunity to obtain a modern and in-demand profession.”

For the Bachelor's degree program Actuarial and Financial Mathematics, the institution has presented the following profile on its website:

“The program aims to provide students with basic knowledge of various fields of mathematics, in particular, financial and actuarial mathematics for the management of financial flows of organizations, and to impart knowledge related to risk management.”

For the Master's degree program Financial Mathematics, the institution has presented the following profile on its website:

“The program is designed to train professionals in the field of mathematics with a focus on finance. Specifically, it prepares individuals for careers as financial analysts, financial tool developers, and financial flow managers. Graduates will be equipped to work effectively in

both state systems and the financial sector, including investment, hedging, banking, insurance, and other related areas, as well as in non-financial sector institutions.”

The Faculty of Mathematics and Mechanics at Yerevan State University (YSU) operates within a broader university structure comprising 21 faculties, each organized into chairs and institutes—96 in total. While accreditation is not mandatory, YSU has previously pursued accreditation in biology and pharmacy. As the oldest university in the country, YSU shows a strong awareness for the value of accreditation for institutional development, student benefit, and the overall improvement of graduate quality, ultimately contributing to national progress. The university’s strategic plan for 2025–2030 aligns with the national strategy, which acknowledges education as a foundational pillar for state development. This strategy emphasizes human resources, the quality of teaching and administrative staff, robust quality assurance systems, and globally competitive education. YSU actively engages in internationalization efforts, including participation in seven Erasmus+ projects that facilitate staff and student mobility. Its alumni are well-prepared to compete internationally and often secure positions around the world, reflecting the institution’s strong emphasis on both educational programs and scientific achievements. Although current legislation limits instruction to the Armenian language, a new law in circulation may lift this restriction, which would enable the university to expand international student enrollment. In this case, YSU intends to acquire more faculty with strong English proficiency as well.

While Armenia maintains historical academic ties with Russia—many faculty members earned their PhDs in Moscow and maintain collaborative relationships including joint research and publications—the university emphasizes that the Armenian educational system is not dependent on Russia. Instead, it has long-standing international connections, with graduates frequently continuing their studies or careers across Europe, the U.S., and beyond. YSU maintains strong publication ties, with over 500 joint publications with Germany, followed by the United States. Returning graduates also contribute significantly to Armenia’s development, further reinforcing the university’s national and international impact.

## **C Expert Report for the ASIIN Seal**

### **1. The Degree Program: Concept, Content & Implementation**

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

**Evidence:**

- Self-Assessment Report
- Module descriptions
- Syllabi
- Website YSU: <https://www.y-su.am/en>
- Website Faculty of Mathematics and Mechanics: [Faculty of Mathematics and Mechanics | YSU](#)
- Discussions during the audit

**Preliminary assessment and analysis of the experts:**

At Yerevan State University (YSU), the study programs related to Mathematics distinguish themselves through a unique academic focus on mathematical fundamentals, unlike other universities in Armenia that primarily offer pedagogical training to prepare future teachers. This specialization leaves YSU with little direct competition and ensures its graduates are in high demand across various industries. The university emphasizes that all master's students are employed—often with high salaries—by the time they graduate. YSU pioneered in the Financial Mathematics program in Armenia, with other institutions only developing similar offerings later, often with support from YSU. Data Science has become one of the most sought-after study programs, while traditional Mathematics has seen a decline in popularity. Nevertheless, employers—particularly banks—continue to favor graduates from Mathematics and Finance programs (notably Actuarial Mathematics) over those from Economics, highlighting the value placed on rigorous quantitative training.

The representatives of the Rector's office and the program coordinators highlight YSU's view of the foundational teaching of Mathematics as a civic responsibility, especially amid rapid technological advancements such as those in Artificial Intelligence (AI). The experts are told for instance, that NVIDIA recently opened an office in Yerevan and built a research center for hundreds of engineers.

The university actively aligns its programs with the Bologna Process and is committed to keeping up with evolving industry needs and technological trends. For instance, the creation of new programs like Data Science is driven by industry demand: companies approach the university to request the training of specialists, prompting YSU to collaborate with international partners (e.g., in Dijon, France) and to obtain the necessary government licenses—a process that typically takes 1.5 to 2 years. These programs are designed in close consultation with stakeholders and include practical components such as internships, some

of which are paid. YSU ensures strong industry engagement by involving sector representatives on program boards—a new strategic measure—where they contribute to curriculum development, serve as advisors, and may also teach. This model not only enhances educational relevance but also strengthens graduate employability across Armenia and beyond.

During the on-site discussions, the experts learn that only about half of the mathematics graduates at YSU find employment in their specific field. Although the university maintains close ties with industry partners, many students have to requalify or shift their focus due to limited direct job opportunities in Mathematics. This is particularly evident at the master's level, where many applicants are already employed and adjust their specialization accordingly. Moreover, Mathematics graduates cannot pursue teaching without additional pedagogical training. The number of enrolled students has recently declined—partly due to intentional efforts to raise admission standards—but only about 50% of students complete the program within four years. Factors contributing to non-completion include mandatory military service for male students, academic underperformance, and emigration, the experts are told. A similar situation exists in the Financial Mathematics program.

International partnerships, such as those with Le Mans University in France and the University of Trier in Germany, have facilitated student mobility, with several YSU graduates continuing their master's studies abroad—although most do not return to Armenia. The number of incoming international students remains very low, aside from a few postdoctoral researchers at the research center, some of whom are from Iran or Georgia and have Armenian roots. Language remains a significant barrier to broader international participation.

Regarding learning outcomes (LOs), the experts observed that those defined for the bachelor's and master's programs in Data Science are quite similar. The program coordinators explained that these outcomes were developed in 2018, during an early phase when the department was still working toward a clear distinction between academic levels. The Data Science curriculum assumes some basic programming knowledge and builds on this with more advanced skills. However, many students struggle with the applied components in the first semester.

YSU is also engaged in several initiatives to align programs more closely with market needs. Through an Erasmus+ project, a new program in Financial Mathematics is currently developed. In collaboration with partners in Dubai and the U.S., YSU is launching a blockchain-related training program, with industry professionals contributing as lecturers and the university trains future specialists. In Data Science, a one-year master's program is currently planned in addition to the existing two-year track. This shift reflects the growing number of students now entering the program with stronger foundational knowledge, which in the

past required the full two years to cover basics such as mathematics and algebra. As student numbers rise, the department reports to now effectively offer both formats.

The experts conclude that the programs' objectives and learning outcomes are clearly defined, publicly available. They enable graduates to pursue relevant careers in line with the European Qualifications Framework. Their relevance to the labor market and society is regularly reviewed with input from academic and industry stakeholders and updated as needed. However, based on the LOs and sample exams reviewed on-site, the experts emphasize that the different EQF levels (European Qualifications Framework) have to be adequately reflected in the exams. Within this framework, level 6 (bachelor's) typically emphasizes the application of knowledge in broad contexts, development of analytical and problem-solving skills, and some degree of research autonomy. In contrast, level 7 (master's) demands a higher degree of originality, critical evaluation, and the ability to conduct independent research or apply advanced knowledge to unfamiliar or complex contexts. Upon assessing whether LOs in the bachelor's and master's programs under review reflect this progression in cognitive demand, complexity, and learner autonomy, the experts notice the lack of such clear distinction in the LOs. In order to avoid misaligned teaching, insufficient academic progression, and difficulties in international recognition of qualifications caused by ambiguous or overlapping LOs, the university needs to update the LOs with reference to EQF descriptors and ensure they are measurable, specific, and level-appropriate. The experts are convinced that this will strengthen curriculum coherence, support student learning, and enhance international comparability of degrees.

In general, the experts are impressed by the overall quality of the study programs. They commend YSU for the strong commitment demonstrated by the Rector, university leadership, and staff. All stakeholders are highly accessible, fostering a culture of open and respectful communication across all levels. The experts also highlight the high level of satisfaction among staff and industry partners regarding the quality of the students.

<b>Criterion 1.2 Name of the Degree Program</b>
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**Evidence:**

- Self-Assessment Report
- Module descriptions
- Syllabi
- Discussions during the audit

**Preliminary assessment and analysis of the experts:**

The experts confirm that the original Armenian names reflect the programs' objectives and intended learning outcomes appropriately. The English translations of the names adequately reflect the focus and content of the study programs. Students confirm that after studying in the programs, they would recommend it to others or study it again.

<b>Criterion 1.3 Curriculum</b>
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**Evidence:**

- Self-Assessment Report
- Module descriptions
- Syllabi
- Discussions during the audit

**Preliminary assessment and analysis of the experts:**

*Content and Structure*

The curricula of the bachelor's and master's study programs (SP) at YSU are structured to ensure students achieve the intended learning outcomes (LOs). Each SP includes a curriculum map linking individual modules and courses to specific LOs, ensuring alignment between course content and the program's overall competence profile. The bachelor's programs typically span 240 ECTS credits over eight semesters, while master's programs range from 60 to 120 ECTS credits, depending on the specialization. These curricula comprise general and specialized components, integrating mandatory and elective courses designed to build both foundational and advanced competencies. For example, in fields such as financial mathematics, actuarial science, and data science, the curriculum balances theoretical knowledge (e.g. in analysis, probability, statistics) with applied skills (e.g. programming, machine learning, financial modelling). In addition, work practice is a mandatory and well-integrated part of the curriculum for both bachelor's and master's programs. It is organized in collaboration with industry partners and research institutions and includes weekly online progress tracking and reporting. The practice is assessed on a pass/fail basis and contributes directly to the acquisition of practical competencies. For master's students, the practice often complements their thesis work and is frequently hosted by the same organizations. Students in data science, for instance, are placed in leading IT companies, while those in financial mathematics complete their practice in banks, government ministries, or financial institutions. Feedback from all stakeholders, including industry supervisors, confirms that the internships effectively support students in achieving the intended LOs. The univer-

sity highlights that the absence of significant problems and the strong employment outcomes of graduates further reflect the curriculum's success in combining academic rigor with practical relevance.

Each module is clearly structured to support the acquisition of specific LOs aligned with the broader goals of the respective degree programs. The coherence, sequencing, and academic level of modules are ensured through alignment with the Armenian National and Sectoral Qualifications Frameworks. Course descriptors and curriculum maps detail the teaching, learning, and assessment methods used, and modules are regularly reviewed and updated through consultations among faculty, coordinators, and external stakeholders to maintain alignment with academic and industry standards.

The university emphasizes that modules are arranged in a logical sequence, allowing students to progressively build knowledge and skills. If a module no longer fits the program's objectives, it is revised or replaced. For example, outdated finance courses were removed from the curriculum and replaced. Regular monitoring ensures that all modules remain consistent and contribute to the program's learning outcomes.

Despite some challenges with on-time graduation—mainly due to personal, health, or military service obligations—most students complete their programs within the expected timeframes. In particular, delayed graduations are more common in bachelor's programs due to military service, while master's students tend to complete their degrees on time. Mechanisms are in place to allow students to resume their studies if interrupted.

Elective courses, which make up 17.5–20% of most programs, provide students with the flexibility to tailor their studies to their interests and career goals. Electives support specialization, enhance practical skills, and help shape the students' individual competence profiles. Master's students also develop their profiles through thesis work and practical courses, ensuring that graduates are well-prepared for both academic and professional pursuits.

In the master's in financial mathematics program, elective courses make up 5% of the total study load, reflecting its one-year duration. These electives fall under the general education component and are designed to broaden students' transferable skills beyond their technical specialization. Subjects such as Entrepreneurship, Career Management, Project Management and Evaluation, and Research Planning and Methods equip students with essential competencies for navigating professional environments, enhancing their adaptability and employability in diverse career paths.

The following distribution of credits is presented for the degree programs:

The bachelor's in Mathematics has a total workload of 240 ECTS credits distributed over 8 semesters, with each semester carrying a study load of 30 credits, except for the 5th and 6th semesters, which have 33 and 27 credits, respectively.

Components of the Curriculum	ECTS Credits
General Education Component (Mandatory)	23
General Education Component (Elective)	4
Specialized Component (Mandatory)	150
Specialized Component (Elective)	36
Courses from Related SPs	12
Other Study Modules*	15
<b>Total Credits</b>	<b>240</b>

\*Other study modules include a work practice and a thesis.

The bachelor's in Applied Statistics and Data Science comprises a total of 240 ECTS credits, distributed over 8 semesters, with an average workload of 30 credits per semester.

Components of the Curriculum	ECTS Credits
General Education Component (Mandatory)	23
General Education Component (Elective)	4
Specialized Component (Mandatory)	150
Specialized Component (Elective)	36
Courses from Related SPs	12
Other Study Modules*	15
<b>Total Credits</b>	<b>240</b>

\* Other study modules include a work practice and a graduation work.

The bachelor's Actuarial and Financial Mathematics comprises 240 ECTS credits, distributed over 8 semesters, with an average load of 30 credits per semester, except for the 5th and 6th semesters, where the credit load is 27 and 33 credits, respectively.

Components of the Curriculum	ECTS Credits
General Education Component (Mandatory)	23
General Education Component (Elective)	4
Specialized Component (Mandatory)	150
Specialized Component (Elective)	48
Other Study Modules*	15
<b>Total Credits</b>	<b>240</b>

\*Other study modules include a work practice and a graduation thesis

The master's Applied Statistics and Data Science comprises 120 ECTS credits, distributed over 4 semesters, with an average workload of 30 ECTS credits per semester.

<b>Components of the Curriculum</b>	<b>ECTS Credits</b>
General Education Component (Mandatory)	9
General Education Component (Elective)	3
Specialized Component (Mandatory)	45
Specialized Component (Elective)	21
Research Component*	42
<b>Total Credits</b>	<b>120</b>

\* The research component includes scientific seminars, a work practice and a Master's thesis.

The master's Financial Mathematics comprises 60 ECTS credits, distributed over 2 semesters, with a credit load of 30 ECTS credits per semester.

<b>Components of the Curriculum</b>	<b>ECTS Credits</b>
General Education Component (Mandatory)	3
General Education Component (Elective)	3
Specialized Component (Mandatory)	39
Specialized Component*	15
<b>Total Credits</b>	<b>60</b>

\*The research component includes a work practice and a Master's thesis.

The master's Mathematics and Applications consists of 120 ECTS credits distributed across 4 semesters, with each semester carrying a workload of 30 credits.

<b>Components of the Curriculum</b>	<b>ECTS Credits</b>
General Education Component (Mandatory)	6
General Education Component (Elective)	6
Specialized Component (Mandatory)	45
Specialized Component (Elective)	21
Research Component*	42
<b>Total Credits</b>	<b>120</b>

\*The research component includes scientific seminars, work practices and a Master's thesis.

During the on-site visit, the experts learn that industry involvement in curriculum development varies across programs, with strong links particularly evident in Data Science and Financial Mathematics. In Data Science, ongoing discussions with stakeholders have led to the design and delivery of courses by industry representatives, such as "Digital Signal Processing" and "Graph Neural Networks." In Financial Mathematics, program coordinators maintain regular contact with partners from the Central Bank and the Ministry of Finance to align the course content with sector needs. Representatives from these institutions also

teach in both bachelor's and master's programs, supervise research projects, and contribute to thesis topic selection. Similarly, new courses, such as those on generative AI and large-language models, are driven by industry input. In contrast, Mathematics programs remain more theoretical, although many instructors are IT professionals, and in recent years, the curriculum has expanded to include more IT- and statistics-focused courses. The strong emphasis on foundational skills in Mathematics is confirmed by both students and stakeholders as one of the program's great strength and unique selling points.

Student feedback is gathered both informally and through tools like Google Forms, and practical training is embedded into all programs through a mandatory "Professional Practice" course. Bachelor students complete an 8-week internship, while master's students undertake a shorter 4-week practice, often at relevant institutions or companies. Students already employed in their field can receive credit for this. The internships are monitored via Moodle, where students submit weekly reports, and company supervisors provide performance evaluations.

Although the law currently limits programs to a single qualification within 240 ECTS credits and disallows minors, students may pursue an additional 30 ECTS for pedagogical training. Course structures follow an 8+2 (for Finance) or 8+4 (for other disciplines) model, with one-year master's programs permitted under national regulations. While these shorter programs are intensive, students—especially those in Applied Statistics and Data Science—sometimes need more time due to the hands-on nature of their training. The bachelor's program culminates in a centralized, formal oral examination across all subjects.

English plays a key role throughout the curriculum. Although most courses are taught in Armenian, English is widely used for literature and written exams—particularly in Financial Mathematics. Students take mandatory English courses in their first year and often write their theses in English before translating them into Armenian. Some students express a desire for more English-taught classes and opportunities to practice subject-specific communication skills in English. Despite legal restrictions on delivering full programs in English, students and stakeholders agree that more optional English classes and the opportunity to write final theses in English would be highly beneficial. In this light, the experts recommend offering the option to write their final theses in English to all students.

In terms of tools and platforms, Python is preferred over MATLAB due to its cost and prevalence in local industry. LaTeX, while not mandatory, is encouraged for thesis writing, and Moodle is used extensively across all departments for managing assignments. Teaching responsibilities are clearly defined but flexible, with some specialized courses taught by invited experts, including lecturers from Europe.

Research is also embedded at the bachelor's level through courses like "Operational Equations," which simulate academic conferences. Students are grouped and assigned leadership roles to foster collaboration and deeper engagement with the subject matter. Across all programs, ethics and societal topics are addressed via optional courses in philosophy and ecology, while a mandatory course in history and first aid reflects broader national requirements. In this context, the experts recommend implementing a course on ethics/societal issues for the Data Science program, in line with the ASIIN Subject-Specific Criteria.

Finally, industry partners, such as Krisp Technologies, play a tangible role by donating equipment and emphasizing the importance of practical skills in graduates. The Central Bank and other employers value hard skills acquired through the programs but often provide soft-skill training internally. Students are encouraged to give presentations, and the experts learn that there is potential for developing more project-based courses. They recommend offering courses in project management and planning, as well as increasing programming offerings, especially in Python, to better support students' future career paths.

Regarding the study programs' length, the experts critically discuss the duration of the Mathematics and Statistics track (8+4 semesters) and, in contrast, the duration of the Finance track (8+2 semesters). They inquire about the reason for this difference. In the meeting with the teaching staff the experts are informed that such a discrepancy is, generally, not forbidden by Armenian law. Moreover, there are particular differences with respect to the professional requirement profiles. While the experts acknowledge that a two-year master's program offers valuable opportunities for acquiring deeper theoretical knowledge, offering programs of varying lengths does not violate any formal regulations—as long as they are based on a standard eight-semester bachelor's degree and the two-semester master's program concludes with a proper scientific thesis. As the experts confirm during their visit, the master's in Financial Mathematics at YSU includes a work practice and a master's thesis. (YSU explains that, in line with the Regulation on the Approval of YSU Study Programmes, the master's in Financial Mathematics was thoroughly revised. Consequently, the previous two-year program was transformed into a one-year program. As stated in the SAR, master's programs in Armenia range from 1 to 2 years/60-120 ECTS credits.)

### *Mobility*

YSU claims to support international student mobility through well-structured programs and established frameworks, including recognition of credits via ECTS and participation in Erasmus+ initiatives. In several bachelor's programs (e.g., Mathematics, Applied Statistics & Data Science, Actuarial & Financial Mathematics), students are provided with a dedicated mobility window of 12 ECTS credits in the 6th or 7th semester, enabling them to study abroad or at other universities. While no formal mobility window exists in the master's

programs, academic mobility is still possible and supported through individual arrangements, particularly for master's theses.

However, student participation in mobility opportunities remains relatively low (see graph below). The primary challenges include insufficient foreign language proficiency, limited availability of exchange programs in certain fields, scheduling conflicts, and difficulties with credit transfer due to curricular misalignments. In response, YSU plans to integrate more English-language content and establish joint programs with European partners, particularly in the master's in Mathematics and Applications. Despite these issues, there has been a notable increase in mobility participation over the past three years, with successful examples of students studying in France, Germany, and Spain, and many graduates pursuing further education at internationally recognized institutions. This trend underscores both growing interest and the global recognition of YSU qualifications.

Academic Year	2020-2021	2021-2022	2022-2023
Number of Mobile Students	2	7	10

The discussions on-site reveal that the number of Erasmus students has increased from 55 to 76, indicating progress in this relevant key performance indicator (KPI). Information about Erasmus opportunities is communicated to students through email, as well as via the university's Facebook page and official website. At the departmental level, a mobility window is available; however, challenges remain regarding the recognition of a full course load, as students often complete only 12–15 ECTS credits instead of the standard 30. These mobility activities typically take place within Armenia.

The experts acknowledge that YSU supports international mobility opportunities for students and staff. Moreover, the experts support more opportunities for English language training.

#### *Periodic Review of the Curriculum*

The implementation of program objectives and the effectiveness of the curriculum are regularly evaluated through a structured and multi-method approach, as per the *Regulation on Monitoring and Periodic Review of Study Programmes (SPs)*. Bachelor's programs were most recently reviewed in 2023/24, while master's programs were evaluated in 2019/20.

Evaluation methods include Curriculum Mapping, which links course content with program-level learning outcomes (LOs), both during development and implementation phases. Direct Assessment refers to the evaluation of final projects, theses, and student assignments

to gauge achievement of specific LOs, while Indirect Assessment includes focus-group interviews with students and graduates, online student surveys on teaching quality, and graduate satisfaction surveys. Moreover, Program Monitoring involves stakeholders such as faculty, students, and employers, resulting in formal reports and action plans for improvement.

Findings from these evaluations have led to changes, YSU states in the SAR. Such changes included more practical sessions in mathematics courses and curriculum adjustments in response to student and staff feedback. Despite not always having formal external evaluations, some programs have been positively assessed in informal consultations with peers from other institutions.

The ongoing review process also examines whether the order of modules supports timely graduation. Evidence from surveys and performance data confirms alignment between course structure and program goals, with improvements made based on comprehensive, documented reviews. In summary, the experts appreciate the effort to foster international mobility and support YSU in further pursuing this path.

#### **Criterion 1.4 Admission Requirements**

##### **Evidence:**

- Self-Assessment Report
- Module descriptions
- Syllabi
- Website YSU: <https://www.y-su.am/en>
- Website Faculty of Mathematics and Mechanics: [Faculty of Mathematics and Mechanics | YSU](#)
- Discussions during the audit

##### **Preliminary assessment and analysis of the experts:**

According to the SAR, admission procedures for the bachelor's and master's programs at YSU's Faculty of Mathematics and Mechanics are transparent, binding, and designed to ensure that students have the necessary prior knowledge to succeed. For bachelor's programs, Armenian applicants must have completed secondary or vocational education and pass entrance exams in Mathematics and either Physics or a Foreign Language (primarily English), with Mathematics being the most critical. Master's applicants must hold a bachelor's degree and are admitted through competitive exams in their field of study, with priority given to recent YSU graduates for tuition-free admission. Foreign students, mainly

from the Armenian diaspora, follow similar admission processes, including interviews and subject-specific assessments, and can also enroll in preparatory programs if needed.

The entrance exams, particularly in Mathematics and specialized topics, are designed to reflect the demands of the programs and are regularly reviewed for effectiveness. English proficiency is especially valued for accessing international literature and IT-related courses. The admission process includes mechanisms for recognizing prior learning and qualifications from other institutions, in line with the Lisbon Recognition Convention, and allows for mobility within and between institutions. Transfer rules permit recognition of coursework if content overlaps sufficiently, with a tolerance of up to 20 ECTS credits of differences.

The university seeks to ensure that admitted students have the foundational knowledge to meet the learning outcomes of the programs. Admission regulations are periodically evaluated and adjusted based on student performance and program needs. Where gaps in prior knowledge are identified, bridging support may be provided without compromising the qualification level.

YSU provides the following statistics on the progress of studies (academic year 2023/24):

Name of the degree programme	B/M	M/M&A	B/A&FM	M/FM	B/AS&DS	M/AS&DS
Number of admission places	46	15	65	20	56	30
Number of applications	50	8	70	18	70	57
Number of admitted students	46	6	65	18	56	29
Competition/admission rates	1.1 and 1	0.53 and 0.4	1.07 and 1/1	0.9 and 0.9	1.25 and 1	1.9 and 0.96
Duration of studies (years)	4	2	4	1	4	2
Number of all students in the programme	141	16	178	16	158	54
Average grade (GPA) distribution of students	"Excellent" – 14.7 % "Good" – 21.3 % "Satisf." – 42.9% "Fail" – 21.1%	"Excellent" – 45 % "Good" – 28.8 % "Satisf." – 26.2% "Fail" – 0%	"Excellent" – 23.2% "Good" – 27,5% "Satisf." – 49,3 % "Fail" – 20.2%	"Excellent" – 71.3% "Good" – 25% "Satisf." – 3.7 % "Fail" – 0%	"Excellent" – 31.9% "Good" – 21.9 % "Satisf." – 37.3 % "Fail" – 8.9%	"Excellent" – 46.4 % "Good" – 27.8 % "Satisf." – 23.9 % "Fail" – 1.9%
Failure rate (%)	32	0	20.1	0	24.25	1.8
Amount of re-sits (re-exams)	458	0	358	0	388	2
Number of graduates	25	10	28	16	20	27
Graduates distribution by grades (GPA)	"Excellent" – 32% "Good" – 48 % "Satisf." – 20 % "Fail" – 0 %	"Excellent" – 70 % "Good" – 10 % "Satisf." – 20 % "Fail" – 0%	"Excellent" – 32.1 % "Good" – 42.8.% "Satisf." – 21.6 % "Fail" – 3.5%	"Excellent" – 100% "Good" – 0% "Satisf." – 0% "Fail" – 0%	"Excellent" – 35 % "Good" – 35 % "Satisf." – 30 % "Fail" – 0%	"Excellent" – 96.3 % "Good" – 0 % "Satisf." – 3.7 % "Fail" – 0%
Completion rate (%)	48.0%	100%	38.8%	88.9%	57.1%	81.8%

Additionally, the experts are informed that the admission to bachelor's programs is based on a state-organized centralized examination system. Students take these standardized exams and, depending on their scores, apply to and are admitted by universities of their choice. In contrast, admissions to master's and PhD programs are managed directly by the

universities, with entrance exams tailored to specific courses or disciplines. Financial aid is available through the universities and is awarded based on criteria such as academic excellence, social status, and student performance, with some rotation or re-evaluation of aid depending on continued achievement. According to the program coordinators, legal requirements stipulate that university programs be taught in Armenian, which limits their ability to attract international students. An exception is found in the field of medicine, in which programs are offered in English and attract a significant number of foreign students, particularly from India and Iran. Broader demographic challenges, including a declining birth rate and emigration, also contribute to the reduced pool of prospective students in Armenia.

In general, the experts find the terms of admission to be binding and transparent.

### **Criterion 1.5 Workload and Credits**

#### **Evidence:**

- Self-Assessment Report
- Module descriptions
- Syllabi
- Discussions during the audit

#### **Preliminary assessment and analysis of the experts:**

YSU implements a credit system aligned with student workload, which includes both contact hours and independent study time. All compulsory elements of the study programs, such as coursework, internships, graduation work, and theses, are assigned ECTS credits based on this workload. The weekly student workload is set at 1.5 credits (45 hours), with 20 contact hours and 25 hours of self-study for bachelor's programs, and 15 contact hours and 30 hours of self-study for master's programs. Credits for each module are calculated by multiplying total weekly workload (class and independent study) by the number of academic weeks (15), then dividing by 30. This calculation aligns with ECTS standards and national regulations. All mandatory study components, including work practice and research work, are credit-bearing. Credit allocation for work practice and graduation work is also based on weekly workload, with adjustments if other modules are taken simultaneously. Regular monitoring ensures that credit allocations accurately reflect actual student effort. This is done through detailed planning, academic performance analysis, and student surveys, which include questions about perceived workload. Adjustments to module credits can be made based on student feedback. Recent evaluations show no major complaints regarding workload, suggesting that the system is balanced and supports graduation within the standard timeframe.

The experts are informed that credit allocations have been adjusted in certain cases to reflect students' actual workload, particularly by reducing in-class hours to 90, ensuring alignment with the time students dedicate to independent study. Master's students report that while the workload can be demanding, they feel comfortable discussing concerns directly with lecturers, who often respond by adjusting the syllabus or negotiating compromises. Generally, students acknowledge that the workload corresponds to the importance and complexity of the course content. Although the official start of the master's program is in September, students note that classes in some courses begin as late as March, leaving only two months until May, which they consider insufficient. Additionally, students confirm that credits earned abroad are successfully transferred and recognized by YSU. According to survey results, a significant percentage of bachelor's students work part-time, while many master's students hold full-time jobs. To accommodate this, master's classes are scheduled in the evenings (6:00–8:00 or 9:00 p.m.) and on Saturdays, making it possible for working students to manage their academic commitments.

The experts conclude that the total workload of the degree programs is adequate and that there is no structural pressure on the quality of teaching and the level of education due to the workload. The students express their general satisfaction with the amount and the distribution of their workload. The estimated time budget is realistic, and the students can usually complete the respective degree program without exceeding the standard study period. Please see criterion 1.1 for an elaboration on the experts' perspective on the exams' reflection of EQF levels.

Regarding examination formats and the weighting of assessment criteria the experts point out that those must be standardized and explicitly stated in module descriptions. If exam types (e.g., oral, written, project-based) and their weightings are left to individual discretion or are communicated informally, this may compromise transparency, fairness, and the comparability of student performance across cohorts and courses. To uphold academic integrity and consistency, module descriptions should clearly specify the types of assessments used, the criteria applied (e.g., participation, assignments, final exam), and the relative weight of each component. Moreover, alignment between assessment forms and learning outcomes must be ensured according to EQF levels. Institutional policy should guide these decisions to eliminate variability based on individual teaching styles and ensure that all stakeholders can clearly understand and evaluate the academic expectations and assessment strategies in each module.

<b>Criterion 1.6 Didactic and Teaching Methodology</b>
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**Evidence:**

- Self-Assessment Report

- Module descriptions
- Syllabi
- Discussions during the audit

**Preliminary assessment and analysis of the experts:**

At YSU, a wide variety of teaching methods and didactic tools are used to support student-centered learning and promote achievement of learning outcomes (LOs). Lecturers independently choose teaching approaches they consider most effective for delivering course-specific LOs, employing lectures, lab sessions, group work, research projects, and both digital and face-to-face tools. The effectiveness of these methods is regularly assessed through student surveys, classroom observations, academic performance analysis, and feedback discussions. Infrastructure such as smartboards, Wi-Fi-equipped classrooms, e-learning via Moodle, and communication tools like Slack and Zoom support both in-person and digital teaching. Faculty receive ongoing training through a structured professional development program, covering methods like gamification, flipped classrooms, and blended learning. The Teaching Excellence Award and bonus incentives recognize innovative teaching. Most lecturers are competent in using modern teaching methods, supported by an IT team and dedicated training spaces, including a lecture recording studio. The balance between contact and self-study hours follows a 1:2 ratio, deemed effective based on student outcomes. Independent scientific research is integral, embedded in several courses across both bachelor's and master's programs, with students participating in conferences, research competitions, and contributing to academic publications. Recent curriculum reviews—based on student input and teaching effectiveness data—have led to course adjustments such as restructured syllabi, improved course integration, and the inclusion of industry experts. These changes have increased student engagement and performance, reflecting YSU's commitment to continuously improving teaching quality in line with academic and professional standards.

The experts learn during the audit that in the Mathematics program, lectures are the primary teaching method, often supported by the use of smartboards and video materials. Independent learning is encouraged, and seminars—referred to as “practical work”—focus on discussion and application. In Data Science, the program begins with more traditional lectures, shifting toward hands-on computer-based work as the content becomes more applied. Assessment methods include participation, written and oral exams, quizzes, reports, homework, and individual tasks such as presentations and teamwork. Some courses also incorporate group research projects. While there is no standardized method for presenting mathematical problem-solving on the board, lecturers have the freedom to grade active participation. Teaching methods are continuously evolving, with input from colleagues who

also teach at the American University of Armenia. This cross-institutional exchange has introduced innovations such as regular quizzes and online grading, which have enhanced student engagement and academic quality.

Although AI use in student work is not yet a major concern in Armenia, staff remain vigilant, using iterative questioning to verify students' understanding. Coordinators express openness to expert suggestions for further improvement.

Students generally express satisfaction with the balance of theoretical and practical learning, especially appreciating the emphasis on individual and analytical work. While some criticize a few teaching styles as outdated or lacking in current literature, others acknowledge that traditional approaches, especially in Mathematics, still hold value. This is confirmed in the meeting with industry representatives as well. Lecturers vary in their methods—some provide scripts, others use slides or smartboards, and some encourage student interaction with code. Though students rarely request online participation, the infrastructure exists to support it. Suggestions from students include adopting modern methods for teaching fundamental mathematics, integrating MIT OpenCourseWare, and incorporating MOOCs (Massive Open Online Courses), while maintaining the strengths of traditional chalk-and-talk instruction. English proficiency among students is reported to be strong.

In summary, the expert group considers the teaching methods and instruments in place to be suitable to support the students in achieving the intended learning outcomes. In addition, they confirm that the study concepts of all programs under review comprise a variety of teaching and learning forms as well as practical parts that are adapted to the respective subject culture and study format. It actively involves students in the design of teaching and learning processes (student-centred teaching and learning).

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

The experts acknowledge that YSU provides an explanation for the overlap in the formulation of learning outcomes. They welcome YSU's clear willingness to meet the requirements and implement changes. YSU explains that the LOs were carefully designed in accordance with national and international standards, which define distinct expectations for each academic level. While similarities in wording may exist—partly due to translation—the actual academic content, assessments, and competencies differ significantly between the programmes. The university commits to revising the LO formulations to better highlight these differences, using EQF descriptors to enhance clarity and distinction. The experts take into

consideration that YSU has requested additional support and guidance in identifying specific LOs or modules where similarities are most evident, in order to fulfil the requirement. As further stated, YSU plans to complete revisions within one academic year, emphasizing applied skills at the Bachelor's level and critical, autonomous competencies at the Master's level, followed by validation with external stakeholders to ensure labor-market relevance and international comparability. Building on existing alignment with national and international benchmarks, the university aims to clarify the learning outcomes' wording while maintaining academic rigor and improving transparency. In light of this statement, the experts expect to be provided with the revised formulations in the ongoing course of the procedure.

In relation to the implementation of English, YSU supports the expert panel's recommendation to increase English-language engagement and highlights that students are already permitted to write theses and assignments in English. Several programmes, such as Applied Statistics & Data Science and Financial Mathematics, already include English-taught courses. YSU plans to formalize and promote English-language thesis options across all reviewed programs, ensuring students receive adequate academic writing support. The university values the panel's input and welcomes continued dialogue on aligning language policies with academic and global standards. The experts appreciate YSU's efforts in this matter.

Moreover, YSU supports the expert panel's recommendation to introduce a dedicated ethics course in the Applied Statistics & Data Science master's program. Although such a course has not yet been implemented due to a lack of qualified staff, it will be added starting in the 2026/27 academic year, with input from industry experts in AI ethics. Other recommended areas are already addressed: "ML Project Management" and "Python" are part of the program, and similar content is included in related programs like Financial Mathematics and Actuarial and Financial Mathematics. To ensure high-quality delivery, YSU will collaborate with local tech firms and international institutions and invest in faculty development. Course design will begin in 2025/26, with validation by academic and external stakeholders. The experts are glad to hear that YSU takes action in this matter and signals a clear intent to add an ethic-related course to the curriculum.

YSU agrees with the expert panel's recommendation to enhance English language training, especially discipline-specific proficiency crucial for fields like Data Science and Financial Mathematics. English is currently compulsory in bachelor's programmes, but gaps remain in professional English skills. To address this, YSU plans to open a University Language Centre offering tailored, flexible English courses and integrate English practice into existing modules, including presentations and assignments. Additionally, more guest lectures and courses will be offered in English. These initiatives will start in the 2026/27 academic year

and aim to improve students' global communication skills while respecting national language policies. Progress will be monitored through student feedback.

YSU acknowledges the experts' concern about low student mobility and fully supports increasing international exchange participation. The Faculty of Mathematics and Mechanics has an established infrastructure, including an Erasmus+ coordinator and collaboration with the International Cooperation Office, to manage and promote mobility opportunities. Student interest is growing, and the Faculty plans to expand Erasmus+ partnerships, such as a new agreement with UBI Business School. Efforts will also focus on securing more funding to remove financial barriers. With these steps, YSU aims to significantly improve student mobility rates.

Moreover, YSU clarifies that the 12–15 ECTS mobility window in bachelor's programmes refers only to internal mobility within YSU and Armenian universities, not international exchanges. International academic mobility (e.g., Erasmus+) is supported separately, allowing for full semester stays abroad (30 or 60 ECTS) through formal tripartite agreements aligned with Erasmus+ and Armenian regulations. To prevent misunderstandings, YSU will improve student communication and revise program documents to clearly distinguish between internal and international mobility options.

The coordinators support the panel and students' recommendation to incorporate modern teaching methods like MIT OCW and MOOCs alongside traditional instruction. While endorsing digital innovation, they note practical challenges such as students' varied English proficiency and limited classroom technology. To address this, YSU will implement a phased approach using curated, multilingual resources and expand its existing Armenian-language Courseware to integrate global content. Blended learning pilots will begin in well-equipped classrooms, with flipped classroom models and offline OCW access. Infrastructure upgrades and partnerships are planned for the 2025/26 academic year to support broader adoption. The coordinators reaffirm their commitment to evolving teaching methods by strategically integrating digital tools and expanding Armenian-language courseware. This hybrid approach balances local constraints with the gradual adoption of global best practices.

The experts consider criterion 1 to be partly fulfilled.

## **2. Exams: System, Concept and Organization**

<b>Criterion 2 Exams: System, Concept and Organization</b>
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**Evidence:**

- Self-Assessment Report
- Module descriptions
- Syllabi
- Regulation on YSU Study Process Organization
- Regulation on the Appeal Procedure of Exam Results
- Regulations on the Final Certification of Graduates
- Regulation on the Completion and Assessment of Bachelor's Graduation Work at YSU
- Regulation on the Completion and Assessment of Master's Thesis at YSU
- Regulation on the Expulsion (Dismissal) and Reinstatement of Students
- Discussions during the audit

**Preliminary assessment and analysis of the experts:**

According to the SAR, YSU implements a structured and transparent system for student assessment, detailed in its regulations and course syllabi, which are accessible through the university's e-learning platform. The system includes various examination formats aligned with course content and learning outcomes (LOs), categorized into four types: with/without final assessments, with/without midterm exams, and graded pass/fail. Evaluation components—such as midterms, final exams, quizzes, independent/research work, and student engagement—are weighted differently depending on course type. Lecturers choose the most appropriate formats and components based on the LOs and specify them in the syllabus and course outline at the start of the semester.

Oral exams are preferred for their flexibility and ability to assess communication skills, while final assessments (including two midterms and a final exam) are considered the most comprehensive. Bachelor's and master's programs conclude with a mandatory thesis or graduation project, publicly defended and evaluated based on established criteria. Regulations also govern make-up exams and academic debt resolution, offering flexible options for students with illnesses, disabilities, or special circumstances.

Anti-plagiarism measures are in place, with strict penalties for cheating or dishonest conduct, although YSU lacks automated plagiarism detection software. In its statement, YSU clarifies that in April 2025, the university subscribed to Turnitin's similarity-checking software, enabling them to upload arXiv submissions and verify content for potential plagiarism either via the Turnitin website or through Moodle integration. As of July 6, 2025, a

total of 3,253 users have submitted their theses, generating 11,431 similarity reports. The experts are provided with the statistics from the Turnitin reports.

The feasibility of exams is regularly reviewed to ensure fair workload and adequate preparation time—25% of the semester is reserved for exams and tests. Recent adjustments, including fewer exams and the option to substitute midterms with projects, have improved the student experience.

External practical assignments are supervised both by YSU and the hosting organization to maintain quality. Ongoing reviews and updates of assessment regulations, based on student feedback and faculty input, help align the system with evolving academic standards and ensure effective measurement of LOs.

During the audit, the experts are informed that at YSU, the academic year is structured into two semesters, beginning on September 1 and running through January 20, followed by a 20-day break, with the second semester starting flexibly in mid-February and ending in early July. A regular semester spans 20 weeks—15 weeks of teaching and five weeks reserved for two midterms and final exams, during which no classes take place. Students typically take a maximum of three exams per semester and no more than two exams per day. Exams are carefully regulated: students must have a current grade (from midterms, participation, etc.) to sit for the final exam; otherwise, they must retake the entire course. Exam retakes are permitted twice per subject, and students who accumulate more than 12 ECTS of academic debt risk expulsion, which is decided on a case-by-case basis by the Rector, based on reports from faculty. Disputes over grades or requests for make-up exams are reviewed by ad hoc boards comprising the lecturer, department chair, a subject specialist, and possibly the dean, although no central institutional examination board exists. In extraordinary situations—such as bereavement, childbirth, or mandatory military service, students may request accommodation from lecturers or the dean.

Examination rules vary by subject: math students are not allowed to use books or computers, whereas programming students are. Oral exams allow some preparation time before answering. Assessment components such as participation and midterms are outlined within a fixed range in the syllabus (e.g., 5–10%), with lecturers having discretion to adjust within this range. Students receive an email in the first week of the semester detailing the exact grade breakdown, which they report is never altered afterward. Although course failures rarely delay graduation and retakes are uncommon—and while the experts commend the long examination periods for allowing students to prepare and take exams without undue stress—students express a desire for more time to plan projects and work on their final theses.

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

YSU clarifies that the description of the Bachelor's final attestation as a centralized oral examination in the report is a misunderstanding. In reality, the program concludes with a public defense of a capstone project, which involves presenting and discussing original independent work. This process, defined by national and institutional regulations, is not a formal examination but a structured evaluation supervised by faculty. YSU affirms compliance with Armenian higher education standards and is willing to provide further documentation or a demonstration to clarify the procedure.

Moreover, YSU highlights that students are already permitted to write theses and assignments in English. Several programs, such as Applied Statistics & Data Science and Financial Mathematics, already include English-taught courses and English-written theses. Examples include master's theses and a peer-reviewed publication in English. YSU plans to formalize and promote English-language thesis options across all reviewed programmes, ensuring students receive adequate academic writing support. The university values the panel's input and welcomes continued dialogue on aligning language policies with academic and global standards.

YSU further clarifies that the noted timing of classes concerns only the one-year master's program in Financial Mathematics, which has a deliberately compressed schedule to allow sufficient time for thesis work. The first semester runs from September to December with exams in January, while the second semester offers two months of classes (February–March) followed by dedicated thesis preparation and defense time (April–June). This design meets Armenian regulations and ensures learning outcomes despite the intensive workload. Other master's programmes at YSU follow a more traditional full-semester schedule. YSU welcomes further dialogue if needed.

In relation to exam forms and the weighting of exam components, YSU appreciates the panel's focus on transparent assessment and clarifies that its current system already mandates detailed, written disclosure of exam formats, grading criteria, and weightings in course syllabi and on Moodle by the second week of each semester. This ensures clarity for students and compliance with institutional regulations. While assessments are aligned with learning outcomes, instructors are allowed flexibility to adapt evaluation methods to their subject matter. In response to the panel's suggestion for greater standardization, YSU has compiled a centralized policy outlining baseline requirements for transparency while maintaining academic autonomy. YSU remains open to further dialogue on balancing consistency with pedagogical relevance. The expert appreciate the cooperative spirit but expect to see the implementation of the requested changes.

The coordinators clarify that YSU's thesis timeline is intentionally structured to provide students with ample time for research and writing. In bachelor's programs, thesis work begins in the 7th semester, with a lighter 8th semester focusing on completion. Master's students start their thesis after the first semester (or at the beginning of it for 2-semester programmes), allowing a full year for independent research. Progress is monitored through periodic attestations on Moodle, reviewed by supervisors, in line with institutional regulations. The university remains open to providing further documentation if needed.

The experts welcome the willingness to implement changes but need to see them put in action as those changes are not outlined yet.

The experts consider criterion 2 to be partly fulfilled.

### 3. Resources

#### Criterion 3.1 Staff and Development

**Evidence:**

- Self-Assessment Report
- Staff Handbook
- Module descriptions
- Syllabi
- Regulation on the Competitive Selection and Appointment to Positions of YSU Teaching staff
- Discussions during the audit

**Preliminary assessment and analysis of the experts:**

As stated in the SAR, the teaching staff at YSU is highly qualified to support the successful delivery of its degree programs. The faculty includes a diverse mix of full-time, part-time, and visiting lecturers, many of whom hold advanced degrees and bring both academic and industry experience. Staffing levels are calculated based on student numbers and teaching hours, ensuring sufficient support for teaching, supervision, and consultation. Armenian academics from leading international institutions are also involved in teaching and thesis supervision, enriching the academic environment. The qualifications of the staff are regularly evaluated through reappointments, certification, student surveys, and classroom observations. A structured professional development program—led by the Center for Continuing Education—encourages ongoing training, with incentives like salary increases and

awards for excellence. Research activity among staff further enhances program quality, with many lecturers engaging students in funded projects and co-authoring scientific publications. Additionally, external specialists from government and industry contribute through lectures and thesis supervision, bringing practical insights to the curriculum. Student satisfaction surveys consistently report high ratings for teaching quality, and feedback mechanisms such as focus groups and departmental meetings help address any shortcomings and guide continuous improvement.

During the interviews, the experts are informed that although Armenian labor law does not permit sabbaticals or permanent contracts (thus limiting faculty appointments to a maximum of five years), YSU maintains a motivated and engaged teaching staff through a variety of professional development and support mechanisms. Many faculty members are active researchers who publish in high-ranking international journals (Q1 and Q2), often in collaboration with colleagues abroad. While most lecturers do not hold full-time positions at YSU, many combine academic roles with industry work, especially in applied fields like Data Science, where over 80% of instructors are industry experts and YSU alumni. Teachers have flexible schedules, participate in international conferences (with substitutes covering their classes), and often take on roles as visiting professors or research fellows. Intensive training programs, such as those through Erasmus+ and the Center for Continuing Education, help staff stay current in pedagogy and subject knowledge. Participation in professional development affects both salaries and teaching evaluations, with bonuses awarded for strong student feedback and additional grants available for publications, travel, and curriculum development. Although the lack of sabbatical opportunities is seen as a limitation, staff members have dedicated weeks during the semester for research and regularly benefit from international collaborations and funding opportunities. YSU actively supports international engagement and continues to prioritize the advancement of teaching quality through structured, credit-based development programs.

Faculty members with teaching loads exceeding their full-time contract receive a fixed reduction of 50 class hours for faculty members who commit to conducting research work and publishing at least one article in the scientific peer-reviewed journals annually. This adjustment is designed to incentivize scholarly activity by freeing time for research without punitive financial measures. Faculty who accept this arrangement and fail to publish within the academic year lose eligibility for the workload reduction in the following year, regardless of subsequent publications. This approach prioritizes accountability while supporting a

balance between teaching and research obligations. For instance, during the 2023/24 academic year, 15 teaching staff members from the Faculty of Mathematics & Mechanics took this responsibility, and 14 of them published articles in peer-reviewed journals.

Instructional workload calculation and planning include supervision tasks as integral components of faculty member's responsibilities. Specifically, the supervision of bachelor's students' graduation work is allocated 20 hours of workload per AY, while master's thesis supervision is assigned 45 hours. Doctoral supervision accounts for 70 hours of workload. This allocation reflects the varying complexity and time investment required for supervising students at different academic levels. Bachelor's thesis supervision involves structured guidance on topic, design, literature review, and final evaluation. Master's thesis supervision entails advanced methodological support, data analysis oversight, and preparation for defense, justifying the proportional increase in allocated hours. Doctoral supervision, requiring sustained mentorship over extended periods, is given the highest hourly allocation. As the university clarifies, these workload metrics are formalized in YSU's academic workload policy and align with institutional standards for equitable faculty workload distribution.

Furthermore, YSU supports participation in international conferences by providing substitute lecturers during faculty absences and encourages academic mobility through visiting professorships and research fellowships. Many staff members maintain strong ties with international institutions, such as Le Mans University in France, facilitated by former colleagues now based abroad. Since 2006, YSU has prioritized faculty development through a structured and recently updated training program aimed at promoting innovative, technology-enhanced teaching. The university also actively supports international engagement for both students and staff, helping to compensate for the lack of formal sabbaticals. Overall, the experts approvingly note the dedication and motivation of the teaching staff. There are enough resources available to provide individual assistance, advice, and support for all students. The support system helps the students to achieve the intended learning outcomes and to complete their studies successfully and without delay.

### **Criterion 3.2 Student Support and Student Services**

#### **Evidence:**

- Self-Assessment Report
- Staff Handbook
- Module descriptions
- Syllabi
- Rector's Order N187/20 from 10.10.2019 on Supporting Students with Disabilities

- Discussions during the audit

**Preliminary assessment and analysis of the experts:**

YSU provides comprehensive academic, administrative, and psychological support structures to help students succeed throughout their educational journey—from admissions to graduation and career placement. These include individual academic advisors, study program coordinators, student organizations, and dedicated centers for admissions, careers, and psychological counseling. YSU states that students benefit from accessible information on programs and courses via the YSU website and e-learning platform, along with strong library resources in multiple formats and languages. Initiatives like the “Awareness of Freshmen” and “Student Self-Governance” programs aim to integrate and orient new students. Despite these resources, the university acknowledges remaining gaps, such as limited Armenian-language academic materials, a lack of language practice clubs, and restricted access to research projects for students. Efforts are ongoing to address these shortcomings, as outlined in the strategic development plans.

During the on-site visit, the experts learn that while housing is not considered a critical issue at YSU as most students live with their parents, it can occasionally pose challenges due to the lack of new construction to expand infrastructure. For students with disabilities, significant progress has been made over the past few years: access to six buildings has been improved with ramps and elevators, and paid assistants are available to support students with special needs. Although no students with disabilities are currently enrolled, the concept of support was introduced approximately 6 years ago, and staff training programs have since been implemented—especially after the political situation with Azerbaijan, which brought an influx of students with special needs as well as refugees. In response, psychological and legal support services have been strengthened at YSU.

The university has also expanded its digital infrastructure, offering syllabi and video-equipped online courses via Moodle and Zoom, including distance learning options with international lecturers. Departments have dedicated offices and mentoring systems for

student support, while various student organizations, the Student Council, and student representatives on bodies like the Board of Trustees and Academic Council provide platforms for voicing concerns and participating in governance.

The experts conclude that enough resources are available to provide individual assistance, advice, and support for all students. The support system helps students to achieve the intended learning outcomes and to complete their studies successfully and without delay.

### **Criterion 3.3 Funds and equipment**

#### **Evidence:**

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

#### **Preliminary assessment and analysis of the experts:**

During the audit, the experts are informed that financial planning at YSU is a shared responsibility between the central administration and the individual departments. The Center for Strategic Planning oversees the overall coordination, while departments conduct their own financial planning based on annual, semiannual, and triannual cycles. Departments submit their budgetary needs—including equipment, conference funding, and other operational costs—which are partially met through centralized funds. Funding allocations are based on a combination of student enrollment numbers, scientific output, and a set of key performance indicators (KPIs) specific to each department. Some programs receive a lump sum, while others may place specific funding requests to the Rector. The Program Coordinators generally express satisfaction with the available resources, noting that programs benefit from both institutional support and industry donations, which have enabled the development of specialized labs.

The university library is well-regarded by both students and faculty and offers access to academic databases, including a subscription to the American Mathematical Society. While students appreciate the resources, they occasionally have to request licenses or materials, and not all classrooms are equally well-equipped. The experts note that the university provides plenty of computer stations to work at, but some study areas do not have sufficient access to power plugs, which is important especially for working with laptops. In the statement, the university expresses that, in order to address the concern, additional power plugs will be installed in the identified areas by October 2025, ensuring equitable access across all study spaces. Furthermore, this observation will be integrated into the ongoing renovations of the Faculty of Mathematics' premises on the 1<sup>st</sup> floor (located above the facilities reviewed by the experts during the on-site visit). These renovations include infrastructural

upgrades designed to modernize learning environments and align them with contemporary pedagogical needs.

Upon visiting the facilities, the experts suggest providing longer opening hours of the central library during exam times so students can meet and work with peers and study. The university confirms in its statement that, starting December 2024, the library will remain open until 9:00 PM during exam periods to better support student study needs.

Students also receive grants to attend international conferences and financial incentives for publishing in high-ranking journals (Q1, Q2). However, the availability of Armenian-language academic literature remains limited, thus requiring knowledge of English and Russian essential. The university clarifies that, while 1st and 2nd year bachelor's courses are well-supported with Armenian materials (textbooks, Moodle content, and video lectures), around 50% of advanced bachelor's and master's courses rely on Russian and English resources. This reflects the faculty's aim to foster international academic engagement. To address the gap, the faculty plans to translate key texts and produce original Armenian-language materials, with progress to be reported in future accreditation updates.

To further enhance teaching quality, students have suggested incorporating modern pedagogical approaches—such as MOOCs and MIT open course materials—alongside traditional chalk-and-talk methods, making full use of the university's technological infrastructure, including video and online learning labs. All members of the YSU academic community, including enrolled students, have access to these digital resources.

Overall, the experts are impressed by the library, serving not only as a place for study but also as a vibrant meeting space with an ample number of study areas. It offers a diverse collection of books in English, Russian, and Armenian. However, they would welcome seeing additional magazines in the future, such as SIAM (Society for Industrial and Applied Mathematics). In its statement, YSU confirms its intent to evaluate subscriptions to additional journals, including SIAM publications, as part of its 2026 subscription cycle.

As of Spring 2025, the university holds subscriptions to the following resources:

1. Elsevier Freedom Collection (last five years)
2. Oxford Academic
3. Cambridge University Press
4. Brill Humanities & Social Sciences Collection
5. JSTOR
6. EBSCOhost
7. Research4Life (including Springer and other publishers)

8. Scopus

9. Mathscinet

To further expand the e-subscriptions, the library will consider subscribing to SIAM.

YSU further explains that, in the interim, the YSU Central Library already provides extensive access to international academic resources. Through a partnership with Elsevier, all students, faculty, and researchers have full access to the ScienceDirect platform until April 2030. This includes numerous peer-reviewed journals and academic books in mathematics and related disciplines, accessible via the YSU internal network. The experts are provided with a comprehensive list of subscribed journals and books. These resources, along with additional details on library services, are also publicly available on the YSU library website. YSU reaffirms its commitment to enhancing its academic repository and will integrate the panel's suggestions into its plan for library resource expansion. Updates on new subscriptions will be included in future institutional reports.

The experts judge the available funds, the technical equipment, the infrastructure, and the facilities (laboratories, library, seminar rooms etc.) to comply with the requirements for sustaining the degree programs.

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

The experts consider criterion 3 to be fulfilled.

## 4. Transparency and Documentation

### Criterion 4.1 Module Descriptions

**Evidence:**

- Self-Assessment Report
- Module descriptions
- Syllabi
- Website YSU: <https://www.yzu.am/en>
- Website Faculty of Mathematics and Mechanics: [Faculty of Mathematics and Mechanics | YSU](#)

### **Preliminary assessment and analysis of the experts:**

After studying the module descriptions and the additional documents on program specifications provided by YSU, the experts observe that the documents include all necessary information. They point out that the module descriptions inform correctly about the students' total workload (in hours per semester) the form of exams, the awarded ECTS points, and the teaching language. Moreover, the module descriptions mention what exams (oral, written computer-based) are conducted and what kind of mid-term and final exam is conducted.

### **Criterion 4.2 Diploma and Diploma Supplement**

#### **Evidence:**

- Self-Assessment Report
- Sample Transcript of Records for each degree program
- Sample Degree Certificate for each degree program
- Sample Diploma Supplement for each degree program

### **Preliminary assessment and analysis of the experts:**

The experts confirm that the students of all degree programs under review are awarded a Degree Certificate, a Transcript of Records, and a Diploma Supplement after graduation. The Diploma Supplement contains all required information about the degree program. The Transcript of Records lists all the courses that the graduate has completed, credits achieved, grades, and cumulative GPA.

### **Criterion 4.3 Relevant Rules**

#### **Evidence:**

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

### **Preliminary assessment and analysis of the experts:**

The experts confirm that the rights and duties of both YSU and the students are clearly defined and binding. All rules and regulations are published on the university's website and the students receive the course material at the beginning of each semester.

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

YSU does not comment on this criterion in its statement.

The experts consider criterion 4 to be fulfilled.

## 5. Quality management: quality assessment and development

### Criterion 5 Quality management: quality assessment and development

#### Evidence:

- Self-Assessment Report
- YSU Charter
- Sample surveys for students, teachers, and partners
- Discussions during the audit

#### Preliminary assessment and analysis of the experts:

YSU ensures the quality of its academic programs through a structured and multi-layered development and review process. Program development begins with dedicated working teams, followed by a peer-review process that includes a review team with representatives from industry to ensure relevance to labor market needs. Only after passing this internal evaluation can a program be submitted for final approval by the university's Scientific Council. Benchmarking is an integral part of this process, involving regular comparisons with similar programs at other universities, supported by special grants that enable the involvement of international experts. Quality assurance continues after implementation through ongoing monitoring. Bachelor's programs undergo a formal review every five years, which includes student focus groups and culminates in a SWOT analysis and detailed evaluation report. YSU reports that since 2002, student surveys have been conducted each semester to assess teaching effectiveness across all courses, while graduate satisfaction surveys evaluate broader aspects of the educational experience, such as curriculum content, learning outcomes, infrastructure, and program organization. Together, these measures form a robust and continuously updated system of internal quality assurance. In this regard, the experts emphasize that the formal feedback loop regarding surveys and evaluations needs to be closed. To do so, students need to be informed about their survey results whether through in-class discussions or otherwise.

During the on-site visit, the Program Coordinators confirm the university's comprehensive system for gathering feedback on teaching and program quality, involving multiple stakeholders and instruments. They specify that each semester, students complete online surveys for every subject they take, comprising of 15–16 questions covering aspects such as

teaching quality, exam structure, and subject relevance. These surveys are anonymous, optional, and typically yield a participation rate of around 30%. Results are made available to students after the course ends but before exams, while lecturers receive their individual feedback after exams. Program chairs and deans receive all data for their respective areas. The experts are told that there is no mandatory requirement to discuss the results, however, informal meetings sometimes occur—for instance, at the dean’s office—especially if issues arise. While some prefer not to make the discussion of the results mandatory, there is a recognized need for more active student engagement with survey outcomes, which could improve teaching and survey participation. The coordinators point out that historically, surveys were mandatory and conducted on paper, but the university moved to online formats due to concerns about anonymity. In addition to these regular course evaluations, student focus groups are conducted every 2–3 years, and graduate feedback is collected annually through online surveys. The experts are provided with these documents. Lecturers and professors also provide feedback, contributing to a broader understanding of program effectiveness and teaching practices. As stated above, the experts emphasize that the feedback loop must be closed, i.e., students need to be informed about survey results.

In the interview, the teaching staff also states that surveys are not obligatory, but they have the right to conduct them. Once the course and the exams are over, teachers learn about the students’ assessment and can then implement changes for the new semester. These surveys are also an opportunity to give suggestions, opinions about the work of the chair, the dean, etc. Moreover, the teachers contend that they do not discuss the results with students in class. However, the staff welcomes the experts’ stance on implementing changes already for the current course and have this suggested to YSU’s management. Individual teachers do ask their students in a “light version” of the survey if they are able to follow the pace of the class, if they require additional material, etc. The teachers confirm that the rector and the deans receive the survey results. They also confirm that those teachers with a high performance according to the surveys receive a bonus as an incentive.

Overall, the experts positively acknowledge that in addition to formal mechanisms, program coordinators actively engage in informal communication with students—often via messaging platforms—to gather feedback, which is considered for continuous improvement. The program coordinators also express satisfaction with the overall communication culture, highlighting the accessibility of the Rector and the openness of institutional channels. Similarly, students enjoy a close, friendly, and open relationship with their lecturers, whom they can approach easily and frequently.

The experts conclude that the quality assurance system of YSU is well designed and ensures high quality and continuous development of the study programs. The feedback of all stakeholders is taken into account by the program coordinators and changes are made instantly.

The experts appreciate that there is good and fruitful cooperation between the stakeholders and the university and confirm that YSU regularly monitors and reviews the degree programs to ensure that they achieve the posed objectives and respond to the needs of the students.

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

In relation to the feedback loop, YSU explains the delays in acting on student feedback and confirms that while course evaluations are systematically conducted, improvements often take 1–3 semesters to implement, limiting communication with the original student cohort. To improve responsiveness, YSU plans to introduce an interim feedback mechanism during the semester to enable real-time adjustments. This will be piloted in the Faculty of Mathematics & Mechanics in 2025/26 and later expanded. The university will formalize these changes in its quality assurance policies, reaffirming its commitment to timely, student-informed improvements.

Furthermore, YSU provides further clarification regarding the timeline for disseminating student survey results and explains the process to ensure alignment with the survey regulation. The current procedure, as detailed in the Regulation on the Organization of Student Survey on Teaching Quality and Effectiveness at YSU, is structured as follows: student surveys are conducted after each semester, following the examination period, rather than before exams. The results are then processed and analyzed during the subsequent semester. Faculty members receive individualized feedback reports once this analysis is complete, enabling them to review and address insights before the next academic cycle.

As described in the SAR and referenced in the student survey regulation, the discussion of survey results with the teaching staff is formalized and consistently implemented. Survey outcomes are reviewed during departmental meetings, where lecturers collectively analyze the feedback, and during Faculty Academic Council sessions, where broader trends are discussed to inform curriculum and teaching improvements. YSU expresses that the proposition of actionable solutions or practical mechanisms to resolve the associated technical challenge would be much appreciated.

While the experts appreciate the clarification and effort, they expect to see evidence for closing the feedback loop within the group which performed the evaluation (and not, as stated by YSU, during the subsequent semester).

The experts consider criterion 5 to be partly fulfilled.

## **D Additional Documents**

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

No additional documents needed.

## **E Comment of the Higher Education Institution (10.06.2025)**

The institution provided a detailed statement:

YSU acknowledges and agrees with the majority of the remarks and recommendations presented by the expert panel. In response, the university proposes specific remedies to address the identified shortcomings and weaknesses. For the remaining observations and remarks, YSU provides additional clarifications and evidence of measures already in place to address these concerns.

Accordingly, YSU presents the following statement:

- 1. Learning outcomes (LOs) defined for the Bachelor's and Master's programmes in "Applied Statistics and Data Science" are quite similar (Criterion 1.1, p.9).***

### **YSU Response to Observation 1.**

The coordinators of the Bachelor's and Master's programmes in "Applied Statistics and Data Science" sincerely thank the expert panel for their valuable observation regarding the similarity of learning outcomes (LOs) between the two levels. We acknowledge the importance of ensuring clear differentiation and take this feedback seriously, while also providing context to clarify the rigour of our programme design process.

The LOs for both programmes were rigorously developed in alignment with the Sectoral Qualifications Framework (SQF) "Mathematics" of the Armenian higher education system, which defines distinct expectations for levels 6 (Bachelor's) and 7 (Master's). This alignment is substantiated by the detailed correspondence matrices in Appendices 21 and 22 of the Self-Assessment Report (SAR, p. 21), demonstrating how each LO maps to the cognitive, skill-based, and autonomy requirements of the SQF. Furthermore, the programmes' LOs adhere to ASIIN's subject-specific benchmarks for "Mathematics", as evidenced in Tables 3 and 4 of the SAR (pp. 31–34), ensuring compatibility with international standards. These frameworks guided the design of our LOs to guarantee that graduates meet both national and global expectations for their respective academic levels.

That said, we recognize that certain similarities in the phrasing of LOs - potentially amplified by translation nuances - may create the impression of overlap. However, the academic content, assessments, and expected competencies between the Bachelor's and Master's programmes are substantially distinct. These distinctions are embedded in module syllabi, thesis requirements, and examinations, even if not fully explicit in the current LO formulations.

To address the panel's concerns, we commit to the following actions:

1. We will refine the wording of LOs to explicitly differentiate between Bachelor's (application, problem-solving in defined contexts) and Master's (critical evaluation, innovation, autonomous research), leveraging EQF descriptors to ensure clarity and measurability.

**2. We kindly request the panel's guidance in identifying specific LOs or modules where similarities are most pronounced. This will enable a targeted revision process, ensuring efficient use of resources and alignment with the panel's expectations.**

3. Revisions will be completed within one AY, followed by validation with external stakeholders, including industry partners and international academic peers, to reinforce labour-market relevance and global comparability.

We believe that the existing foundational alignment with SQF and ASIIN benchmarks provides a robust framework for these improvements. By refining LO phrasing while preserving the programmes' core academic rigour, we aim to eliminate ambiguities and enhance transparency for students, faculty, and external evaluators.

***2. The different EQF levels have to be adequately reflected in the exams. Upon assessing whether LOs in the bachelor's and master's programs under review reflect this progression in cognitive demand, complexity, and learner autonomy, the experts notice the lack of such clear distinction in the LOs. The university needs to update the LOs with reference to EQF descriptors and ensure they are measurable, specific, and level-appropriate (Criterion 1.1, p.10).***

#### **YSU Response to Observation 2.**

We fully acknowledge the observation regarding the need to strengthen the distinction between Bachelor's and Master's learning outcomes (LOs) and examinations in line with EQF level descriptors. This feedback aligns with our commitment to continuous improvement, and we are prepared to take targeted steps to address it. Simultaneously, we wish

to reaffirm that the design of our LOs has been guided by rigorous frameworks to ensure both national and international relevance.

The programmes' LOs were developed in strict accordance with the Armenian National Qualifications Framework (NQF) and the "Mathematics" Sectoral Qualifications Framework (SQF), which are aligned with the EQF. As documented in Appendices 19–24 of the Self-Assessment Report (SAR, p. 21), each LO has been mapped to the cognitive, skill-based, and autonomy expectations defined for EQF levels 6 and 7. Furthermore, the programmes' alignment with ASIIN's subject-specific benchmarks in "Mathematics" (Tables 1–6, SAR pp. 24–41) underscores their compatibility with globally recognized standards. These frameworks ensured that graduates acquire competencies validated not only within Armenia's higher education system but also in international contexts, enabling them to pursue careers or further studies across Europe and beyond.

That said, we recognize that the phrasing of certain LOs, particularly after translation into English, may not fully convey the intended academic progression between levels. For instance, while Master's modules inherently require greater originality and independent research - evident in thesis requirements, research works, and complex problem-solving assessments - these distinctions may not be explicitly articulated in the current LO formulations. Similarly, examinations, though designed to reflect escalating cognitive demands, could benefit from clearer differentiation in their alignment with EQF descriptors.

To address this, we will initiate a review of the LOs and assessments, refining their wording to explicitly emphasize the EQF's level-specific expectations: Bachelor's LOs will focus on applied problem-solving in structured contexts and foundational research skills, while Master's LOs will highlight critical evaluation, innovation, and autonomous application of knowledge in novel scenarios. Concurrently, we will revise examinations and research works to ensure they reflect these distinctions. **To expedite this process, we kindly request the expert panel's guidance in identifying specific LOs or modules where inconsistencies are most apparent. Such targeted feedback will allow us to prioritize revisions efficiently, ensuring resources are directed where they are most impactful.**

We emphasize that these improvements will build upon the existing foundation of SQF and ASIIN compliance, preserving the programmes' robust alignment with established benchmarks while enhancing clarity for students, faculty, and international partners. The revisions will be implemented within one academic year (AY), followed by validation through consultations with industry stakeholders and external academic experts to reinforce labour-market relevance and global comparability.

In conclusion, we view the panel's feedback as a valuable opportunity to refine our programmes' transparency and coherence. By harmonizing our well-established frameworks

with the panel's insights, we are confident that these updates will further elevate the academic distinction between levels, support student progression, and strengthen international recognition.

**3. *The Bachelor's programme culminates in a centralized, formal oral examination across all subjects (Criterion 1.3, p.15).***

**YSU Response to Observation 3.**

We wish to clarify that the expert panel's characterization of the Bachelor's programme's final attestation as a "centralized, formal oral examination across all subjects" represents a misunderstanding of YSU's established processes. In accordance with the appropriate regulation<sup>4</sup> and as explicitly stated in the Self-Assessment Report (SAR, p. 91), the Bachelor's programme concludes with a public defence of the graduation work - a capstone project requiring independent work. This defence, which includes a presentation and oral discussion of the student's original work, is distinct from a formal examination and aligns with the national regulation<sup>5</sup> for attestation of Bachelor's programme graduates.

The attestation process is neither centralized nor an examination in the traditional sense; it is a structured, faculty-supervised evaluation of a student's ability to produce and defend independent work. We acknowledge that terminology such as "oral defence" may have inadvertently contributed to this misinterpretation, but the process itself is unambiguously defined in institutional and national regulations. YSU remains fully compliant with Armenian HE standards, and no deviation from the described process exists in practice.

Should the panel require further evidence or clarification, we are prepared to provide additional documentation or arrange a demonstration of the graduation work defence procedure to resolve any remaining uncertainties.

**4. *More optional English classes and the opportunity to write final theses in English would be highly beneficial. The experts recommend offering the option to write their final theses in English to all students (Criterion 1.3, p.15).***

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<sup>4</sup> <https://www.y-su.am/en/documents/64483> (Regulation on the Completion and Assessment of Bachelor's Graduation Work at YSU, 2017).

<sup>5</sup> <https://www.arlis.am/DocumentView.aspx?DocID=151260> (Regulations on the Final Certification of Graduates of Institutions Offering Higher Professional Study Programmes in the RA. Order No. 1282-N of the Minister of Education, Science, Culture, and Sports of the RA, dated November 7, 2017, in Armenian).

#### **YSU Response to Observation 4.**

The coordinators fully support the expert panel's recommendation to expand opportunities for students to engage with English-language academic work, as this aligns with our strategic goal of fostering global competencies and enhancing international collaboration. We are pleased to clarify that existing institutional and Faculty policies already permit students to write their graduation works, theses, and research assignments in English, provided they demonstrate sufficient proficiency in the language.

To further illustrate our commitment, several programmes under review already integrate English-medium instruction and assessments. For instance, for several years now, the majority of Master's theses in the "Applied Statistics & Data Science" programme have been written in English. The course "Financial Risk Management" in the "Financial Mathematics" Master's programme is fully taught in English, with assignments and examinations conducted in the same language. Additionally, in the Master's programme in "Applied Statistics & Data Science", the course "Applied Statistics" will be taught in English in the next AY. Similarly, Master's students routinely complete research works and theses in English, particularly when collaborating with international partners or addressing globally relevant topics. As an example, in the 2024/25 AY, two students from "Financial Mathematics" Master's programme prepared and defended their master theses in English. Moreover, they co-authored a peer-reviewed article and published it in English<sup>6</sup>. These examples highlight our proactive approach to embedding English-language opportunities within the curriculum.

Building on this foundation, we will formalize and promote the option of encouraging to write final theses in English across all programmes under the review, ensuring guidance and language support (e.g., academic writing guidance, proofreading resources) are available to students.

We appreciate the panel's emphasis on this matter and welcome further dialogue on strategies to balance linguistic accessibility with academic rigor, ensuring our graduates remain competitive in both local and global markets.

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<sup>6</sup> <https://doi.org/10.46991/BYSU.G/2024.15.2.057>

- 5. *The experts recommend implementing a course on ethics/societal issues for the Data Science programme, in line with the ASIIN Subject-Specific Criteria (Criterion 1.3, p.16).***
- 6. *The experts recommend offering courses in project management and planning, as well as increasing programming offerings, especially in Python, to better support students' future career paths (Criterion 1.3, p.16).***

### **YSU Response to Observations 5 & 6.**

The coordinators endorse the expert panel's recommendations to introduce a dedicated course on Ethics in the "Applied Statistics & Data Science" Master's programme. The ML Project Management course is already offered within the programme. As for "Python" programming, it is offered as well in two semesters. These enhancements align with our commitment to equipping students with both technical proficiency and the critical awareness necessary to navigate the complexities of modern data-driven industries. So far, the coordinators have not introduced a course on Ethics and Societal Issues in the programme due to the lack of available specialists qualified to teach this subject. However, beginning with the 2026/27 AY, the Faculty is committed to including this course in the curriculum. To deliver this content with rigour and relevance, we will collaborate with experts from industry practitioners specialising in AI ethics and policy who can deliver the course in either an offline or online format.

The elective course "Project Management and Evaluation" is already part of the "Financial Mathematics" Master's program, and students actively enrol in it. Regarding "Python," the "Actuarial and Financial Mathematics" Bachelor's programme includes a mandatory course titled "Programming (Python)" within the "Professional Component." In the "Financial Mathematics" Master's programme, there is a course called "Information Technologies in the Professional Field," which, based on its description and objectives, focuses on Python for finance.

To ensure high-quality instruction, we will leverage partnerships with local tech firms and international universities to recruit adjunct lecturers with industry experience in ethical AI and software project management. Existing faculty will also receive professional development opportunities to refine their expertise in these areas. Course development will begin in the 2025/26 AY, following validation by Faculty's Academic Council and external stakeholders.

- 7. *Student participation in mobility opportunities remains relatively low (Criterion 1.3, p.17).***
- 8. *The experts appreciate the effort to foster international mobility and support YSU in further pursuing this path (Criterion 1.3, p.18).***

#### **YSU Response to Observations 7 & 8.**

The programme coordinators acknowledge the expert panel's observation regarding student mobility rates and fully endorse the recommendation to enhance participation in international exchange opportunities. We recognize the value of academic mobility in fostering global competencies, cross-cultural collaboration, and career readiness, and we are committed to addressing current limitations through targeted initiatives.

YSU's Faculty of Mathematics and Mechanics (FM&M) has established a robust infrastructure to support mobility, including a dedicated ECTS/Erasmus+ coordinator who works in close partnership with the university's International Cooperation Office (ICO). This collaboration ensures systematic dissemination of mobility opportunities - via newsletters and departmental briefings - and streamlined management of applications for both incoming and outgoing students and faculty. Notably, student interest in international exchanges has grown steadily in recent years, reflecting heightened awareness of global academic and professional landscapes.

To capitalize on this momentum, Faculty will prioritize expanding Erasmus+ partnerships in Mathematics, Data Science, and Actuarial/Financial Mathematics. For example, a Memorandum of Understanding has been signed with UBI Business School in Brussels, aimed at enhancing student mobility within the "Actuarial and Financial Mathematics" Bachelor's programme.

Furthermore, we will advocate for increased funding to reduce financial barriers, leveraging Erasmus+ grants and exploring bilateral scholarships with partner universities.

While challenges persist, we are confident that these measures, coupled with the expertise of our mobility coordinators and the growing enthusiasm of our student body will elevate participation rates.

**9. Challenges remain regarding the recognition of a full course load, as students often complete only 12–15 ECTS credits instead of the standard 30 (Criterion 1.3, p.17).**

**YSU Response to Observation 9.**

The coordinators appreciate the expert panel’s attention to academic mobility structures and would like to clarify the distinction between internal and international mobility practices to resolve any potential misunderstandings. At YSU, the 12-15 ECTS credit mobility window referenced in Bachelor’s programmes pertains exclusively to “internal (virtual or physical) mobility” within YSU and Armenian HEIs. This mandatory component allows students to broaden their academic horizons by taking elective courses from related disciplines, fostering interdisciplinary learning while maintaining curricular coherence. It is not intended to replace full-semester international exchanges, which operate under separate frameworks.

For “international academic mobility” (e.g., Erasmus+), both Bachelor’s and Master’s programme students are designed to accommodate a full, 30 ECTS credit semester at partner universities, contingent upon the signing of a tripartite agreement between YSU, the host institution, and the student. Current agreements explicitly require students to complete a full course load abroad (30 or 60 ECTS credits), ensuring seamless credit transfer and alignment with YSU’s degree requirements. These agreements are structured to comply with Erasmus+ standards and Armenian legal provisions<sup>7</sup>, as detailed in SAR (page 68).

To mitigate confusion, we will enhance communication to students regarding the differences between internal and international mobility through updated programme handbooks and advisory consultations. The panel’s feedback underscores the need for clearer articulation of these structures in programme documentation, and we commit to revising relevant sections to explicitly differentiate between internal electives and international exchanges.

**10. Experts support more opportunities for English language training (Criterion 1.3, p.17).**

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<sup>7</sup> <https://www.arlis.am/DocumentView.aspx?DocID=70813> (Regulation on Academic Mobility of Students in the RA HEIs, 2009, in Armenian / amended in 2011).

### **YSU Response to Observation 10.**

The coordinators acknowledge the expert panel's recommendation to enhance English language training opportunities and welcome this insight as a strategic priority for strengthening students' professional readiness. We fully recognize the importance of advancing discipline-specific English proficiency, particularly in fields like Data Science and Actuarial/Financial Mathematics where global collaboration and technical communication are essential.

Currently, English is a compulsory component of all YSU Bachelor's programmes, with students completing 4 ECTS credits over two semesters. While surveys indicate general satisfaction with foundational language skills, we concur with the panel's emphasis on addressing gaps in professional English, such as technical writing, research presentation, and domain-specific terminology. Past attempts to introduce specialised English modules in Bachelor's programmes faced challenges due to varying proficiency levels among students and the presence of alternative language preferences (e.g., German or French). However, these experiences have informed more nuanced strategies to integrate English into the curriculum without disadvantaging learners.

### **For the Master's study programmes please refer to our response to the Observation 5 of the experts panel.**

Building on this foundation, YSU is finalising plans to establish a "University Language Centre", which will offer extracurricular English training tailored to students' academic and career goals. This Centre will provide flexible, tiered courses - from general proficiency to advanced technical communication - ensuring accessibility for all skill levels. Complementing these measures, we are revising course requirements to embed discipline-specific English practice across modules. For example, in the Master's programme's "Scientific Seminar" (a 3 and 4-semester module in the 1,5 or 2-year programme), students will be encouraged to present their research in English, while Bachelor's courses will incorporate English-language literature reviews and assignment submissions.

To further integrate English into professional training, the Faculty of Mathematics and Mechanics will prioritize guest lectures delivered in English through YSU's internal grant scheme, inviting international scholars and industry experts to lead sessions on topics such as AI ethics and similar subjects. Additionally, the course "Quantitative Finance" in the "Financial Mathematics" Master's programme will transition to English-medium instruction, complementing the already English-taught course "Financial Risk Management." This approach balances compliance with Armenia's national language policies and the growing demand for globally relevant skills.

These initiatives will be piloted in 2026/27 AY, with progress monitored through student feedback. We are confident that this multifaceted approach - combining targeted language support, curricular integration, and international collaboration - will bridge the gap between general and professional English proficiency, empowering graduates to excel in multilingual academic and industry environments.

We thank the panel for underscoring this critical area and remain committed to evolving our strategies in line with global educational trends and student needs.

***11. Although the official start of the master's program is in September, students note that classes in some courses begin as late as March, leaving only two months until May, which they consider insufficient (Criterion 1.5, p.21).***

**YSU Response to Observation 11.**

The coordinators clarify that the observation regarding the timing of classes applies exclusively to the one-year Master's programme in "Financial Mathematics", which follows a structured academic calendar designed to accommodate thesis preparation. In this programme, the first semester (September–December) includes four months of coursework, followed by examinations in January. The second semester (February–June) provides two months of instruction (February–March), after which formal classes end to allow students ample time (April–May) to finalise their thesis, prepare for exams, and complete the thesis defence in June.

This schedule is an intentional design, ensuring dedicated periods for independent research and thesis refinement while complying with Armenian regulatory standards. At the same time, the intensive workload of the courses ensures the required number of class hours, forms of assessment, and achievement of the learning outcomes.

Other Master's programmes with a 1.5-2 year duration at YSU operate under a conventional two full semester timeline without such compressed scheduling.

We appreciate the panel's attention to student feedback and remain open to further clarification if required.

**12. Regarding examination formats and the weighting of assessment criteria the experts point out that those must be standardized and explicitly stated in module descriptions. If exam types (e.g., oral, written, project-based) and their weightings are left to individual discretion or are communicated informally, this may compromise transparency, fairness, and the comparability of student performance across cohorts and courses. To uphold academic integrity and consistency, module descriptions should clearly specify the types of assessments used, the criteria applied (e.g., participation, assignments, final exam), and the relative weight of each component. Moreover, alignment between assessment forms and learning outcomes must be ensured according to EQF levels. Institutional policy should guide these decisions to eliminate variability based on individual teaching styles and ensure that all stakeholders can clearly understand and evaluate the academic expectations and assessment strategies in each module (Criterion 1.5, p.22).**

#### **YSU Response to Observation 12.**

We appreciate the expert panel's emphasis on transparency in assessment practices but wish to clarify that YSU's system already mandates the formal and explicit specification of examination formats, criteria, and weightings in all module documentation. As evidenced in the programme specifications (Appendices 1–6 of the SAR), course syllabi, and Moodle platforms (Appendices 44–49 of the SAR), students receive detailed, written information about assessment types (e.g., oral exams, written tests, research projects), grading criteria (participation, assignments, final exams), and component weightings in the start of each semester. According to the regulation on YSU study process organisation<sup>4</sup> and the academic calendar, it is required that the course syllabi be uploaded on the Moodle platform by the second week of the semester, and ensure students' access to them. This ensures clarity and fairness, as students are fully informed of expectations from the outset.

While institutional guidelines require alignment between assessments and learning outcomes, the university allows lecturers flexibility to tailor evaluation methods to the unique demands of their modules. For example, a course on "Machine Learning" may prioritise project-based assessments to reflect applied competencies, while a theoretical module in "Advanced Statistics" might emphasise written exams to test analytical rigour. This deliberate variability ensures that assessments remain fit-for-purpose, reflecting the diversity of disciplines and EQF-level expectations (e.g., autonomy in Master's-level research projects vs. structured problem-solving in Bachelor's exams).

That said, we recognise the panel's call for greater standardisation to enhance cross-course comparability. To address this, we have already consolidated existing guidelines into a centralised policy document<sup>8</sup>, outlining baseline requirements for assessment transparency while preserving necessary flexibility for discipline-specific adaptations (see the SAR, criterion 2, pages 89-92). This policy explicitly requires that all syllabi and Moodle pages include standardised sections on assessment alignment with learning outcomes, criteria definitions, and weighting rationales.

We reaffirm that YSU's current assessment practices comply with national regulations and prioritise pedagogical appropriateness over rigid uniformity. Nevertheless, we welcome the panel's feedback as an opportunity to strengthen documentation consistency. We thank the panel for underscoring the importance of this issue, and we remain open to further discussion on balancing standardisation with academic autonomy.

***13. Suggestions from students include adopting modern methods for teaching fundamental mathematics, integrating MIT OpenCourseWare, and incorporating MOOCs (Massive Open Online Courses), while maintaining the strengths of traditional chalk-and-talk instruction (Criterion 1.6, p.24).***

### **YSU Response to Observation 13.**

The coordinators welcome the expert panel's and students' recommendation to integrate modern teaching methods, including MIT OCW (OpenCourseWare) and MOOCs (Massive Open Online Courses), alongside traditional pedagogical approaches. We recognize the value of blending innovative digital resources with the foundational strengths of in-person instruction to enhance learning outcomes. However, we wish to contextualize the challenges and ongoing efforts to balance these priorities.

While we fully endorse the use of global open-access resources like MIT OCW, practical constraints such as varying English proficiency levels among students and uneven access to advanced classroom technologies (e.g., high-speed internet, large interactive panels) necessitate a phased, tailored implementation. To address this, we will prioritize curated, multilingual adaptations of MOOCs and OCW materials, focusing on topics where visual or

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<sup>8</sup> <https://www.yzu.am/en/documents/64485> (Regulation on YSU Study Process Organisation, 2007, Part 6 and 7 / last revised in 2022).

interactive content (e.g., data visualization, algorithmic simulations) can transcend language barriers.

Concurrently, we highlight the Faculty of Mathematics & Mechanics' existing "Armenian-language Courseware"<sup>9</sup>, developed by the Student Scientific Council, which already provides localized digital resources aligned with the curriculum. This platform, widely utilized by students, demonstrates our commitment to innovation within linguistic and infrastructural realities. Building on this foundation, we will expand the Courseware to include embedded links to curated MOOCs and OCW materials, allowing students to explore global resources at their own pace while maintaining structured guidance in Armenian.

To mitigate technological gaps, we will pilot blended learning modules in well-equipped classrooms, combining traditional lectures with flipped classroom models using offline-accessible OCW content. Additionally, we are pursuing partnerships with tech providers and international donors to upgrade infrastructure, prioritizing smart classrooms in the 2025/26 AY.

**We reaffirm that traditional methods remain vital for fostering deep conceptual understanding, particularly in fundamental Mathematics.** However, by strategically integrating digital tools where feasible and expanding our Armenian-language Courseware, we aim to create a hybrid model that respects local constraints while progressively adopting global best practices.

We thank the panel and students for this constructive input and remain dedicated to evolving our teaching methodologies in step with technological and pedagogical advancements.

***14. Students typically take a maximum of three exams per semester and no more than two exams per day (Criterion 2, p.25).***

#### **YSU Response to Observation 14.**

We appreciate the expert panel's attention to student workload and wish to clarify the examination structure. YSU's regulations stipulate that students undertake maximum 4–5 semester-end examinations across all programmes, supplemented by 2 interim assessments (midterms or assignments) per course. Remarkably, no more than two examinations

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<sup>9</sup> <https://mathteam.notion.site/math>

are scheduled on the same day, as mandated by the YSU regulation<sup>10</sup> on student assessment.

***15. Students express a desire for more time to plan projects and work on their final theses (Criterion 2, p.26).***

**YSU Response to Observation 15.**

We would like to clarify that the timeline for final work/thesis preparation is intentionally structured to ensure students have adequate time to develop and refine their work. In the Bachelor's programmes, students commence their graduation work in the end of the 7<sup>th</sup> semester (of an 8-semester programme), with the final semester deliberately lightened from classes to prioritize research, writing, and defence preparation. Similarly, Master's students begin their thesis work in the end of the 1<sup>st</sup> semester (of a 3 or 4-semester programme) and in the beginning of the 1<sup>st</sup> semester (for a 2-semester programme), allowing a full year to conduct independent research under faculty guidance. Periodic attestations are conducted to monitor the progress of graduation work/thesis completion. For this purpose, according to the established schedule, the student periodically uploads the work/thesis plan and individual sections to the Moodle platform, and after being reviewed by the supervisor, their work/thesis is attested and they are permitted to proceed to its defence.

This phased approach balances coursework and thesis demands in compliance with YSU's regulations on Graduation works<sup>11</sup> and Master's theses<sup>12</sup>, which mandate structured supervision, progress reviews, and dedicated defence periods. For detailed timelines and requirements, please refer to sections 4.1 and 25 of the mentioned regulations.

We thank the panel for their observation and remain available to provide further documentation if required.

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<sup>10</sup> <https://www.y-su.am/en/documents/64485> (Regulation on YSU Study Process Organisation, 2007, Part 6 and 7 / last revised in 2022).

<sup>11</sup> <https://www.y-su.am/en/documents/64483> (Regulation on the Completion and Assessment of Bachelor's Graduation Work at YSU, 2017).

<sup>12</sup> <https://www.y-su.am/en/documents/64484> (Regulation on the Completion and Assessment of Master's Thesis at YSU, 2017 / revised in 2023).

***16. Faculty members with teaching loads exceeding their full-time contract receive a 25% reduction in teaching hours to focus on research, with the expectation of producing at least one publication annually—failure to do so results in salary deductions (Criterion 3.1, p.28).***

**YSU Response to Observation 16.**

The accreditation panel’s interpretation of YSU’s policy on faculty workload reduction appears to stem from a miscommunication in the original report. YSU’s actual practice, as detailed in the SAR, is not a 25% reduction in teaching hours but a fixed reduction of 50 class hours for faculty members who commit to conducting research work and publishing at least one article in the scientific peer-reviewed journals annually. This adjustment is designed to incentivise scholarly activity by freeing time for research without punitive financial measures. Faculty who accept this arrangement and fail to publish within the academic year lose eligibility for the workload reduction in the following year, regardless of subsequent publications. This approach prioritises accountability while supporting a balance between teaching and research obligations. For instance, during the 2023/24 AY, 15 teaching staff members from the Faculty of Mathematics & Mechanics took this responsibility, and 14 of them published articles in peer-reviewed journals.

***17. The university uses a point-based system to track academic contributions, assigning 20 points for supervising bachelor’s theses and 50 for master’s theses (Criterion 3.1, p.28).***

**YSU Response to Observation 17.**

The university acknowledges the panel’s observation regarding the tracking of academic contributions and wishes to clarify the methodology in question. At YSU, instructional workload calculation and planning include supervision tasks as integral components of faculty member’s responsibilities. Specifically, the supervision of Bachelor’s students’ graduation work is allocated 20 hours of workload per AY, while Master’s thesis supervision is assigned 45 hours. Doctoral supervision, though not explicitly referenced in the expert panel’s report, accounts for 70 hours of workload.

This allocation reflects the varying complexity and time investment required for supervising students at different academic levels. Bachelor’s thesis supervision involves structured

guidance on topic, design, literature review, and final evaluation. Master's thesis supervision entails advanced methodological support, data analysis oversight, and preparation for defence, justifying the proportional increase in allocated hours. Doctoral supervision, requiring sustained mentorship over extended periods, is accorded the highest hourly allocation.

These workload metrics are formalised in YSU's academic workload policy<sup>13</sup> and align with institutional standards for equitable faculty workload distribution.

The university appreciates the panel's attention to this matter and can provide further documentation if needed to avoid ambiguity.

***18. Some study areas do not have sufficient access to power plugs, which is important, especially for working with laptops (Criterion 3.3, p.30).***

**YSU Response to Observation 18.**

The university acknowledges the panel's observation regarding insufficient access to power plugs in certain study areas and fully accepts this feedback. YSU recognises the importance of adequate infrastructure to support student learning, particularly for laptop-based activities, and commits to resolving this issue promptly.

To address the concern, the university will install additional power plugs in the identified areas by October 2025, ensuring equitable access across all study spaces. Furthermore, this observation will be integrated into the ongoing renovations of the Faculty of Mathematics' premises on the 1<sup>st</sup> floor (located above the facilities reviewed by the expert panel during the March 2025 site visit). These renovations include infrastructural upgrades designed to modernize learning environments and align them with contemporary pedagogical needs.

YSU appreciates the panel's diligence in identifying this opportunity for improvement and reaffirms its commitment to fostering an infrastructure that supports academic excellence and student success.

***19. Availability of Armenian-language academic literature remains limited, thus requiring knowledge of English and Russian is essential (Criterion 3.3, p.30).***

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<sup>13</sup> <https://www.y-su.am/en/documents/64847> (The Norms of YSU Teaching Staff Educational and Educational-Methodological Workload Calculation, 2020 / amended each year).

### **YSU Response to Observation 19.**

The Faculty of Mathematics & Mechanics acknowledges the panel's observation regarding the limited availability of Armenian-language academic literature for advanced courses and provides the following clarifications.

For 1<sup>st</sup> and 2<sup>nd</sup> year Bachelor's students, all professional courses are supported by Armenian-language educational materials, including printed textbooks accessible in the YSU Central Library and the Faculty's reading rooms, e-lectures on the Moodle e-learning platform, and full video lectures for selected courses. Detailed information about these resources, along with supplementary mathematics materials, is available on a dedicated website<sup>14</sup> created by the Faculty's Student Scientific Council.

For 3<sup>rd</sup> and 4<sup>th</sup> year Bachelor's courses and Master's programmes, approximately 50% of professional courses currently lack Armenian-language literature. However, students at this level are encouraged and equipped to utilise Russian- and English-language academic resources, which are readily accessible through the university's libraries and digital repositories. This approach aligns with the Faculty's goal of preparing graduates for engagement with international scholarly communities.

YSU recognises the need to expand Armenian-language materials for advanced courses and commits to addressing this gap through targeted initiatives, such as translating key textbooks and developing original publications. Progress on these efforts will be documented in subsequent updates to the Accreditation Decision.

***20. Upon visiting the facilities, the experts suggest providing longer opening hours of the central library during exam times so students can meet and work with peers and study. Moreover, some study areas currently lack access to power outlets (Criterion 3.3, p.30).***

### **YSU Response to Observation 20.**

YSU welcomes the panel's recommendation to extend the operating hours of the central library during examination periods and recognizes the importance of providing students with adequate study facilities. To inform, the university has already extended the library's

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<sup>14</sup> <https://mathteam.notion.site/math>

working hours until 9:00 PM during examination sessions, starting December 2024. This adjustment will ensure students have sufficient time to collaborate with peers, access resources, and prepare for assessments in a conducive environment.

Regarding the panel's observation on power outlets in study areas of the library, the university reaffirms its commitment to addressing this concern as outlined in Response to Observation 18 (installation of additional outlets by October 2025 and integration into ongoing renovations).

YSU appreciates the panel's practical suggestions and remains dedicated to enhancing campus infrastructure to meet the evolving needs of its academic community.

***21. The experts would welcome seeing additional magazines in the future, such as SIAM (Society for Industrial and Applied Mathematics) (Criterion 3.3, p.30).***

**YSU Response to Observation 21.**

YSU acknowledges the panel's recommendation to expand access to specialised Mathematics journals, such as those published by the Society for Industrial & Applied Mathematics (SIAM), and appreciates this constructive feedback. The university confirms its intent to evaluate subscriptions to additional journals, including SIAM publications, as part of its 2026 subscription cycle, pending budgetary review and prioritisation.

As of Spring 2025, the university holds subscriptions to the following resources:

1. Elsevier Freedom Collection (last five years)
2. Oxford Academic
3. Cambridge University Press
4. Brill Humanities & Social Sciences Collection
5. JSTOR
6. EBSCOhost
7. Research4Life (including Springer and other publishers)
8. Scopus
9. Mathscinet

To further expand our e-subscriptions, our library will consider subscribing to SIAM.

In the interim, the YSU Central Library already provides extensive access to international academic resources. Through a partnership with Elsevier, all students, faculty, and researchers have full access to the ScienceDirect platform until April 2030. This includes numerous peer-reviewed journals and academic books in mathematics and related disciplines, accessible via the YSU internal network.

A comprehensive list of subscribed journals can be found [here](#) and subscribed books are listed [here](#). These resources, along with additional details on library services, are publicly available on the YSU Library [Website](#).

YSU reaffirms its commitment to enhancing its academic repository and will integrate the panel's suggestions into its plan for library resource expansion. Updates on new subscriptions will be included in future institutional reports.

***22. The experts emphasize that the formal feedback loop regarding surveys and evaluations needs to be closed. To do so, students need to be informed about their survey results whether through in-class discussions or otherwise (Criterion 5, p.32). The experts emphasize that the feedback loop must be closed, i.e., students need to be informed about survey results (Criterion 5, p.33).***

#### **YSU Response to Observation 22.**

YSU fully acknowledges the panel's observation regarding the timeliness of student feedback implementation and shares the experts' concerns. As outlined in the SAR, Chapter 5, student course evaluations are systematically conducted after each semester, with results consolidated and reviewed within the Faculty during the subsequent semester. Instructors then implement course- and teaching-related improvements in the following semester(s), depending on the complexity of the required changes.

The current process, while robust in ensuring systematic enhancements, spans 1–3 semesters, creating a technical challenge in communicating implemented improvements to the original cohort of students. This is particularly relevant given that most courses conclude within a single semester. YSU recognises that this delay, though unintentional, limits opportunities to inform the students who initially provided feedback.

To address this gap and strengthen transparency, YSU considers the adoption of an interim feedback mechanism during the semester, enabling real-time adjustments for improvements requiring minimal implementation time. This approach ensures that students are

informed of actionable changes before the course concludes, fostering a culture of responsiveness and trust. This mechanism will face no technical barriers to implementation, as it integrates seamlessly with existing evaluation frameworks.

As a testament to its commitment, YSU will formalise these procedural updates within its quality assurance policies and pilot the interim feedback system in the Faculty of Mathematics & Mechanics during the 2025/26 AY. This pilot will serve as a foundation for scaling best practices across the university, ensuring alignment with both student expectations and international student feedback standards.

YSU reaffirms its dedication to fostering an academic environment where student feedback directly informs continuous improvement, and updates on these initiatives will be documented in subsequent institutional reports.

***23. The survey results are made available to students after the course ends but before exams, while lecturers receive their individual feedback after exams (Criterion 5, p.33).***

#### **YSU Response to Observation 23.**

YSU would like to provide further clarification to the expert panel's observation regarding the timeline for disseminating student survey results and explains the process to ensure alignment with the survey regulation<sup>15</sup>.

The current procedure, as detailed in the regulation, is structured as follows: student surveys are conducted after each semester, following the examination period, rather than before exams. The results are then processed and analysed during the subsequent semester. Faculty members receive individualised feedback reports once this analysis is complete, enabling them to review and address insights before the next academic cycle.

***24. The experts are told that there is no mandatory requirement to discuss the results, however, informal meetings sometimes occur—for instance, at the dean's office—***

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<sup>15</sup> <https://www.yzu.am/en/quality-assurance/192#accordion-1> (Regulation on the Organization of Student Survey on Teaching Quality and Effectiveness at YSU; Questionnaire of the Student Survey on Teaching Quality and Effectiveness at YSU; 2003 / last revised in 2020).

***especially if issues arise. While some prefer not to make the discussion of the results mandatory, there is a recognized need for more active student engagement with survey outcomes, which could improve teaching and survey participation (Criterion 5, p.33).***

#### **YSU Response to Observation 24.**

YSU acknowledges the panel's observation regarding the discussion of student survey results and offers the following clarification. As described in the SAR and referenced in the student survey regulation<sup>11</sup>, the discussion of survey results with the teaching staff is formalized and consistently implemented. Survey outcomes are reviewed during departmental meetings, where lecturers collectively analyze the feedback, and during Faculty Academic Council sessions, where broader trends are discussed to inform curriculum and teaching improvements.

With regard to engaging students in discussions about survey results, the university has already addressed this issue in its response to Observation 22 above. YSU is committed to strengthening student participation in the feedback process and ensuring that survey outcomes are shared and discussed in a transparent and meaningful manner.

YSU appreciates the panel's recognition of the need for active engagement with survey results and reaffirms its commitment to fostering a collaborative environment in which both students and faculty contribute to continuous improvement in teaching & learning.

***25. In the interview, the teaching staff also states that surveys are not obligatory, but they have the right to conduct them. Moreover, the teachers contend that they do not discuss the results with students in class. The staff welcomes the experts' stance on implementing changes already for the current course and have this suggested to YSU's management (Criterion 5, p.33).***

#### **YSU Response to Observation 25**

YSU acknowledges the panel's observation regarding the nature of student surveys and provides the following clarification. As outlined in the SAR and in accordance with the university's established regulation<sup>11</sup>, the conducting of student surveys evaluating teaching quality and effectiveness is a mandatory process at the institutional level. These surveys are carried out centrally by YSU's central administration at the conclusion of each semester

for every course or study module, ensuring consistency and objectivity. In this regard, the teaching staff may have been referring to interim surveys, which are occasionally conducted at the discretion of individual instructors during the semester. These interim surveys are not mandatory but serve as supplementary tools for teachers seeking additional feedback to enhance their courses in real time.

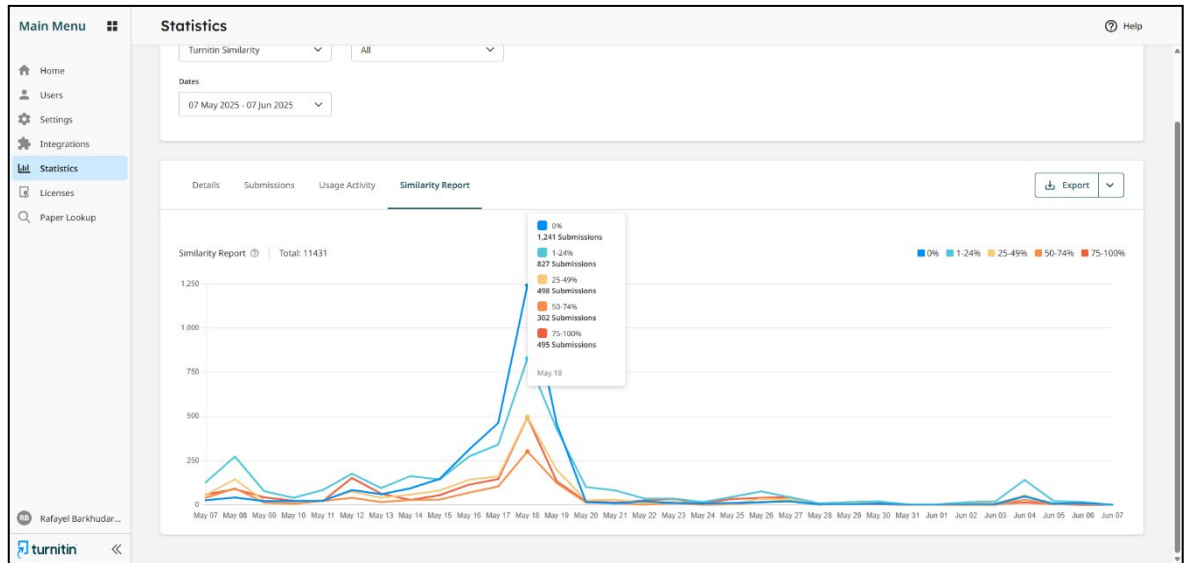
YSU reaffirms that the results of the central surveys are systematically analyzed and shared with instructors at the beginning of the following semester. This process ensures that feedback is used to inform meaningful improvements in teaching & learning outcomes. The university remains committed to maintaining this structured approach to quality assurance while encouraging transparency and collaboration between students and faculty.

Regarding the sharing and discussion of survey results (in terms of the implemented changes, improvements, or taken measures) with the original student cohort who provided the feedback, we have already addressed this issue in our response to Observation #22. **However, we would appreciate it very much if the expert panel propose actionable solutions or practical mechanisms to resolve the associated technical challenge.**

***26. YSU lacks automated plagiarism detection software (Criterion 2, p.22).***

**YSU Response to Observation 26.**

YSU acknowledges the panel's observation regarding the absence of plagiarism detection software and offers the following clarification. In April 2025, we subscribed to Turnitin's similarity-checking software, enabling us to upload arXiv submissions and verify content for potential plagiarism either via the Turnitin website or through Moodle integration. As of July 6, 2025, a total of 3,253 users have submitted their theses, generating 11,431 similarity reports. The statistics from Turnitin reports are provided below.



## F Summary: Expert recommendations (13.06.2025)

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

Degree program	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ba Mathematics	With requirements for one year	30.09.2030	–	–
Ba Mathematics and Applications	With requirements for one year	30.09.2030	–	–
Ba Actuarial and Financial Mathematics	With requirements for one year	30.09.2030	–	–
Ma Financial Mathematics	With requirements for one year	30.09.2030	–	–
Ba Applied Statistics and Data Science	With requirements for one year	30.09.2030	–	–
Ma Applied Statistics and Data Science	With requirements for one year	30.09.2030	–	–

### Requirements

#### For all degree programs

- A 1. (ASIIN 1.1) Update the Learning Objectives in order to reflect a clear distinction between EQF levels 6 and 7.
- A 2. (ASIIN 2) Exam forms and the weight of criteria in the module descriptions need to be specified. Moreover, the weight of exams in the different modules needs to be stipulated to avoid individual decisions.

A 3. (ASIIN 5) Close the formal feedback loop and inform students about the evaluation results.

## G Comment of the Technical Committee 12- Mathematics (05.06.2025)

*Assessment and analysis for the award of the ASIIN seal:*

The TC discusses the procedure and follows the assessment of the experts without any changes.

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

<b>Degree program</b>	<b>ASIIN Seal</b>	<b>Maximum duration of accreditation</b>	<b>Subject-specific label</b>	<b>Maximum duration of accreditation</b>
Ba Mathematics	With requirements for one year	30.09.2030	–	–
Ma Mathematics and Applications	With requirements for one year	30.09.2030	–	–
Ba Actuarial and Financial Mathematics	With requirements for one year	30.09.2030	–	–
Ma Financial Mathematics	With requirements for one year	30.09.2030	–	–
Ba Applied Statistics and Data Science	With requirements for one year	30.09.2030	–	–
Ma Applied Statistics and Data Science	With requirements for one year	30.09.2030	–	–

### Requirements

#### For all degree programs

- A 1. (ASIIN 1.1) Update the Learning Objectives in order to reflect a clear distinction between EQF levels 6 and 7.

- A 2. (ASIIN 2) Exam forms and the weight of criteria in the module descriptions need to be specified. Moreover, the weight of exams in the different modules needs to be stipulated to avoid individual decisions.
- A 3. (ASIIN 5) Close the formal feedback loop and inform students about the evaluation results.

## H Decision of the Accreditation Commission (27.06.2025)

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

The Commission discusses the procedure and follows the assessment of the experts without any changes.

The Accreditation Commission decides to award the following seals:

<b>Degree program</b>	<b>ASIIN Seal</b>	<b>Maximum duration of accreditation</b>	<b>Subject-specific label</b>	<b>Maximum duration of accreditation</b>
Ba Mathematics	With requirements for one year	30.09.2030	–	–
Ma Mathematics and Applications	With requirements for one year	30.09.2030	–	–
Ba Actuarial and Financial Mathematics	With requirements for one year	30.09.2030	–	–
Ma Financial Mathematics	With requirements for one year	30.09.2030	–	–
Ba Applied Statistics and Data Science	With requirements for one year	30.09.2030	–	–
Ma Applied Statistics and Data Science	With requirements for one year	30.09.2030	–	–

### Requirements

#### For all degree programs

- A 1. (ASIIN 1.1) Update the Learning Objectives in order to reflect a clear distinction between EQF levels 6 and 7.

- A 2. (ASIIN 2) Exam forms and the weight of criteria in the module descriptions need to be specified.
- A 3. (ASIIN 5) Close the formal feedback loop and inform students about the evaluation results.

# I Fulfilment of Requirements (27.03.2026)

## Analysis of the experts and the Technical Committee (03.03.2026)

### Requirements

#### For all degree programmes

- A 1. (ASIIN 1.1) Update the Learning Objectives in order to reflect a clear distinction between EQF levels 6 and 7.

Initial Treatment	
Experts	Fulfilled. Vote: unanimous Justification: The experts consider the descriptions regarding the differentiation between Bachelor's and Master's LOs in the university's statement to be adequate. For Applied Statistics and Data Science, the distinction between EQF levels 6 and 7 is made clear. For the other programs, the experts hold that said distinction could be described even more precisely. Nonetheless, they consider the requirement to be fulfilled.
TC 12	Fulfilled Vote: unanimous Justification: The TC follows the assessment of the experts.

- A 2. (ASIIN 2) Exam forms and the weight of criteria in the module descriptions need to be specified.

Initial Treatment	
Experts	Fulfilled. Vote: unanimous Justification: The experts note that in the syllabi as well as the Program Specifications provided by YSU, the exam form is well-described in the section "Assessment Methods and Criteria". Students are provided with comprehensive written information on assessment types (e.g., oral examinations, written tests, research projects), grading components (e.g., participation, assignments, final exams), and their respective weighting (expressed in percentages or grade points). The experts notice some slight differences in the Module Handbooks for the B-M and the M-AS&DS, stating, for instance,

	that “midterm exams/tests can be conducted orally or in writing.” In so doing, the programs state alternatives, but these are then specified on the first day of class or in the syllabus for the respective course. The experts thus consider the requirement to be fulfilled.
TC 12	Fulfilled Vote: unanimous Justification: The TC follows the assessment of the experts.

A 3. (ASIIN 5) Close the formal feedback loop and inform students about the evaluation results.

Initial Treatment	
Experts	Fulfilled. Vote: unanimous Justification: The Faculty of Mathematics and Mechanics has introduced an interim (mid-term) feedback mechanism that allows for timely adjustments during the semester. The experts, thus, consider the requirement to be fulfilled.
TC 12	Fulfilled Vote: unanimous Justification: The TC follows the assessment of the experts.

## Decision of the Accreditation Commission (27.03.2027)

Degree programme	ASIIN-label	Subject-specific label	Accreditation until max.
Ba Mathematics	All requirements fulfilled.	–	30.09.2030
Ma Mathematics and Applications	All requirements fulfilled.	–	30.09.2030
Ba Actuarial and Financial Mathematics	All requirements fulfilled.	–	30.09.2030
Ma Financial Mathematics	All requirements fulfilled.	–	30.09.2030
Ba Applied Statistics and Data Science	All requirements fulfilled.	–	30.09.2030

I Fulfilment of Requirements (27.03.2026)

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<b>Degree programme</b>	<b>ASIIN-label</b>	<b>Subject-specific label</b>	<b>Accreditation until max.</b>
Ma Applied Statistics and Data Science	All requirements fulfilled.	–	30.09.2030

## Appendix: Program Learning Outcomes and Curricula

According to the Program Specifications, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the bachelor's degree programs:

### Mathematics:

A. Professional knowledge and understanding		B. Practical professional skills	
A1	present the basic topics of real and complex analysis.	B1	Construct mathematical models for problems arising in various fields, research and propose solutions.
A2	present the basic principles of algebra.	B2	Construct effective algorithms to solve various problems with the help of programming tools.
A3	formulate the basic principles of geometry.	B3	Use programming packages to solve theoretical and applied problems.
A4	Present the basic principles of probability theory and statistics.	B4	Apply statistical programming packages for solving applied statistics problems.
A5	formulate the main provisions of differential equations.	B5	Solve simple mathematical problems, applying the acquired theoretical knowledge.
A6	present the basic principles of functional analysis.	B6	Make simple generalizations for theoretical material <u>or a solved problem</u> .
A7	formulate the basic provisions of information technologies.		
A8	present preliminary ideas in the field of natural science.		
C. General (transferable) skills			
C1	use different sources (Internet, electronic libraries, scientific articles, etc.) to get the necessary information.	C5	communicate in writing and orally in native and foreign languages with the professional community.
C2	participate in discussions, argue and present one's point of view, <u>perform team work</u> .	C6	collect, analyze and interpret quantitative and qualitative data related to the field of Mathematics, show a creative approach when solving professional problems
C3	specialize in various fields of science, technology and economy, where rational <u>thinking, analytical abilities, logic</u> are required.		
C4	be a well-rounded, literate citizen ready to face everyday challenges.	C7	plan <u>effectively the time</u> and the necessary resources for solving the assigned problems, both individually and in a group.

Applied Statistics and Data Science:

<b>A. Professional knowledge and understanding</b>		<b>B. Practical professional skills</b>	
A1	reproduce the basics of probability theory and mathematical statistics,	B1	apply mathematical methods to solve professional problems,
A2	present the ways of building software systems with a modeling orientation,	B2	build statistical models for problems arising in various fields, examine the database and draw conclusions based on them,
A3	apply probabilistic and statistical methods to solve scientific problems,	B3	build effective algorithms to solve various problems with the help of programming tools,
A4	apply statistical methods for data analysis, processing and decision-making,	B4	use mathematical programming packages (Matlab, <u>Matematica</u> , R-programming) for solving theoretical and applied problems,
A5	analyze and apply probabilistic models in science,	B5	apply the methods of mathematical statistics in econometric problems,
		B6	apply R-programming statistical packages for solving applied statistics problems,
<b>C. General (transferable) skills</b>			
C1	use various sources to get the necessary information,	C4	communicate in writing and orally in native and foreign languages with the professional community,
C2	coordinate and analyze the received professional information and make conclusions,	C5	continue education in master's degree in financial and actuarial mathematics, information technologies, programming, computer sciences, economics.
C3	process the received data and make conclusions, participate in discussions, argue and present the received results,		

**Actuarial and Financial Mathematics:**

A. Professional knowledge and understanding		B. Practical professional skills	
A1	present the basics of mathematical analysis, analytical geometry, probability theory and applied statistics,	B1	design possible options for decisions to be made under conditions of risk and uncertainty, using modern quantitative and statistical methods to predict and manage existing risks based on the best information,
A2	interpret the obtained results, present ways and options for solving practical problems,	B2	analyze and evaluate the economic situation, predict the prospects of economic development at the macro and micro level using mathematical and statistical methods and models,
A3	present actuarial modeling methods and actuarial aspects of investment activity,	B3	assess risks related to insurance, reinsurance and bankruptcy and options for reducing or making them manageable,
A4	formulate the features and problems of insurance, the principles of reinsurance, explain the features of insurance activities in the international business environment,	B4	classify various financial tools, indicating their areas of application and appropriateness, use financial derivatives, interpret the features of corporate governance,
A5	present the basics of building and managing an investment portfolio, explain the principles of using derivatives	B5	use professional software packages (MATLAB, MS Excel, Python) to solve practical problems,
	in building an investment portfolio,		
A6	present the main quantitative, statistical, optimization and econometric methods and models used for micro and macroeconomic and financial analysis for risk management decision-making purposes.	B6	apply the methods of mathematical analysis, higher algebra, analytic geometry, probability theory and applied statistics to solve practical problems.
C. General (transferable) skills			
C1	make decisions in the face of uncertainty by looking for adequate solutions in the constantly changing environment,	C4	use professional literature (including foreign language), prepare scientific reports, specialize in various fields of science and economy, where rational thinking, analytical abilities, and logic are required.
C2	work with large databases, with their help carry out impact assessments, analyzes and forecasts,	C5.	to be a multifaceted, literate citizen, ready to overcome everyday challenges.
C3	participate in discussions, argue, and present personal point of view, perform teamwork,		

According to the Program Specifications, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the master's degree programs:

Mathematics and Applications:

A. Professional knowledge and understanding		B. Practical professional skills	
A1	List the elements of the theory of fields, rings, groups, algebras; point out the current problems in these areas.	B1	Construct algebraic models; implement various algebraic algorithms in practice.
A2	Present the main classical algorithms; the basics of signal processing.	B2	Apply the spectral decomposition of a normal operator; apply factorization methods for solving differential and integral equations; apply various numerical methods.
A3	Reproduce the properties of trigonometric and orthogonal series, bases in general Banach spaces.	B3	Construct wavelet bases and apply them in the theory of signal processing; study the convergence of Fourier series of some functions; implement fast Fourier algorithms; make approximations in the complex domain.
A4	Reproduce the methods of model-based design; the main problems of equations of mathematical physics.	B4	Analyze and apply probabilistic models; apply methods of mathematical statistics in econometrics; make predictions.
A5	Present probabilistic models corresponding to random phenomena; present industrial model problems.	B5	Build mathematical models for problems arising in various fields; research and propose solutions.
A6	Explain the mathematical concepts related to information technology.	B6	Build effective algorithms for solving various problems using programming tools; use programming packages for solving theoretical and applied problems.
C. General (transferable) skills			
C1	Process and analyze the results obtained; prepare reports presenting the results of research; conduct scientific debates.	C3	Choose the necessary research methods and adapt the existing methods to the study of a specific problem; use scientific publications and data on the Internet; collect information in the field of specialization.
C2	Analyze the existing problems and propose ways to solve them; apply the knowledge in solving the problems related to the field.		

Applied Statistics and Data Science:

<b>A. Professional knowledge and understanding</b>		<b>B. Practical professional skills</b>	
A1:	Demonstrate a comprehensive understanding of the fundamentals of Probability Theory and Statistics.	B1:	Apply mathematical and statistical methods and tools proficiently to solve both applied and theoretical problems.
A2:	Exhibit proficiency in constructing computer programs with a modeling orientation.	B2:	Grasp and adapt to new methods emerging daily in response to the rapid growth in the field.
A3:	Apply probabilistic and statistical methods effectively in the natural sciences.	B3:	Process and analyze datasets, formulate statistical models for challenges in diverse areas, and make informed decisions based on these models.
A4:	Justify fundamental theoretical results within the specialization field.	B4:	Develop efficient algorithms using programming tools to address a variety of field-specific problems.
A5:	Articulate recent methods and models for Data Analysis.	B5:	Implement algorithms using the Python programming language.
A6:		B6:	Design databases and other resources efficiently to support the needs of the field.
<b>G. General (transferable) skills</b>			
C1:	Utilize various sources to acquire necessary information effectively.	C3:	Systematically organize and analyze obtained information, draw meaningful conclusions.
C2:	Process acquired data, make informed decisions, actively participate in discussions and debates, and articulate and present obtained results.	C4:	Specialize in different fields of science, technology, or economy, where analytical skills and applied statistical knowledge are essential.

Financial Mathematics:

<b>A. Professional knowledge and understanding</b>		<b>B. Practical professional skills</b>	
A1:	present financial modeling methods and aspects of investment activity,	B1:	design possible options for decisions to be made using financial tools and modern quantitative and statistical methods,
A2:	present the basics of investment portfolio construction and management, apply financial derivatives and principles in investment portfolio construction,	B2:	use financial derivatives in the actuarial process, interpret the features of corporate management, identify the possibilities of their application,
A3:	classify various financial tools indicating their areas of application and expediency,	B3:	use specialized software packages (MATLAB, MS Excel, EViews, Python, R) to solve practical problems,
A4:	present the main quantitative, statistical and econometric methods and models used for financial analysis, risk management and hedging for decision-making purposes.	B4:	develop financial models for solving specific situational problems,
		B5:	apply the knowledge gained about finance, financial markets and their tools for the purposes of formulating and solving practical problems.
<b>General (transferable) skills</b>			
C1:	work with large databases and with their help to carry out impact assessments, analyzes and forecasts,	C3:	look for adequate solutions in the conditions of continuously changing financial and economic environment, which will make it possible to make decisions in case of uncertainty,
C2:	work in a team, perform analytical work,	C4:	use professional literature (including foreign language).

The following **curriculum** is presented:

See pg. 12-14.



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